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THE RELATIONS BETWEEN MATERNAL CHARACTERISTICS, MOTHERS' EMOTIONAL AVAILABILITY DURING INFANT BEDTIMES, INFANT TEMPERAMENT, AND INFANT SOCIAL-EMOTIONAL OUTCOMES

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ABSTRACT

A primary purpose of parenting is to socialize the child as a productive member of society. Competent parents promote a balance of social connectedness (including parent-child attachment) and self-regulation (including emotion regulation) as developmentally appropriate in their children (Baumrind, 1996; Darling & Steinberg, 1993). Understanding parenting quality and how it relates to child social and emotional outcomes is essential in light of the important implications that these outcomes have for children's adjustment in larger society.

The first aim of the present dissertation was to better understand the factors that influence parenting quality, the relations between parenting quality and child social-emotional outcomes, and the role of child characteristics in both parenting and child outcomes during the first two years of life. The second aim was to extend the parenting literature in several ways: to examine parenting quality through the lens of emotional availability (EA), to assess mothers' EA from video recordings of mother-infant interactions during the less-studied context of infant bedtimes, and to consider contributions of infant temperament (including surgency, negative affectivity, and orienting/regulation) to EA and its links to infant social-emotional outcomes. Data for the three studies was drawn from a larger NIH-funded study of 167 children and their families.

Study 1 examined mothers' depressive symptoms, coparenting quality, maternal and infant sleep, and infant temperament during infants' first 6 months as predictors of mothers' EA at bedtime with their infants at 9 months. Whereas mother-reported coparenting quality was both directly and indirectly predictive of EA, changes in depressive symptoms during the first 6 months only predicted lower EA when infants were temperamentally highly surgent.

In Study 2, trajectories of mothers' bedtime EA across five time points (1, 3, 6, 9, and 12 months) during the infant's first year were examined as predictors of infant attachment security at 12 months. Infant temperamental reactivity was also included as a potential moderator. Two maternal EA trajectory types, one that was consistently high and another that was consistently low, were identified and found to predict infant attachment security. In addition, infant temperamental surgency/extraversion moderated the relation between EA trajectories and infant attachment security such that highly surgent infants of mothers showing a low EA trajectory had the lowest attachment security at the end of the first year.

Study 3 examined the influences of mothers' EA towards their infants during bedtime, infant attachment security, and interactions between bedtime parenting and attachment with infant temperamental reactivity, on infants' emotion regulation strategy use at 12 and 18 months. Whereas EA was not directly related to infants' emotion regulation strategies, infant attachment security had direct relations with infants' orienting towards the environment and tension reduction behaviors. Both maternal EA and infant attachment security were particularly important in the use of less-adaptive strategies for infants high on negative affectivity.

In conclusion, the results of the studies indicate the significant relations between mothers' psychosocial resources and mothers' parenting quality, parenting quality across the first year and infant attachment security, secure attachment and infants' more adaptive emotion regulation, as well as the significant role of infant reactive temperament in all of these relations. These findings contribute to the parenting literature by demonstrating the importance of examining the emotional availability of parenting during the less-studied context of infant bedtimes, and contributions of infant temperamental characteristics in understanding child social-emotional development.

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INTRODUCTION

A primary goal of parenting is to socialize the child as a productive member of society (Baumrind, 1996). Competent parents engage in a parenting style, employ parenting practices, and cultivate parent-child relationships in ways that promote a balance of communion and agency as developmentally appropriate in their children (Baumrind, 1996; Darling & Steinberg, 1993). Children of competent parents are not only able to connect to others, take social responsibility, and pursue socially-appropriate goals, but also have the ability to act on one's own account, to be independent, to engage in purposeful behaviors, and strive towards achievement.

Parenting thus cannot be discussed without reference to an aspect of the child's social connectedness with others (such as parent-child attachment) and self-organization (such as emotion regulation). As indicated by the literature, parenting quality is a primary determinant of child social-emotional and behavioral development (Belsky & Fearon, 2008; Blandon, Calkins, & Keane, 2010; Sroufe, 2005). Whether a child is securely attached to the parent, whether a child can regulate emotions in socially adaptive ways, and whether a child is behaviorally competent are significantly shaped by the quality of parenting (Chang, Schwartz, Dodge, & McBridge-Chang, 2003; De Wolff & van IJzendoorn, 1997; Kogan & Carter, 1996). Understanding parenting quality and how it relates to child social-emotional outcomes is essential in light of the important implications that these outcomes have for children's adjustment in larger society.

The first aim of the present dissertation is to better understand factors that influence parenting quality, the relations between parenting quality and child social-emotional outcomes, and the role of child characteristics in both parenting and child outcomes during the first two

years of life. The second aim is to extend the literature that has examined the links between parenting and infant social-emotional outcomes in several ways. Parenting quality will be examined through the lens of emotional availability, a multidimensional conceptualization of parenting that emphasizes the affective qualities of parenting. Parenting quality will also be examined during a less-studied context of infant bedtimes. Finally, the contributions of child temperament to parenting quality and its links to child social-emotional outcomes will be considered.

Three main questions are addressed: Do parents' psychosocial resources and child temperament predict bedtime parenting quality? Do bedtime parenting quality and child temperament predict infant attachment security? Do bedtime parenting, infant attachment security, and child temperament predict infant emotion regulation outcomes? The following sections (a) review two primary social-emotional outcomes of infancy and toddlerhood – attachment security and emotion regulation – that are of focus in the present dissertation, (b) discuss the ways in which the present dissertation extends the literature on parenting during infancy, and (c) introduce three studies that will address the main research questions.

Child Social-Emotional Outcomes: Infant Attachment Security and Emotion Regulation

Infant Attachment Security

Attachment security indicates the degree to which the "bond, tie, or enduring relationship between a young child and his mother" is secure (Ainsworth, Blehar, Waters, & Wall, 1978, p. 17). A securely attached child experiences distress when separated from his primary caregiver, and security and comfort from his caregiver during times of stress (Cassidy, 1999). Attachment

security develops during the first year of life in four stages. The first stage is "preattachment" (first few months of life) in which the infant does not have an attachment figure yet and shows indiscriminant attachment behavior. In the second stage of "attachment-in-the-making" (3 to 6 months), selectivity towards a caregiver emerges. "Clear-cut attachment" is evident from 6 to 7 months and wanes in strength around 2 years and beyond. The fourth stage is a "goal-corrected partnership" in which the child is better able to understand the attachment figure's goals that influence his/her behaviors due to development in communication skills, perspective taking, representational thinking, delay of gratification, and autonomy (Ainsworth, 1967; Ainsworth et al., 1978; Bowlby, 1969).

Attachment formation involves mental representations or "internal working models" of the attachment figure (Ainsworth et al., 1978; Bowlby, 1969; Cassidy, 1999) that shape the child's current and future behaviors (Main, Kaplan, & Cassidy, 1985). A secure child's internal working model includes a sense of self as worthy of love, and others as available and responsive. In contrast, an insecurely attached child has a working model of the self as unworthy of love or incompetent, and others as rejecting or inconsistently available (Cassidy & Berlin, 1994; Mikulincer, Shaver, & Pereg, 2003). Mental representations of attachment have long-term implications for relationships with other individuals such as peers and later romantic partners (Cassidy, 2001; Crowell & Treboux, 2001; Crowell et al., 2002; Sroufe, 2005; Waters & Cummings, 2000).

Starting from the second half of the first year of life, infants regard the attachment figure as their source of comfort or "secure base" from which to explore their environment (Ainsworth et al., 1978; Bowlby, 1969). An attachment figure who is accessible and responsive allows infants to actively explore their environment (Ainsworth, 1979). When attachment behavior is

intensely activated, infants need to attain proximity or contact with the attachment figure for physical and/or emotional comfort and security. Thus infants balance the attachment and exploration needs according to the availability and behavior of the caregiver as well as conditions of the environment (Cassidy, 1999).

The attachment-exploration balance, the degree to which infants rely on the attachment figure as an adequate secure base from which to explore and to which to return when distressed, can be used as an indication of the quality of the parent-child attachment relationship. Four attachment classifications have been identified for infants: secure (B), insecure-avoidant (A), insecure-ambivalent/resistant (C; Ainsworth, 1967, 1979), and disorganized (D; Main & Solomon, 1990). Secure infants use the mother as a secure base from which to explore, display significant distress at separation from the mother, and seek contact with the mother at reunion. Avoidant infants tend to avoid the mother, do not display distress at separation, and ignore the mother upon reunion. Ambivalent/resistant infants tend to display anxiety before separation, intense distress at separation, and ambivalent and/or resistant behaviors upon reunion with the mother (Ainsworth, 1979). Infants with disorganized attachment seem unclassifiable in the secure, avoidant, and ambivalent/resistant classifications. They lack a clear-cut strategy in regards to the caregiver as a secure base. Instead, they show behaviors marked by disorganization such as disordering of expected temporal sequences, stilling of movements and expressions, a predomination of fear and confusion, and the use of several aspects of different strategies at the same time (Main & Solomon, 1990).

Implications of infant attachment security for child adjustment. From the "nature" perspective of behavioral geneticists, attachment security is not as important as genetics in understanding the developmental outcomes of a child (Harris, 1998). Caregiving that is "good

enough" will lead to good developmental outcomes as genetics take over (Scarr, 1992). However, the "nurture" perspective of attachment theorists views attachment security as key to children's development in multiple domains (Sroufe, Egeland, Carlson, & Collins, 2005). If a child fails to develop an attachment to a caregiver within the critical period of the first year of life, the child faces social-emotional, behavioral, cognitive, and language difficulties. In addition, the child that develops an insecure attachment has a high likelihood of developing later inter- and intrapersonal problems including psychopathologies (Cassidy, 1999). Secure attachment, in contrast, has many positive implications for the developmental outcomes of the child (Bretherton, 2005; Cassidy, 2001; Sroufe, 2005).

Early attachment security serves as a foundation upon which the child develops and functions (Sroufe, 2005). The organization of behaviors within the attachment relationship affects how the child organizes his/her behavior towards the environment. This continuity in development sets the child on a particular trajectory, and predicts individual functioning in the early years and even through early adulthood (Ainsworth, 1979; Sroufe, 2005; Stams et al., 2002; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000). One possible mechanism is the internal working model of attachment relationships that develops during infancy. In Waters et al. (2000)'s 20-year longitudinal study, a 64% concordance between infant attachment security and adult mental representations of attachment relationships was found. Individuals who were secure as infants were more likely to be assigned to the corresponding autonomous classification during adulthood, avoidant infants to the dismissing adult classification, resistant attachment to the preoccupied classification, and disorganized attachment to the unresolved classification (Bakermans-Kranenburg & van IJzendoorn, 1993). The following sections review the relations between infant attachment security and later functioning.

Secure attachment is related to many positive outcomes including social competence, healthy self-development, effective emotion regulation, and increased protection against behavior problems and psychopathology, even in problematic environments (Sroufe, 2005). Securely attached infants show more social competence with adults and peers compared to insecurely attached infants. They are more cooperative and positive with their mothers and other less familiar adults. As preschoolers they are more likely to engage in "committed compliance" in which they accept the parental agenda as their own, and eagerly follow parental directives (Kochanska, Coy, & Murray, 2001). During school age, they are more competent in initiating contact with and responding to peers, display more empathy in peer interactions, and more actively participate in peer groups (Sroufe, 2005). They form more reciprocated and close friendships during middle childhood, and participate smoothly in a wide range of social situations during high school (Sroufe, 2005). They also are more able to seek care, to give care, to be comfortable with autonomy, and to engage in open communication in adult romantic relationships (Cassidy, 2001).

In terms of self-development, individuals who were securely attached show higher levels of self-direction, self-reliance, self-confidence, self-esteem, and ego-resiliency (Ainsworth et al., 1978; Cowan & Cowan, 2002; Sroufe, 2005). Their internal working models of relationships include ideas of the self as worthy of love and care, and others as available and responsive (Bretherton, 2005). Securely attached children are able to engage in longer periods of exploration and show more interest in exploration during free-play. They also engage in more persistent problem-solving and effectively elicit their mothers' help during problem-solving tasks (Ainsworth, 1979). Their coping strategies are characterized by persistence and flexibility (Ainsworth et al., 1978; Greenberg, Kusche, & Speltz, 1991; Schore, 2001; Sroufe, 2005).

Finally, children with secure attachment display greater emotional understanding (Thompson & Meyer, 2007; Raikes & Thompson, 2006) and more effective emotion regulation (Diener, Mangelsdorf, McHale, & Frosch, 2002; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Guttmann-Steinmetz & Crowell, 2006; Waters et al., 2010). As children gain confidence in the caregiver's capacity to provide assistance in regulating their affective states, they also become more confident in their own capacities for regulation (Sroufe, 2005). Infants and preschoolers with secure attachments express both positive and negative emotions in an open and flexible manner (Cassidy, 1994), employ more parent-oriented and less object-orientated emotion regulatory strategies during a frustration task (Diener et al., 2002), and engage in greater self-distraction, quiet waiting, and information gathering during a delay of gratification task (Gilliom et al., 2002).

In comparison to securely attached children, children with insecure attachments show greater social incompetence, more dependency on others, emotion dysregulation, and are at a higher risk for behavior problems and psychopathology. The specific negative sequelae differ by type of insecure attachment and are considered separately. Avoidant attachment is related to more aggression and noncompliance (Ainsworth et al., 1978; Ainsworth, 1979). Individuals with avoidant attachment have difficulty with interpersonal closeness due to the lack of emotional openness in communication, dismissal of the importance of attachment relationships, and derogation of the attachment figure (Cassidy, 2001). They minimize negative emotions, do not seek comfort from others as they except them to be rejecting and unreliable, and are unable to provide care in romantic relationships (Cassidy, 1994). Their emotion regulation strategies are less people oriented and more self-soothing (Diener et al., 2002). Children with avoidant attachment also are likely to develop an inflated sense of self as independent as well as a false

sense of autonomy; however, teachers have rated them as highly dependent, yet isolated and asocial during the preschool years (Sroufe, 2005).

Children with ambivalent/resistant attachment tend to be more easily frustrated, less persistent, and generally less competent (Ainsworth et al., 1978; Ainsworth, 1979). They heighten negative emotions to elicit response from attachment figures (Cassidy, 1994). They also show less active exploration of novel objects, and less flexibility and effectiveness in problem-solving tasks (Sroufe, 2005). During preschool, teachers rate them as highly dependent and needy, passive, and easily frustrated (Sroufe, 2005). They are less competent in peer interactions (Sroufe, 2005), and overseek care and are unable to give care to their romantic partner (Cassidy, 1994).

Among the insecure attachment classifications, disorganized attachment in particular places infants at increased risk for later externalizing and internalizing problems, and psychopathology (Cassidy, 1999; Cowan & Cowan, 2002; Dozier, Stovall, & Albus, 1999; Easterbrooks, Davidson, & Chazan, 1993; Madigan et al., 2007). Sroufe (2005) found the correlation between infant disorganization and the number and severity of psychiatric symptoms at 17½ years to approach .40. There is also evidence that disorganized attachment is especially predictive of dissociation, self-injurious behavior, and personality disorders (e.g., Borderline Personality Disorder; Levy, 2005), whereas avoidant attachment is more strongly related to conduct disorders, and resistant attachment with anxiety disorders (Sroufe, 2005).

Infant Emotion Regulation

Although a lack of consensus regarding the definition of emotion regulation exists in the literature, most studies examining emotion regulation employ a definition that includes the

modification of emotions in the service of social and/or non-social goals. Focusing on the processes of change, Cole, Martin, and Dennis (2004) define emotion regulation as "systematic changes either in the activated emotion or psychological processes and activities associated with activated emotions" (p. 320). A similar definition is emotion regulation as a set of competencies to modulate affective states (Shields and Cicchetti, 1998). Other definitions elaborate further on the goals of modulating emotional arousal such as affect-related social adaptation (Eisenberg & Morris, 2002), influencing the social environment (Kopp, 1989), adaptive non-social responses (Calkins, 1994), and regulating affective responding across multiple domains (NICHD Early Child Care Research Network, 2004). The definition by Thompson (1994) adds external and internal influences on regulation as another important component: "emotion regulation consists of extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (pp. 27-28).

Emotion regulation is also studied as part of a broader concept of emotional competence which includes the understanding of emotions, appropriate emotional expression, and the ability to inhibit or modulate emotion and emotion-related behaviors in order to achieve socially acceptable goals (Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Eisenberg, Cumberland, & Spinrad, 1998; Halberstadt, Denham, & Dunsmore, 2001; Volling, McElwain, Notaro, & Herrera, 2002). Studies examining emotional competence focus on emotion-related behavioral regulation including voluntary inhibition or activation of behaviors related to emotion (Eisenberg, Morris, & Spinrad, 2005).

The measurement of emotion regulation is varied (Eisenberg et al., 2005). During infancy and toddlerhood, the intensity and frequency of affective arousal and use of emotion regulation

strategies during frustration tasks are typically measured. Regulatory strategies that are examined include parent-focused regulation (e.g., looking at mother, fussing to mother, help seeking, and social referencing), object-focused regulation (e.g., looking at the task object), and self-focused regulation (e.g., self-comforting, redirecting attention, and tension reduction behaviors; Braungart-Rieker, Garwood, Powers, & Wang, 2001; Buss & Goldsmith, 1998; Crockenberg & Leerkes, 2004; Diener & Mangelsdorf, 1999; Ekas, Braungart-Rieker, Lickenbrock, Zentall, & Maxwell, 2011; Stifter & Braungart, 1995). From 24 months and older, toddlers' negative affect and compliance during tasks involving toy clean-up (Feldman & Klein, 2003) or delay of gratification (Mischel, Shoda, & Rodriguez, 1989) are frequently used as measures of emotional competence or regulation (Leerkes, Blankson, & O'Brien, 2009; NICHD Early Child Care Research Network, 2004). The regulatory strategies of orienting toward the task object (e.g., puppet), distraction (e.g., orienting toward mother), and tension-reduction/aggression (e.g., banging the object of frustration) are typically coded (Calkins, Smith, Gill, & Johnson, 1998).

Working with Thompson (1994)'s definition of emotion regulation, the present dissertation will examine the relations between the "extrinsic processes" of maternal parenting quality, "intrinsic processes" of infant temperamental reactivity, the mother-infant attachment relationship, which includes both extrinsic and intrinsic aspects, and the behavioral emotion regulation strategies that infants employ to "modify emotional reactions" (i.e., frustration) in service of the "goals" of playing with an attractive toy (and mother). The regulatory strategies of orienting towards the mother, toy, and environment, self-comforting, neutral vocalization, avoidance, and tension reduction behaviors will be examined (Stifter & Braungart, 1995).

Whether an emotion regulation strategy is adaptive often depends on the goals of the infant in the current situation that the infant faces (Thompson, 1994). When the infant is denied

access to an attractive toy as well as responses from the mother (as in Study 3), it may be most adaptive to orient towards the toy and the mother at first, but turn to other strategies, such as redirecting attention towards the environment, that will help reduce frustration when the mother continues to be unresponsive. In addition, strategies such as avoidance (e.g., pushing back on the high chair in which they are seated) or tension reduction behaviors (e.g., actively banging legs against the high chair) may be less adaptive in that they either maintain or increase infants' frustration.

Implications of infant emotion regulation for child adjustment. The ability to regulate emotions and related behaviors in socially adaptive ways is an important aspect of children's successful development (Halberstadt et al., 2001). Lack of emotion regulation skills during infancy and toddlerhood is not only indicative of later externalizing or internalizing behaviors (Calkins et al., 1998) but also predictive of problems in cognitive and social development through the preschool and early school years (Eisenberg et al., 1998; Morris, Silk, Steinberg, Myers & Robinson, 2007; NICHD Early Child Care Research Network, 2004). In addition, when emotion regulatory processes become patterns that disrupt children's processing of information and events, affective experience and expression, and integration of emotion with other processes, emotion is said to be dysregulated (Cole & Hall, 2008). Emotion dysregulation is a common characteristic of psychopathologies (Cole, Michel, & Teti, 1994).

Addressing Gaps in the Literature on Parenting Quality During Infancy

Given the important inter- and intrapersonal implications of infant attachment and emotion regulation, a large literature has examined the influences of parenting quality on these outcomes. There exist, however, certain gaps that should be addressed to further deepen the

understanding of parenting quality, and its relation to infant outcomes. Three of these gaps – the need to study parenting quality as the multidimensional construct of emotional availability, the need to examine parenting quality during the less-studied context of infant bedtime, and the need to consider contributions of child temperament – are addressed in the present dissertation.

Parenting Quality as a Multidimensional Construct of Emotional Availability

A major tenet of attachment theory is that sensitive parenting leads to secure attachments, and insensitive parenting leads to insecure attachments (Ainsworth et al., 1978; Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000). A sensitive mother accurately perceives and interprets the child's cues, and responds to them appropriately and promptly (Ainsworth et al., 1978). In observations of mother-infant dyads in both Uganda and the U.S., Ainsworth found a strong link between maternal sensitivity and attachment security (Ainsworth et al., 1978). A large number of studies have since focused on parental sensitivity in relation to attachment security. However, these studies have not been able to replicate the large effect found in Ainsworth's study, obtaining instead small to medium effect sizes (Aviezer, Sagi, Joels, & Ziv, 1999; Campbell et al., 2004; De Wolff & van IJzendoorn, 1997; Fish & Stifter, 1995; Goldsmith & Alansky, 1987; Isabella & Belsky, 1991; Smith & Pederson, 1988; Sroufe, 2005; Stams, Juffer, & van IJzendoorn, 2002; Tomlinson, Cooper, & Murray, 2005; Vereijken, Riksen-Walraven, & Kondo-Ikemura, 1997; Ziv, Aviezer, Gini, Sagi, & Koren-Karie, 2000), with some studies finding no association at all (Lohaus, Keller, Ball, Voelker, & Elben, 2004). Based on the small to modest effect sizes and the relatively small amount (±9%) of variance accounted for in attachment security by sensitivity, the attachment field acknowledges that the link is not as strong as previously thought.

The weak or no links found in studies may reflect an issue with measurement in which different definitions of sensitivity and measurements of attachment are used in different studies. Whereas Ainsworth did many hours of observations in various contexts to assess maternal sensitivity, most studies today obtain brief observations of mother-child interactions in free play contexts and use the 21-minute-long Strange Situation lab procedure to measure attachment security. Stronger links between sensitivity and attachment are found, for example, when the Attachment Q-Sort (Waters & Deane, 1985), which involves two hours of observation of mother-child interactions in the home, is used (as compared to the Strange Situation procedure; Vereijken et al., 1997).

Weak links between parental sensitivity and infant attachment point to the need to examine parenting quality that includes, but is not limited to, sensitivity. The multidimensional construct of emotional availability is one such conceptualization of parenting quality. Parental emotional availability is the parent's "affective attunement" to the child's emotions, needs, and goals (Biringen, 2000; Easterbrooks & Biringen, 2000). The term "emotional availability" was first used by Mahler, Pine, and Bergman (1975) to describe the mother's supportive presence during the child's exploration of the environment. An emotionally available mother was viewed as encouraging the child's explorations and accepting of the child's returns for comfort (i.e., a secure base). Later, emotional availability was extended to include the mother's acceptance of a wide range of both positive and negative affects in the child, and her regulation of emotional exchanges during interactions with the child (Emde, 1980; Emde & Easterbrooks, 1985).

The construct of emotional availability is related to Ainsworth's construct of sensitivity in several ways. Just as a highly sensitive parent picks up on even subtle cues of the child and does not distort them according to his/her own needs, the emotionally available parent also

perceives and interprets the child's cues accurately and responds appropriately to them. Both constructs define optimal parenting as supporting the child's attachment and exploration needs in smooth and synchronous ways (Bretherton, 2000). The two constructs, however, place emphasis on different aspects of parent-child interactions. Compared to Ainsworth's sensitivity construct, EA's sensitivity dimension places greater emphasis on the affective communications and interactions between parent and child (Biringen, 2000; Biringen & Robinson, 1991; Easterbrooks & Biringen, 2005). EA-sensitivity also has a greater focus on the dyadic nature of parent-child interactions, including mutual negotiation of conflicted or mismatched interactions (Bretherton, 2000). Thus, EA-sensitivity is assessed as a quality of a particular parent-child relationship rather than as a trait of the parent (Easterbrooks & Biringen, 2005).

Parental emotional availability consists of four dimensions: sensitivity, structuring, non-intrusiveness, and non-hostility (Biringen, 2000). Sensitivity is an overall assessment of the parent's affect, clarity of perceptions, appropriate responsiveness, awareness of timing, flexibility, variety and creativity in modes of play, acceptance, accessibility, and style of conflict resolution during parent-child interactions (Biringen, Robinson, & Emde, 1998). A highly sensitive parent displays genuine interest and pleasure in the child, accurately perceives the child's emotional and behavioral cues, and responds in an appropriate manner. Thus, the emotional communication between parent and child is mostly positive, accepting, and smooth. Also, a more sensitive parent is able to resolve mismatches in interactions to return to more synchronous states in which both parent and child together determine goals. Inconsistent sensitivity is when the parent shifts back and forth between being affectively attuned with the child and being preoccupied with other concerns. An insensitive parent is either overbearing (e.g.,

displays negative facial expressions and tones of voice) or noninteractive (e.g., affectively flat and unresponsive; Biringen et al., 1998).

Structuring is the degree to which the parent appropriately structures the child's exploration by following the child's lead and setting limits for appropriate behavior (Biringen et al., 1998). Optimal structuring includes providing rules and a framework for interactions in a way to which the child is receptive (Biringen, 2000). The parent actively participates in the interaction by providing adequate information and simplifying complex tasks into simpler steps, but does not overly control the child's activity (Biringen et al., 1998; Lovas, 2005). Inconsistent structuring occurs when the parent shows repetitive attempts to structure that are not successful or withdraws from the interaction. Structuring is non-optimal when the parent is a passive member of the interaction, failing to provide any structure for the child (Biringen et al., 1998).

Non-intrusiveness refers to the parent's ability to be verbally and nonverbally available to the child without being overly directive, stimulating, interfering, or protective during parent-child interactions (Biringen, 2000; Biringen et al., 1998). A non-intrusive parent engages with the child in a smooth way that does not interrupt the child's autonomy or overpower the interaction (Biringen et al., 1998; Bornstein, Gini, Suwalsky, Putnick, & Haynes, 2006), and instead allows the child to lead in exploration and during interactions (Biringen & Robinson, 1991; Lovas, 2005). An intrusive parent too frequently directs the interaction based on parental agenda, and fails to provide the child with opportunities to explore and lead (Biringen et al., 1998).

Non-hostility is talking and behaving with the child in a generally patient, pleasant, and harmonious manner, and not expressing covert or overt hostility towards the child (Biringen, 2000; Bornstein et al., 2006; Lovas, 2005). Non-hostile parents engage in appropriate emotion

regulation such as not displaying covert hostility in the form of impatience, passive-aggressive behaviors, or boredom during interactions (Biringen, 2000; Biringen et al., 1998). They also do not engage in overtly harsh or demeaning behaviors that threaten or frighten the child (Biringen et al., 1998).

Parenting Quality During the Infant Bedtime Context

Parenting has been examined in various contexts including naturalistic observations (Ainsworth et al., 1978) and structured tasks such as parent-infant free-play, feeding, teaching, and clean-up (Booth, Mitchell, Barnard, & Spieker, 1989; Kochanska, Aksan, & Joy, 2007; Poehlmann et al., 2011). Despite the considerable amount of knowledge of parenting quality during infancy that has been gained, there is still much to be learned about the impact of parenting in less-studied contexts such as infant bedtimes that may bear importantly on infant development.

Bedtime interactions may provide one of the earliest contexts for parents to influence their infants' physiological, cognitive, and social-emotional development. Unlike more commonly observed structured contexts such as free-play, infant bedtime is a naturalistic context that occurs on a daily basis. Whereas parents will put their infants down to sleep at the end of every day, they may not engage in daily free-play interactions with their infants, especially in the infants' earliest months.

During bedtime, parents have the goal of bringing the infant to a comfortable, restful, and non-distressed state so that the infant can fall asleep and sleep during the night. Parenting quality during bedtime interactions may thus have important implications for the quality of infants and young children's nighttime sleep (Anders, 1994; Teti, Kim, Mayer, and Countermine, 2010),

physical development, and cognitive outcomes (El-Sheikh, Buckhalt, Keller, Cummings, & Acebo, 2007; Gregory et al., 2005; Spruyt et al., 2008). Bedtime parenting quality may also have implications for social-emotional functioning during infancy and beyond. In Western societies, bedtime typically precedes the longest parent-infant separation of the day, a potential source of distress for the infant (Sadeh, Tikotzky, & Scher, 2010). Cessation of parent-infant interactions and separation from parents may be distressing for infants who wish to maintain their contact or interaction with their parents. Infant bedtimes may require parents to assure infants of their availability when needed, as well as to down-regulate their infants' emotions in order to facilitate falling asleep.

In addition, infant bedtimes have the potential to engender parents' distress. Infant sleep during the first year is one of the primary concerns for parents. Parents' most common complaint to pediatricians is related to infant sleep, with 20-30% of infants reported as having sleep problems such as difficulty falling asleep and frequent night wakings (Sadeh, Tikotzky, & Scher, 2010). Such perceptions, even if subjective, may influence the ways in which parents interact with their infants during the bedtime and nighttime contexts, which in turn, may influence the development of infants.

The present dissertation focuses on bedtime as a unique context for examining parenting quality. Whereas a substantial number of studies have examined parenting practices during bedtime such as soothing techniques (Mindell, Sadeh, Kohyama, & Hwei How, 2010) and limit setting (Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006), the present study shifts the focus from specific bedtime parenting practices to the emotional quality of parenting when parents put their infants to bed.

Differential Susceptibility of Temperamentally Reactive Children

Parenting is inherently a relational construct involving bi-directional interactions between parent and child (Lerner, Rothbaum, Boulos, & Castellino, 2002). A study of parenting quality and child outcomes should, therefore, consider the "goodness-of-fit" between parental contributions and child characteristics such as temperament (Belsky, 1984; Thomas and Chess, 1977). Beebe et al. (2010), for example, found that the ways that infants regulated their own behaviors and coordinated their behaviors with mothers provided two to three times more information about later attachment security (at 12 months) than mothers' contingent coordination with infant behavior.

Definitions of temperament. Four general definitions of temperament are utilized in the literature examining relations between infant temperament, parenting quality, and infant outcomes (Goldsmith et al., 1987). These definitions provided by Thomas and Chess, Buss and Plomin, Goldsmith, and Rothbart are in agreement that temperament is biologically based, temperamental dimensions indicate behavioral tendencies, and temperament is relatively stable over time. They differ, however, in what dimensions should be included as part of temperament (Goldsmith et al., 1987).

Thomas and Chess (1977) have conceptualized temperament as "the stylistic component of behavior, that is, the *how* of behavior" (Goldsmith et al., 1987, p. 508), comprised of nine dimensions: rhythmicity of biological functions, activity level, approach/withdrawal, adaptability, sensory threshold, quality of mood, intensity of mood, distractibility, and attention span. They have also delineated three clusters of temperament: easy, difficult, and slow-to-warm-up (Goldsmith et al., 1987). "Difficult" temperament, which is characterized by irregularity of

biological functions, withdrawal from novelty, slow adaptability, frequent negative mood, and high intensity of mood, has received the most attention in the literature (Goldsmith et al., 1987).

According to Buss and Plomin, temperament is a set of inherited personality traits – emotionality, activity, and sociability – that appear early in life (Goldsmith et al., 1987). Goldsmith considers temperament as individual differences in the intensity and temporal parameters of expression of emotional behavior (Goldsmith & Campos, 1982, p. 178).

Rothbart and colleagues define temperament as "individual differences in emotional, motor, and attentional reactivity to stimulation, and in patterns of behavioral and attentional self-regulation" (Putnam, Sanson, & Rothbart, 2002, p. 244). Whereas "reactivity" refers to the latency, duration, and intensity of responses to changes in the environment, "self-regulation" refers to processes involved in modifying reactivity (i.e., responses to the environment; Rothbart & Bates, 2006; Rothbart & Derryberry, 1981). They have identified three higher-order factors of infant temperament, which include Surgency/Extraversion, Negative Affectivity, and Orienting/Regulation (Gartstein & Rothbart, 2003). Surgency/Extraversion refers to overall activity level and the tendency to either approach or withdraw from novel situations. Negative Affectivity includes sadness, fear, anger, distress to limitation, and soothability. Orienting/Regulation involves the ability to focus attention and behavioral inhibition. Whereas Surgency/Extraversion and Negative Affectivity correspond to the reactive aspects of infant temperament, Orienting/Regulation indicates the regulatory aspect of infant temperament. The present dissertation employs Gartstein and Rothbart (2003)'s definition of infant temperamental reactivity and self-regulation, and examines each of the three higher-order factors of infant temperament.

Transactional and interactional models of temperament and parenting. Studies indicate that both child temperament and parenting have unique and additive effects on children's social-emotional outcomes (Bates, Schermerhorn, & Petersen, 2012; Kiff, Lengua, & Zalewski, 2011). In a transactional model, parents not only shape their children's temperamental characteristics, but also respond differently to those characteristics (Kiff et al., 2011). These bidirectional relations (transactions) between child temperament and parenting are expected to affect child outcomes. For example, many studies have found a direct link between infant negative affectivity and less optimal parenting (Kiang, Moreno, & Robinson, 2004; van den Boom & Hoeksma, 1994). Child temperament also interacts with parenting to predict outcomes in children. That is, the effect of parenting on child outcomes has been found to depend on the temperamental characteristics of the child (Kiff, Lengua, & Zalewski, 2011).

The present dissertation examines both transactional and interactional models of temperament and parenting in relation to child social-emotional outcomes, with particular emphasis on one type of interaction: the differential susceptibility of highly reactive children. Various studies suggest that children with highly reactive temperaments are more sensitive to both positive and negative environmental influences (Belsky, 2005; Belsky & Pluess, 2009; Klein Velderman, Bakermans-Kranenberg, Juffer, & van IJzendoorn, 2006; van IJzendoorn & Bakermans-Kranenburg, 2004). Referred to as "differential susceptibility," parenting quality is expected to more strongly predict social-emotional and behavioral outcomes for temperamentally reactive children than for less reactive children (Belsky, 2005; Belsky & Pluess, 2009; van IJzendoorn & Bakermans-Kranenburg, 2012). Indeed, parenting quality has been found to be more important for children high in negative affectivity, such that if the caregiver has high sensitivity, highly negative children are more likely to be securely attached (Braungart-Rieker et

al., 2001; Crockenberg, 1981; van den Boom, 1994), show higher levels of self-regulation (Feldman, Greenbaum, & Yirmiya, 1999; Gilliom et al., 2002), and are less likely to have externalizing problems (Belsky, Hsieh, & Crnic, 1998; Blair, 2002; van Aken, Junger, Verhoeven, van Aken, & Dekovic, 2007).

Main Research Questions

Three studies will be conducted to address the aforementioned gaps in the parenting literature, and to better understand the relations between bedtime emotional availability, infant temperament, and infant social-emotional outcomes during the first two years of life. Specifically, the relations between mothers' psychosocial and sleep resources, infant temperament, and bedtime emotional availability (Study 1), between bedtime emotional availability, infant temperament, and infant attachment security (Study 2), and between bedtime emotional availability, infant attachment security, infant temperament, and infant emotion regulation (Study 3) will be examined.

Study 1: Maternal Emotional Availability During Infant Bedtime: An Ecological Framework

As the quality of parenting during infant bedtimes may be an important predictor of infant social-emotional outcomes, it is important to understand what factors influence bedtime parenting quality. Study 1 draws from ecological theory (Belsky, 1984; Bronfenbrenner & Morris, 2006), to examine mothers' psychological and social resources, and child characteristics

as predictors of bedtime parenting quality. Specifically, mothers' depressive symptoms and the quality of the coparenting relationship during infants' first 6 months are expected to predict how emotionally available mothers are to their infants during bedtime at 9 months. In addition, as parenting is examined in the bedtime context, the quality of mothers' sleep and infant sleep problems are expected to predict bedtime emotional availability. Finally, infant temperamental reactivity and/or self-regulation may directly influence or interact with parent characteristics to influence bedtime emotional availability.

Study 2: Mothers' Emotional Availability During Infant Bedtime Across the First Year of Life: Relations with Infant Temperament in Predicting Attachment Security

There is increasing support for links between parental emotional availability (and its dimensions) and infant attachment security (Biringen et al., 2005; Easterbrooks et al., 2000). Study 2 intends to extend this literature in two ways. First, trajectories of mothers' emotional availability during infant bedtimes across the first year will be examined as predictors of infant attachment security. Second, the differential susceptibility hypothesis will be tested to examine whether infants with highly reactive and/or less well regulated temperaments have more secure attachments when bedtime emotional availability is high, and less secure attachments when emotional availability is low.

Study 3: Infant Emotion Regulation: Relations to Bedtime Emotional Availability, Attachment Security, and Temperament

Study 3 is the first to examine both parenting quality in the context of bedtime and infant attachment security as predictors of infant emotion regulation strategies. How emotionally available mothers are towards their infants during bedtime and the security of infant attachment may influence infants' emotion regulation abilities during a frustration task at 12 and 18 months. In addition, Study 3 extends previous studies by examining whether infants rated as temperamentally reactive are differentially susceptible to the influences of bedtime parenting and attachment security in their capacity for regulating emotion.

STUDY 1

Maternal Emotional Availability During Infant Bedtime: An Ecological Framework

Introduction

Parenting quality is a primary determinant of child social-emotional and behavioral development (Belsky & Fearon, 2008; Sroufe, 2005). Whether a child is securely attached to the parent, whether a child can regulate emotions in socially adaptive ways, and whether a child is behaviorally competent are significantly shaped by the quality of parenting (Chang, Schwartz, Dodge, & McBridge-Chang, 2003; De Wolff & van IJzendoorn, 1997).

Although considerable knowledge of parenting quality during infancy has been gained from naturalistic observations (Ainsworth, Blehar, Waters, & Wall, 1978) and from structured tasks including parent-infant free-play, feeding, teaching, and clean-up (Kochanska, Aksan, & Joy, 2007; Poehlmann et al., 2011), there is still much to be learned about parenting and its impact in other contexts that, although less well-studied, may bear importantly on early child development. The present study focuses on one such context, bedtime, a parent-child context identified by Teti, Kim, Mayer, and Countermine (2010) as important to children's outcomes for at least two reasons: (1) Bedtime typically precedes the longest parent-child separation of the day, and thus parents' ability to structure bedtimes may bear importantly on how well infants and young children sleep during the night; (2) the quality of bedtime parenting in sleep contexts, and children's sleep quality, may have significant implications for physical development, social relationships, emotional functioning, and cognitive outcomes during infancy and beyond (El-

Sheikh, Buckhalt, Keller, Cummings, & Acebo, 2007; Spruyt et al., 2008). Indeed, infant bedtime may be one of the earliest contexts in which parenting influences infants' physiological, behavioral, and social-emotional development, and thus the focus is placed on bedtime as a unique context for examining parenting quality.

The present study draws from ecological theory (Belsky, 1984; Bronfenbrenner & Morris, 2006) to identify predictors of parenting quality at bedtime across the first six months of life, with particular focus on parents' psychological resources, the social context, and child characteristics as potential determinants of parenting (Belsky, 1984). The predictive linkages between mothers' depressive symptoms, coparenting relationship quality, maternal and infant sleep, infant temperament, and parenting quality, defined here as mothers' emotional availability (EA; Biringen, 2000), were examined during infant bedtimes when infants were 9 months of age. Whereas there is a significant literature that focuses on practices parents use to put infants to sleep (e.g., soothing techniques and limit setting; Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006; Tikotzy & Sadeh, 2009), the present study examines the emotional quality of these behaviors (i.e., how emotionally available parents are as they carry out bedtime parenting practices; Teti et al., 2010). Also, as most studies have not directly addressed whether changes in these domains predict parenting quality during the first year, increases or decreases during first 6 months, in addition to mean-levels, were examined as predictors of mothers' EA at 9 months. Each of these predictor domains is discussed below.

Maternal Depressive Symptoms

Parental well-being is one type of psychological resource that is central to competent parenting (Dix, 1991). When parents experience mood disruptions that manifest as depressive

symptoms, the emotional quality of parenting suffers. Many studies link mothers' depressive symptoms with compromised parenting, in particular, lower sensitivity, poorer structuring, and greater hostility and intrusiveness (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Murray, Fiori-Cowley, Hooper, & Cooper, 1996). Other studies examining emotionally available parenting as measured by the Emotional Availability Scales (EAS; Biringen, Robinson, & Emde, 1998) have found that mothers with greater depressive symptoms are less emotionally available toward their children (Trapolini, Ungerer, McMahon, 2008). In addition, depressive symptoms that are severe and chronic over time may be especially damaging to mother-infant interactions (Teti & Towe-Goodman, 2008). Thus, greater mean-level depressive symptoms in mothers across the first 6 months postpartum were expected to predict less emotionally available parenting during bedtimes at 9 months. It is also possible that changes in depressive symptoms could be predictive of parenting quality. Early postpartum depression, for example, frequently resolves across the first year (Gonidakis, Rabavilas, Varsou, Kreatsas, & Christodoulou, 2008) without untoward effects on the infant (Campbell, Cohn, & Meyers, 1995). Postpartum depression that does not resolve, however, is associated with less positive mother-infant interactions (Campbell et al., 1995). Thus, associations between changes from 1 to 6 months in maternal depressive symptoms and bedtime parenting were also examined, with the expectation that changes in symptoms would be inversely related to maternal EA by 9 months.

Coparenting

In addition to psychological resources, aspects of parents' social context are expected to influence parenting quality. The present study examines one such aspect, mothers' perceptions of their coparenting relationships with their partners, as a predictor of bedtime parenting.

Coparenting refers to the ways in which parents coordinate with each other in their roles and responsibilities as parents (Feinberg, 2003). There is growing empirical support for linkages between quality of coparenting and quality of mother-infant interactions. Problems in coparenting have predicted greater negativity in parent-child interactions (Kitzmann, 2000), and the degree to which parents support or undermine each other in their parenting efforts have been found to predict parenting quality (Feinberg, Reiss, Neiderhiser, & Hetherington, 2005). For example, parents' coparenting conflict (self-reported level of conflict with their spouses/partners about issues regarding their children) was negatively related to the quality of mother-infant interaction when the infant was 9 months old (Cabrera, Shannon, & La Taillade, 2009).

Whereas marital quality typically declines following the birth of an infant (Gottman & Notarius, 2000), much less is known about stability and change in coparenting during the early postpartum period. At least one study found the coparenting relationship to be relatively stable, albeit sensitive to changes in other contextual factors, during the first six months of life (Van Egeren, 2004). Mothers who report more coparental support and cooperation and less coparental conflict across the first six months were expected to be more emotionally available during bedtime. As coparenting quality could also change across this same time for some parents, linkages between coparenting changes from 1 to 6 months and bedtime parenting at 9 months were examined. Changes in positive coparenting were expected to be positively associated with EA at 9 months, and changes in negative coparenting were expected to be negatively associated with EA at 9 months.

Maternal and Infant Sleep

Evidence is emerging that the quantity and quality of mothers' sleep may also impact their parenting quality, although studies of these linkages are sparse and have not, to date, made use of direct observations of parent-child interactions. For example, in a study by Meltzer and Mindell (2007), mothers with poor sleep quality due to their children's sleep disruptions reported more parenting stress and caregiving overload. Similarly, when mothers perceived their infants as having sleep problems (i.e., woke up more frequently during the night for longer durations), mothers reported higher levels of parenting stress (Sinai & Tikotzky, 2012). An ecological model of predictors of bedtime parenting of infants should include both maternal sleep and infant sleep as predictors because although infant sleep consolidates rapidly during the first six months of life, there is substantial variability across infants (Henderson, France, & Blampied, 2011; Gomez, Newman-Smith, Breslin, & Bootzin, 2011), and approximately 25 percent of infants are reported to experience sleeping difficulties (Sadeh, Tikotzky, & Scher, 2010). Thus, both mean levels and changes in maternal and infant sleep across the first six months were examined as predictors of parenting quality during bedtime at 9 months, as it was expected that normative development in infant sleep, either in terms of averaged levels and/or greater decreases in night waking frequency and duration across time, would be related to higher bedtime parenting quality. In contrast, non-normative development in which infants maintain high average frequencies of night wakings, and/or who show small or no decreases in night waking across time, may have negative implications for parenting quality.

Infant Temperament

Parenting has been conceptualized as a bi-directional, transactional process in which both the parent and child mutually influence each other over time (Lerner, Rothbaum, Boulos, & Castellino, 2002). Infant temperament, taken as a biologically-based set of traits that underlie the manner in which infants engage with the world, may contribute importantly to parental perceptions of their infants and to parenting quality, and thus infant temperament was included as a factor that could theoretically directly influence, or interact with parental factors to influence, parenting quality at 9 months. Temperament has been defined as "individual differences in emotional, motor, and attentional reactivity to stimulation, and in patterns of behavioral and attentional self-regulation" (Putnam, Sanson, & Rothbart, 2002, p. 244). In their conceptualization of infant temperament, Rothbart and colleagues identified three higher-order factors of temperament, Surgency/Extraversion, Negative Affectivity, and Orienting/Regulation (Gartstein & Rothbart, 2003). Surgency/Extraversion refers to overall activity level and the tendency to either approach or withdraw from novel situations. Negative Affectivity includes sadness, fear, anger, distress to limitation, and soothability. Orienting/regulation involves the ability to focus attention and behavioral inhibition. In the present study, all three higher-order factors of temperament were examined as direct and moderating influences on parenting quality.

Both main and moderator effects of infant temperament on parenting quality have been found in prior work. For example, many studies have found a direct link between infant negative affectivity and less optimal parenting (e.g., Kiang, Moreno, & Robinson, 2004). Other work has found that child temperament interacts with parent characteristics, and the larger social context, to influence parenting quality (Calkins, Hungerford, & Dedmon, 2004). In support of the moderating role of infant temperament, a meta-analysis by Paulussen-Hoogeboom, Stams,

Hermanns, & Peetsma (2007) indicated that infant negative affectivity was more likely to predict poorer parenting when other maternal or social aspects (e.g., age, SES) are considered. In addition, Pauli-Pott, Mertesacker, Bade, Bauer, and Beckman (2000) reported that maternal depressive symptoms interacted with high infant negative affectivity to predict low sensitivity during mother-infant interactions. Interestingly, very little work has been done to date examining infant temperament as a moderator of the impact of infant sleep on parent-child outcomes. Such an examination is overdue, given that temperament's link with sleep has been, at best, ephemeral, with some studies finding the expected association between temperamental reactivity and poor sleep, but others not (Weinraub et al., 2012). This suggests that temperament's influence on outcomes associated with sleep may be indirect. For example, Troxel, Trentacosta, Forbes, and Campbell (2013) found that sleep problems in toddlers predicted emotional and behavioral problems only among children high on negative emotionality. The present study examined whether infant temperament interacts with infant sleep problems to predict maternal bedtime parenting quality.

Hypotheses

1. Mothers' depressive symptoms averaged across 1, 3, and 6 months were expected to be inversely related to mothers' emotional availability (EA) during infant bedtime at 9 months. In line with previous work that suggests that the chronicity and severity of depressive symptoms are related with poorer parenting quality, mothers with chronic and high depressive symptoms, that is, above the clinical cut-off for two or more time points, were expected to show lower bedtime EA compared to mothers below the clinical cut-off.

2. Mother-perceived coparenting quality averaged during the first 6 postnatal months was expected to predict EA during infant bedtime at 9 months. Mothers who experienced more positive coparenting (e.g., support and cooperation) and less negative coparenting (e.g., conflict) were expected to be more emotionally available when interacting with their infants.

3. The quantity and quality of mothers' sleep averaged across the first 6 months were expected to predict mothers' emotional availability during infant bedtime at 9 months. Mothers who reported fewer hours of sleep or poorer quality of sleep were expected to show lower levels of EA when trying to put their infants to sleep for the night. Infant sleep quality was also expected to predict mothers' EA towards their infants. The frequency and/or length of infant night wakings could influence maternal emotional availability during bedtime.

4. Changes in maternal and infant variables during the first 6 months were expected to predict mothers' EA at 9 months. The present study examined whether increases or decreases in maternal variables during the first 6 postpartum months were predictive of mother's emotional availability during infant bedtime at 9 months. An inverse relation was expected between changes in maternal depressive symptoms, negative coparenting, and infant night wakings from 1 to 6 months and maternal EA at 9 months. In addition, positive associations were expected between changes in positive coparenting and maternal sleep and maternal EA.

5. Infant temperament was expected to both directly predict mothers' EA during infant bedtime, and to moderate the relations between maternal variables and mothers' EA. Whereas some studies have found infant temperament to be directly related to lower parenting quality, others have found infant temperament to moderate the relations between maternal variables and parenting quality. In the present study, an inverse relation was expected between highly reactive infant temperament (at 6 months) and maternal EA at 9 months. In addition, it was expected that

temperamental reactivity would moderate the relation between maternal variables and EA during infant bedtime at 9 months. In line with earlier work (Calkins et al., 2004; Pauli-Pott et al., 2000), mothers' depressive symptoms, coparenting quality, and quantity and quality of sleep were expected to be more strongly predictive of parenting quality when mothers perceived their infants to be more surgent, higher in negative affect, and less well regulated than when their infants were less reactive.

Method

Participants

The study sample included 106 mothers and their infants from a larger NIH-funded and IRB-approved study (SIESTA – Study of Infants' Emergent Sleep TrAjectories) of parenting, infant sleep, and infant development across the first two years of life. Mothers who were 18 years or older, of any ethnic background, and fluent in English were recruited 1 to 2 days after delivery from the obstetric floors of the Mt. Nittany Medical Center Mother and Baby Clinic and the Milton S. Hershey Medical Center in central Pennsylvania. Mothers who were interested and gave permission for further contact were called 2 weeks later and given the complete details of the study. Of the 898 mothers contacted who met study criteria, 167 (18.6%) agreed to participate.

Video-recordings of bedtime parenting at 9 months of infant age could not be obtained for 21 families: 17 (10.2%) dropped from the study, 2 did not consent video-recording, and 2 informed staff that they could not complete the home visit due to unspecified negative life events. In addition, bedtime parenting quality could not be coded for 40 families as there was too little or

no mother-infant interaction. Reasons for the lack of bedtime interaction included families not turning the video recording system on as instructed, engaging in bedtime in a room without a camera, or not having a bedtime routine that was long enough to assess the quality of parenting.

In the sample, 59 (55.7%) of the infants were female, and 39 (36.8 %) were first-borns. Mothers' mean age was 30.0 years (*SD* = 5.17), and 87.7% were married and living with a partner. 7.5% were high-school graduates, 50.0% attended or graduated from college, and 34.0% obtained graduate or professional degrees. The percentage of mothers who were employed was 61.9%. The mean family income was $69,423.15, the range being $0 to $300,000. Ethnicity was distributed as follows: 84.0% White, 4.7% African American, 2.8% Asian, 5.7% Latino, and 2.8% Other. The 106 mothers in the final sample did not differ significantly from the rest of the mothers (*n* = 61) recruited into the larger study at 1 month in terms of the sociodemographic variables and study variables. The only exception was change in mothers' hours of sleep between 1 to 3 months: mothers in the final sample reported less change in hours of sleep (*M* = 2.55, *SD* = 5.76) than mothers not in the final sample (*M* = *5*.27, *SD* = 6.61), $t(147) = 2.58$, $p < .05$.

Maternal-Report Measures

Depressive symptoms (1, 3, 6 months). The Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1994) depression subscale assessed the severity of depressive symptoms. The depression subscale contains 13 items including "crying easily," "feeling lonely," and "feeling hopeless about the future" (ranging from $\alpha = .89$ to .92 across 1, 3, and 6 months). Each item was rated on a 5-point scale (ranging from "not at all" to "extremely") to the degree that each problem has distressed the respondent within the past 7 days. Depressive symptoms at 1, 3, and 6 months showed moderate stability over time (*r* = .62 to .64), and were averaged into an average

depressive symptoms variable (α = .84). To assess whether chronic and high depressive symptoms were particularly predictive of emotional availability, a dummy code for mothers who reported depressive symptoms above the clinical cut-off of 13 at two or more times across the first 6 months was created.

Coparenting (1, 3, 6 months). The Coparenting Relationship Scale (CRS; Feinberg, Brown, & Kan, 2012) is a 47-item self-report measure of coparenting. Each item was rated on a 7-point scale (ranging from "not true of us" to "very true of us" for the first 39 items; and "never" to "very often" for the last 8 items). The CRS taps into six dimensions of coparenting: Agreement with Partner (ranging from α = .69 to .80 across 1, 3, and 6 months; e.g., "My partner and I have different ideas about how to raise our child"), Increased Closeness (α = .74 to .78; e.g., "The stress of parenthood has caused my partner and me to grow apart"), Support-Cooperation (α = .82 to .89; e.g., "My partner asks my opinion on issues related to parenting"), Endorses Partner's Parenting (α = .81 to .83; e.g., "My partner has a lot of patience with our child"), Exposure to Conflict (α = .75 to .84; e.g., "Argue with your partner about your child, in the child's presence"), and Competition-Undermining (α = .57 to .72; e.g., "My partner tries to show that she or he is better than me at caring for our child").

For the purpose of data reduction, a positive coparenting quality variable was created by combining the four dimensions of Agreement with Partner, Increased Closeness, Support-Cooperation, and Endorses Partner's Parenting (intercorrelations ranging from *r* = .49 to .77 across 1, 3, and 6 months; α = .82 to .86). Similarly, the two dimensions of Exposure to Conflict and Competition-Undermining were combined to form a negative coparenting quality variable (*r* = .36 to .53; α = .52 to .69). Mean positive (α = .93) and negative (α = .85) coparenting quality variables were created by averaging across 1, 3, and 6 months. Positive and negative coparenting

showed moderate to high stability across time, ranging from r = .80 to .83 for positive coparenting, and r = .56 to .74 for negative coparenting.

Maternal and infant sleep (1, 3, 6 months). Sleep-related variables were obtained from two measures that mothers completed for 7 consecutive days at each age point: The 24-Hour Sleep Patterns Inventory (24-Hr SPI; Meltzer, Mindell, & Levandoski, 2007) and The Infant Sleep Diary (adapted from Burnham, Goodlin-Jones, Gaylor, & Anders, 2002). The 24-Hour Sleep Patterns Inventory is a daily phone interview that asks parents about their sleep patterns during the past 24 hours. Questions include mothers' total hours of sleep, and overall quality of sleep (measured on a 5-point scale). The Infant Sleep Diary is a parent-report measure of infant sleep-related variables including the frequency of infant night wakings, and the length of each night waking. For both measures, maternal and infant sleep-related variables were summed across the week at each age point (1, 3, and 6 months). Correlations between time points ranged from r = .41 to .56 for mother's total hours of sleep, r = .53 to .60 for mothers' overall quality of sleep, r = .34 to .47 for frequency of night wakings, and r = .22 to .45 for length of night waking. The summed scores from 1, 3, and 6 months were combined and then averaged.

Infant temperament (6 months). The Infant Behavior Questionnaire–Revised (IBQ-R; Rothbart & Gartstein, 2000) is a 191-item measure of infant temperament. Parents rated each item on a scale of 0 to 7, in which 1 is their infant "never engages in the behavior", and 7 is their infant "always engages in the behavior". Three higher-order factors of Surgency/Extraversion, Negative Affectivity, and Orienting/Regulation can be obtained from 14 subscales (see Gartstein & Rothbart, 2003). Surgency/Extraversion is comprised of the subscales of approach, vocal reactivity, high intensity pleasure, smiling and laughter, activity level, and perceptual sensitivity (α = .77). Negative Affectivity includes the subscales of sadness, distress to limitations, fear, and

falling reactivity (α = .67). Orienting/Regulation is the combination of the subscales of low intensity pleasure, cuddliness, duration of orienting, and soothability (α = .57).

Maternal Emotional Availability (9 Months)

When the infants were 9 months old, home visits were conducted by project staff in order to obtain video recordings of the infant's typical sleep location and where parents carried out their bedtime routines. The digital video recording system used for the recordings included a Bosch Divar XF digital video recorder (DHR-0800B-150A; Bosch Security Systems) that stored all the video data, up to four IR Color CCD night-vision cameras (C420BCVFIR; ARM Electronics) and microphones (CV-5104MIC; Channel Vision) that recorded the video and audio data, and a 9-inch portable DVD player (A299-1040; Audiovox D9000) that was used to determine camera placement.

Multiple camera and microphone inputs were used to capture parent-infant bedtime interactions. One camera was placed above the infant's crib/bed area. A second camera was trained on a particular chair or place in the room where the infant slept (either the infant's room or the parents' bedroom) if parents indicated that they took the infant there during bedtime. A third camera overlooked the room where the infant slept to capture bedtime activities such as feeding, diaper-changing, and book-reading, as well as anyone entering and leaving the room. Finally, if parents engaged in bedtime activities in another room such as the living room, a fourth camera was set up in that room. Parents were asked to turn the video system on approximately one hour before they began bedtime routines with their infant, and off in the morning after the infant woke up. The start of bedtime was marked when both the parent (typically the mother) and infant appeared on camera, and began to interact. The end of bedtime was marked at the

beginning of the infant's five consecutive minutes of sleep in his/her sleep location (e.g., crib, bassinet, parent's bed). The average length of infant bedtimes was 41.36 minutes (*SD* = 32.12), with a range of 3.57 to 202.58 minutes. The length of infant bedtimes was significantly correlated with bedtime emotional availability, $r(106) = -.34$, $p < .001$, and thus bedtime length was statistically controlled in all analyses.

The Emotional Availability Scales (EAS; Biringen et al., 1998) were used to score the emotional quality of parenting during mother-infant interactions at bedtime. Maternal emotional availability is scored on four dimensions: sensitivity (assessing maternal appropriate responsiveness and emotional connectedness with the infant on a 9-point scale), structuring (assessing the mothers' ability to scaffold the infant's bedtime and set appropriate limits on a 5-point scale), non-intrusiveness (assessing controlling behaviors on a 5-point scale), and non-hostility (assessing covert and overt hostility on a 5-point scale). The scoring of emotional availability was adapted to bedtime parenting following criteria established by Teti et al. (2010). Sensitivity was high if mothers responded accurately and promptly to their infants' emotional cues during various bedtime activities such as nursing/bottle-feeding, diaper-changing, and book-reading. Mothers were rated high on structuring if they used quiet and soothing bedtime routines that successfully guided infants toward sleep, but lower if mothers left their infants unattended for a substantial amount of time. If infants slept in their own rooms, mothers were scored lower on sensitivity and structuring if they took longer than 1 minute to respond to their infants when they became distressed after being put down to sleep. Non-intrusiveness was rated high when mothers did not initiate new interactions that interfered with the infant falling asleep, and did not insist that the infant fall asleep quickly. Mothers were scored high on non-hostility if they did not express impatience, sarcasm, or anger toward their infants.

The author and another coder, trained and certified to use the Emotional Availability Scales scoring system, coded the mother-child interactions during bedtime. Coders were blind to all other study variables. Inter-rater reliability was done periodically to minimize consensual drift, with disagreements resolved by consensus. The intra-class correlations for 9 (8.5%) randomly-selected tapes were .99 for sensitivity, 1.00 for structuring, .83 for non-intrusiveness, and .98 for non-hostility. The reliability for the composite of maternal emotional availability (sensitivity, structuring, non-intrusiveness, non-hostility) was .99. The four dimensions were standardized into z-scores, and then combined to create a composite emotional availability score in which higher scores indicate higher emotional availability ($\alpha = .84$).

Data Analysis

In order to determine whether the predictor variables changed significantly over time, repeated measures ANOVAs were run for each predictor variable. For those predictor variables that showed a significant change over time, change scores between time points (i.e., between 1 and 3 months, and between 1 and 6 months) were created when the main effect of time and the within-subject contrasts were significant. The relevant change scores were then included in both partial correlations and hierarchical multiple regression analyses (described below).

Partial correlations were used to examine whether the average level of depressive symptoms, coparenting quality, sleep quantity and quality, and infant temperament had direct linkages with mothers' emotional availability at bedtime, and whether the degree of change in the predictor variables between the three time points were related to maternal emotional availability (for those predictors that were found to change significantly over time). Finally, hierarchical multiple regression analyses were used to test whether infant temperament

moderates the relations between the predictor variables (mothers' depressive symptoms, coparenting quality, maternal and infant sleep, and changes in these variables) and emotional availability at 9 months. The hierarchical multiple regression for each predictor variable included 3 steps. The first step included the control variables as covariates. The second step included the predictor variable combined and averaged across 1, 3, and 6 months (centered); change score(s) (e.g., between 1 and 3 months, and/or between 1 and 6 months; centered); and infant temperament factor(s) (e.g., Surgency/Extraversion, Negative Affectivity, Orienting/Regulation; centered). The third step included the multiplicative interaction term(s) between the averaged predictor and infant temperament factor(s); the multiplicative interaction term(s) between the change score(s) and temperament factor(s). Each temperament factor was tested as a moderator in separate regression models, and were only included in the above final model if it was a significant moderator. Each of the final regression models were then trimmed (i.e., removed non-significant terms starting with the largest tail probability) until only significant interactions and/or main effects remained, in order to obtain the best predictive model for each predictor.

Results

Preliminary Analyses

Correlations among predictor variables. Table 1-1 provides the correlations between mothers' average (1, 3, and 6 months combined) depressive symptoms, positive and negative coparenting, sleep variables, as well as infant temperament factors (Surgency/Extraversion, Negative Affectivity, and Orienting/Regulation) at 6 months. Several notable correlations between the predictor variables emerged. Mothers' depressive symptoms and coparenting quality

Table 1-1. Correlations between mothers' average depressive symptoms, positive and negative coparenting, maternal and infant sleep-related variables, and infant temperament factors (n =106).

Variable	1	2	3	4	5	6	7	8	9	10
1. Depressive symptoms	1									
2. Positive coparenting	-.56**	1								
3. Negative coparenting	.43**	-.64**	1							
4. Hours of sleep (maternal)	-.18	.21*	-.11	1						
5. Sleep Quality (maternal)	-.42**	.24*	-.15	.21*	1					
6. Freq. infant night wakings	.04	-.07	.14	-.02	-.32**	1				
7. Length infant night wakings	.07	-.15	.01	-.14	.07	-.33**	1			
8. Infant Surgency/Extraversion	-.12	.11	.17	-.28**	-.01	.00	-.04	1		
9. Infant Negative Affectivity	.25*	-.32**	.36**	-.08	-.36**	.29**	.06	.09	1	
10. Infant Orienting/Regulation	-.32**	.37**	-.11	-.17	.19	-.10	-.11	.63**	-.39**	1

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

(positive and negative) were interrelated in the expected directions. Positive coparenting was related to more hours of sleep and higher sleep quality in mothers. More frequent infant night wakings was also significantly related to poorer sleep quality in mothers.

Correlations between infant temperament factors indicated that higher orienting/regulation was related to higher surgency/extraversion and lower negative affectivity. Higher negative affectivity in infants was significantly related to higher maternal depressive symptoms, less positive and more negative coparenting, lower sleep quality in mothers and more frequent infant night waking.

Control variables. Correlations between infant and maternal demographic variables (infant gender, whether mothers were first-time parents, whether mothers breastfed their infant, mother's age, marital status, and employment status, and family income) and bedtime emotional availability were conducted to determine control variables. Child gender, mothers' age, $r(105) = .31$, $p < .01$., and mothers' marital status were significantly correlated with EA. EA was significantly higher for male infants ($M = .79$, $SD = 2.60$) than for female infants ($M = –.63$, $SD = 3.86$), $t(104) = 2.17$, $p < .05$; and significantly higher for mothers with partners ($M = .27$, $SD = 3.22$) than for mothers who were single ($M = –2.32$, $SD = 4.36$), $t(104) = –2.43$, $p < .05$. Thus, in addition to the length of infant bedtimes, these variables were statistically controlled in analyses.

Main Hypotheses

Hypothesis 1. Mothers' depressive symptoms, averaged across 1, 3, and 6 months, and the chronicity and severity of symptoms were expected to predict mothers' emotional availability (EA) during infant bedtime at 9 months. Contrary to expectations, mothers' average level of symptoms were not associated with maternal EA, partial $r(93) = –.13$, $p = .20$. In addition, the 15 mothers with chronic and high depressive symptoms (i.e., above the clinical cut-off for two or more times across the first 6 months) were not significantly lower on EA at 9 months ($M = –.94$, $SD = 4.36$) as compared to the remaining mothers ($M = .19$, $SD = 3.27$; $t(102) = 1.17$, $p = .24$.

Hypothesis 2. Mothers' coparenting quality during the first 6 months was hypothesized to predict mothers' EA during infant bedtime at 9 months. As expected, a history of more positive coparenting significantly predicted higher maternal EA, partial $r(92) = .31$, $p < .01$, and a history of more negative coparenting significantly predicted lower maternal EA, partial $r(90) = –.43$, $p < .001$. For a more detailed understanding of how coparenting quality related to emotional availability, partial correlations between the six individual dimensions of coparenting and EA were conducted. These analyses showed that all of the six coparenting dimensions were significantly associated with EA. Whereas Agreement with Partner, $r(93) = .29$, $p < .01$, Increased Closeness, $r(92) = .26$, $p < .05$, Support-Cooperation, $r(93) = .28$, $p < .01$, and Endorses Partner's Parenting, $r(93) = .28$, $p < .01$, were positively correlated with EA, Exposure to Conflict, $r(93) = –.31$, $p < .01$, and Competition-Undermining, $r(90) = –.42$, $p < .001$, were negatively correlated with EA.

Hypothesis 3. Mother and infant sleep quality and quantity averaged across the first 6 months were expected to influence mothers' emotional availability during infant bedtime at 9 months. Partial correlations indicated that these four hypothesized relations between maternal and infant sleep-related variables and bedtime EA were unsupported. Averages of mothers' hours of sleep, $r(90) = .03$, $p = .78$, sleep quality, $r(89) = –.12$, $p = .26$, the frequency of infant night wakings, $r(90) = .06$, $p = .59$, and the average length of infant night wakings, $r(81) = –.05$, $p = .67$, were not significantly associated with mothers' EA.

Hypothesis 4. Changes in maternal and infant variables during the first 6 months were expected to predict maternal bedtime EA at 9 months. RM ANOVAs indicated a decrease from 1 to 6 months in maternal depressive symptoms, decreases from 1 to 3 months, and from 1 to 6 months, in the frequency and duration of infant night wakings, and increases from 1 to 3 months,

and from 1 to 6 months, in mothers' hours of sleep, all *p*s < .05. However, none of the partial correlations between the change scores for these variables and 9-month maternal EA was significant.[1]

Hypothesis 5. Infant temperament at 6 months was expected to both directly influence mothers' emotional availability during infant bedtime at 9 months, as well as interact with maternal variables to predict mothers' emotional availability. Our hypotheses were partially supported. Bivariate correlations of the three higher-order factors of temperament with mothers' emotional availability indicated that Surgency/Extraversion (SE), partial $r(94) = –.35$, $p < .01$, and Negative Affectivity (NA), partial $r(94) = –.23$, $p < .05$, were negatively related to EA. Orienting/Regulation was not significantly related to EA, partial $r(94) = –.03$, $p = .77$. Thus, mothers engaged in less emotionally available parenting during bedtime at 9 months when they perceived their infants as more surgent and affectively negative at 6 months.

Of the eight hierarchical multiple regression models testing whether infant temperament (at 6 months) moderated the relations between maternal variables and EA at 9 months, three indicated significant interactions: (a) infant SE (at 6 months) by mothers' depressive symptoms (change from 1 to 6 months) interaction, (b) infant SE by mothers' positive coparenting (average) interaction, and (c) infant SE by mothers' negative coparenting (average) interaction.
First, the regression model for maternal depressive symptoms as predictor of EA indicated that the main effect of change in maternal depressive symptoms (from 1 to 6 months) was not significant, $B = –.06$, $t = –1.39$, $p > .05$, the main effect of infant SE was significant, $B = –1.84$, $t = –3.98$, $p < .001$, and the interaction of change in depressive symptoms with infant SE was significant, $F_{change} = 6.41$, $p < .05$. The overall R^2 was .43, $F(7, 98) = 11.49$, $p < .001$. In order to

[1] Analyses including all change scores, regardless of whether they were significant in the RM ANOVAs or not, did not indicate any differences in the results.

examine the amount of variance accounted for in EA by the interaction term, f^2, the ratio of variance explained by the interaction term alone to the unexplained variance in the final model, was calculated (Dawson, 2013). The f^2 value was –.07 (Cohen et al., 2003 describe .02 as being a small effect). Analysis of simple slopes (Aiken & West, 1991) indicated that the simple slope was not significant when infants were low on SE (–1 *SD* below the mean; gradient = .07, $p > .05$), but was significant for infants who were high on SE (+1 *SD* above the mean; gradient = –.20, $p < .01$). Thus, variation in change in maternal depressive symptoms from 1 to 6 months was inversely related to mothers' EA at 9 months when infants were highly surgent, but not when infants were low on surgency (Figure 1-1). That is, only mothers with highly surgent infants showed less emotional availability when they experienced an increase in depressive symptoms from 1 to 6 months, and more emotional availability when their symptoms decreased.

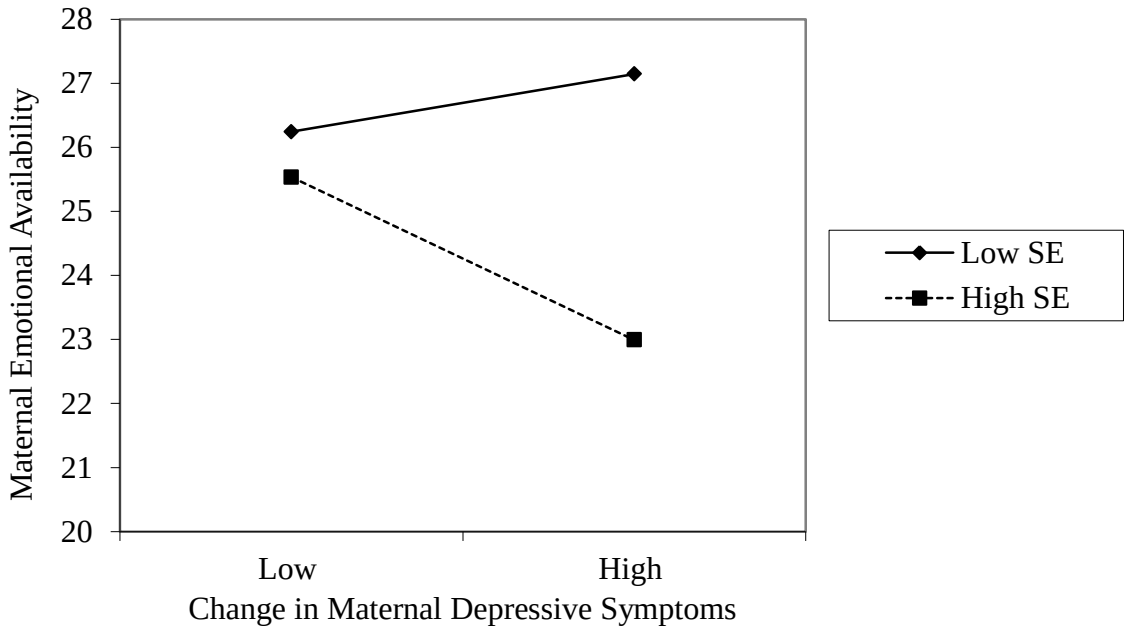


Figure 1-1. Interaction effect of change from 1 to 6 months in mothers' depressive symptoms and infant Surgency/Extraversion (at 6 months) on mothers' emotional availability (at 9 months).

Second, in the regression model for mothers' positive coparenting as predictor of EA, the main effects of positive coparenting (averaged across 1, 3, and 6 months), $B = .06$, $t = 3.50$, $p < .01$, and infant SE, $B = –2.01$, $t = –4.63$, $p < .001$, were qualified by a significant interaction of positive coparenting and infant SE, $F_{change} = 5.53$, $p < .05$. The overall R^2 was .53, $F(7, 96) = 14.04$, $p < .001$, and the f^2 value was –.06. Analysis of simple slopes indicated that the simple slope for infants who were low on SE (–1 *SD* below the mean) was not significant (gradient = .02, $p > .05$), but for infants who were high on SE (+1 *SD* above the mean), it was significant (gradient = .10, $p < .001$). When infants were highly surgent, variation in positive coparenting was positively related to mothers' EA, but not for low-surgent infants (Figure 1-2).

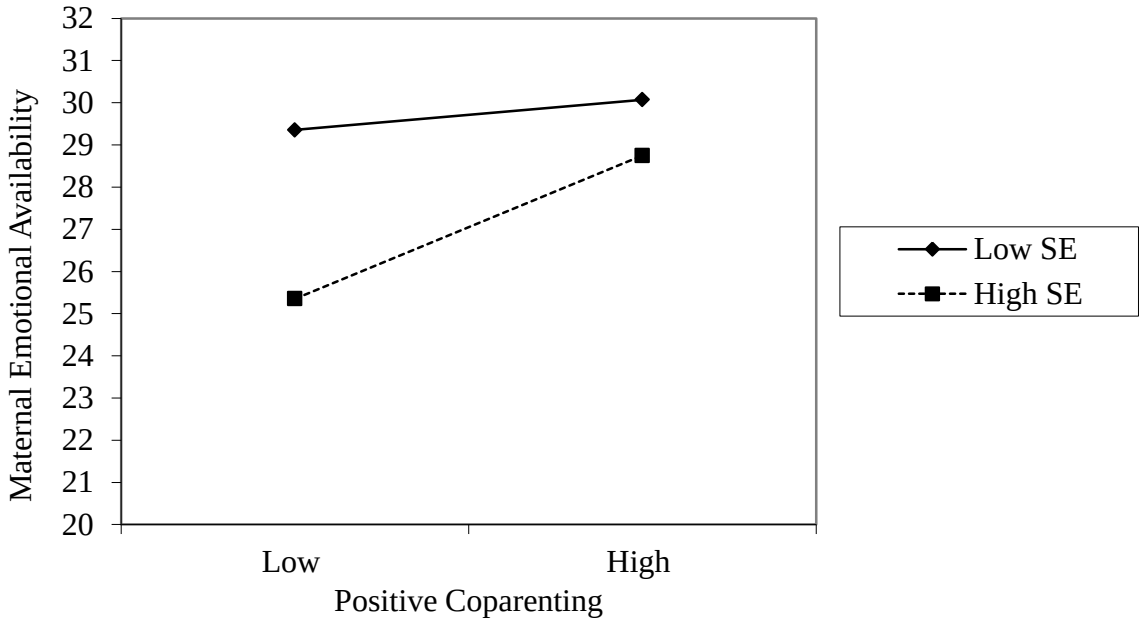


Figure 1-2. Interaction effect of mothers' average positive coparenting and infant SE (at 6 months) on mothers' emotional availability (at 9 months).

Finally, the regression model with negative coparenting as predictor of EA indicated that the main effects of negative coparenting (averaged across 1, 3, and 6 months), $B = –.16$, $t = –$

3.10, $p < .01$, and infant SE, $B = –1.36$, $t = –3.09$, $p < .01$, were qualified by a significant interaction of negative coparenting and infant SE, $F_{change} = 10.02$, $p < .01$. The overall R^2 was .57, $F(7, 94) = 16.50$, $p < .001$, and the f^2 value was –.10. Analysis of simple slopes indicated that the simple slope for infants who were low on SE (–1 *SD* below the mean) was not significant (gradient = –.02, $p > .05$), but for infants who were high on SE (+1 *SD* above the mean), it was significant (gradient = –.30, $p < .001$). When infants were highly surgent, variation in negative coparenting was inversely related to mothers' EA, but not for low-surgent infants.

Discussion

The present study is the first to take an ecological approach to understanding parenting quality during infant bedtime using actual observations of parenting quality. Mothers' psychological, social, and sleep-related resources as well as infant characteristics were examined together as predictors of parenting quality. In agreement with ecological theory, mothers' social resources, conceptualized presently as the coparenting relationship, across the first 6 months, and infant temperamental surgency/extraversion and negative affectivity, were found to directly predict mother-infant interaction quality at 9 months. Whereas mothers' depressive symptoms did not directly predict mothers' emotional availability, they did interact with infant surgent temperament to do so.

Coparenting Quality and Emotional Availability

When the coparenting relationship was more positive, parenting quality was higher, with parenting quality suffering when mothers experienced more negative coparenting. More

specifically, agreement with the partner in matters of coparenting, feeling increased closeness with the partner, and receiving support and endorsement from the partner during coparenting were related to mothers' abilities to be more emotionally available during interactions with their infants. Conversely, conflict or competition in the coparenting relationship spilled over into the mother-infant relationship, relating to interactions marked by lower emotional availability.

Of all the maternal predictors of parenting analyzed in the present study, only coparenting was a direct predictor of parenting quality during infant bedtime. Showing mean stability across the first 6 months, the quality of the coparenting relationship was a particularly important social resource for how emotionally available mothers were toward their infants. This corroborates findings from previous studies reporting linkages between coparenting support and conflict and parenting quality during mother-infant interactions (Cabrera et al., 2009; Caldera & Lindsey, 2006; Feinberg et al., 2005), and extends these linkages to the infant bedtime context.

In addition, regression analyses indicated that both positive and negative coparenting quality interacted with infant surgent/extraverted temperament to predict mothers' emotional availability. That is, low levels of positive coparenting, and high levels of negative coparenting were related to lower emotional availability in mothers only when infants were high on temperamental surgency/extraversion. These findings are in line with previous studies that have found child temperament to interact with parental characteristics and social context to influence parenting quality (Pauli-Pott et al., 2000; Paulussen-Hoogeboom et al., 2007).

Infants with a highly surgent temperament, that is, those who are highly active, tend to rapidly approach novelty, experience pleasure from stimuli with high intensity, complexity, or novelty, and are perceptually sensitive to even low intensity stimuli in the external environment (Gartstein & Rothbart, 2003). Such infants may need more time and effort from their parents,

which is likely to require parents to work better together as coparents. If the quality of the coparenting relationship is highly positive, mothers may feel better supported in coparenting their surgent infants. However, less agreement with and support from a coparent are likely to make engaging in emotionally available parenting with a surgent infant more difficult.

Similarly, if mothers perceive very little conflict or competition in the coparenting relationship, this may enable them to be emotionally available to their infants, even if they are highly surgent. However, if high levels of negative coparenting are coupled with a highly surgent child, this may pose a particular challenge for mothers. Thus, under conditions of high positive coparenting and low negative coparenting, mothers may be "buffered" from the challenges of having a temperamentally surgent infant (Solmeyer & Feinberg, 2011).

Maternal Depressive Symptoms and Emotional Availability

Contrary to expectations and findings of previous studies, mothers' levels of depressive symptoms, and change in maternal symptoms from 1 to 6 months, did not directly predict parenting quality. Depressive symptoms, by themselves, may not be related to parenting quality in this community sample as mothers generally had low levels of symptoms. Except for a few mothers, most mothers' symptoms were in the low, sub-clinical range, and were likely not high enough by themselves to compromise their emotional availability. The lack of a significant relation between chronic and high depressive symptoms and parenting quality may also be attributable to the lack of statistical power due to the very small number of mothers (n = 15) in the present study who reported clinical levels of depressive symptoms at two or more time points across the first 6 months. Given the homogeneity of the sample, these 15 mothers may represent a smaller, higher risk group that could not be clearly discerned in the study.

In the presence of a temperamentally surgent infant, however, variations in changes in mothers' depressive symptoms from 1 to 6 months did predict the quality of parenting at 9 months. That is, increases in mothers' depressive symptoms were predictive of lower maternal EA, and decreases in mothers' depressive symptoms were predictive of higher maternal EA, only for more surgent infants. These findings are the first to suggest that changes in depressive symptoms in mothers may affect parenting differently, depending on the surgency of the child.

Maternal and Infant Sleep Quality and Emotional Availability

In contrast to expectations, maternal and infant sleep-related variables were not predictors of parenting quality at bedtime. A possible explanation is that mothers regard frequent and prolonged night wakings in their infants as normative, especially during the first six months when infant sleep is not yet well consolidated. With normative decreases in the number and duration of night wakings over time, infant sleep quality may not be perceived as problematic by mothers, and thus does not affect how emotionally available they are toward their infants during bedtime. Another possibility is that bedtime parenting quality predicts concurrent and/or subsequent infant sleep quality (as found in Teti et al., 2010), but is not as clearly predicted by assessments of infant and maternal sleep obtained at earlier points in infant development. It will be important for future work to explore the directionality of effects.

Child Temperament and Emotional Availability

Infant temperament had both direct and moderating relations with mothers' emotional availability. Consistent with previous findings, infants in the present study who were perceived

by mothers as more surgent and affectively negative at 6 months tended to elicit less emotionally available parenting at bedtime. As discussed above, however, temperament was also an important moderator of associations between mothers' social ecology and well-being, and mothers' capacity for emotionally available interactions with their infants at bedtime. These findings are consistent with earlier work demonstrating that infant temperament predicted poorer parenting in the context of other maternal risk factors (Paulussen-Hoogeboom et al., 2007).

Whereas infant negative affectivity directly predicted maternal EA, in contrast with previous studies (Putnam et al., 2002), infant negative affectivity did not interact with the other predictor variables in predicting parenting quality. The reason for this is not clear. It is possible that infant negative affectivity does not affect parenting quality during infant bedtimes as much as infant surgency/extraversion. Mothers may be more understanding of an emotionally upset infant, and thus more willing to exert additional effort for the infant at bedtime, than for a surgent infant who, by definition, is highly active and less responsive to mothers' efforts, when the task at hand is to put the infant to bed. Interestingly, the temperamental higher-order factor of orienting/regulation (OR) bore no relation to maternal EA. One possible reason may be the limited variability and low alpha of OR found in the present sample.

Limitations

Although efforts were made during the recruitment of families to increase the racial diversity of the present sample, the majority (80.5%) of the sample was Caucasian, which reduces the representativeness of the findings. The findings are also limited to a low-risk sample of mothers who were above average on parenting quality. Another limitation was that only findings related to mothers were reported in the present study. Although a few fathers were

involved in infant bedtime at 9 months, the sample size of fathers who were involved with infant bedtimes was too small and thus lacked power to detect significant findings. Despite the limited involvement of fathers during infant bedtime at 9 months, fathers' overall involvement in coparenting their infants with their partners appeared to extend in important ways to mothers' parenting at infant bedtimes. Even if fathers were not physically present and involved during infant bedtimes in the majority of families, mothers were more emotionally available towards their infants if they were more "in sync" with fathers about coparenting. Finally, although our use of video to capture bedtime interactions was a strength of the study, interactions were obtained only for one night, which may have limited the representativeness of the video obtained.

Conclusions

This study used an ecological framework to demonstrate that determinants of mothers' emotional availability with their infants at bedtime parenting are complex, with various resources available to mothers as well as infant characteristics playing important influential roles. The present results suggest that any efforts to improve mothers' emotional availability toward their infants during the first year should take into consideration the quality of the coparenting relationship, child temperamental characteristics, and the manner in which child temperament impacts linkages between maternal resources and parenting. Additional studies are needed to better understand the characteristics and predictors of parenting at bedtime, and to address the relations between the quality of bedtime parenting and both immediate and long-term child developmental outcomes.

STUDY 2

Mothers' Emotional Availability During Infant Bedtime Across the First Year of Life: Relations with Infant Temperament in Predicting Attachment Security

Introduction

A major tenet of attachment theory is that sensitive parenting leads to secure attachments, and insensitive parenting leads to insecure attachments (Ainsworth, Blehar, Waters, & Wall, 1978; Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000). Since Mary Ainsworth's observational study in which a strong link between maternal sensitivity and attachment security was found (Ainsworth et al., 1978), there have been a large number of studies that have focused on parental sensitivity in relation to attachment security. These studies have generally found small to medium effect sizes for the link between parental sensitivity and attachment security (Aviezer, Sagi, Joels, & Ziv, 1999; De Wolff & van IJzendoorn, 1997; Fish & Stifter, 1995; Isabella & Belsky, 1991; Sroufe, 2005; Tomlinson, Cooper, & Murray, 2005; Ziv, Aviezer, Gini, Sagi, & Koren-Karie, 2000), with some studies finding no association at all (e.g., Lohaus, Keller, Ball, Voelker, & Elben, 2004).

One explanation for the inconsistent findings may be a measurement issue in that studies vary as to how they define and measure maternal sensitivity. Whereas Ainsworth did lengthy observations in various naturalistic contexts to assess maternal sensitivity, many studies today typically obtain relatively brief, one-time observations of mother-child interactions in structured

contexts. The quality of parenting in contexts other than the often studied free play, feeding, teaching, and clean-up contexts has received less attention as a predictor of attachment security. Another explanation may be that the impact of parental sensitivity on attachment security depends in part on characteristics of the infant, such that infants vary in their susceptibility to the caregiving environment (Belsky, 2005). Referred to as "differential susceptibility," this hypothesis proposes that high quality parenting may be a stronger predictor of attachment security for infants with more reactive temperaments than for infants with less reactive temperaments, because reactive temperament may reflect a nervous system that is highly sensitive to environmental experience, whether positive or negative (Belsky, 2005; Belsky & Pluess, 2009). Infants who are more sensitive to their environments are more likely to (a) benefit from positive parenting experiences during which they experience greater pleasure and rewards, and (b) respond more adversely to negative parenting experiences during which they experience greater displeasure and punishments (Belsky & Pluess, 2009). Indeed, several studies suggest that the effect of maternal parenting on infant attachment security depends on infant temperamental characteristics, such that attachment security in infants with more reactive temperaments is more likely when parenting quality is high, and less likely when parenting quality is low, as compared to infants with less reactive temperaments (Klein Velderman, Bakermans-Kranenberg, Juffer, & van IJzendoorn, 2006).

In light of these issues, the present study (a) examines parenting quality through the lens of the multidimensional construct of emotional availability, which includes, but is not limited to, sensitivity; (b) obtains longer naturalistic observations of emotional availability at multiple time points across the first year during the less-studied parenting context of infant bedtime; and (c) assesses whether infants with more reactive and less well regulated temperaments are

differentially susceptible to the quality of bedtime parenting in relation to attachment security at the end of the first year of life.

Emotional Availability: A Multidimensional Indicator of Parenting Quality

Parental emotional availability is the parent's "affective attunement" to the child's emotions, needs, and goals (Biringen, 2000; Easterbrooks & Biringen, 2000). The term "emotional availability" was first used by Mahler, Pine, and Bergman (1975) to describe the mother's supportive presence during the child's exploration of the environment. Inspired by Ainsworth's original concept of sensitivity, an emotionally available mother was viewed as encouraging the child's explorations and accepting of the child's returns for comfort (i.e., a secure base). Later, emotional availability was extended to include the mother's acceptance of a wide range of both positive and negative affects in the child, and her regulation of emotional exchanges during interactions with the child (Emde, 1980; Emde & Easterbrooks, 1985). In addition to placing a greater emphasis on the affective qualities of parent-infant interactions, emotional availability also includes three other dimensions of parenting quality – structuring, non-intrusiveness, and non-hostility (Biringen, Robinson, & Emde, 1998). Each dimension of emotional availability is described in the following sections.

Sensitivity. Sensitivity is an overall assessment of the parent's affect, clarity of perceptions, appropriate responsiveness, awareness of timing, flexibility, variety and creativity in modes of play, acceptance, accessibility, and style of conflict resolution during parent-child interactions (Biringen et al., 1998). A highly sensitive parent displays genuine interest and pleasure in the child, accurately perceives the child's emotional and behavioral cues, and responds in an appropriate manner. Thus, the emotional communication between parent and

child is mostly positive, accepting, and smooth. Also, a more sensitive parent is able to resolve mismatches in interactions to return to more synchronous states in which both parent and child together determine goals (Biringen et al., 1998).

Structuring. Structuring is the degree to which the parent appropriately structures the child's exploration by following the child's lead and setting limits for appropriate behavior (Biringen et al., 1998). Optimal structuring includes providing rules and a framework for interactions in a way to which the child is receptive (Biringen, 2000). The parent actively participates in the interaction by providing adequate information and simplifying complex tasks into simpler steps, but does not overly control the child's activity (Biringen et al., 1998; Lovas, 2005).

Non-Intrusiveness. Non-intrusiveness refers to the parent's ability to be verbally and nonverbally available to the child without being overly directive, stimulating, interfering, or protective during parent-child interactions (Biringen, 2000). A non-intrusive parent engages with the child in a smooth way that does not interrupt the child's autonomy or overpower the interaction (Bornstein, Gini, Suwalsky, Putnick, & Haynes, 2006), and instead allows the child to lead in exploration and during interactions (Biringen & Robinson, 1991; Lovas, 2005). An intrusive parent too frequently directs the interaction based on parental agenda, and fails to provide the child with opportunities to explore and lead (Biringen et al., 1998).

Non-Hostility. Non-hostility is talking and behaving with the child in a generally patient, pleasant, and harmonious manner, and not expressing covert or overt hostility towards the child (Biringen, 2000; Bornstein et al., 2006; Lovas, 2005). Non-hostile parents engage in appropriate emotion regulation such as not displaying covert hostility in the form of impatience, passive-aggressive behaviors, or boredom during interactions (Biringen, 2000; Biringen et al., 1998).

They also do not engage in overtly harsh or demeaning behaviors that threaten or frighten the child (Biringen et al., 1998).

Trajectories of Emotional Availability Across the First Year. Although the relation between emotional availability and children's social-emotional outcomes is well-established in the literature (Aviezer et al., 1999; Biringen, 2000; Volling, McElwain, Notaro, & Herrara, 2002; Ziv et al., 2000), few studies have examined the stability (consistency of individual differences) and continuity (consistency of mean levels) of emotional availability at multiple time points during infancy and toddlerhood (Bornstein et al., 2010). Bornstein et al. (2006a, 2006b) demonstrated moderate stability and continuity (no mean-level changes) in mother-infant emotional availability across one week when infants were 5 months old, and when toddlers were 2 years old. Similarly, Lovas (2005) found moderate stability in emotional availability for both mothers and fathers (during free play and clean-up) between 19 and 24 months. Other studies have found discontinuity in emotional availability dimensions: Biringen et al. (1999) found a slight increase in maternal sensitivity between 9 and 14 months; whereas Bornstein et al. (2010) found decreases in mothers' sensitivity, structuring, and non-intrusiveness between 5 and 20 months. Based on these studies, moderate stability and both continuity and discontinuity in maternal emotional availability may be expected.

Observations of mother-infant interactions when the infant is 1, 3, 6, 9, and 12 months of age would enable an assessment of both the stability and continuity of emotional availability across the first year, whether certain trajectories of emotional availability over time can be identified, and whether such trajectories are differentially associated with infant outcomes. It may be plausible for mothers' emotional availability to be consistently high, consistently low, increasing/decreasing, or inconsistent across the first year. If such trajectories in parenting

quality exist, each trajectory may relate to infant outcomes in a particular way. For example, as suggested by both theory and empirical findings, a consistently high trajectory of parenting quality may be most beneficial to infants in terms of their attachment security. In contrast, parenting quality that is consistently low is expected to lead to less secure attachment in infants. With regards to changes in parenting quality across the first year, improvements in parenting quality may benefit infants, whereas declines or inconsistencies in parenting quality may lead to the poorest attachment outcomes in infants (NICHD Early Child Care Research Network, 2006; Sroufe, 2005).

Emotional Availability During Infant Bedtimes: Links to Infant Attachment Security

The present study examines parenting quality during the less-studied context of infant bedtimes. Bedtime interactions may provide one of the earliest contexts for parents to influence their infants' physiological, cognitive, and social-emotional development. Unlike more commonly observed structured contexts such as free-play, infant bedtime is a naturalistic context that occurs on a daily basis. Whereas parents will put their infants down to sleep at the end of every day, they may not engage in daily free-play interactions with their infants, especially in the infants' earliest months.

During bedtime, parents have the goal of bringing the infant to a comfortable, restful, and non-distressed state so that the infant can fall asleep and sleep during the night. Parenting quality during bedtime interactions may thus have important implications not only for the quality of infants and young children's nighttime sleep (Anders, 1994; Teti, Kim, Mayer, and Countermine, 2010), but also for physical development, cognitive outcomes, and social-emotional functioning during infancy and beyond (El-Sheikh, Buckhalt, Keller, Cummings, & Acebo, 2007; Gregory et

al., 2005; Spruyt et al., 2008). In Western societies, bedtime typically precedes the longest parent-infant separation of the day, a potential source of distress for the infant (Sadeh, Tikotzky, & Scher, 2010). Cessation of parent-infant interactions and separation from parents may be distressing for infants who wish to maintain their contact or interaction with their parents. Infant bedtimes may require parents to down-regulate their infants' emotions, as well as to promote feelings of safety and security in order to facilitate falling asleep. Whereas a substantial number of studies have examined parenting practices during bedtime such as soothing techniques (Mindell, Sadeh, Kohyama, & Hwei How, 2010) and limit setting (Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006), the present study shifts the focus from specific bedtime parenting practices to the emotional quality of parenting when parents put their infants to bed.

Infant Attachment Security at 12 months. Parental emotional availability has been related to attachment security from infancy through middle childhood in both the U.S. and non-U.S. countries (Biringen et al., 2005; Easterbrooks, Biesecker, & Lyons-Ruth, 2000). For example, parental interactive behavior characterized by emotional support, non-intrusiveness, structuring, and low hostility was related to more secure attachments in 15 month olds (van Bakel and Riksen-Walraven, 2002). Maternal sensitivity and more optimal structuring of mother-infant play were related to secure attachment in 14 to 22 month olds (Aviezer et al., 1999). Similarly, maternal sensitivity and structuring/intrusiveness were higher for infants securely attached at 12 months compared to insecurely attached infants (Ziv et al., 2000). High intrusiveness (but not sensitivity) predicted more insecure attachments at 18 months (Tomlinson et al., 2005), and, in particular, avoidant attachment at 12 months (Isabella & Belsky, 1991). Fish and Stifter (1995) found both lower sensitivity and higher intrusiveness to be related to insecure attachment at 18 months. Also, Biringen et al. (2005) found that mothers' emotional availability

was especially predictive of resistant attachment when longer observations of mother-child interactions were obtained. Thus, together, the above findings point to the validity of parental emotional availability as a predictor of infant attachment security.

The present study will be the first to examine trajectories of parents' emotional availability during infant bedtime across the first year as predictors of infant attachment security. The quality of parenting during infant bedtime may be particularly important to assess, in light of the fact that bedtime involves, for most infants, the longest parent-infant separation of the day (Teti et al., 2010). Parents' ability to create a safe and secure bedtime environment for their infants may be particularly important in shaping infant-parent attachments across the infants' first year.

Infant Reactive Temperament: Direct and Moderating Effects

According to the differential susceptibility hypothesis, a reactive temperament may both exacerbate the negative effects of poor parenting and augment the positive effects of high quality parenting on children's attachments to parents (Belsky, 2005; Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007). For example, several studies have found parental sensitivity to be more important for infants high in irritability, such that if the parent has high sensitivity, highly irritable infants are more likely to be securely attached (Crockenberg, 1981; van den Boom, 1994). In addition, an examination of the second-by-second "dyadic contingency" between parent and infant revealed that infants' self- and interactive contingency (ways that infants regulated their own behaviors and coordinated their behaviors with mothers) provided two to three times more information about later attachment security (at 12 months) than mothers'

interactive contingency (mothers' contingent coordination with infant behavior; Beebe et al., 2010).

Whereas a direct effect of infant temperament on attachment security is not strongly supported, both theoretically and empirically (Vaughn, Bost, & van IJzendoorn, 2008), consideration of the interaction between parenting quality and infant temperament will be a necessary aspect of understanding how mothers' emotional availability during infant bedtimes predicts later infant attachment security. More emotionally available parenting during bedtime may be particularly important for the attachment security of infants who are more temperamentally reactive and less well regulated. That is, infants who are highly surgent/extraverted or are high on negative affectivity may respond with greater intensity to both high and low emotional availability during bedtime, which would be expected to either foster or hinder the developing attachment relationship between parent and infant. Highly active infants who are prone to approach and are perceptually sensitive, and/or infants who tend to become highly distressed and take longer to recover from distress, may benefit most from bedtime parenting that allows them enough time to reach a state that is calm enough to fall asleep, and benefit least from parenting that requires these infants to fall asleep at parents' demand/schedules. Those surgent or affectively negative infants whose parents are particularly sensitive to their emotional needs, structure in ways to prepare them for bedtimes, and do not display intrusive or impatient behaviors may be the ones who form more secure attachments. In addition, infants low on the temperamental factor of orienting/regulation may be particularly responsive to emotionally available parenting that helps them to down-regulate to a restful state. Parents who are emotionally available to their infants whose regulatory capabilities are particularly immature may be better promoting the quality of the parent-infant attachment relationship than parents

who do not respond in an understanding way to their infants' limited capabilities to self-regulate (e.g., self-soothe).

Hypotheses

The present study examines trajectories of mothers' emotional availability (EA) across five time points (1, 3, 6, 9, and 12 months) across the first year of life, as well as in interaction with infant temperamental reactivity, as a predictor of infant attachment security at 12 months. The following hypotheses are proposed:

1. As earlier studies have found moderate stability and both continuity and discontinuity in maternal EA across time, multiple types of EA trajectories during infant bedtimes across 1, 3, 6, 9, and 12 months of age may exist. These types may include consistently high, consistently low, increasing, decreasing, or inconsistent trajectories.

2. Maternal EA trajectory types were expected to differentially predict infant attachment security at 12 months. Consistently high and/or increasing EA trajectories were expected to be related to more secure attachment. Consistently low, decreasing, and/or inconsistent EA trajectories were expected to be related to less secure attachment.

3. Per the differential susceptibility hypothesis, infant temperamental reactivity was expected to moderate the relation between maternal bedtime EA trajectory types and infant attachment security at 12 months. Infants with highly reactive temperaments were expected to be more susceptible to parenting quality at bedtime, such that maternal EA trajectories would be more strongly related to infant attachment for highly reactive infants compared to low reactive infants (Figure 2-1).

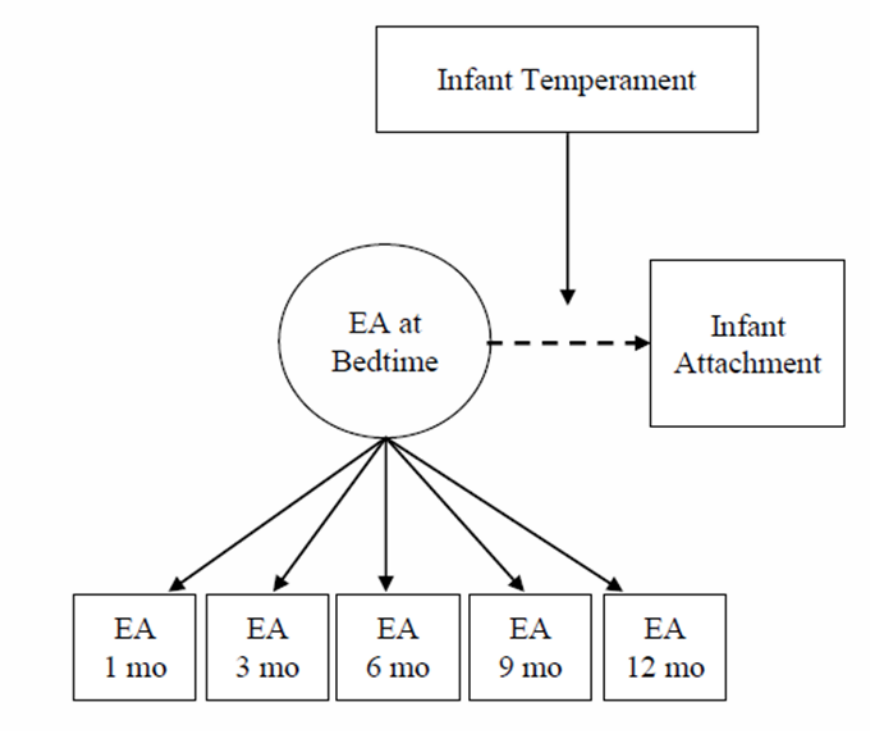


Figure 2-1. Model of EA trajectory latent classes with infant attachment as a distal outcome (12 months), and infant temperament (6 months) as moderator.

Method

Participants

One hundred and twenty-nine mothers and their infants from a larger NIH-funded study of parenting, infant sleep, and infant development during the first two years of life were included in the present study. A total of 167 mothers were recruited in the larger study shortly after delivery from the obstetric floors of the Mt. Nittany Medical Center Mother and Baby Clinic and the Milton S. Hershey Medical Center in central Pennsylvania. All mothers at recruitment who were 18 years or older, of any ethnic background, and fluent in English were included in the study.

Of the original 167 families recruited, 22 families had dropped from the study between 1 and 12 months of infant age, and 16 families did not have at least two codable video recordings of mother-infant interactions at bedtime across the five assessment occasions (1, 3, 6, 9, and 12 months). Reasons for missing video data included (a) no consent for video recordings (n = 3), father-infant interaction only (n = 2), inability to complete the home visit protocol due to unspecified life events (n = 1), and too little or no mother-infant interaction during bedtime to assess parenting quality (n = 10). Comparisons between these 38 families and the 129 families included in the present study sample on sociodemographic variables indicated no significant differences.

In the final study sample, mothers' average age at recruitment was 29.72 years (SD = 5.13), 84.5% of mothers were married, 82.2% of mothers had college or graduate degrees, 62.5% of mothers were employed, and the average family income was $68,805.39. The sample included 85.2% White, 3.9% African American, 2.3% Asian, 5.5% Latino, and 3.1% Other families. Approximately half (54.3%) of the infants were female, and 34.1% were first-borns.

Measures

Maternal emotional availability during infant bedtime (1, 3, 6, 9, and 12 months). Home visits were conducted by project staff when infants were 1, 3, 6, 9, and 12 months old to obtain video recordings of infant bedtime interactions. The digital video recording system included a Bosch Divar XF digital video recorder, Infrared Color CCD night-vision cameras, Channel Vision 5104 microphones, and a portable DVD player. Up to four cameras were set up in the room where the infant slept, and another room (e.g., living room) if parents reported that they took the infant there for any part of bedtime. The cameras overlooked the infant's sleep

location (e.g., bassinet, crib, or parents' bed), a chair/sofa used for bedtime activities such as feeding, and/or a changing table. Parents were asked to start the recording approximately one hour before they began bedtime with their infant, and to end it when the infant woke up in the morning. Sample sizes and average length and range of infant bedtimes at each time point of the study sample are provided in Table 2-1.

The first and second authors who were certified to use the Emotional Availability Scales (Biringen et al., 1998), and were blind to the other study variables, coded the bedtime interactions. Adequate inter-rater reliability was established at each time point (intra-class correlations ranged from .80 to 1.00, with most above .95). Composite EA scores were created by combining the standardized z-scores of the four EA dimensions at each time point (Cronbach's alphas ranged from .75 to .84).

Table 2-1. Means, standard deviations, and ranges (in minutes) of length of infant bedtimes at 1, 3, 6, 9, and 12 months (n = 95-102).

Age (months)	N	*M* (minutes)	*SD*	Min	Max
1	95	75.74	45.45	8.40	256.28
3	97	71.11	65.28	1.17	319.47
6	99	48.00	43.24	2.48	246.27
9	101	41.55	32.70	3.57	202.58
12	102	45.66	30.23	6.40	158.17

The four dimensions of EA – sensitivity, structuring, non-intrusiveness, and non-hostility – were adapted according to criteria established in Teti et al. (2010) to code interactions during infant bedtime. Sensitivity was scored high if mothers responded accurately, appropriately, and promptly to their infants' emotional and behavioral cues during bedtime activities such as

nursing/bottle-feeding, diaper-changing, book-reading, and cuddling. Structuring was scored high if mothers used quiet and calming bedtime routines that gently guided infants toward sleep, but lower if mothers either showed repetitive attempts that were not successful in guiding their infants toward sleep, or left their infants unattended for longer than a few minutes. If mothers took more than 1 minute to respond to their infants who became distressed after being put down to sleep in their own rooms, the sensitivity and structuring scores were commensurately lowered. Mothers were scored lower on non-intrusiveness if they initiated new interactions that interfered with the infant falling asleep, and/or insisted that the infant fall asleep quickly. Non-hostility was scored lower if mothers expressed boredom, impatience, sarcasm, or anger in response to their infants.

As different subgroups or trajectories of EA were thought to exist across the five time points during the infant's first year (1, 3, 6, 9, and 12 months), mothers' composite EA scores at each time point were recoded so that 1 represented a score of 21 or higher, and 2 represented a score lower than 21. The cut-off score of 21 was used as this represents parenting quality viewed as "good enough." An EA score of 21 is typically the sum of a "generally sensitive" score of 7 (out of the total of 9) for Sensitivity (Biringen et al., 1998), along with a score of 4 (out of the total of 5) for Structuring that is appropriate and successful, and a score of 5 (out of the total of 5) for Non-Intrusiveness and Non-Hostility (i.e., no intrusive or hostile behaviors were observed). In a few cases, slight variations in the combination of the four EA dimensions were found such that a mother who showed slight intrusiveness (i.e., a score of 4.5 for Non-Intrusiveness) could have received a composite score of 21 if they showed otherwise highly sensitive parenting behavior (i.e., 7.5 or higher), and "good-enough" scores on the other 2 dimensions (i.e., 4 on Structuring, and 5 on Non-Hostility). Thus, even if composite scores of 21 included a half-point

reduction in Structuring, Non-Intrusiveness, or Non-Hostility, they were included in the high EA category as these typically reflected highly emotionally available mothers whose very high sensitivity scores were decreased (e.g., from 8.5 to 7.5) due to brief moments of structuring, intrusiveness, or hostility that were not "good enough." Different trajectories of mothers' EA across the first year were identified by including the binary EA indicators at five time points in the data analysis model.

Infant temperament (6 months). Infant temperament was measured using the Infant Behavior Questionnaire–Revised (IBQ-R; Rothbart & Gartstein, 2000). Mothers rated each of the 191 items on a 7-point scale, in which 1 indicates their infant "never engages in the behavior", and 7 indicates their infant "always engages in the behavior". Three temperament factors can be obtained from 14 subscales: Surgency/extraversion is comprised of the subscales of approach, vocal reactivity, high intensity pleasure, smiling and laughter, activity level, and perceptual sensitivity ($\alpha = .80$); Negative affectivity includes the subscales of sadness, distress to limitations, fear, and falling reactivity (reverse coded; $\alpha = .64$); and Orienting/regulation is the combination of the subscales of low intensity pleasure, cuddliness, duration of orienting, and soothability ($\alpha = .56$; Gartstein & Rothbart, 2003). Each temperament factor was examined separately as potential moderators. Whereas surgency/extraversion and negative affectivity factors correspond to the reactive aspects of infant temperament, orienting/regulation indicates the regulatory aspect of infant temperament.

Infant attachment security (12 months). At the 12-month home visit, a coder blind to all other observational data on the families observed mothers and infants for 1.5 to 2 hours to assess infant attachment security using the Attachment Q-Set procedure (AQS; Waters & Deane, 1985). After the home observation, coders sorted the 90 items of the Q-Sort into nine stacks

distributed from least (very much unlike the child) to most characteristic (very much like the child) of the infant. A security score for each infant was obtained by correlating each item's score, based on its position in the distribution, with a Security Criterion Sort of the hypothetically most secure child (Waters, Vaughn, Posada, & Kondo-Ikemura, 1995). An example item with a high (> 7.0) criterion sort security score is, "Child clearly shows a pattern of using mother as a base from which to explore," (Item 36, security score = 8.8). An example item with a low security score (< 3.0) is, "At home, child gets upset or cries when mother walks out of the room. (May or may not follow her.)" (Item 75, security score = 1.20). Higher AQS scores indicate more secure attachment in the infant (M = .41, SD = .22, range: –.38 – .75). Consistent with previous studies using the AQS (e.g., Park & Waters, 1989), the security score of .34 (which separates the bottom one-third to the top two-thirds of the sample) was used as a cut-off to distinguish between less secure (n = 43) and more secure (n = 86) infants.

A team of raters who were trained to high reliability conducted the 12-month AQS observations. The intra-class correlation (absolute agreement) for rater pairs on 145 observations in the larger study was .95. The Attachment Q-Set has been shown to be a reliable and valid measure of infants' secure-base behavior in a familiar environment (Howes, Vu, & Hamilton, 2011; van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004).

Data Analysis

Latent class analysis (LCA; e.g., Collins & Lanza, 2010) was used to identify latent subgroups of mothers based on repeated measures of the quality of EA across the infant's first year at 1, 3, 6, 9, and 12 months of age. LCA estimates the proportion of mothers expected to be in each latent class (latent class membership probabilities) as well as a set of parameters that

reflects the correspondence between the latent classes and the items measuring latent class membership (item-response probabilities). The binary maternal EA indicators at five time points were included in the latent class model, so that the latent classes represent trajectories of maternal bedtime EA during the infant's first year (Lanza & Collins, 2006).

A classify-analyze approach to LCA with a distal outcome using maximum-probability assignment with an inclusive LCA (Bray, Lanza, & Tan, in press) was used to examine whether the identified types of EA trajectories differentially predicted infant attachment security at 12 months, and whether the effects of EA trajectory on infant attachment were moderated by infant temperamental reactivity. Analyses were conducted using PROC LCA (Lanza, Dziak, Huang, Xu, & Collins, 2011) in SAS 9.3 (SAS Institute, Cary NC).

Growth Mixture Modeling including mothers' EA as continuous variables was also conducted. As the results indicated a lack of variance in the slopes for the two classes, as well as a lack of variance in the intercept of the second class, the classify-analyze approach to LCA that includes EA as binary indicators was used. Although this may be considered a limitation, the dichotomization of EA was done in a theoretical sense of "good enough" parenting versus not.

Results

Preliminary Analyses

Descriptive statistics for mothers' EA at 1, 3, 6, 9, and 12 months, infant attachment security at 12 months, and infant temperament factors at 6 months are provided in Table 2-2. All intercorrelations between mean EA at the five time points were significant, *r*s = .26 to .62, all *p*s < .05, indicating moderate-to-strong stability. In addition, a repeated measures ANOVA

indicated that there were no significant changes in the means across time (Greenhouse-Geisser F (3.33, 163.27) = 1.76, $p > .05$), indicating moderate continuity in EA during the first year. EA and infant temperament were related such that surgency/extraversion was negatively related to EA at all time points, rs = –.22 to –.46, all ps < .05; negative affectivity was negatively related to EA at 3, 6, and 9 months, rs = –.22 to –.30, all ps < .05; and orienting/regulation was negatively related to EA at 12 months, $r = –.20$, $p < .05$. Intercorrelations between infant temperament factors and infant attachment security indicated a significant but modest relation between surgency/extraversion and attachment security, $r = –.22$, $p < .05$.

Table 2-2. Descriptive statistics for mothers' emotional availability, infant temperament factors and infant attachment security (n = 129).

	M	*SD*	*SE*	α
Emotional Availability				
1 month	19.18	2.91	.30	.77
3 months	19.55	2.70	.27	.75
6 months	19.01	3.04	.31	.75
9 months	18.68	3.65	.36	.84
12 months	18.86	3.33	.33	.79
Infant Temperament (6 months)				
Surgency/Extraversion	4.92	.72	.06	.80
Negative Affectivity	2.92	.59	.05	.64
Orienting/Regulation	5.15	.54	.05	.56
Infant Attachment Security (12 months)	.41	.22	.02	-

Main Hypotheses

Hypothesis 1. Multiple types of trajectories were expected to represent mothers' EA during infant bedtime across the first year. The G^2 likelihood-ratio chi-square, AIC (Akaike, 1974), and BIC (Schwarz, 1978) fit indices were used to compare models with one through four

latent classes (see Table 2-3). A two-class model was selected as optimal: the G^2 statistic was not significant, and both the AIC and BIC were minimized with this model. The matrix of item-response probabilities in Table 2-4 shows how the five binary EA indicators defined the two latent classes identified.

Each latent class corresponds to an underlying subgroup of mothers characterized by a particular pattern of EA across five time points during the infant's first year. These latent classes are referred to as "EA trajectories." The first EA trajectory was characterized by a moderate to high probability (.66, .78, .72, .67, .59) of "good-enough" or high EA at each time point. This EA trajectory comprised 54% of the sample, and was labeled "High EA." The second EA trajectory was characterized by a low probability (.17, .12, .15, .07, .17) of high EA at each time point. This EA trajectory was labeled "Low EA," and comprised 46% of the sample.

Table 2-3. Indicators of fit for models with one through four latent classes.

Number of latent classes	*df*	G^2	*p*-value	AIC	BIC	Solution %[a]
1	26	78.06	< .001	88.06	102.36	100.00
2	20	17.51	.62	39.51	70.97	100.00
3	14	11.50	.65	45.50	94.11	100.00
4	8	6.28	.62	52.28	118.05	40.80

[a] Solution % is the percentage of times solution was selected out of 1000 random sets of starting values.

Table 2-4. Item-response probabilities for "yes" response to high emotional availability.

	Probability of "yes" response conditional on latent class				
Latent class	1 mo	3 mo	6 mo	9 mo	12 mo
1 (54%)	.66	.78	.72	.67	.59
2 (46%)	.17	.12	.15	.07	.17

Hypothesis 2. EA trajectory types were expected to differentially predict infant attachment security at 12 months. Infant attachment security (AQS scores) was added to the two-class model as a covariate in order to generate posterior probabilities. A maximum-probability assignment rule was then used to infer latent class (EA trajectory) membership based on these posterior probabilities. EA trajectory was then treated as known in the outcome analysis regressing infant attachment security on EA trajectory (Bray et al., in press).

Infant AQS scores were significantly predicted by maternal EA trajectory types (–2 Loglik = 8.34 (1), $p < .01$; $B = –.72$, $t = –4.39$, $p < .0001$; overall $R^2 = .13$, $F(1, 127) = 19.27$, $p < .0001$. Infants of mothers with a High EA trajectory were more securely attached than those of mothers with a Low EA trajectory. Specifically, infants of High EA mothers had a mean AQS score of .48 (more secure), and a mode of .62 (more secure). In contrast, for infants of Low EA mothers, the mean AQS score was .33 (less secure), and the mode was .32 (less secure). In sum, infants of mothers with a High EA trajectory were more likely to be securely attached at 12 months, with higher mean and mode attachment security scores, than infants of mothers with a Low EA trajectory.

Hypothesis 3. Infants with highly reactive temperaments were expected to be more susceptible to mothers' EA compared to low reactive infants. That is, the relations between mothers' EA trajectories across the first year and infant attachment security at 12 months were expected to differ by infant temperamental reactivity. Infant attachment security (AQS scores), infant temperament factors (surgency/extraversion, negative affectivity, orienting/regulation), and attachment by temperament factor interaction terms were added to the two-class model as covariates in order to generate the posterior probabilities used to infer EA trajectory membership

(Bray et al., in press). Note that these are not covariates used in the traditional sense of control variables. In LCA, covariates are included as predictors of latent class membership probabilities.

Multiple regression analyses with EA trajectory, temperament factors, and EA trajectory by temperament interaction terms as predictors of infant attachment security indicated that the interaction of EA trajectory by infant surgency/extraversion was significant ($B = –.52$, $t = –2.07$, $p < .05$; overall $R^2 = .18$, $F(7, 116) = 3.63$, $p < .01$). Figure 2-2 illustrates the effect of EA on infant-mother attachment and shows that, among surgent infants of mothers with consistently low bedtime EA, attachment security was lower compared to non-surgent infants of mothers with low EA. Interestingly, attachment security was equally high for both surgent and non-surgent infants when mothers' bedtime EA was high.

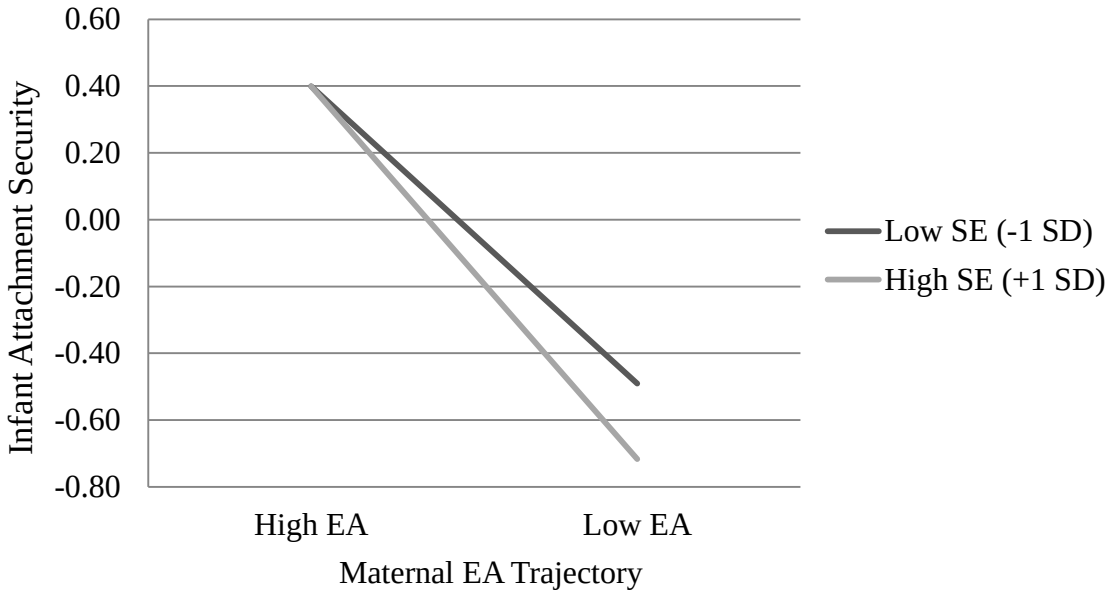


Figure 2-2. Moderation of the relation between maternal EA trajectory and infant attachment security by infant temperamental surgency/extraversion.

Discussion

The present study is the first to examine trajectories of mothers' observed emotional availability across the first year during infant bedtimes as predictors of infant attachment security at 12 months. Infant temperament factors of surgency/extraversion, negative affectivity, and orienting/regulation were also examined as moderators of the relation between bedtime emotional availability and infant attachment security. Two maternal EA trajectory types, one that was consistently high and another that was consistently low, were identified and found to predict infant attachment security. Also, infant temperamental surgency/extraversion significantly moderated the relation between EA trajectories and infant attachment security.

EA Trajectory Types Across the First Year

Mother's EA observed during infant bedtimes at 1, 3, 6, 9, and 12 months across the infant's first year either followed a consistently "good enough" or high trajectory, or a consistently low trajectory. This is in line with previous studies that have found moderate stability in EA across multiple time points (Bornstein et al., 2006a, 2006b; Lovas, 2005), as well as others that have found parenting behaviors to be moderately stable across childhood (Dallaire & Weinraub, 2005; Holden & Miller, 1999). If the hypothesized increasing, decreasing, and inconsistent trajectories do exist, a larger or at-risk sample may be required to identify such trajectories.

EA Trajectory Types, Infant Temperament, and Infant Attachment Security

The two maternal EA trajectories were significant predictors of infant attachment security at 12 months. As expected, when mothers showed consistently high bedtime EA across the first year, infants were more likely to be securely attached at 12 months; conversely, consistently low bedtime EA was related to an increased probability of insecure attachment. This finding extends the literature of studies linking maternal sensitivity in non-sleep contexts with attachment security (De Wolff & van IJzendoorn, 1997; Rothbaum et al., 2000; Tomlinson et al., 2005) by examining multiple observations of parenting quality that includes, but is not limited to, sensitivity, in the less-studied context of infant bedtime.

Further, infant temperamental surgency/extraversion moderated the relation between maternal EA trajectories and infant attachment security, which corroborates studies that have found infant temperament to be an important contributor to the quality of the mother-infant attachment relationship (Belsky, 2005; Belsky & Pluess, 2009; Klein Velderman et al., 2006). Temperamentally reactive infants were expected to be differentially susceptible, for better and for worse, to the influences of parenting quality (Belsky et al., 2007). In partial support of this hypothesis, highly surgent infants were more likely to have insecure attachment than low surgent infants when their mothers showed a consistently low EA trajectory across the first year. That is, low bedtime EA was predictive of insecure attachment especially for those infants with high temperamental surgency. However, high bedtime EA predicted secure attachment in infants regardless of infant surgency, which suggests that, in this sample, highly surgent infants did not necessarily fare better from high maternal EA than low surgent infants. Thus, these results better fit the diathesis-stress model (Ingram & Luxton, 2005; Monroe & Simons, 1991) in which infants' high surgency ("diathesis" or temperamental reactivity) coupled with low maternal EA

("stressor" or negative environmental influence) was predictive of insecure attachment (negative outcome), but both high and low surgent infants were securely attached when parenting quality was high. Mothers whose parenting quality is consistently high across multiple time points during the infant's first year seem to be engaging in parenting that is highly sensitive and adept at structuring bedtime interactions with even their highly surgent infants. Highly surgent infants, however, appear to be particularly reactive to emotionally unavailable bedtime parenting, placing them at greater risk for insecurity than non-surgent infants.

In contrast to the findings involving surgency, and in contrast to previous studies (Crockenberg, 1981; van den Boom, 1994), infant negative affectivity did not moderate the relation between parenting quality and infant attachment security. Although the reason for this is not clear, mothers may regard infant negative affect during bedtime as normative. Mothers may be more tolerant of an emotionally distressed infant at bedtime, but less tolerant of a surgent infant, who by definition is highly active and less responsive to mothers' efforts to put to bed. Indeed, whereas high negative affectivity is the most straight-forward characteristic of a reactive temperament, a highly surgent/extraverted infant that is high on activity level, approach, and perceptual sensitivity may present a different kind of a temperamentally reactive infant. The interaction of difficulties in parenting and high surgency/extraversion in infants may then negatively affect infant attachment security.

Infant temperamental orienting/regulation also was not a significant moderator. One explanation may be the limited variability of orienting/regulation in the present sample. At 6 months, infants were rated by mothers as relatively high on orienting/regulation (M = 5.15, SD = .54), including the ability to focus attention and inhibit behavioral responses, cuddliness, and soothability, with none of the infants scoring below a 4 on a 7-point scale. Another explanation

may be that infant orienting/regulation may not be as salient to parenting during the first year as are the reactive aspects of surgency/extraversion and negative affectivity. Orienting/regulation could be a more subtle aspect of infant temperament in that parents are less likely, in early infancy, to expect their infants to focus attention and inhibit their behavioral responses. In this regard, orienting/regulation may become more impactful in toddlerhood, during which self-regulatory capabilities such as effortful control emerge and mature (Rothbart, Ahadi, & Hershey, 1994). Given the links between infant orienting/regulation and later effortful control in toddlerhood (Gartstein, Bridgett, Young, Panskeep, & Power, 2013), the regulatory aspect of infant temperament clearly needs further study. Overall, the findings that infant temperamental surgency moderated the relation between maternal EA trajectories and infant attachment security underscores the need to include infant characteristics, particularly the more reactive aspects of temperament, in any study of parenting quality and infant outcomes.

Limitations

The findings of the present study are based on a largely homogenous sample of low-risk, middle-class families. Future studies of more diverse families are needed to better understand the relation between bedtime parenting across the first year, infant temperament, and attachment security. In addition, although mother-perceived infant temperament has been found to have both direct and moderating effects on parenting quality (Pauli-Pott, Mertesacker, Bade, Bauer, & Beckman, 2000; Paulussen-Hoogeboom, Stams, Hermanns, & Peetsma, 2007), it may be important to include objective measures of temperament in predicting infant outcomes. Despite these limitations, strengths of the study include naturalistic observations of parenting quality

obtained at multiple times during the infant's first year during the less-studied context of infant bedtime.

Conclusions and Future Directions

The present study is the first to demonstrate that trajectories of bedtime parenting quality across the first year of life, in interaction with temperament, predict infant attachment security at 12 months. Emotionally available parenting in the context of infant bedtime predicted more secure attachment, with less emotionally available parenting being particularly important for the mother-infant attachment relationship of infants high on temperamental surgency. These findings indicate the need for more studies of the complex roles that bedtime parenting quality and infant reactive temperament play in infants' attachment security. For example, future studies might examine whether the emotional quality of bedtime parenting continues to influence attachment security during toddlerhood, and whether it plays an important role in other aspects of infants' social-emotional development, such as emotional and behavioral regulation. Other key outcomes to assess in relation to bedtime parenting quality could include sleep-related outcomes during infancy and toddlerhood. Parental emotional availability could also be examined during nighttime to better understand how bedtime parenting is associated with parenting across the night, and the extent to which nighttime parenting quality also contributes to infant and toddler outcomes. Finally, studies of the emotional quality of bedtime parenting are needed in cultures that engage primarily in co-sleeping, to understand whether parental decisions about sleep arrangements impact quality of parenting when putting infants to sleep, and whether co-sleeping arrangements in any way moderate linkages between bedtime parenting and child developmental outcomes.

STUDY 3

Infant Emotion Regulation: Relations to Bedtime Emotional Availability, Attachment Security, and Temperament

Introduction

The ability to regulate emotions and related behaviors in socially adaptive ways is an essential aspect of children's successful development (Calkins & Leerkes, 2010; Halberstadt, Denham, & Dunsmore, 2001; Kopp, 1989; Thompson, 1994). Lack of emotion regulation skills during infancy and toddlerhood is not only indicative of later aggressive or withdrawn behaviors (Calkins, Smith, Gill, & Johnson, 1998) but also predictive of problems in cognitive and social development through the preschool and early school years (Eisenberg, Cumberland, & Spinrad, 1998; Morris, Silk, Steinberg, Myers & Robinson, 2007).

Both parenting quality and the mother-infant attachment relationship have important implications for children's emotion regulation competencies (Cassidy, 1994; Kogan & Carter, 1996; Sroufe, 1995, 2005). Despite the wealth of studies examining relations between the quality of parenting and child regulatory outcomes, most studies relate individual dimensions of parenting (e.g., sensitivity) in relation to various aspects of emotional competence in infants, toddlers, and preschoolers (e.g., emotion understanding, intensity and duration of emotional expression, and emotion regulation strategies). Thus, in the present study, the multidimensional construct of emotional availability that involves affective attunement to the child's emotions, needs, and goals, an acceptance of both positive and negative emotions in the child, and adaptive regulation of emotional exchanges during interactions with the child is employed (Biringen,

2000; Emde & Easterbrooks, 1985). Emotionally available parents engage in sensitive, structuring, non-intrusive, and non-hostile behaviors that enable the child to use the parent for comfort and support as well as engage in adaptive emotion regulation strategies (Biringen, 2000; Biringen, Robinson, & Emde, 1998; Kogan & Carter, 1996; Little & Carter, 2005).

The present study also examines parental emotional availability during the context of bedtime as a predictor of child emotion regulation. Bedtime is a naturalistic, daily-occurring context in which parents have the goal of bringing the child to a comfortable, restful, and non-distressed affective state so that the child can fall asleep and sleep throughout the night, typically apart from parents. Cessation of parent-infant interactions and separation from parents may potentially be distressing for children who wish to maintain their contact or interaction with their parents (Sadeh, Tikotzky, & Scher, 2010). Emotionally available parents who respond contingently and appropriately to child signals, make effective use of bedtime routines to facilitate children's sleep, avoid intense or high-level stimulation of the child when the child is settling to sleep at bedtime, and refrain from overt and covert expressions of irritability or anger when interacting with the child, are expected to promote a safe and secure affective state in their children, and to enable adaptive emotion regulatory capabilities.

In addition, children with highly reactive temperaments have shown to be more susceptible to both positive and negative environmental influences (Belsky, 2005; Belsky & Pluess, 2009), which suggests that the temperamental reactivity of the child may moderate the relations between parenting quality and child emotion regulation, and between attachment security and emotion regulation. The present study examines how bedtime parenting quality and child attachment security interact with child temperamental reactivity to influence child emotion regulation. Relevant theory and findings are discussed in the following sections.

Emotion Regulation: Definition and Measurement

Most studies examining emotion regulation employ a definition that includes the modification of emotions in the service of social and/or non-social goals. Focusing on the processes of change, Cole, Martin, and Dennis (2004) define emotion regulation as "systematic changes either in the activated emotion or psychological processes and activities associated with activated emotions" (p. 320). A similar definition is emotion regulation as a set of competencies to modulate affective states (Shields and Cicchetti, 1998). Other definitions elaborate further on the goals of modulating emotional arousal such as affect-related social adaptation (Eisenberg & Morris, 2002), influencing the social environment (Kopp, 1989), adaptive non-social responses (Calkins, 1994), and regulating affective responding across multiple domains (NICHD Early Child Care Research Network, 2004). The definition by Thompson (1994) adds external and internal influences on regulation as another important component: "emotion regulation consists of extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (pp. 27-28).

Although emotion regulation is measured in a variety of ways (see review by Eisenberg, Morris, & Spinrad, 2005), the intensity and frequency of affective arousal and use of emotion regulation strategies during frustration tasks are typically measured in infants. Regulatory strategies that are examined include parent-focused regulation (e.g., looking at mother, fussing to mother, help seeking, and social referencing), object-focused regulation (e.g., looking at toy), and self-focused regulation (e.g., self-soothing, redirecting attention, and tension reduction behaviors; Crockenberg & Leerkes, 2004; Ekas, Braungart-Rieker, Lickenbrock, Zentall, & Maxwell, 2011; Stifter & Braungart, 1995).

Working with Thompson (1994)'s definition of emotion regulation, the present study examines the relations between the "extrinsic processes" of maternal parenting quality, "intrinsic processes" of infant temperamental reactivity, the mother-infant attachment relationship, which includes both extrinsic and intrinsic aspects, and the behavioral emotion regulation strategies that infants employ to "modify emotional reactions" (i.e., frustration) in service of the "goals" of playing with an attractive toy (and mother). The regulatory strategies of orienting towards the environment, focusing on the mother and/or toy, self-comforting, avoidance, and tension reduction behaviors will be examined (Stifter & Braungart, 1995).

According to Thompson (1994), whether an emotion regulation strategy is adaptive often depends on the goals of the infant in the current situation that the infant faces. When the infant is denied access to an attractive toy as well as responses from the mother (as in the present study), it may be most adaptive to orient towards the toy and the mother at first, but turn to other strategies, such as redirecting attention towards the environment, that will help reduce frustration when the mother continues to be unresponsive. In addition, strategies such as avoidance (e.g., pushing back on the high chair in which they are seated) or tension reduction behaviors (e.g., actively banging legs against the high chair) may be less adaptive in that they either maintain or increase infants' frustration.

Parental Emotional Availability and Infant Emotion Regulation

The quality of parent-child interactions has been particularly emphasized as an influence on children's developing emotion regulation (Spinrad & Stifter, 2002; Sroufe, 1995). It is during healthy interactions with parents that a child acquires knowledge of emotions and adaptive regulatory strategies (Chang, Schwartz, Dodge, & McBridge-Chang, 2003; Parke, Cassidy,

Burks, Carson, & Boyum, 1992). Indeed, the ways in which mothers respond to their children's emotional cues are related to children's emotional skills (Eisenberg et al., 1998; Morris et al., 2007).

Sensitivity. As infants rely primarily on their parents to modulate their arousal level (Kopp, 1989), early sensitive caregiving plays an important role in the development of children's emotion regulation (Kogan & Carter, 1996; Leerkes, Blankson, & O'Brien, 2009). Through responsive, contingent, and age-appropriate affective displays, parents enable the child to maintain an optimal level of emotional arousal in terms of inducing or sustaining positive emotions and decreasing negative arousal (Tronick, 1989). Parents' contingent responsivity to the child's distress helps to modulate the child's emotional arousal and provides the child with learning experiences during which the child can acquire more adaptive strategies to manage negative emotions (Eisenberg et al., 1998). Children with mothers that respond sensitively to their changing emotional cues tend to show lower negative reactivity and more regulatory strategies than children whose mothers are less sensitive (Spinrad & Stifter, 2002). In addition, sensitive responsivity to children's distress seems to engender children's use of more age-appropriate emotion regulation strategies that are less self-oriented (e.g., thumb sucking) and more parent-oriented (e.g., focuses gaze on parent; Eisenberg et al., 1998).

Structuring. Parents structure children's self-regulation of emotion through encouraging the child to shift attention, and modeling the use of adaptive strategies in response to distress (Cole, Dennis, Smith-Simon, & Cohen, 2009). Consistent support through soothing, positive affect, and instrumental help allows children to understand that emotions can be managed and provides them with access to strategies that reduce distress (Denham & Kochanoff, 2002; Raikes & Thompson, 2006). Mothers who engage in emotionally available structuring will pace their

activity level in response to the child's cues such as gaze aversion, scaffold self-soothing by providing security objects, and provide positive guidance that will help children learn to regulate their emotions in adaptive ways (Calkins et al., 1998; Leerkes et al., 2009).

Intrusiveness and hostility. Parents' positive (e.g., warm) and negative (e.g., hostile) affective expressiveness have shown robust links to child outcomes (Bornstein, 1995). In particular, parents' expression of hostile emotion has been linked to children's expression of negative emotion (Eisenberg et al., 1998). Also, when parents react negatively (e.g., reject, punish, or ignore) to children's distress, negative arousal is less likely to decrease, and maladaptive regulation in the form of minimization or over-regulation of emotions is likely to occur (Cassidy, 1994). Frequent and intense negative emotions of parents may preclude children from learning about emotions and acquiring adaptive regulatory strategies (Denham & Kochanoff, 2002), and instead, model dysregulated behaviors that negatively impact children's responses to their own and others' emotions (Eisenberg et al., 2001). Studies have shown that maternal intrusive and hostile behaviors (e.g., being constantly at the child, expressing irritation or anger, and scolding or teasing) that exert excessive or negative control over the child are linked with greater orienting towards sources of frustration and fewer adaptive emotion regulation strategies in the child (Calkins et al., 1998; Chang et al., 2003; Little & Carter, 2005).

Mother-Infant Attachment Security and Infant Emotion Regulation

The quality of the mother-infant attachment relationship has both theoretical and empirical links to children's emotion regulation. According to attachment theory, the mother-infant attachment relationship provides a foundation upon which children's emotion regulatory capabilities develop (Bowlby, 1982; Cassidy, 1994; Sroufe, 1995). Beginning from parent-

initiated regulation of emotions during face-to-face interactions in the earliest months, infants gain the ability for dyadic coregulation in the first year (Sroufe, 1995). With repeated interactions with parents in emotion-laden contexts, infants become increasingly able to autonomously use strategies to regulate their emotional arousal (Calkins et al., 1998; Feldman, Greenbaum, & Yirmiya, 1999; Kopp 1989). The organization of behaviors within the attachment relationship thus affects how children organize their emotions and behaviors towards the environment (Sroufe & Waters, 1977). This continuity in development may set children on a particular trajectory, and impact social-emotional competencies, including emotion regulation, in the early years (Ainsworth, 1979; Sroufe, 2005; Thompson, 2008).

Attachment theory posits securely attached children to show more adaptive emotion regulation than children with insecure attachment (Bridges & Grolnick, 1995; Cassidy, 1994; Sroufe, 2005). Children who feel secure with their parent and have confidence in the parent's capacity to provide assistance in regulating their affective states will be able to better regulate emotional arousal and also effectively explore their environment which, in turn, has positive implications for adjustment (Eisenberg et al., 2001; Sroufe, 1995, 2005). Indeed, secure attachment is associated with greater emotional understanding (Raikes & Thompson, 2006), expression of both positive and negative emotions in an open and flexible manner (Cassidy, 1994), and more adaptive emotion regulation (Diener, Mangelsdorf, McHale, & Frosch, 2002; Waters et al., 2010). Infants with secure attachments employ more parent-oriented and less object-orientated emotion regulation strategies during a frustration task (Braungart & Stifter, 1991; Diener et al., 2002; Leerkes & Wong, 2012), and engage in a greater variety of adaptive strategies (Leerkes & Wong, 2012).

On the other hand, children with insecure attachments show greater emotion dysregulation (Sroufe, 2005), placing them at greater risk for externalizing and internalizing problems, and psychopathology (Cassidy, 1999; Madigan, Moran, Schuengel, Pederson, & Otten, 2007). Insecure-avoidant infants who likely experienced repeated rejection from their parent tend to engage in less parent-oriented and more object-oriented emotion regulation strategies (Crugnola et al., 2011; Diener et al., 2002; Leerkes & Wong, 2012). Several studies indicate self-comforting strategies are more common in infants with avoidant attachment (Braungart & Stifter, 1991; Diener et al., 2002; Leerkes & Wong, 2012), whereas Crugnola et al. (2011) did not find these strategies to differ by attachment quality. Insecure-resistant infants are more likely to employ high levels of parent-oriented emotion regulation strategies possibly due to their uncertainty of parental emotional availability based on a history of inconsistent care (Bridges & Grolnick, 1995; Cassidy, 1994). They are also more likely to use tension-reduction strategies, such as hitting or throwing the object (e.g., toy) when distressed (Calkins & Johnson, 1998; Leerkes & Wong, 2012).

The Differential Susceptibility of Highly Reactive Infants

Both temperament and attachment perspectives on children's emotional development agree that the emotion regulation abilities of infants are based on an interaction between the infant's temperamental characteristics and environmental influences (Calkins & Leerkes, 2010; Sroufe, 1995; Thompson, 1994). Children who are temperamentally reactive may be more sensitive to their environment, namely parenting quality and the attachment relationship, given their greater likelihood of becoming distressed in a frustrating situation, greater dependence on external sources of regulation, and higher risk for maladjustment (Kiff, Lengua, & Zalewski,

2011; Stupica, Sherman, & Cassidy, 2011). As stipulated by the differential susceptibility hypothesis, reactive infants may be differentially susceptible to both positive and negative parenting quality, and to both secure and insecure attachment (Belsky, 1997; Klein Velderman, Bakermans-Kranenberg, Juffer, & van IJzendoorn, 2006). Studies have found parenting quality to more strongly predict social-emotional and behavioral outcomes for temperamentally reactive children than for less reactive children (Belsky, 2005; Belsky & Pluess, 2009; van IJzendoorn & Bakermans-Kranenburg, 2012). Leerkes et al. (2009), for example, found that maternal sensitivity to child distress was associated with lower emotion dysregulation only for highly reactive 24-month olds. In addition, Ursache, Blair, Stifter, and Voegtline (2013) found that 15-month olds with both high emotional reactivity and high emotion regulation were the most likely to have caregivers who showed more supportive parenting.

Both the differential susceptibility hypothesis and empirical findings suggest that high maternal emotional availability marked by sensitivity to child cues, appropriate structuring, and non-intrusive and non-hostile responses during bedtime are more likely to influence the emotion regulation abilities of highly reactive infants than those of low reactive infants. High emotional availability may predict greater use of adaptive regulatory strategies (e.g., redirecting attention towards the environment), whereas low emotional availability may predict greater use of less-adaptive regulatory strategies (e.g., tension reduction) for highly reactive, but not low reactive, infants. Similarly, infant temperament may interact with attachment security to predict emotion regulation strategies such that highly reactive infants, compared to low reactive infants, may use more adaptive strategies when securely attached, and to use more of the less-adaptive strategies when insecurely attached. It is plausible that the relations between particular emotion regulation

strategies and insecure attachment (e.g., the greater use of tension reduction behaviors in resistant infants) as found in previous studies are stronger for highly reactive infants.

Hypotheses

1. (a) Maternal bedtime emotional availability at 12 and 18 months was expected to predict infants' use of emotion regulation strategies at 12 and 18 months, both concurrently and longitudinally. When emotional availability was high, infants were expected to engage in emotion regulation strategies that would be adaptive in a situation during which the infant is denied access to an attractive toy as well as responses from the mother: orient (redirect attention) towards the environment, focus less on both the source of frustration (the attractive toy) and the mother who is unavailable, and self-comforting. Conversely, infants were expected to engage in more of the less-adaptive strategies – avoidance and tension reduction behaviors – when emotional availability was low.

(b) Infant attachment security at 12 months was expected to predict infants' use of emotion regulation strategies at 12 and 18 months. In line with attachment theory and previous findings, secure infants were expected to engage in more adaptive strategies than insecure infants; insecure-avoidant infants were expected to engage in less mother-oriented, more object (toy)-oriented, and more self-comforting strategies (Braungart & Stifter, 1991; Crugnola et al., 2011; Diener et al., 2002; Leerkes & Wong, 2012); and insecure-resistant infants were expected to engage in more mother-oriented, avoidance, and tension-reduction strategies (Crugnola et al., 2011; Leerkes & Wong, 2012), compared to secure infants.

2. (a) Infant temperamental reactivity (at 12 and 18 months) was expected to moderate the relation between maternal bedtime emotional availability and infant emotion regulation

strategies at 12 and 18 months. In accordance with the differential susceptibility hypothesis, high maternal emotional availability was expected to predict greater use of adaptive strategies, and low emotional availability to predict greater use of less-adaptive strategies, for highly reactive infants, compared to low reactive infants.

(b) Infant temperamental reactivity (at 12 months) was expected to moderate the relation between attachment security and emotion regulation strategies at 12 and 18 months. As predicted by the differential susceptibility hypothesis, secure infants were expected to use more adaptive strategies compared to insecure infants, and insecure infants to use more less-adaptive strategies compared to secure infants, only among highly reactive infants.

Method

Participants

The sample of 144 mothers and their infants came from a larger NIH-funded two-year longitudinal study of parenting, infant sleep, and infant development (SIESTA – Study of Infants' Emergent Sleep TrAjectories). A total of 167 mothers who were 18 years or older, of any ethnic background, and fluent in English were recruited from the obstetric floors of the Mt. Nittany Medical Center Mother and Baby Clinic and the Milton S. Hershey Medical Center in central Pennsylvania, shortly after mothers had given birth. The 23 families who had dropped out of the study by 12 months or were missing data for all study variables were not included in the present study. No sociodemographic differences were found between these mothers not included in the study, and the mothers in the final study sample.

The final study sample included 78 (54.2%) female and 54 (37.5%) first-born infants. Mothers' average age was 30.2 years (*SD* = 5.2), 84.7% of mothers were married, 34.0% graduated from college, and 30.6% obtained graduate or professional degrees. Two-thirds (66.0%) of mothers were employed, and the average family income was $71,574.58 (ranging from $5,000 to $350,000). The ethnic composition of the sample was: 86.1% White, 3.5% African American, 2.1% Asian, 4.9% Latino, and 2.8% Other.

Measures

Bedtime parenting quality (12 and 18 months). Video recordings of infant bedtimes were obtained when infants were 12 and 18 months of age. A digital video recorder, night-vision cameras, and microphones were used to capture parent-infant bedtime interactions. Cameras were focused on areas in which parent-infant bedtime interactions took place: the infant's typical sleep location (e.g., crib), a chair in the infant's or parents' room, and another room such as the living room or basement. Parents were instructed to start the video recording approximately one hour before they began to get their infant ready for bed. The average length of infant bedtimes was 45.89 minutes (*SD* = 30.10) at 12 months, and 49.95 minutes (*SD* = 37.41) at 18 months.

Video-recordings of bedtime parenting could not be obtained or coded for 40 families at 12 months, and 55 families at 18 months. Reasons included attrition, no consent for video-recording, unspecified negative life events, and lack of bedtime interaction (e.g., a bedtime routine that was too short to assess parenting quality, bedtime activities carried out in a room without a camera, and video recording turned on after the infant was already asleep).

The emotional quality of bedtime parenting was coded by the author and another coder using the Emotional Availability Scales (EAS; Biringen, Robinson, & Emde, 1998). Four

dimensions of emotional availability that were adapted to the bedtime context (according to Teti, Kim, Mayer, & Countermine, 2010) were scored. Sensitivity assessed mothers' accurate, appropriate, and prompt responses to their infants during bedtime activities. Structuring assessed mothers' successful use of bedtime routines to guide infants toward sleep. Mothers were scored lower on sensitivity and structuring if they took longer than 1 minute to respond to their infants who became distressed after being put down to sleep. Non-intrusiveness assessed whether mothers initiated new interactions that interfered with the infant falling asleep, or overly insisted that the infant fall asleep. Non-hostility assessed mothers' expression of covert (e.g., impatience) and/or overt (e.g., anger) hostility during interactions with their infants.

Intra-class correlations (absolute agreement) for the four emotional availability dimensions ranged from .98 to 1.00 for 8 (7.7%) randomly-selected 12-month tapes, and 9 (10.1%) randomly-selected 18-month tapes. At each time point, z-scores for the four dimensions were computed and combined to create a composite emotional availability score in which higher scores indicate higher emotional availability (α = .82 at 12 months, α = .90 at 18 months).

Infant attachment security (12 months). When infants were 12 months of age, infants and their mothers completed the Strange Situation procedure (Teti & Kim, in press), a measure of mother-infant attachment security. The procedure is comprised of eight 3-minute episodes. In Episode 1, the infant and mother are introduced to the room with developmentally-appropriate toys on the floor, and two chairs (one for the mother and another for the stranger who enters the room later). In Episode 2, the infant plays with the toys, and the mother takes a seat on one of the chairs. An adult stranger (female) enters the room in Episode 3. In Episode 4, the mother is cued to leave the room. The stranger comforts the infant if he/she becomes distressed. The mother returns to the room during Episode 5, and comforts the infant if distressed and re-engages the

infant with the toys. The stranger leaves. In Episode 6, the mother leaves the room for the second time. This episode is cut short if the infant becomes highly distressed. The stranger re-enters the room in Episode 7, and comforts the infant if distressed. Finally, in Episode 8, the mother returns and the stranger leaves for the second time. The primary focus is on the child's proximity- and contact-seeking behavior, contact-maintaining behavior, resistant behavior, and avoidant behavior during the two reunion episodes (5 and 8). Secure (B), insecure-avoidant (A), and insecure-resistant (C) classifications were obtained using Ainsworth's tripartite classification system (Ainsworth, Blehar, Waters, & Wall, 1978). A researcher who trained and achieved reliability through the University of Minnesota workshop coded the Strange Situations. In the present study, inter-rater reliability (Cohen's K) on 22 (15.3%) tapes was .73. A total of 94 (65.3%) infants were classified as secure, 25 (17.4%) as insecure-avoidant, 8 (5.6%) as insecure-resistant.

Child temperament (12 and 18 months). Child temperament was measured using the Infant Behavior Questionnaire–Revised (IBQ-R; Rothbart & Gartstein, 2000) at 12 months, and the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, 2006) at 18 months. The IBQ-R is a 191-item measure of infant (3 to 12 months) temperament. Parents rated each item on a scale of 0 to 7, in which 0 is "not applicable", 1 is their infant "never engages in the behavior", and 7 is their infant "always engages in the behavior". The IBQ-R yields 14 subscales and 3 higher-order factors of Surgency/Extraversion, Negative Affectivity, and Orienting/Regulation (Gartstein & Rothbart, 2003). Surgency/Extraversion is comprised of the subscales of approach, vocal reactivity, high intensity pleasure, smiling and laughter, activity level, and perceptual sensitivity ($\alpha = .78$). Negative Affectivity includes the subscales of sadness, distress to limitations, fear, and falling reactivity ($\alpha = .61$). Orienting/Regulation is the

combination of the subscales of low intensity pleasure, cuddliness, duration of orienting, and soothability (α = .64).

The ECBQ is a 201-item measure of child (18 to 36 months) temperament. Similar to the IBQ, a 0 to 7 rating scale is used for all items, and 18 subscales and 3 higher-order factors can be derived (Putnam et al., 2006). The Surgency/Extraversion factor includes the subscales of impulsivity, activity level, high intensity pleasure, sociability, and positive anticipation (α = .62). Negative Affectivity includes the discomfort, fear, sadness, frustration, soothability (reverse-coded), motor activation, perceptual sensitivity, and shyness subscales (α = .74). The Orienting/Regulation factor is comprised of the subscales of inhibitory control, attentional shifting, low intensity pleasure, cuddliness, and attentional focusing (α = .71). The temperament factor of Negative Affectivity indicating child temperamental reactivity was included as a moderator in the present study.

Infant emotion regulation (12 and 18 months). At 12 and 18 months, infants and mothers completed the Toy Removal Task (Stifter & Braungart, 1995). Infants were seated in a high chair with the mothers seated slightly to the side of the infant. For 90 seconds, the infants and mothers played with a toy (Busy Box). Mothers were then instructed to remove the toy from the infant and place it on her seat so that the toy was in the infant's sight but out of reach. For the next two minutes, mothers did not look at or respond to their infant. The toy removal episode was cut short if the infant engaged in 20 seconds of hard crying. After two minutes of toy removal or 20 seconds of hard crying, whichever came first, mothers were asked to return the toy to the infant, but also to not interact with her infant for one minute. At the end of the toy return episode, mothers resumed interaction with their infants. The average length of the toy removal

episode was 113.6 seconds (*SD* = 26.8) at 12 months, and 111.6 seconds (*SD* = 28.2) at 18 months.

Negative reactivity. Infant negative reactivity was coded during the toy removal episode of the Toy Removal Task (Stifter & Braungart, 1995). The presence/absence of four intensity levels of negative reactivity was scored every 5 seconds using four codes: No, mild, moderate, and high. The mild negative reactivity code was scored when the infant displayed low intensity negative reactivity through pouting, fussing, whining, grunting, frowning, furrowing the brow, and/or crinkling the nose. When the infant was crying, the moderate negative reactivity code was scored. High pitched and/or prolonged screaming and/or wailing, or crying that included breath-holding, tears, and/or face changing colors were scored using the high negative reactivity code.

Peak negative reactivity during the first minute, and last 30 seconds, of the toy removal episode were dummy coded: 0 = no, 1 = mild, 2 = moderate, and 3 = high. If the toy removal was cut short, a code of 4 was used. Difference scores between the negative reactivity peaks were computed such that a positive score indicated an increase in negative reactivity, and a negative score indicated a decrease in negative reactivity.

Regulatory strategies. For every 5 seconds of the toy removal episode, six regulatory strategies were scored (Stifter & Braungart, 1995). Orienting was scored when the infant's eyes were focused on the environment or down on their own body for one second or longer. When the infant looked at or towards the mother, looks to mother was scored; when the infant looked at the toy, looks to toy was scored. Self-comforting was scored when the infant engaged in repetitive fine motor movements including sucking on fingers, rubbing the face, stroking head or ears, and clasping clothes. avoidance was scored when the infant had an arched back, pushed back against

the high chair, strained forward, and physically turned the head away. Tension reduction behaviors included repetitive and active banging with hands, feet, or back on the high chair.

Coders who were blind to the other study variables coded the cases for infant negative reactivity. Inter-rater reliability for rater pairs was calculated on 30 (11.4%) randomly-selected cases across reactivity codes (ICCs = .92 to .98). Different coders who were blind to the negative reactivity codes as well as the other study variables coded the regulatory strategies. The inter-rater reliability (ICCs) of rater pairs for 27 (10.2%) randomly-selected cases across regulatory strategies ranged .85 to .99.

The scores for each of the negative reactivity and regulatory behavior codes were summed and divided by the total number of 5-second intervals in the toy removal episode. The resulting proportion variables had a possible range of 0 to 1. The majority of infants engaged in orienting, looks to mother, and looks to toy (which were normally distributed), but only a third to two-thirds of infants engaged in self-comforting, avoidance, and tension reduction behaviors (which were positively skewed). Thus, whereas all behaviors were dichotomized and included as binary ("engaged" vs. "not engaged") variables in analyses, only the normally distributed behaviors of orienting, looks to mother, and looks to toy were included as continuous proportion outcome variables in analyses.

Data Analysis

Logistic regression models were estimated to examine whether infants' use of emotion regulation strategies were predicted by maternal bedtime emotional availability (Hypothesis 1a) and infant attachment security (Hypothesis 1b), and whether child temperamental reactivity moderated the relations between emotional availability and regulatory strategies (Hypothesis 2a),

and between attachment security and regulatory strategies (Hypothesis 2b). Separate logistic regression analyses were conducted at each time point: (a) concurrent relations between emotional availability, temperament, and emotion regulation at 12 months; (b) emotional availability and temperament at 12 months predicting emotion regulation at 18 months; and (c) concurrent relations between emotional availability, temperament, and emotion regulation at 18 months.

The strategies of orienting, looks to mother, and looks to toy at 12 and 18 months were included as continuous outcome variables in hierarchical multiple regression (Hypotheses 1a, 2a), ANOVA (Hypotheses 1b), and ANCOVA (Hypotheses 2b) analyses. In order to obtain the best predictive model, the models including the significant moderators were trimmed (i.e., non-significant terms starting with the largest tail probability were removed) until only significant interaction and/or main effects remained.

Results

Preliminary Analyses

Descriptives. The descriptives for all predictor, moderator, and outcome variables are provided in Table 3-1. Intercorrelations between maternal emotional availability and infant temperamental negative affectivity indicated significant relations between 12- and 18-month emotional availability, $r(72) = .43$, $p < .001$, and between 12- and 18-month negative affectivity, $r(127) = .51$, $p < .001$. In addition, one-way ANOVAs indicated that there were significant differences between the three infant attachment classifications (secure, insecure-avoidant, insecure-resistant) in 12-month negative affectivity, $F(2, 126) = 8.95$, $p < .001$. Tukey's post-hoc

comparisons indicated that insecure-resistant infants' negative affectivity (M = 3.92, SD = .85) was higher than that of insecure-avoidant (M = 2.98, SD = .63) and secure (M = 3.26, SD = .50) infants.

Table 3-1. Descriptive statistics for maternal bedtime emotional availability, infant temperament factors, and infant emotion regulation strategies (n = 144).

	M	*SD*	*SE*
Emotional Availability			
12 months	18.88	3.33	.33
18 months	18.99	3.66	.39
Infant Negative Affectivity			
12 months	3.26	.58	.05
18 months	2.59	.52	.05
Infant Emotion Regulation Strategies			
Orienting			
12 months	.60	.24	.02
18 months	.53	.26	.02
Looks to Mother			
12 months	.63	.22	.02
18 months	.62	.22	.02
Looks to Toy			
12 months	.36	.21	.02
18 months	.46	.25	.02
Self-Comforting			
12 months	.24	.27	.02
18 months	.18	.25	.02
Avoidance			
12 months	.08	.12	.01
18 months	.19	.22	.02
Tension Reduction			
12 months	.11	.16	.01
18 months	.08	.12	.01

Covariates. Correlations between demographic variables (child gender, maternal age, maternal employment status, maternal marital status, family income, and number of children in the home) and child regulatory strategies indicated that child gender, maternal age, and family income were related to avoidance, looks to toy, and orienting: Male infants (M = .23) engaged in more avoidance than female infants (M = .15) at 18 months, $t(123) = 2.14$, $p < .05$); mothers' age was negatively correlated with avoidance at 12 months, $r(138) = –.21$, $p < .05$, and positively correlated with looks to toy at 18 month, $r(124) = .32$, $p < .001$); and family income was inversely related to orienting at 18 months, $r(109) = –.21$, $p < .05$). These demographic variables were thus included as covariates in analyses for the corresponding outcome variables.

Correlations between negative reactivity and regulatory strategies. During the toy removal episode at 12 months, no negative reactivity was significantly correlated with the regulatory strategies of orienting, $r(139) = .40$, $p < .001$, looks to mother, $r(139) = –.30$, $p < .001$, avoidance, $r(139) = –.20$, $p < .05$, and tension reduction, $r(139) = –.17$, $p < .05$; mild negative reactivity was significantly correlated with orienting, $r(139) = –.35$, $p < .001$, looks to mother, $r(139) = .28$, $p < .01$, and self-comforting, $r(139) = .22$ $p < .05$; moderate negative reactivity was significantly correlated with tension reduction, $r(139) = .17$, $p < .05$; and high negative reactivity was significantly correlated with orienting, $r(139) = –.37$, $p < .001$, and looks to mother, $r(139) = .18$, $p < .05$. Similarly, during the toy removal episode at 18 months, No negative reactivity was significantly correlated with the regulatory strategies of orienting, $r(125) = .25$, $p < .01$, looks to mother, $r(125) = –.26$, $p < .01$, and looks to toy, $r(125) = –.23$, $p < .05$; mild negative reactivity was significantly correlated with looks to toy, $r(125) = .23$, $p < .01$, and avoidance, $r(125) = .29$ $p < .01$; moderate negative reactivity was significantly correlated with looks to mother, $r(125) = .31$, $p < .01$, and orienting, $r(125) = –.28$, $p < .01$; and high negative reactivity

was significantly correlated with avoidance, $r(125) = –.20$, $p < .05$, and orienting, $r(125) = –.22$, $p < .05$.

The regulatory strategies were also correlated with the difference scores between the peak negative reactivity during the first minute and the peak negative reactivity during the last 30 seconds of the toy removal episode. At 12 months, the regulatory strategy of orienting was significantly correlated with change (decrease) in peak reactivity, $r(139) = –.19$, $p < .05$. At 18 months, the regulatory strategy of avoidance was significantly correlated with change (increase) in peak reactivity, $r(125) = .24$, $p < .01$.

Hypothesis 1a: Emotional Availability as Predictor of Emotion Regulation Strategies

Contrary to expectations, maternal bedtime emotional availability at 12 and 18 month did not predict infants' emotion regulation strategies concurrently or longitudinally (all *p*s > .05).

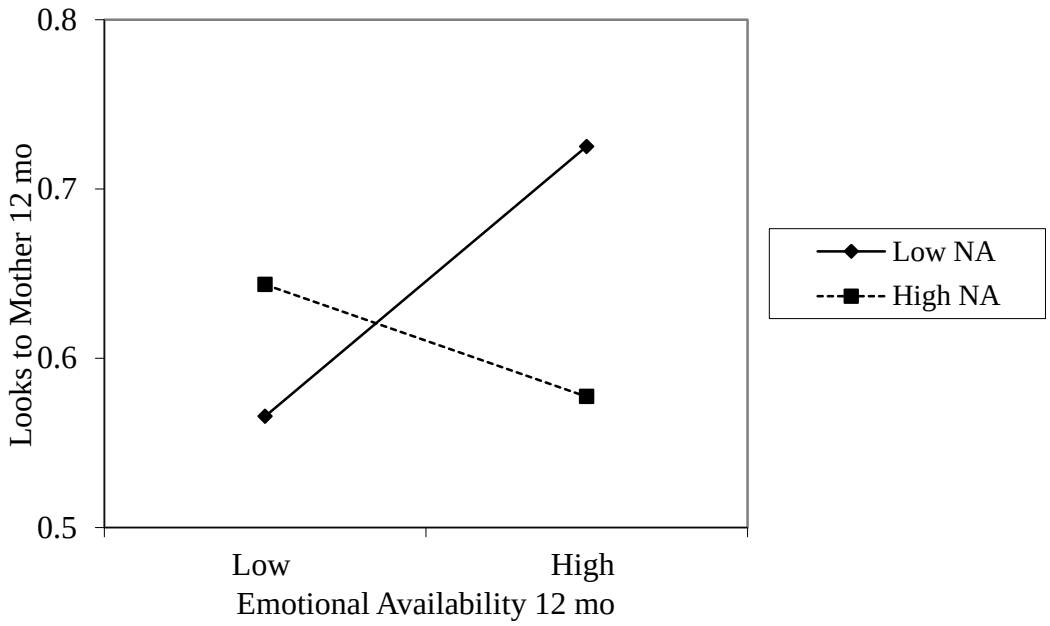
Hypothesis 1b: Attachment Security as Predictor of Emotion Regulation Strategies

Infant attachment security at 12 months was expected to predict infants' use of emotion regulation strategies at 12 and 18 months. Two significant relations were found at 12 months: An one-way ANOVA indicated that secure infants ($M = .60$) engaged in more orienting towards the environment than insecure-resistant infants ($M = .37$), $t = –2.69$, $p < .01$. Also, logistic regression analyses indicated that insecure-resistant infants had a decreased log odds of 2.30 in the use of tension reduction compared to secure infants, Wald statistic = 4.44, $p < .05$. That is, insecure-resistant infants were less likely to engage in tension reduction behaviors than secure infants.

Hypothesis 2a: Temperamental Reactivity as Moderator of the Relation between Emotional Availability and Emotion Regulation Strategies

Infant temperamental reactivity was expected to moderate the relations between maternal bedtime emotional availability and infant emotion regulation strategies at 12 and 18 months. Multiple regression analyses indicated that emotional availability interacted with infant temperamental reactivity to predict the regulatory strategy of looks to mother at both 12 months, $t = –2.23$, $p < .05$ ($f^2 = –.05$), and 18 months, $t = –2.46$, $p < .05$ ($f^2 = –.07$). In line with the differential susceptibility hypothesis, higher EA was related to less looks to mother ("better"), and low EA was related to more looks to mother ("worse") for infants high on negative affectivity, compared to infants low on negative affectivity (Figure 3-1). The simple slopes when infants were low on negative affectivity (–1 *SD* below the mean; gradient = .02, $p < .01$, at 12 months; gradient = .02, $p < .01$, at 18 months), and when infants were high on negative affectivity (+1 *SD* above the mean; gradient = –.01, $p < .05$; gradient = –.02, $p < .01$, at 18 months) were significant (Aiken & West, 1991).

a)



b)

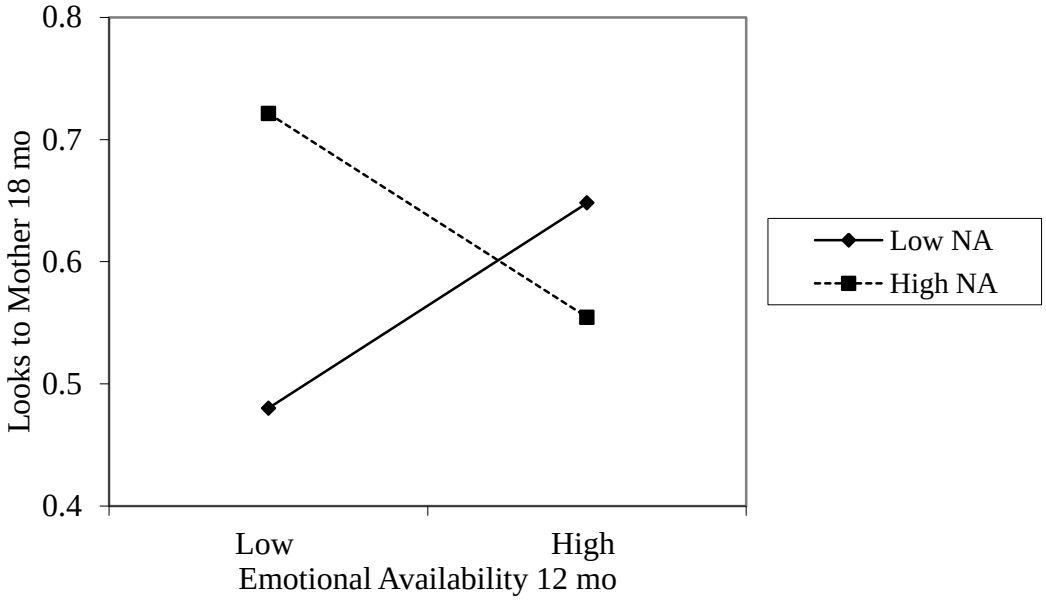


Figure 3-1. Moderation of the relation between maternal bedtime emotional availability and the strategy of looks to mother by infant temperamental negative affectivity at (a) 12 months, and (b) 18 months.

Hypothesis 2b: Temperamental Reactivity as Moderator of the Relation between Attachment Security and Emotion Regulation Strategies

Infant temperamental reactivity at 12 months was expected to moderate the relations between infant attachment security and emotion regulation strategies at 12 and 18 months. Infant attachment security interacted with temperamental negative affectivity to predict the regulatory strategy of avoidance. Logistic regression analyses indicated that the probability of avoidance at 18 months was higher for insecure-avoidant infants than secure infants among infants high on temperamental negative affectivity, Wald statistic = 5.30, $p < .05$ (Figure 3-2). The simple slopes when infants were high on negative affectivity (+1 *SD* above the mean) were significant, gradient = –2.18, $p < .05$, whereas, the simple slopes when infants were low on negative affectivity (–1 *SD* below the mean) were not, gradient = .37, $p > .05$.

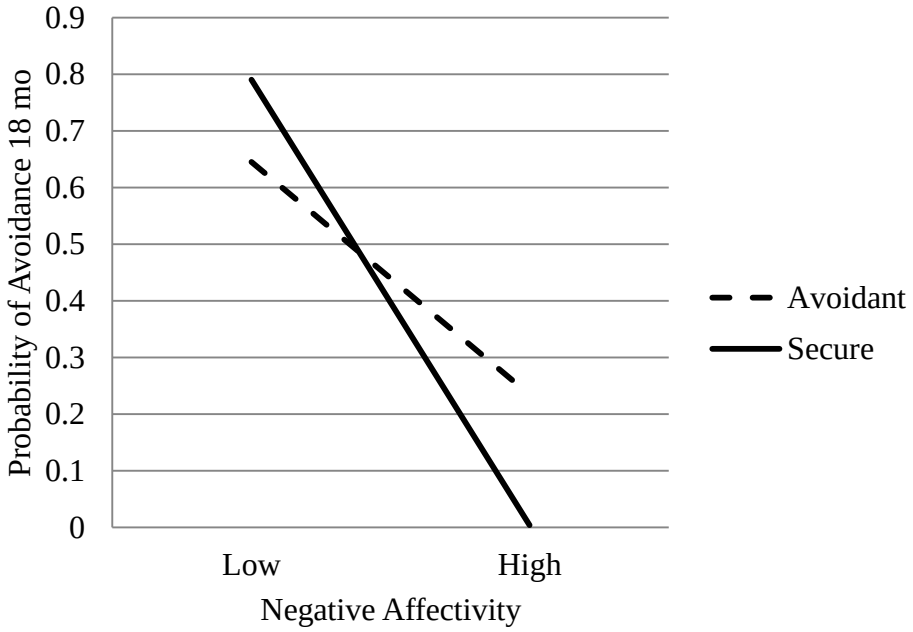


Figure 3-2. Moderation of the relation between infant attachment security and the probability of avoidance by infant temperamental negative affectivity.

Discussion

The present study examined the influences of mothers' emotional availability towards their infants during bedtime, infant attachment security, and interactions between bedtime parenting quality and attachment with infant temperamental reactivity, on infants' emotion regulation strategy use during a frustration task at 12 and 18 months. Whereas emotional availability was not directly related to infants' emotion regulation strategies, infant attachment security had direct relations with infants' orienting towards the environment and tension reduction behaviors. Partial support was also found for the differential susceptibility of highly reactive infants in that maternal emotional availability and infant attachment security were particularly important for the use of less-adaptive strategies in infants high on temperamental negative affectivity.

Negative Reactivity and Regulatory Strategies

Infants' emotion regulation strategies were assessed during a frustration task that required infants to regulate negative reactivity while denied access to an attractive toy as well as mothers' support. Given that infants in this frustrating situation needed to distract themselves away from the inaccessible toy and the unresponsive mother until they became accessible again, greater use of orienting (redirecting attention towards the environment), and less focus on the toy and mother (i.e., the sources of frustration) were expected to be more adaptive. In addition, as indicated in previous findings, greater use of self-comforting was considered to be more adaptive in reducing frustration, whereas greater use of avoidance and tension reduction behaviors was

expected to either maintain or increase infants' frustration (Braungart & Stifter, 1991; Crugnola et al., 2011; Diener et al., 2002; Leerkes & Wong, 2012).

The relations between infants' negative reactivity and regulatory strategies during the toy removal episode of the frustration task were largely in agreement with expectations. Although directionality cannot be determined in these correlational data, infants' orienting towards the environment was correlated with no or less negative reactivity at both 12 and 18 months. Specifically, greater orienting was related to infants showing no negative reactivity or less moderate or high levels of negative reactivity, and a greater decrease in negative reactivity across the two minutes during which the toy was made inaccessible. In contrast, greater focus on the unavailable mother, and avoidance behaviors were related to more negative reactivity, and a greater increase in negative reactivity during the toy removal, suggesting that these strategies were less adaptive in reducing infants' frustration. Infants who focused on the inaccessible toy also showed more mild levels of frustration; although, this was only found at 18 months.

Interestingly, infant self-comforting was related to greater (not less) mild negative reactivity at 12 months. It may be that in a situation during which the toy and mother are both inaccessible, self-comforting is less adaptive in terms of regulating frustration. Important questions to explore in future research would be whether to specify whether the adaptiveness of self-comforting is context-dependent, whether self-comforting becomes less adaptive across infancy and toddlerhood as children gain in more sophisticated strategies of regulation such as verbal communication, and whether greater use of self-comforting during toddlerhood and early childhood is related to higher levels of excessive self-comforting in later development (e.g., eating disorders, substance abuse).

Emotional Availability and Regulatory Strategies

Mothers' emotional availability during infant bedtime was not significantly related to infants' regulatory strategies at 12 and 18 months. This null finding is in contrast to previous studies that have shown links between the quality of parent-child interactions and infant emotion regulation (Eisenberg et al., 1998; Leerkes et al., 2009; Spinrad & Stifter, 2002). It is possible that the above average levels of parenting quality found in the present community sample may have lacked enough variance to detect meaningful differences in infants' strategy use. Despite the lack of direct relations between maternal emotional availability and infants' regulatory strategies, the quality of bedtime parenting interacted with infant temperamental reactivity to predict infants' mother-oriented strategy use. The interactions are discussed further below.

Attachment Security and Regulatory Strategies

As a secure attachment relationship indicates a history of positive interactions during which the mother adequately met the infants' regulatory needs, and provided assistance in regulating emotions, secure infants were expected to engage in more adaptive regulatory strategies than insecure infants (Cassidy, 1994; Sroufe, 1995, 2005; Thompson, 2008). As expected and consistent with previous studies (e.g., Leerkes & Wong, 2012), secure infants used the adaptive strategy of orienting towards the environment more than insecure-resistant infants. This finding suggests that infants with secure attachment were better able to regulate their frustration through shifting their attention towards the environment, and that attachment security, indicative of a history of interactions with mothers, rather than concurrent parenting quality, was directly predictive of infants' more adaptive strategy use.

Contrary to expectations and previous findings, insecure-resistant infants were less likely to engage in the less-adaptive strategy of tension reduction compared to Secure infants. One potential explanation for this unexpected finding may be that although insecure-resistant infants have been found to display higher levels of tension reduction behaviors (typically measured during the Strange Situation procedure in previous studies), they are also most prone to high levels of distress (Braungart & Stifter, 1991), compared to insecure-avoidant and secure infants. It may be that when faced with a frustrating situation in which the mother is purposely unresponsive, insecure-resistant infants may become too distressed to engage in any regulatory strategy (Braungart-Rieker & Stifter, 1996; Calkins & Johnson, 1998). That mothers in the present study rated insecure-resistant infants higher on temperamental negative affectivity than insecure-avoidant and secure infants lends support to this explanation.

Moderating Role of Temperament

A primary goal of the present study was to examine whether temperamentally reactive infants were differentially susceptible, for better and for worse, to maternal emotional availability and attachment security in relation to their emotion regulation abilities. Several findings indicated the moderating role of infant temperamental reactivity, providing partial support for the differential susceptibility hypothesis. First, the hypothesis that low emotional availability during bedtime would predict greater use of less-adaptive strategies during the toy removal episode of the frustration task for highly reactive infants, compared to low reactive infants, was supported. In the use of the less-adaptive strategy of looks to mother at 12 and 18 months, highly reactive infants focused less on the unresponsive mother when mothers engaged in emotionally available bedtime parenting, and focused more on the unresponsive mother when

mothers showed low emotional availability, than low reactive infants. These findings suggest that for infants high on negative affectivity, high emotional availability was "better" and low emotional availability was "worse" for infants' ability to focus less on a source of frustration (i.e., an unresponsive mother).

Second, the hypothesis that insecure infants would use more less-adaptive strategies compared to secure infants, only among highly reactive infants, was supported. At 18 months, insecure-avoidant infants with high negative affectivity were more likely to engage in the less-adaptive strategy of avoidance, than secure infants with high negative affectivity. For highly reactive infants, secure attachment provided benefits such that infants were less likely to use less-adaptive avoidance strategies (e.g., arching back, pushing back against the high chair) when frustrated, whereas insecure attachment increased the likelihood of such avoidance strategies. No significant differences in avoidance strategies were found between secure and insecure attachments for low reactive infants.

In summary, temperamentally reactive infants who were rated by their mothers as being high on negative affectivity were found to be differentially susceptible to both maternal emotional availability and security of the mother-infant attachment relationship in relation to two strategies that were less adaptive in regulating frustration: whereas high emotional availability and secure attachment were related to less focus on the unresponsive mother and less avoidance behaviors, low emotional availability and insecure attachment were related to greater focus on the unresponsive mother and more avoidance behaviors. In contrast, among infants who were low on negative affectivity, the strategy of looks to mother was positively related to maternal emotional availability, and avoidance strategies did not differ by attachment classification. It may be that for these low reactive infants who are less likely to get frustrated, maternal

emotional availability and attachment security has less straightforward relations with emotion regulation strategy use during a frustration task.

Limitations

One limitation of the present study is the homogenous sample of primarily middle-class Caucasian families, which limits the generalizability of the findings. It will be important for future research to address whether these findings are relevant to more diverse samples. Another limitation is the lack of power to detect significant relations due to the (a) small numbers of infants with insecure-resistant (6.3%) and insecure-avoidant (19.7%) classifications, and (b) inability to include the strategies of self-comforting, avoidance and tension reduction as continuous variables. More comparable numbers of insecure-resistant, insecure-avoidant, and secure infants may reveal relations between attachment security, temperamental reactivity, and emotion regulation strategies of infants that were expected but not found in the present study. In addition, the findings are limited to infant's relationships with their mothers. More work needs to be done on other external factors, such as fathers, siblings, daycare, and peer groups, that may influence the emotion regulation abilities of infants. Finally, it may be important to include objective measures of infant temperament.

Conclusions and Future Directions

The present study adds to the literature in several important ways. First, both maternal emotional availability during the less-studied context of infant bedtime and infant attachment security were included as predictors of infant emotion regulation strategies. Second, the

differential susceptibility of highly reactive infants was examined, considering the moderating role of infant characteristics in infants' emotional development. Finally, mother-rated infant temperament was distinguished from infant negative reactivity during the emotion-regulation (frustration) task.

The findings reported in the present study point to the complex relations between parenting quality, infant attachment security, and infant reactive temperament in relation to the specific strategies that infant engage in when they experience frustration. Clearly, there is still a wealth of knowledge to be gained with regards to the development of emotion regulation in children. Future studies might further explore how the adaptiveness of particular regulatory strategies may depend on the specific "goals" of the particular situation that infants are in; determine whether and how disorganized attachment (characterized by atypical emotional reactions and bizarre behaviors; Main & Solomon, 1986) relates to specific emotion regulation strategies; and conduct cross-cultural studies that can provide insights into the universal and culture-specific processes of emotion regulation in the first years of life.

CONCLUSION

The present dissertation aimed to better understand the factors that influence parenting quality, the relations between parenting quality and child social-emotional outcomes, and the role of child characteristics in both parenting and child outcomes during the first two years of life. Three studies addressed the following main questions: Do parents' psychosocial resources and child temperament predict bedtime parenting quality (Study 1)? Do bedtime parenting quality and child temperament predict infant attachment security (Study 2)? Do bedtime parenting, infant attachment security, and child temperament predict infant emotion regulation outcomes (Study 3)?

The studies' findings indicate that the "answers" to these questions are complex. Whereas certain parental resources (positive and negative coparenting) predicted parenting quality directly, others (changes in depressive symptoms) interacted with infant temperamental surgency to do so (Study 1). In addition, high and low trajectories of parenting quality across the infant's first year were related, respectively, to more and less secure attachment, with the low trajectory being particularly disadvantageous for surgent infants in regards to attachment security (Study 2). Finally, both parenting quality and infant attachment security interacted with infant reactive temperament to predict infants' use of emotion regulation strategies, such that infants high on negative affectivity were particularly susceptible (Study 3).

Together, the findings indicate that important relations exist between mothers' psychosocial resources, mothers' parenting quality during infant bedtimes, infant reactive temperament (particularly surgency and negative affectivity), and infant social (attachment security) and emotional (emotion regulation abilities) outcomes. The findings imply that any intervention efforts to improve mothers' emotional availability toward their infants during the

first year should take into consideration the quality of the coparenting relationship, child temperamental reactivity, and the ways in which reactive temperament impacts the relations between maternal psychosocial resources and parenting quality. Child reactive temperament should also be an essential element in the endeavor of promoting better social-emotional development – more secure attachment and more adaptive emotion regulation – in infants. Given that reactive infants had the lowest attachment security when parenting was less than optimal, and were particularly susceptible to parenting quality and attachment security in relation to their emotion regulation abilities, more resources may need to be designated to these reactive infants and their parents.

In conclusion, the present dissertation contributes to the parenting literature by demonstrating the importance of examining the emotional availability of parenting during the less-studied context of infant bedtimes, and the significant role of infant temperamental characteristics, in understanding two key aspects of child social-emotional development. More studies are needed to better understand the predictors of emotional availability during the first year of life, and how parental emotional availability, in interaction with child temperament, promotes healthy social connectedness and self-regulation during infancy and beyond.

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