ABSTRACT

Title of Document:	COGNITIVE AND PHYSIOLOGICAL MEDIATORS OF THE LINK BETWEEN MATERNAL ATTACHMENT AND SELF-REPORTED RESPONSES TO CHILD DISTRESS
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Given recent evidence that caregivers' responses to their children's distress are predictive of a host of child outcomes, the goal of the present study was to examine attachment related differences in maternal responses to child distress. In addition, I examined whether the link between maternal attachment and maternal responses to child distress was mediated by maternal negative attribution biases about infant distress and maternal electrodermal reactivity in the context of infant distress. Path analyses revealed that (a) maternal attachment-related anxiety was positively related to maternal distress reactions to child distress, (b) that maternal negative attribution biases were negatively related to supportive maternal responses, and (c) that maternal electrodermal reactivity was positively linked with unsupportive maternal responses. These findings advance the literature on the maternal characteristics associated with supportive and unsupportive maternal responses to child distress.

COGNITIVE AND PHYSIOLOGICAL MEDIATORS OF THE LINK BETWEEN
MATERNAL ATTACHMENT AND SELF-REPORTED RESPONSES TO CHILD
DISTRESS

By

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Chapter 1: Introduction

Bowlby (1969/1982, 1973, 1980), the founding father of attachment theory, conceptualized the attachment behavioral system as a species universal system with the predictable outcome of proximity to a caregiver in times of distress. Proximity is achieved through a number of predictable behaviors such as reaching, crawling, calling, and crying. The manner in which a caregiver responds to these signals, particularly in times of infant distress (Leerkes, Blankson, & O'Brien, 2009), contributes to a number of child outcomes, both positive outcomes when responses are sensitive and appropriate (e.g., increased ability to decode emotional expressions, positive social and emotional competence, and empathy; Eisenberg, Fabes, Schaller, Carlo, & Miller, 1991; Jones, Eisenberg, Fabes, & MacKinnon, 2002; Roberts, 1999), and negative outcomes when responses are insensitive or intrusive (e.g., lowered ability to cope with emotions, increased negative affect and anxiety, and lowered empathy and social responsiveness; Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Eisenberg et al., 1991; Fabes, Leonard, Kupanoff, & Martin, 2001). Given this wide range of outcomes, it is a striking omission in the research literature that so few investigations have attempted to elucidate the maternal characteristics associated with maternal responses to child distress. Understanding such factors may allow researchers to design and implement parenting interventions aimed at reducing risk for negative child outcomes.

In this thesis, I propose that a mother's self-reported caregiving behavior in the face of child distress is influenced by her attachment system in a predictable way. Furthermore, I propose two meditational mechanisms by which this occurs. In the following sections, I first describe the caregiving behavioral system. Second, I explain

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how it relates to and is influenced by the adult attachment system in the context of caring for a distressed social partner. Third, I address specifically how adult attachment may affect parental responses to child distress (Figure 1, path c). Fourth, I propose that negative parental attributions mediate the link between adult attachment and self-reported responses to child distress (Figure 1, paths a and b) and explain how this may occur. Finally, I examine maternal emotion regulation, as indicated by maternal physiological reactivity when faced with child distress, as an additional mediator of this link (Figure 1, path d and e).

The Caregiving Behavioral System

According to Bowlby (1969/1982), a mother's response to her child's distress is guided by her caregiving behavioral system. The set goal of the caregiving behavioral system is protection and care of young, and is achieved through such predictable behaviors as retrieval, calling, restraining, and soothing distressed offspring (Cassidy, 2008). However, the caregiving system is just one of many behavioral systems in humans, and must work in tandem with and opposite a host of other behavioral systems (e.g., the sexual system, the sociable system) that likely influence the manner in which a caregiver is able to provide protection and care (Cassidy, 2008).

One system that may influence operation of the caregiving system is the attachment system. Although he focused on the attachment behavioral system in young children, Bowlby (1979) believed it to be a lifelong construct, "from the cradle to the grave" (p. 129), that is continuously activated and regularly aroused, even in adulthood. Such life-long activation should be cognitively, physiologically, and behaviorally manifested, just as it is in childhood (Mikulincer & Shaver, 2007). As such, the

attachment system can reasonably be expected to influence activities involving these manifestations, such as caregiving (Mikluncer & Shaver, 2007). However, the type of response prompted by the attachment system's influence on the caregiving system and the degree to which the attachment system, hinders effective caregiving may depend on individual differences in attachment system functioning. In the following section, I will briefly discuss self-reported attachment styles and how they relate to caregiving behavior.

Adult Attachment, Caregiving, and Response to Distress

Adult attachment styles, gleaned from self-reports about typical behavior and feelings in close relationships, are thought to reflect generally stable "patterns of expectations, needs, emotions, emotion-regulation strategies, and social behavior" in relational contexts (Shaver & Mikulincer, 2002, p. 134) and are characterized along two dimensions. On the one hand, high scores on the attachment avoidance dimension reflect discomfort with close, personal relationships and dependency. Individuals high on the avoidance dimension are thought to regularly deactivate their attachment system in the service of avoiding powerful, and in particular, negative emotions (Mikulincer & Shaver, 2008). Attachment anxiety, on the other hand, reflects a desire for closeness augmented by a fear of rejection and abandonment and a general distrust of the availability of others. Individuals high in attachment anxiety are thought to hyperactivate attachment needs in the service of keeping attachment figures close by (Mikulincer & Shaver, 2008). High levels of either or both constructs indicate attachment insecurity, whereas low levels of both are thought to reflect a secure attachment. Secure attachment is associated with comfort with both autonomy and intimacy, as well as the ability to regulate affect and emotion in times of stress (Mikulincer & Shaver, 2008). Consistent with the notion that

these dimensions should guide adult behavior, affect, and cognitions, empirical evidence suggests that there are significant links between adult attachment and a number of related constructs, such as communication, emotional expression, and perceptions of social partners (for a full review, see Mikulincer & Shaver, 2007).

Accordingly, caregiving behavior, which is likewise influenced by affect and cognitions (Dix, Ruble, Grusec & Nixon, 1986), ought to be influenced by adult attachment styles. For instance, secure individuals have a positive cognitive model of themselves as efficacious care providers and of others as worthy and deserving of support and care, providing a "psychological foundation" (Mikulincer & Shaver, 2007; p. 329) for providing sensitive, altruistic care. Furthermore, secure individuals have a positive view of their own ability to elicit care (Mikulincer & Shaver, 2008). Thus, caring for another person is non-threatening and they are able to respond to the distressed person in a sensitive and empathic manner (Mikulincer & Shaver, 2007). Insecure individuals, on the other hand, hold no such notions about their own efficacy as caregivers and can easily be overwhelmed by the expectation of care from another person (Mikulincer & Shaver, 2007). Therefore, providing adequate care for a distressed social partner may seem secondary to alleviating one's own discomfort, leading to less supportive responding (Kunce & Shaver, 1994). The reasons for this insensitivity vary by attachment style. Insecure-avoidant people, as noted above, tend to minimize attachment related needs, even in the face of distress. Thus, they tend to avoid close, intimate situations and to reject signs of weakness and vulnerability in others. This translates into less sensitive responses to other people's distress, and even anger or annoyance when others openly express such needs (Mikulincer & Shaver, 2007; see Rholes, Simpson, & Oriña, 1999, for

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empirical support). Insecure-anxious people, on the other hand, tend to intensify

attachment related needs, making them vulnerable to becoming enmeshed in the personal

problems of the care-seeker. People high on the anxious dimension may evince intense

emotional reactions that can cause them to be intrusive or to seek support themselves,

rather than providing it (Mikulincer & Shaver, 2007). Furthermore, their need for

closeness and approval can lead to caregiving behavior rooted in selfish, not empathic,

reasons (Collins, Guichard, Ford, & Feeney, 2006).

      Empirically, these notions are supported through a number of studies examining

the relation between a person's attachment style and his or her responses to another

person's distress. For instance, in adult romantic relationships where each individual

both gives and receives care, secure individuals have been consistently found to provide

the most supportive and sensitive care to distressed partners (Feeney, 1996; Feeney &

Collins, 2001; Feeney & Hohaus, 2001). In contrast, insecure individuals tended to

provide care consistent with the theoretical notions outlined above. In one study, for

instance, avoidant individuals who were manipulated to believe their partners needed

high levels of support actually provided *less* support than avoidant individuals who

believed their partner needed only minimal support (Feeney & Collins, 2001). In the

same study, anxious individuals were more likely to provide support in the high need

condition, but were inconsistently supportive in the low need condition, demonstrating an

attunement to more intense displays of emotional negativity (Feeney & Collins, 2001).

Additionally, avoidant individuals tend to respond to the needs of other with distance and

anger (Rholes et al., 1999), whereas anxious individuals tend to be intrusive, to focus on

their own distress, and to act in ways that are out of sync with their partner's need

(Collins & Ford, 2010). Similar findings were reported in studies using self-reports (Carnelley, Pietromonaco, & Jaffe, 1996) narrative accounts (Feeney & Hohaus, 2001), and laboratory observations (Feeney & Collins, 2001, for findings with both anxious and avoidant individuals; Simpson et al. 1992, 2002, for findings with avoidant individuals only) of caregiving behavior in response to partner distress.

Adult Attachment and Parental Response to Child Distress

An individual's response to another's distress becomes increasingly important in the context of the parent-child relationship (Leerkes et al., 2009), and the ever-present attachment system should still guide parenting behavior. In fact, according to Bowlby, "No one should be surprised therefore when a woman expecting a baby or a mother caring for her children has a strong desire to be cared for and supported herself. The activation of attachment behaviour in these circumstances is probably universal and must be considered the norm" (Bowlby, 1988, p. 3-4). This notion is supported by large body of literature (including one meta-analysis; van Ijzendoorn, 1995) indicating that secure and insecure individuals tend to parent in qualitatively different manners. However, much of this literature uses the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1984, 1986, 1996), which purportedly taps into state of mind with respect to attachment, a theoretically different construct than that measured by self-reports. In this paper, I will focus only on studies looking at self-reported attachment-related differences in parental response to child distress.

To the best of my knowledge, only two studies have examined self-reported attachment-related individual differences in parental caregiving in times of distress. In one study, parents responded to the their child's distress after the child received an

inoculation (Edlestien et al., 2004). Parents were coded on a number of parenting domains (e.g., parental sensitivity, parental non-hostility) that were later combined to create one parental responsiveness scale. Although attachment anxiety was unrelated to parental responsiveness, attachment avoidance was inversely related to the construct when children showed high levels of distress, even after controlling for parental personality and child temperament. Specifically, parents who were high on attachment avoidance showed less responsiveness when their children were highly distressed, whereas parents who were low on attachment avoidance showed higher responsiveness when their children were highly distressed. In the other study examining the link between parental (and in this case, only maternal) self-reported attachment style and responses to child distress, mothers' self-reported responses to their children during and after invasive medical procedures demonstrated that secure mothers were more likely to explain and ask questions about the procedure, and were more likely to physically comfort their children (Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1997). Conversely, mothers who were classified as anxious or avoidant on a self-report measure of attachment were less likely to physically comfort their children or explain what was happening to them, and were more likely to report not having sufficient time to properly attend to their children. Thus, attachment avoidance appears to be strongly and inversely related to sensitive responses to child distress. More studies using self-reported attachment measures are needed to clarify the role of attachment anxiety in maternal responses the child distress.

The Mediating Role of Maternal Attributions about Child Behavior

A growing body of theoretical and empirical evidence supports the claim that parental cognitions play a central role in guiding parenting behavior (e.g., Bugental & Goodnow, 1998; Miller, 1995; Murphey, 1992). Indeed, it is not possible to understand the foundations of parental actions fully without examining the role of the cognitive processes to which they are linked (Bugental & Johnston, 2000). Research over the past thirty years has examined parental cognitions in a number of child domains, including parental cognitions about child academic performance (Natale, Aunola, & Nurmi, 2009), parent-child interactions (Bugental & Happaney, 2002), and, most relevant to this study, parental attributions for child behavior (e.g., Daggett, O'Brien, Zanolli, & Peyton, 2000). Of particular interest have been both the origins of parental attributions and the effect such attributions have on subsequent parental behavior. In this study, I propose that maternal negative attributions mediate the link between maternal attachment style and maternal reactions to child distress (Figure 1). In particular, I propose that maternal negative attributions result from an insecure attachment style (Figure 1, path a), and that negative attributions predict unsupportive responses to child distress (Figure 1, path b). Conversely, low levels of attachment anxiety and avoidance should predict a lower negative attribution bias, which will be associated with supportive responses to child distress.

Adult attachment and attributions about child behavior. The notion that maternal attachment should guide attributions about child behavior is in agreement with well-established theoretical approaches that attempt to elucidate the origins of individual differences in cognitive processing. Theories in multiple psychological fields (e.g. social

psychology, developmental psychopathology) have underscored the importance of social relationships in the formation of individual differences in social information processing (see Crick & Dodge, 1994, for a review; see also Bowlby, 1973; Cassidy & Shaver, 2008). Likewise, theories of adult attachment styles posit that adult attachment guides cognitive processes in a manner that is relatively stable and operates automatically and outside of conscious awareness (Mikulincer & Shaver, 2007). The structure of a person's attachment organization leads to specific, predictable patterns of expectations and interpretations of the world and the people in it (Dykas & Cassidy, 2011). These unconscious cognitions are adaptive in helping humans to interpret the world around them by providing a quick, efficient means for understanding and interpreting social information (Bowlby, 1973; Bretherton & Munholland, 1999, 2008) and even biasing the kinds of attributions people make. By using preformed mental schemas as a perceptual filter, individuals are able to quickly assign meaning to a range of social cues on a moment-to-moment basis.

However, just as attachment orientations differ across individuals, so too do cognitions prompted by the attachment system, and these differences bias the manner in which people process social information. Secure individuals are able to recognize and expect available, responsive, and sensitive care and, as a result, are open to recognizing and dealing with a range of emotions (Dykas & Cassidy, 2011, Mikulincer & Shaver, 2007). They have likely had experiences of being able to tolerate distressing emotions due both to their ability to elicit care and their caregiver's ability to calm them. Thus, when presented with ambiguous social information, such as the cries of a distressed infant, secure individuals are unthreatened and likely to process this information in a

positive fashion (e.g., Leerkes & Siepak, 2006). Insecure individuals, on the other hand, hold cognitive representations of caregivers as unresponsive, insensitive, and even rejecting and likely have not had the consistent experience of being soothed when upset. They see the world as rejecting and themselves as incapable of eliciting care and therefore process ambiguous social information in a negative manner (Dykas & Cassidy, 2011; Feeney & Cassidy, 2003).

These social information-processing biases can be extended to the particular kinds of attributions individuals make when interpreting social information. As adult attachment styles guide the cognitive representations that are applied to incoming information, the perceptual biases inherent in different models should guide interpretation in predictable ways. Specifically, the attributions secure people make should be positively biased, and those made by insecure individuals should be negatively biased. In fact, a considerable amount of emerging empirical evidence supports the notion that an individual's experiences in close personal relationships have a profound impact on the manner in which he processes social information (see Dykas & Cassidy, 2011, for a review). For instance, one study found a negative correlation between self-reported attachment security and negative attributions regarding the causes of hypothetical negative events involving the participant (Newcomb Rekart, Mineka, Zinbarg, & Griffith, 2007). Additionally, two studies found that insecure individuals made more negative attributions for partner behavior than secure individuals (Collins, 1996; Sümer & Cozzarelli, 2004). Similarly, one study found that negative attributions mediated the association between insecure attachment and negative self-reported couple communication (Pearce & Halford, 2008). Although one study found this association

(i.e., negative attributions mediating the link between attachment style and marital functioning) only in anxious women (but in both anxious and avoidant men; Gallo & Smith, 2001), these studies form a solid empirical basis for the hypothesis that adult attachment should guide attributions about social partners.

Maternal attachment and maternal attributions about infant distress. While parenting, parents must interpret the cues of their children on a minute-by-minute basis. One particularly salient social cue in parenting is an infant's cries (Murray, 1979). Infant crying is an aversive, ostensive signal that care is needed and the ways parents respond is, in part, guided by their attributions for the cry (Dix et al., 1986). To my knowledge, the notion that maternal attachment should influence maternal attributions about child distress has been examined in only one study investigating mothers' interpretations of infant cries. Leerkes and Siepak (2006) found that attachment avoidance in adulthood was significantly and positively correlated with negative attributions about infant crying and that higher levels of security acted as a buffer against negative attribution biases regarding infant cries. Although more work is needed to support and extend these results, the notion that maternal attachment should guide maternal attributions about child distress is theoretically sound, and has garnered some empirical support.

Parental attributions and parenting behavior. Consideration of parental cognitions as a precursor of parental behavior is not new in psychological research. Early attempts to predict parenting behavior from parental attitudes and values proved fruitless (e.g., Holden & Edwards, 1989), so researchers then drew on the already booming field of attribution theory to examine parental attributions regarding themselves and child behavior (Grusec & Mammone, 1995). Multiple models exist within attribution theory.

For instance, Weiner (1980) posited that attributions about the causes of all behavior can be gleaned by examining the behavior's position on the intersecting dimensions of internality/externality, stability/ instability, and controllability/uncontrollability. Drawing on this and other attribution models, theories regarding parental attributions posit that a parent's beliefs about the cause of a child's behavior will guide subsequent parental behavior with that child.

For instance, Dix and Grusec (1985) proposed a model of parent attributions in which parents must make a series of quick, in-the-moment decisions regarding the source of their child's behavior. Specifically, they must decide whether the child intended the effects produced by the behavior, and if so, whether the behavior reflects a dispositional characteristic of the child (i.e., was internally motivated) or is the result of an environmental factor (i.e., was externally motivated). Then, if parents attribute intentionality to the behavior, they must further decide if the child is responsible (or in the case of misbehavior, blameworthy) for it. This series of attributions (regarding the cause and responsibility of the behavior) hypothetically leads parents to either positive or negative affect, which, in turn, affects their behavioral response.

For instance, a parent whose infant is crying must decide whether the infant is crying intentionally (e.g., to get what she wants) and if so, if it is because of her disposition (e.g., she is a fussy, difficult baby) or because of external causes (e.g., she is uncomfortable because of something in the environment). The parent must further decide if she is responsible for the behavior – that is, if she can control her crying and is choosing not to. Parents who assign intentionality and responsibility or blame to an aversive behavior are hypothesized to become affectively negative and engage in harsher

parenting (Dix & Grusec, 1985). On the other hand, parents who attribute developmental or external causes to behavior, such as ignorance of social norms or environmental effects, should produce a much more sympathetic response. Although a majority parents do tend to attribute external, situational causes to child misbehavior (Dix, 1991; Gretarsson & Gelfand, 1988; Power, Gershenhorn, & Stafford, 1990), parents who trend in the opposite direction (i.e., who believe that child misbehavior is stable, global, and dispositional) are considered to have a negative attributional bias which, theoretically, leads to less sensitive parenting.

The large body of the empirical work on parental attributions of child behavior stems, in part, from the idea that child abuse results from parental attribution of willful noncompliance to their children's misbehavior and the belief that the child has a stable and "bad" disposition (e.g., Bauer & Twentyman, 1985; Larrance & Twentyman, 1983; but see Rosenberg & Reppucci, 1983 for discrepant findings). This work has been incredibly fruitful, with findings indicating that mothers who are abusive or coercive with their children are more likely to attribute intentionality and negative dispositions to their children (e.g., Hildyard & Wolfe, 2007; Pidgeon & Sanders, 2009; Smith & O'Leary, 1995) and are more likely to make hostile attributions regarding their child's behavior. For instance, in a sample of nearly 500 women, Berlin, Dodge, and Resnick (in press) found that each one point score increase on an index of hostile attributions raised the likelihood of child maltreatment by 26%. Furthermore, mothers who made more hostile attributions while pregnant reported engaging in harsher parenting practices two years later. Work in intervention research further supports the claim that negative parental attributions about child behavior raise the risk of engaging in abuse. Bugental et al.

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(2002) designed and tested an intervention aimed at addressing parents' negative

attributions about their child's behavior (e.g., that the child behaves with negative intent

or challenges parental power). The intervention prompted parents to think of a

challenging parenting context and to assign meaning to the child behavior. They were

then continuously prompted until they gave a non-blaming reason for the behavior, and

then immediately brainstormed strategies to deal with the behavior in the future.

Approximately 25% of the parents in the control conditions (i.e., a group who received

similar services *not* aimed at changing parental cognitions, and a group who received no

services) were implicated in engaging in child abuse by the end of the first year of their

child's life. In contrast, in the intervention condition, only 4% of the parents engaged in

child abuse. Additionally, the use of corporal punishment was halved among the

intervention participants.

Even in cases of non-abuse, negative attributions regarding child misbehavior

have been linked to harsher parenting practices. For example, Nix et al. (1999) reported

that mothers' hostile attributions significantly predicted self-reported harsh parenting

practices, and that this link was strongest in ambiguous situations. That is, parents who

interpret ambiguous childcare situations in a hostile manner also engage in harsher

parenting practices (Nix et al., 1999).   Other studies have replicated this effect (e.g.,

Larrance & Twentyman, 1983), which suggests that a mother's attribution style is most

influential in ambiguous situations. Another study, conducted by Daggett, O'Brien,

Zanolli, and Peyton (2000), found that negative interpretations of child behavior were

related to a lower quality caregiving environment (assessed on measures of parent

responsiveness, acceptance, and involvement with the child, as well as environmental

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variables). In addition, MacKinnon-Lewis, Lamb, Arbuckle, Baradaran, & Volling (1992) found that a mother's tendency to make negative attributions about her child's behavior was predictive of her aggressiveness while completing a potentially frustrating task with the child. In fact, the most aggressive dyads were those in which the child and the mother both attributed hostile intent to each other.

Additionally, parental attributions of intentionality, stability, and internality for misbehavior have been linked to harsher parenting practices. For instance, Geller and Johnston (1995) reported that mothers who attributed internal and controllable causes for negative child behavior also indicated that would react more negatively in response. Another study using a community sample found that both mothers and fathers who attributed child responsibility for misbehavior also engaged in more aggressive parenting (Smith Slep & O'Leary, 2007). Additionally, using an open ended attribution probe, Smith and O'Leary (1995) found that mothers' "dysfunctional" maternal attributions were related to arousal while watching scenes of maternal discipline, and that both attributions and arousal predicted harsh, but not lax, parenting (see also Leung & Slep, 2006, for similar findings). Parental attributions of intent have even been experimentally manipulated to demonstrate the causal link between negative attributions and harsh parenting. Dix, Ruble, and Zambarano (1989) presented mothers with vignettes describing children engaging in negative behaviors. Half of the women were told that the child understood that his behavior was unacceptable and the other half was told that the child had no such understanding. Two weeks later, they listened to the same vignettes and reported on how they would have reacted. Mothers who had been told that the behavior was intentional and understood by the child endorsed more power assertive and

less inductive parenting. Furthermore, parents who self identified as authoritarian parents also tended to assign greater competence and responsibility to the children. Slep and O'Leary (1998) found similar results, reporting that mothers who were manipulated to believe that a videotaped child was responsible for his misbehavior had more dysfunctional attributions (defined as those assigning higher levels of control, intent, and negativity of intent to child behavior), reported that they would engage in more overreactive discipline in the same situation, and reported marginally more anger in response to the video.

Additionally, parental attributions can affect overall relationship quality and appear to be somewhat stable across time and situations. For example, one study found that mothers whose negative trait conceptions of their children rest on the assumption that these traits are internal, stable, controllable, and global were more likely to report general relationship dissatisfaction with their children (Sacco & Murray, 1997). In addition, Power et al. (1990) found that mothers who interpreted their six-week-old infant's difficult behavior as due to disinterest and resistance were more likely than other mothers to attribute willfulness and unpredictability to their infants three months later. They also reported that mothers' attributions were stable across a variety of caregiving situations (e.g., bath time, feeding, bedtime; Power et al., 1990). Dix and colleagues (1986) examined the longitudinal course of mothers' attributions, and found that mothers' negative attributions changed as children developed. Specifically, as children advanced developmentally, mothers were more inclined to attribute internal, stable causes as opposed to external, environmental causes for misbehavior (but, see Zeedyk, 1997 for contrary results).

The notion that maternal attributions about child behavior are pervasive, stable, and can become increasing negative across time is particularly relevant to the current study, as I am using maternal attributions about infant behavior to infer a bias toward her attributions about a much older child's distress. Although it may be difficult to imagine that the attributions a mother makes about a crying infant would be similar to those she would make for her six year old child, research indicates that attributions of intent and blame increase as children age (Dix et al., 1986). Thus, those mothers who exhibit a negative attribution bias towards even a young infant may be at particularly high risk for demonstrating similar negative attributions for their own children. This negative attribution bias, directed even towards an unfamiliar infant, is likely to be implicit when making attributions about her own more developmentally advanced child.

The Mediating Role of Physiological Reactivity in the Face of Child Distress

Another mechanism that may account for the proposed link between maternal attachment and maternal response to distress is the mother's tendency to become physiologically dysregulated in the face of stressful events (Figure 1). One essential component of effective caregiving is the ability to regulate one's own emotions when faced with another's distress (Dix, 1991). Dealing with the distress of any social partner, including one's own child, can be a stressful event, particularly in situations in which a clear cause and solution are not easily discerned. Effective emotion regulation allows a caregiver to down-regulate her own distress, appraise the situation and provide a sensitive and appropriate response (Dix, 1991). In contrast, the inability to effectively regulate emotions in the caregiving context hypothetically leads to less sensitive responses that are more focused on alleviating one's own distress, rather than the child's (Dix, 1991).

In this thesis, I propose that mothers who evince high levels of avoidance on a self-report attachment measure will have higher electrodermal reactivity in response to infant cries (Figure 1, path d), and that higher electrodermal reactivity will predict unsupportive responses to child distress (Figure 1, path e). In the following sections, I will review the theoretical underpinnings of the link between attachment and physiological reactivity to stressful events, as well as the somewhat sparse literature exploring this link empirically. Then, I examine how physiological reactivity to infant and child signals is associated with parenting behavior.

Attachment and physiological responses to stressful events. Given that the attachment system is itself a key player in the development of emotion regulation (Cassidy, 1994), it is no surprise that the attachment system continues to affect a person's ability to effectively regulate emotions even in adulthood (see Mikulincer & Shaver, 2007, for a review). Secure individuals have confidence in their ability to cope with distressing events and are thought to use adaptive coping strategies when faced with emotion eliciting situations (Mikulincer & Shaver, 2008). They are thus able to use their cognitive resources to reappraise stressful situations to seem less threatening and to generate solutions and resolutions to the problem at hand. They are also more likely to have developed effective self-soothing skills through early experiences of supportive caregiving and are thus unthreatened by negative emotions (Mikulincer & Shaver, 2007). Accordingly, secure individuals are open to facing a wide range of emotions in both themselves and others and are able to deal with emotion eliciting events, such as a distressed child, with confidence and relative ease (Mikulincer & Shaver, 2007).

Insecure individuals, however, are theorized to hold distinctly different patterns of emotion regulation. Avoidant individuals tend to suppress potentially painful emotions, such as anger, sadness, and fear. This style of coping, termed distance coping, is characterized by strategies such as distraction, cognitive distancing, behavioral distancing, and cognitive disengagement when faced with potentially distressing emotions and events (Mikulincer & Shaver, 2007). Paradoxically, even though both secure and avoidant people are down-regulating their emotions, avoidant people tend to do so to such a degree that they effectively cut off the emotion from ever consciously occurring, whereas secure individuals allow the emotion to occur and only down-regulate if such action is necessary for achieving the goal at hand (e.g., relieving another's distress; Mikulincer & Shaver, 2007). Empirically, this pattern of emotion regulation has been supported and has implications in both support seeking in times of distress (Collins & Feeney, 2000; Simpson, Rholes, & Nelligan, 1992) and support provision to social partners in distress (e.g., Feeney & Collins, 2001).

Anxious individuals, on the other hand, tend to be hypervigilant to threat cues (e.g., the distress of a social partner) and tend to maximize negative emotions. Rather than down-regulating negative affect in the service of accomplishing one's goals, anxious individuals tend to focus on it, interfering with their ability to deal with threatening situations. For example, anxious individuals have been found to report experiencing more anger and hostility in response to conflict with social partners (Simpson, Rholes, & Phillips, 1996) and evince decreased attention to target stimuli when presented in the context of threatening emotional stimuli (Silva, Soares, & Esteves, 2012).

One means by which to examine the hypothesized link between attachment and emotion regulation in adulthood is through the measurement of physiological reactions to stressful events. For instance, reactions of the autonomic nervous system (ANS) provide an objective index of both conscious and unconscious reactivity to stressful events (Lang, 1994). Specifically, increases in electrodermal activity (EDA) and heart rate (HR) are taken to indicate greater emotional dysregulation and negative affect in the face of distress (Bongard, Pfeiffer, al'Absi, Hodapp, & Linnenkemper, 1997; Lovallo et al., 1985; Porges, 1995). Hypothetically, the maladaptive emotion regulation processes of both avoidant and anxious individuals should be supported by greater ANS activity when faced with a stressful task.

Empirically, this notion is supported across the few studies examining attachment related differences in ANS reactivity to stressful events. Consistently, both avoidant and anxious individuals are characterized by heightened ANS reactivity to stressful events, despite their qualitatively different means of regulating emotions. For instance, in one study, avoidant individuals (as measured by the Adult Attachment Interview; AAI; George, Kaplan, & Main, 1984, 1986, 1996) showed heighted EDA in response to a conflict discussion with a romantic partner, and high levels of attachment anxiety were associated with increases in HR. Conversely, security was associated with the lowest levels of EDA in comparison to baseline (Roisman, 2007; see also Kim, 2006 for similar results concerning blood pressure). Avoidant and anxious women have also shown higher ANS (blood pressure and HR) responses than secure women when they engaged in or were told they were about to engage in a stressful laboratory task (Carpenter & Kirkpatrick, 1996; Feeney & Kirkpatrick, 1996). Additionally, both avoidant and

anxious participants in one study reacted to anger eliciting scenarios with increased HR in comparison to secure participants (Mikulincer, 1998).

The link between attachment and ANS reactivity appears to be especially strong for avoidant individuals, who, despite reporting subjectively lower levels of distress (Diamond & Fagundes, 2010; Diamond, Hicks, & Otter-Henderson, 2006), consistently show heightened levels of ANS reactivity. For instance, two studies found evidence of heightened EDA in avoidant, but not anxious, individuals in response to discussing potentially painful childhood memories (Dozier & Kobak, 1992; Roisman, Tsai, & Chang, 2004). Additionally, avoidance has been associated with increased skin conductance levels (SC; a measure of EDA) and lower HR variability at baseline, understood to indicate decreased flexibility in dealing with a stressful environment (Maunder, Lancee, Nolan, Hunter, & Tannenbaum, 2006) in response to a variety of lab tasks, including discussions of attachment related themes, math tasks, and giving a speech (Diamond, Hicks, & Otter-Henderson, 2006). Taken together, these findings indicate that insecure individuals, and especially avoidant individuals, intrinsically respond to stressful situations with heightened reactivity reflective of deficient emotion regulatory processes.

The role of emotional and physiological dysregulation in parenting behavior. In line with the proposed mediation, the ability of a mother to regulate her own emotions effectively when faced with the distress of her child should, in turn, affect her behavioral response. Effective emotion-regulation allows a mother to focus her efforts on relieving her child's distress, rather than her own. Conversely, maladaptive or ineffective regulation of negative emotions in the parenting context leads to self-focused, intrusive,

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or less frequent or sensitive responses (Rueger, Katz, Risser, & Lovejoy, 2011). Indeed, strong affective reactions to parenting challenges are thought to decrease long-term child-focused motives in favor of short-term, self-focused motives (Maccoby & Martin, 1983), which are often less sensitive or appropriate responses. For instance, hypersensitivity to aversive stimuli (e.g., the cries of a distressed child) in the context of parenting is often cited as one possible explanation for the hostile and punitive parenting associated with abusive and depressed parents (e.g., Bauer & Twentyman, 1985; Black, Heyman, & Slep, 2001; Frodi & Lamb, 1980). Additionally, multiple studies have found an association between mothers' negative emotional reactions to child distress and insensitive responding (Leerkes, 2010; Leerkes, Parade, & Gudmundson, 2011, Lorber & Slep, 2005). In fact, a recent meta-analysis found significant associations between parental negative affect and hostile parenting and between positive parental affect and supportive parenting (Rueger, Katz, Risser, & Lovejoy, 2011).

However, given that parental reports of emotional experiences in parenting contexts are subjective and often reflective, researchers have turned to physiological measures as a more objective and immediate means of discerning parental reactivity and its effects on parental behavior. Traditionally, such research has focused on physiological responses to infant cries. This tradition, inspired by the desire to understand abusive parenting, stems from the idea that infant cries are universally aversive, often ambiguous (Murray, 1979), salient child cues that every parent must often deal with in the first few years of their child's life. Additionally, infant cries, but not other infant signals, consistently produce physiological reactions in parents (Frodi & Lamb, 1980). Theoretically, the expected links follow a similar pattern to those outlined

above. Parents who are hypersensitive to the aversiveness of infant cries should tend to engage in less sensitive parental responses (Lorber & O'Leary, 2005).

Empirically, the link between physiological responses to infant cries and subsequent differences in parental responding has been supported. For instance, one study found that mothers who had higher HR reactivity to their own baby's cries also tended to respond to the cries more quickly (Vecchio, Walter, & O'Leary, 2009). Although faster responding may seem to an indication of greater sensitivity, importantly, the authors did not examine the nature of the response. Thus, it can only been presumed that physiological dysregulation affected the speed, not the quality, of the response.

Unsurprisingly, the few studies that have examined suboptimal parenting and physiological dysregulation have found that greater physiological reactivity (generally interpreted as reflecting increased negative affect; Beauchaine, 2001; Bongard, Pfeiffer, al'Absi, Hodapp, & Linnenkemper, 1997; Porges, 1995) is linked with less sensitive, or even abusive, responding. For instance, in a study of abusive versus non-abusive parents, abusive parents evinced significantly larger increases in both SC and HR in response to videotapes of crying infants than non-abusive parents (Frodi & Lamb, 1980; see also McCanne & Hagstrom 1996). Another study found that mothers who evinced accelerated HR reactions to audiotapes of crying infants at 5 months post partum were also more likely to have infants who were insecurely attached (Donovan & Leavitt, 1989), a known result of insensitive parenting (Ainsworth, Blehar, Waters & Wall, 1978). Finally, increased maternal HR reactivity has been linked with overreactive discipline in a community sample of mothers with young toddlers (Lorber & O'Leary, 2005).

The Present Study

The first goal of the present study was to expand the scant literature on the link between self-reported attachment styles and caregiving behavior in times of child distress. Specifically, I examined how self-reported maternal anxiety and avoidance relate to maternal self-reported responses to their child's distress. Only two studies thus far have examined this link (Edlestien et al., 2004; Goodman et al., 1997) despite the fact that it has been demonstrated that a mother's response to her child's distress is far more predicative of child outcomes than maternal caregiving in any other context (Leerkes et al., 2009). Given the myriad of developmental outcomes associated with parental responses to child distress (e.g., Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Eisenberg et al., 1991; Fabes, Leonard, Kupanoff, & Martin, 2001), this is a striking omission in the literature.

The second goal of the present study was to examine, for the first time, two possible mediators for the link between maternal attachment and the manner in which a mother responds to her child in times of child distress. In addition to testing the direct links between maternal attachment and maternal response to child distress, I tested a meditational model in which maternal attachment was indirectly related to maternal response to distress through maternal attributions about infant crying and maternal physiological reactivity in the face of distress. These meditational models are in line with previous research that shows that parents who have negative attributions of their children's behavior and who are more physiologically reactive to their children tend to endorse harsher parenting practices (e.g., Lorber & O'Leary, 2005, Nix et al., 1999).

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The present study also addresses an important gap in the attachment literature. Few studies have examined the role of self-reported attachment and parenting behaviors in the context of child distress (Edlestien et al., 2004; Goodman et al., 1997). Given that the adult attachment literature contains support for the notion that there are attachment-related individual differences in caregiving behavior (e.g, Feeney & Collins, 2001), this is a surprising gap, and has implications for parenting interventions aimed at improving parental supportiveness. In adding to this body of literature, I hope to provide support for attachment-related individual differences that can be used to inform such interventions, as well as therapists and practitioners.

Hypotheses.

Hypotheses related to maternal self-reported unsupportive responses to distress.

Hypothesis 1. Maternal avoidance will be positively related to maternal self-reported unsupportive responses to child distress.

Hypothesis 2. Maternal physiological response to infant distress will partially mediate the link between maternal avoidance and maternal self-reported unsupportive responses to child distress. Specifically, I expect that greater maternal avoidance will predict higher levels of electrodermal reactivity, which, in turn, will predict more self-reported unsupportive responses to child distress.

Hypothesis 3. Negative attribution biases will partially mediate the link between maternal avoidance and maternal self-reported unsupportive responses to child distress. Specifically, I expect that greater maternal avoidance will predict stronger negative attribution biases, which, in turn, will predict more self-reported unsupportive responses to child distress.

Hypothesis 4. Maternal anxiety will be positively related to maternal self-reported unsupportive responses to child distress.

Hypothesis 5. Negative attribution biases will partially mediate the link between maternal anxiety and maternal self-reported unsupportive responses to child distress. Specifically, I expect that greater maternal anxiety will predict stronger negative attribution biases, which, in turn, will predict more self-reported unsupportive responses to child distress.

Hypotheses related to maternal self-reported supportive responses to distress.

Hypothesis 6. Maternal avoidance will be negatively related to maternal self-reported supportive responses to child distress.

Hypothesis 7. Maternal physiological response to infant distress will partially mediate the link between maternal avoidance and maternal self-reported supportive responses to child distress. Specifically, I expect that greater maternal avoidance will predict higher levels of electrodermal reactivity, which, in turn, will predict less self-reported supportive responses to child distress.

Hypothesis 8. Negative attribution biases will partially mediate the link between maternal avoidance and maternal self-reported supportive responses to child distress. Specifically, I expect that greater maternal avoidance and will predict stronger negative attribution biases, which, in turn, will predict less self-reported supportive responses to child distress.

Hypothesis 9. Maternal anxiety will be negatively related to maternal self-reported supportive responses to child distress.

Hypothesis 10. Negative attribution biases will partially mediate the link between maternal anxiety and maternal self-reported supportive responses to child distress. Specifically, I expect that greater maternal anxiety will predict stronger negative attribution biases, which, in turn, will predict less self-reported supportive responses to child distress.

Chapter 2: Method

Participants

Participants were 90 mothers (65.8% married) of 6- to 7- year-old children (46.7% girls; mothers' mean age: 38.39; SD = 6, Range: 25 - 47; child's mean age: 6.95 years; SD = 0.61; Range: 6.00 – 7.93) in the Washington, D.C. area, recruited primarily through fliers and email notices. The only inclusion criterion was the ability to speak English well enough to complete the protocol (89.5% of mothers were native English speakers). Mothers self-reported races were as follows (mothers could choose as many races or ethnicities as applied): 37.8% White, 37.8% Black/African American, 2.2% Asian, 11.1% Hispanic or Latino, 2.2% Native, 3.3% other, and 15.6% failed to report. The median annual household income was between $79,000 and $99,000.

Procedure

The study, which took place in a single two-hour lab visit at the Maryland Child and Family Development Laboratory at the University of Maryland, College Park, was part of a larger study about children's social-emotional development (see Table 1). All measures and instructions were presented on a computer and were in the same order for each participant. An experimenter was available for questions during each portion of the study, but was not always present in the room.

Order of tasks. Upon arrival at the lab, the experimenter answered any questions about the procedure and then obtained informed consent. Then, the experimenter attached three components of the Biopac MP 150 system (described in the measures section) to each mother to monitor her heart rate, breathing rate, and electrodermal activity. Then, mothers entered a quiet room (separate from her child) to complete her

portion of the experiment. Each mother first completed a demographics questionnaire about her and her family. Mothers then rested upright with closed eyes for three minutes in order to obtain a psychophysiological baseline for later comparison. They then completed some questionnaires about themselves and their children (Table 1). Following these assessments, each mother reunited with her child for a break and some snacks. After the break, which lasted from 3-5 minutes, mothers returned to the original testing room. There, they watched some videos, completed an additional questionnaire, and played a computer game (Table 1).

Measures and Materials

Collection of maternal electrodermal activity. To measure electrodermal activity, we used a Biopac MP 150 system. Prior to each session, the experimenter thoroughly cleaned and recalibrated the system to zero before applying an odor-free, hypo-allergenic silver chloride gel to the two silver chloride electrodes. At the start of the study, the experimenter attached the electrodes to the palmer surface of the second phalanges of the index and middle fingers of each participant's non-dominant hand using double-sided adhesive discs, Velcro bands, and surgical tape. Electrodermal activity (EDA) sample rate was 1000 samples per second at a gain of 5 $\mu\Omega$/V and 10 Hz. The experimenter attached heart rate sensors on the right and left side of the upper chest using adhesive discs. She also secured a thick elastic Velcro band around the lower portion of the participant's chest to measure breathing rate. Heart rate and breathing rate will not discussed in the present study.

***Maternal physiological response to infant distress*.** In order to measure mothers' responses to viewing an infant in distress, we used a paradigm pioneered by Leerkes &

Seipak (2006). Mothers watched four one-minute videos featuring two different infants in distress (i.e., each infant was presented two times). Both infants were Caucasian and dressed gender-neutrally and both were crying loudly and continuously. One infant displayed fear at a novel object approach; the other displayed frustration due to arm restraint. The two kinds of clips were counterbalanced across participants. Following each clip, mothers completed a questionnaire on the emotions she had experienced while watching the clips. Further, she reported her attributions of why each infant was crying. Physiological reactivity was recorded throughout. Intervals used in the analyses will include three two-minute intervals for each participant. Each two-minute interval contains one one-minute video and one minute of the mother answering questionnaires. Thus, for each mother, I analyzed EDA responses during six minutes of the study, three of which were her physiological responses to crying infant videos, and three of which were her physiological responses to answering questions about the videos. The placement of the one-minute video within the two-minute interval was variable among participants.

Electrodermal reactivity. EDA analysis was completed using the AcqKnowledge v4.1 software. Electrodermal response was measured by skin conductance level (SCL) and reported in microsiemans (previously known as micromhos). Following previous literature (e.g., Diamond, Hicks, & Otter-Henderson, 2006; Holland & Roisman, 2010) and accepted psychophysiological and statistical practice (see Rogosa, 1995), I calculated a change score by subtracting the mean SCL of the baseline rest period from the mean SCL of the three two-minute intervals. The mean SCL of the baseline was calculated using two minutes of the three minute baseline resting period. The mean SCL of the

intervals of interest was calculated by averaging SCL across all three intervals. Change

scores ranged from -3.09 to 2.46, with negative scores indicating a drop in mean SCL

relative to baseline[1].

Leerkes Negative Attribution Bias Assessment (Leerkes & Seipak, 2006).

After watching each one-minute crying infant clip, mothers rated the extent to which they

[1] In order to fully explore the physiological data, I ran two additional *post hoc* analyses using different analytic methods. First, in order to circumvent the methodological limitation discussed in the discussion section, I averaged the maximum tonic peak values across the three video-watching intervals and subtracted out the maximum peak value of the baseline to obtain a peak difference score for each participant. In doing so, I hoped that I could capture the participants who were most reactive to the infant cry videos without the potential for "wash-out" effects (see the Discussion section for further exploration of this limitation). Rerunning the analyses with these new values yielded no significant links between this measure of skin conductance and any of the model variables. It is possible that it is chronic dysregulation, and not just one instance of increased EDA, that is linked with both attachment and parenting practices. Additionally, the link between negative attribution biases and supportive maternal responses to distress went from being a significant link ($b = -.14$; $p = .05$) to a marginally significant link ($b = -.14.$; $p = .06$). However, given that the original model (Model 1; using the tonic mean difference score) is a better fit to the data (Model 1 AIC = 526.36; Model 2 AIC = 606.332; Burnham & Anderson, 2002), I feel confident in the results originally reported in this thesis. All other significant links were unchanged. Second, I calculated phasic skin conductance and counted the number of skin conductance responses across each video-watching interval. Recent evidence suggests that both the phasic and tonic components of skin conductance are important and rely on different neural mechanisms; thus, I wanted to explore both (Dawson, Schell, & Filion, 2007; Nagai, Critchley, Featherstone, Trimble, & Dolan, 2004). Again, rerunning the analyses resulted in no significant links with electrodermal activity. This is perhaps unsurprising given two facts. First, phasic SCRs reflect only a small proportion of an individual's EDA profile and may not fully capture the extent to which a person becomes chronically dysregulated over a period of time (i.e., across the whole video watching interval; Boucsein, 2012). Second, the methodological limitation noted in the discussion section also applies here; it is possible that many participants returned to baseline levels of arousal while answering questionnaires, thereby washing out any effects that may have emerged. Interestingly, there was one marginally significant link between attachment related avoidance and electrodermal activity in the model examining maternal distressed reactions to child distress ($b = -5.569$, $p = .06$), such that mothers who evinced higher attachment related avoidance also had fewer skin conductance responses while watching videos of crying infants. However, once again, model comparison revealed that the original model (AIC = 552.74) was a better fit to the data than this supplemental model (AIC = 1218.01; Burnham & Anderson, 2002). No other significant links were changed.

agreed with 14 attribution statements about why the infants were crying (Appendix B). Ratings were on a 7-point-scale from strongly disagree to strongly agree. Items included such attributions as "The baby was having a bad day" and "The baby was tired". Three subscales will be created reflecting previously identified factors. *Temporary / physical* attributions includes 5 items (having a bad day, in a bad mood, tired, hungry, not feeling well). *Situation / emotion* attributions includes 3 items (upset by the situation, no one was helping the baby, trying to show he/she needs help). *Negative / internal* attributions includes 6 items (spoiled, difficult temperament, trying to make mother's life difficult, unreasonable, selfish, just wanted attention). In the present study, all three subscales demonstrated high internal consistency (*temporary / physical*, α = .94; *situation / emotion*, α = .87; *negative / internal*, α = .73). In order to reduce the number of predictor variables in my model and following Leerkes and Seipak (2006), I calculated a *negative attribution bias* score by subtracting the temporary and situational attribution scores from the negative attribution score. Scores ranged from -9.51 to -4.58, with higher scores indicating a stronger negative attribution bias.

Experiences in Close Relationships Scale (ECR; Brennan, Clark, & Shaver, 1998). Mothers' attachment style was assessed using the ECR, a 36-item self-report measure designed to tap into attachment anxiety and avoidance in the context of both current and retrospective important relationships (Appendix A). The anxiety subscale (18 items, $\alpha = 0.92$) measures how afraid a person is of being rejected and abandoned, and the avoidance subscale (18 items, $\alpha = .86$) measures the extent to which a person feels uncomfortable with close relationships and avoids intimacy and reliance on others. Each item is rated on a 7-point scale from 1 (*disagree strongly*) to 7 (*agree strongly*). Two

subscales reflecting mothers' attachment-related anxiety (e.g., I worry about being abandoned) and avoidance (e.g., I get uncomfortable when people want to be very close to me) were calculated by averaging the responses across all subscale items. One item, item 36 ("I resent it when my partner spends time away from me"), was unintentionally omitted from the measure; subscales were calculated without the missing item. In the present study, both subscales demonstrated high internal consistency (anxiety, α = .92; avoidance, α = .90). The psychometric properties of the ECR have been well established (Crowell, Fraley, & Shaver, 2008).

Coping with Children's Negative Emotions Scale (CCNES; Fabes, Eisenberg, & Bernzweig, 1990). The CCNES is a self-report measure in which mothers respond to 12 hypothetical vignettes in which their child becomes distressed (e.g., "If my child loses some prized possession and reacts with tears, I would..."; Appendix C). After reading each vignette, mothers indicate on a scale from one (*very unlikely*) to seven (*very likely*) how likely they would be to respond in a particular way (e.g. "get upset with him/her for being so careless and then crying about it"). The measure yields six subscales that reflect the degree to which mothers would respond by becoming distressed themselves (Distress Reactions), verbally or physically punishing their child (Punitive Reactions), discounting their child's emotions or the seriousness of the situation (Minimization Reactions), accepting and validating their child's distress (Expressive Encouragement), giving the child strategies to ameliorate the distress (Emotion-Focused Reactions), and helping their child solve the problem that caused the distress (Problem-Focused Reactions; Fabes et al., 1990). In the current study, all subscales demonstrated high internal consistency (Distress Reactions, α = .67; Punitive Reactions, α = .79; Minimization Reactions, α = .80;

Expressive Encouragement, α = .85; Emotion-Focused Reactions, α = .74; Problem-Focused Reactions, α = .75). The psychometric properties of the CCNES are well established (Fabes, Poulin, Eisenberg, & Madden-Derdich, 2002).

Following Spinrad et al.'s (2007) procedure for the Coping with Toddler's Negative Emotions Scale (CTNES; Spinrad, Eisenberg, Kupfer, Gaertner, & Michalik, 2004), I will run a principal components analysis (PCA) with varimax rotation (allowing the factors to correlate) using the six subscales.

Chapter 3: Results

Results are presented in the following manner. First, I will present the results of the principal components analysis run on the subscales of the CCNES (Fabes et al., 1990) in the data reduction phase of my analysis. Then, I will present descriptive statistics and the bivariate correlations between key model variables. Third, I will report the fit statistics of each model and the significance of each of the paths in the tested models.

Principal Components Analysis

Following Spinrad et al.'s (2007) procedure for the Coping with Toddler's Negative Emotions Scale (CTNES; Spinrad, et al., 2004), I ran a principal components analysis (PCA) with varimax rotation using the six subscales of the CCNES (Fabes et al., 1990; see Table 2 for the rotated component matrix). One subscale (Distress Reactions) did not load onto either of the two resulting scales and was run in subsequent models alone (Figure 2). I then conducted a second PCA with the remaining five subscales and, consistent with previous literature (Spinrad et al., 2007), two factors with Eigenvalues greater than 1 emerged. The first factor had an Eigenvalue 2.27 and explained 45% of the variance among the variables. This factor was conceptualized as supportive responses to child distress and included the subscales of Expressive Encouragement, Emotion-Focused Reactions, and Problem-Focused Reactions. All factor loadings in the rotated component matrix were at or above .75. The second factor, thought to reflect unsupportive responses to child distress, included the subscales of Minimization Reactions and Punitive Reactions. It accounted for 29% of the variance among the variables and had an Eigenvalue of 1.46. Both factor loadings in the rotated component matrix were at or above .88 (Table 3). Each factor was run in a separate model to reduce

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the number of outcome variables in each model and to boost the statistical power to find

meaningful associations among my variables (Figures 3 and 4). Conceptually, the

Distress Reactions model (Figure 2) was still considered a model of unsupportive

parental responding, despite its distinction from the factor labeled as such.

Descriptive Statistics

Means, standard devations, skewness values, and kurtotic values of key study

variables are presented in Table 4. All variables were with normal range for skewness

and kurtosis, other than electrodermal reactivity, which is highly kurtotic. Unfortunately,

all attempts to correct this (e.g. square root and log transformations) resulted in a more

extreme kurtotic value. Given that path models are robust to violations of kurtosis (van

Belle, 2002), and all other variables were normally distributed, no further attempts to

correct this violation were made.

Additionally, the zero-order correlations between study variables are presented in

Table 5. Examination of these correlations revealed that there were few significant

correlations between study variables. Unsupportive maternal responses were positively

correlated with maternal electrodermal reactivity ($r = .258, p < .05$) and negatively

correlated with supportive maternal responses ($r = -.219, p < .05$). Additionally, maternal

distress reactions were positively correlated with both maternal anxiety ($r = .32\ p < .01$)

and unsupportive maternal responses ($r = .33, p < .05$), and negatively correlated with

supportive maternal responses ($r = -.21, p < .05$). No other significant correlations

emerged.

Principal Analyses

All analyses were run using Mplus statistical software Version 7 (Muthén & Muthén, 1998-2012). In each analysis, I used resampling methods (i.e., bootstrapping) to generate bias-corrected confidence intervals to determine the significance of indirect effects. In testing mediations, and particularly in case of small sample sizes such as that in the present study, bias-corrected bootstrapping has been defended as the best practice method for generating confidence intervals and for examining indirect effects (MacKinnon, Lockwood, & Williams, 2004; Shrout & Bolger, 2002). In each of these analyses, I used maximum likelihood estimation to account for missing data (Graham, 2009).

The path diagrams for the three models tested are presented in Figures 5, 6, and 7. Significant and marginally significant unstandardized path coefficients are included. All other path coefficient values are presented in Tables 6, 7, and 8. Each model will be presented here in turn.

Maternal self-reported distress reactions to child distress. Results of the path analysis indicated that the model was a good fit to the data ($\chi^2[1] = .02$, $p = .89$; $CFI = 1.00$; $RMSEA = .00$; $SRMR = .004$; Hu & Bentler, 1999). The model accounted for 4% of the variance in maternal negative attribution biases and 11% of the variance in maternal distress reactions. Only one significant path emerged. Maternal attachment-related anxiety was significantly and positively related to maternal distress responses to child distress ($b = .19$, $p < .05$); that is, mothers who reported more attachment-related anxiety also reported that they were more likely to become distressed in response to their child's distress. A marginally significant finding also emerged. Maternal anxiety (but not

maternal avoidance) was a marginally significant predictor of maternal negative attribution biases (b = -.17, p = .08), such that higher maternal attachment-related anxiety was related to a lower negative attribution bias score. Maternal attachment organization was not significantly related to maternal electrodermal reactivity and maternal avoidance was not directly related to maternal distress reactions. Neither maternal negative attribution biases nor maternal electrodermal reactivity were linked with maternal distress reactions. Additionally, examination of the bias-corrected confidence intervals revealed that there were no indirect effects linking maternal attachment organization and maternal distress reactions.

Supportive maternal self-reported responses to child distress. Results of the path analysis indicated that the model was a good fit to the data ($\chi^2[1]$ = .01, p = .91; *CFI* = 1.00; *RMSEA* = .00; *SRMR* = .003; Hu & Bentler, 1999). The model accounted for 4% of the variance in maternal negative attribution biases and 5% of the variance in supportive maternal responses to child distress. There was a significant link between maternal negative attribution biases and supportive maternal responses (b = -.14, p = .05), such that mothers who evinced a higher negative attribution bias also reported engaging in less supportive responses to their child's distress. Maternal attachment organization was not significantly related to either maternal negative attribution biases or maternal electrodermal reactivity, nor was it directly or indirectly related to supportive maternal responses. Maternal electrodermal reactivity also had no significant relation with supportive maternal responses.

Unsupportive maternal self-reported responses to child distress. Results of the path analysis indicated that the model was a good fit to the data ($\chi^2[1]$ = .001, p = .97;

CFI = 1.00; *RMSEA* = .00; *SRMR* = .001; Hu & Bentler, 1999). The model accounted for 4% of the variance in maternal negative attribution biases, .1% of the variance in electrodermal reactivity, and 11% of the variance in unsupportive maternal responses to child distress. Only one significant path emerged. Maternal electrodermal reactivity was significantly related to unsupportive maternal responses, such that mothers who evinced larger changes in mean skin conductance level while watching crying infants also reported engaging in more unsupportive parenting behaviors in response to child distress (b = .35, p < .05). One additional marginally significant finding emerged. Maternal anxiety (but not maternal avoidance) was a marginally significant predictor of maternal negative attribution biases (b = -.17, p = .08), such that higher maternal attachment-related anxiety was related to a lower negative attribution bias score. Neither maternal anxiety nor maternal avoidance was significantly related to maternal electrodermal reactivity or directly related to unsupportive maternal responses. Maternal negative attribution biases were also not linked with unsupportive maternal responses. Additionally, examination of the bias-corrected confidence intervals revealed that there were no indirect effects linking maternal attachment and unsupportive maternal responses.

Summary of findings. In sum, across three models, I found three significant links. First, maternal attachment-related anxiety was significantly and positively related to maternal distress responses to child distress. Second, maternal negative attribution biases were negatively linked with supportive maternal responses. Finally, maternal electrodermal reactivity was positively linked with unsupportive maternal responses.

Chapter 4: Discussion

Given recent and mounting evidence that maternal behavior in the context of child distress is one of the most salient predictors of later child outcomes (Leerkes et al., 2009), it is surprising that there exists a dearth of evidence on the factors influencing mothers' responses to their children's negative emotions. The current study attempted to fill this gap in the literature by exploring a number of possible predictors of maternal responses to child distress. In particular, I empirically explored the relation between maternal attachment organization and maternal self-reported responses to child distress, predicting that mothers who evinced higher attachment-related anxiety and avoidance would also report that they engaged in more unsupportive responding to their own child's distress and less supportive responding. Additionally, I tested two mediating mechanisms by which this may occur (see Figure 1). I hypothesized that both maternal attachment-related anxiety and maternal attachment-related avoidance would be positively related to maternal negative attribution biases about infant distress which would, in turn, be positively related to unsupportive maternal responses to child distress and negatively related to supportive maternal responses. I also hypothesized that maternal attachment-related avoidance would be positively related to increases in electrodermal activity in the context of infant distress, which, in turn, would be positively related to unsupportive maternal responses and negatively related to supportive maternal responses.

Results did not support my hypotheses. Although all three of the models I tested were a good fit to the data, only three significant main effects, and no indirect effects, emerged. The significant main effects were as follows: First, maternal attachment-related anxiety was significantly related to maternal distress reactions to child distress, such that

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mothers who reported higher attachment-related anxiety also reported engaging in more distressed responding to their child's distress. Second, maternal negative attributions biases were negatively linked with maternal supportive responses, such that mothers who evinced a higher negative attribution bias about a crying infant also reported engaging less supportive responding to their children's distress. Finally, increases in electrodermal activity in the context of infant distress were positively linked to unsupportive maternal self-reported responses to child distress; that is, mothers who showed larger increases in electrodermal activity, relative to baseline, while watching infants cry also reported engaging in more unsupportive responses to their children's distress. I discuss these results in detail in the following sections. Additionally, I discuss study strengths and limitations.

Maternal Attachment and Maternal Self-Reported Responses to Child Distress

Maternal attachment-related anxiety was significantly linked only with maternal distress reactions. Maternal attachment-related avoidance was not significantly related to any type of maternal responses to child distress (Figure 1, path c).

The link between maternal attachment-related anxiety and maternal distress reactions is in line with theoretical suppositions regarding attachment-related individual differences in caregiving. Specifically, people with high levels of attachment-related anxiety are thought to intensify attachment-related needs in themselves and others, which can lead to enmeshment or becoming entangled in the emotions of social partners (Mikulincer & Shaver, 2007). Additionally, when dealing with stressful events, individuals high in attachment-related anxiety tend to utilize coping strategies that serve to intensify distress rather than relieve it (e.g., Birnbaum, Orr, Mikulincer, & Florian,

1997; Mikulincer & Florian, 1995, 1998). This study lends support to these suppositions, as mothers who were high on attachment-related anxiety also reported that they tend to deal with the distress of their child by becoming distressed themselves. Perhaps by enmeshing themselves in the emotions of the person they are caring for, people with high levels of attachment-related anxiety also seek to receive the care they are theorized to desire. That attachment-related avoidance was *not* linked to distress reactions is also in line with theory. Individuals high on the attachment-related avoidance dimension tend to suppress attachment-related needs, using strategies like anger and distance from the source of distress to cope (Mikulincer & Shaver, 2007; Rholes et al., 1999). People with high levels of attachment-related avoidance thus tend to shun personal needs expressed by others (Mikulincer & Shaver, 2007), and would not be hypothesized to express them in relation to a social partner or child's need. Future studies should continue to explore the link between parental attachment and parental responses to child distress, examining possible mediating mechanisms, relations to father reports, and behavioral indices of this phenomenon in both avoidant and anxious individuals.

The preponderance of null findings in the models predicting supportive and unsupportive responses (Figures 2 and 3), however, is surprising, given that adult attachment orientation has been linked with quality of caregiving in a number of empirical reports (e.g., Feeney & Collins, 2001). In fact, these findings are in direct opposition to two previous studies that found that self-reported parental attachment was a significant predictor of the supportiveness of parental responding in the context of child distress (Edlestien et al., 2004; Goodman et al., 1997).

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There are, however, a number of reasons the discrepancies between the extant literature and these results may have occurred. First, my self-reported outcome measure, based on hypothetical situations, differed substantially from the two previous studies that examined parental responses in the context of child distress. Both Edlestien et al. (2004) and Goodman et al. (1997) used rather objective measures of parental responsiveness in relation to a specific, distressing, medical procedure (i.e., direct observation and an inventory of parental behaviors, respectively). It is possible that "in the moment" responding differs from hypothetical responding, leading to my discrepant findings. Additionally, by being given many options about how to respond to child distress, the mothers in my study were able to consider multiple options, some of which they may not be accustomed to using "in the moment," thereby not accurately reflecting their typical maternal behavior. Future studies may address this by using both self-report and observational measures of maternal responding in the context of child distress.

The Mediating Role of Maternal Attributions about Infant Distress

Contrary to expectations, maternal negative attribution biases did not mediate the link between either dimension of maternal attachment and supportive, unsupportive, or distressed maternal self-reported responses to child distress (Figure 1, paths a and b). In fact, only one significant link emerged. Maternal negative attribution biases were negatively linked with supportive (but not unsupportive or distressed) maternal self-reported responses to child distress (Figure 1, path b).

Maternal attachment and maternal attributions about infant distress. The null finding regarding maternal attachment and maternal attributions about infant distress is inconsistent with the only other study to examine this link. Using the same paradigm

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as the current study, Leerkes and Siepak (2006) found that attachment-related avoidance was significantly and positively correlated with negative attributions about infant distress. Given the dearth of literature on this particular path, more studies will be needed to elucidate its nature.

There are a few methodological reasons the null relation between maternal attachment organization and negative attribution biases may have occurred. First, Leerkes and Siepak (2006) used an undergraduate population for their study, of which only 8% were parents. Thus, their population likely did not have much experience with crying infants, a detail which may have colored participants' ability to accurately identify why the infants typically cry. The current study, on the other hand, used mothers of six-year-old children who had had years of experience discerning why their own infants and children were crying. They had ample opportunity to learn why infants cry, and to make attributions about their own child's behavior. This may have led to different trends in responses and a more valid assessment of the kinds of attributions experienced mothers make about infant cries. It may, in fact, be that in parental populations, attachment-related differences in the kinds of attributions parents make about infant distress are very small or nonexistent. Future studies examining this link should use parent populations to ensure valid, experience-based, rather than intuition-based, responses.

Additionally, Leerkes and Siepak (2006) presented more attribution statements than the current study, in which I used only those statements that loaded onto factors identified by those authors (2006). Perhaps the inclusion of four additional attribution statements allowed participants to vary their responses in a statistically significant manner, leading to effects that would not have otherwise emerged. Finally, the Leerkes

and Siepak study had nearly five times the number of participants as the current study, giving them the power to detect smaller effect sizes. This explanation for our discrepant results seems particularly likely, given that the effect they found (i.e., that attachment-related avoidance correlates with negative attributions; $r = .11$, $p < .05$) was quite small. Future studies should use all original eighteen attribution statements, gold standard measures of adult attachment, such as the ECR, and large sample sizes to detect small effects. Additionally, future research should employ populations reflective of the question of interest.

Maternal attributions about infant distress and maternal self-reported responses to child distress. Maternal negative attribution biases were negatively linked with supportive maternal responses to child distress, such that mothers who evinced a higher negative attribution bias also reported engaging in less supportive responding to their children's distress. This is consistent with previous literature, which has largely found that negative attribution biases are consistently linked with harsher, and thus, less supportive, parenting practices (e.g., Gellar & Johnston, 1995).

Interestingly, the null findings regarding maternal negative attribution biases and unsupportive maternal responses to child distress are thereby inconsistent with this same literature. One reason for this discrepancy may have to do with the fact that participants made attributions about an unfamiliar infant's distress, but reported on their responses to their own (much older) child's distress. Perhaps mothers' negative attributions about unfamiliar crying infants are, in fact, unrelated to their behavior with their own child at age six. Older children often express distress in qualitatively different ways than infants, so attributions about infant wailing may not map onto attributions about a six-year-old's

sadness about a lost toy. Although Dix and colleagues (1986) found that as children advanced developmentally, mothers were more inclined to attribute internal, stable causes as opposed to external, environmental causes for *misbehavior*, the same may not be true for child distress. Thus, future studies examining attributions and parenting behavior in the context of child distress should examine parental attributions regarding their own child's distress at the developmental age of interest. However, it is important to note that no studies thus far have examined this particular question. Therefore, my null results must be taken as support that there in fact exists no such link until additional empirical literature adds to this body of knowledge.

Additionally, maternal negative attribution biases were not significantly linked to maternal distress reactions to child distress. As distress reactions are qualitatively viewed as a type of unsupportive responding to child distress, one might have expected there to be a link. Given, however, that most studies examining parental attributions find that negative attributions relate to harsher parenting, and not distress (e.g., Nix et al., 1999), it is perhaps unsurprising that no link emerged. However, to the best of my knowledge, this is also the first study to examine the link between maternal negative attribution biases and maternal distress responses to child distress and as such, must be taken at face value until additional evidence is available. Future studies should continue to explore maternal attributions about child distress and the particular maternal responses they prompt.

The Mediating Role of Electrodermal Reactivity in the Face of Infant Distress

Results suggested that maternal attachment was unrelated to electrodermal reactivity in the context of infant distress (Figure 1, path d). However, electrodermal reactivity to infant cries was positively linked to unsupportive, but not supportive or

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distressed, maternal responses to child distress (Figure 1, path e). That is, mothers who showed larger increases in electrodermal activity, relative to baseline, while watching infants cry also reported engaging in more unsupportive responses to their children's distress.

Maternal attachment and maternal electrodermal reactivity infant distress. The finding that maternal attachment was unrelated to increases in electrodermal reactivity in the face of infant distress was both consistent and inconsistent with the extant literature. Specifically, increases in electrodermal activity in the context of stressful laboratory events (i.e., completing a stressful math problem or speaking about potentially painful childhood experiences) has been consistently linked with avoidant, but not anxious, attachment (e.g., Dozier & Kobak, 1992; Roisman, Tsai, & Chang, 2004). However, no studies have examined attachment-related differences in reactivity to infant cries. It may be that infant cries, although known to increase electrodermal activity in general (Frodi & Lamb, 1980), do not create the sort of stressful environment that may elicit this response in avoidant individuals. Heightened reactivity in avoidant individuals is thought to result from the suppression of undesirable attachment-related needs and information (Fraley & Shaver, 1997). Perhaps, however, infant cries awaken a caregiving response rather than a need response, leading to universally consistent increases in electrodermal reactivity. Due to the methodological limitation discussed in the next paragraph, examination of this question was impossible in this sample (but see Table 4 for the mean change score). More studies on the subject are needed before any strong conclusions can be reached about attachment-related differences in electrodermal reactivity in the context of infant distress.

Additionally, there is a significant methodological reason that this null finding may have occurred. Because of computational limitations, I was unable to time lock the videos the mothers watched to their electrodermal responses resulting in intervals that were a combination of both video watching and answering questionnaires. It may be that mothers' true electrodermal reactivity was washed out by this combination. For example, a mother who was highly reactive to the infant cry videos may still have returned to baseline while answering questionnaires, thus significantly lowering her mean skin conductance level across the interval. This may have washed out any attachment related effects that would have otherwise emerged. Future studies should time lock stimulus events with electrodermal recording.

Maternal electrodermal reactivity infant distress and maternal self-reported responses to child distress. The finding that increases in electrodermal activity in the context of infant distress (relative to baseline) were positively linked to unsupportive maternal responses is consistent with previous literature regarding ANS reactivity, and a significant addition to the literature on electrodermal reactivity and parenting behavior. Although studies have found that increases in maternal heart rate are associated with overreactive discipline (Lorber & O'Leary, 2005) and insecure child attachment (Donovan & Leavitt, 1989), no study examining non-abusive populations has looked at electrodermal reactivity in particular. Those studies that have examined electrodermal reactivity in the context of infant distress have focused primarily on the differences that arise between abusive and non-abusive populations (e.g., Frodi & Lamb, 1980; McCanne & Hagstrom 1996), finding that abusive populations evince higher electrodermal activity to infant cries than non-abusive populations. The finding that electrodermal reactivity

was significantly linked with unsupportive maternal responses, even in a normative population, is thus an important contribution to this literature, and is striking given the methodological limitation noted in the previous section.

That electrodermal reactivity was not linked to supportive maternal responses was unexpected. However, the empirical literature suggests that it is ineffective regulation of negative emotions in the parenting context that leads to negative parenting outcomes (Rueger, Katz, Risser, & Lovejoy, 2011). It cannot be unequivocally supposed that the inverse is true (i.e., that the absence of emotional distress necessarily relates to supportive parenting). Future studies should examine other possible predictors of supportive maternal responses to child distress.

It is also quite surprising that maternal electrodermal reactivity in the context of infant distress was not significantly linked with maternal distress reactions. Greater physiological reactivity is generally interpreted as reflecting increased negative affect (e.g., Beauchaine, 2001), which is precisely what mothers who scored high on the Distress Reactions subscale were reporting – increased negative affect in the context of child distress. However, it is possible that physiological dysregulation in the context of infant distress reflects a specific type of negative affect (e.g., anger, but not anxiety) that is well captured with the measurement of electrodermal activity. This seems likely, given that physiological dysregulation in response to infant cries has been linked with harsher parenting (Lorber & O'Leary, 2005) and abuse (Frodi & Lamb, 1980), rather than overinvolved or enmeshed parenting. It may then be that the mothers who are responding to their child's distress with distress are not becoming physiologically dysregulated in a manner that is reflected in electrodermal reactivity. Future studies should examine other

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indices of physiological dysregulation when considering this link. Additionally, studies that are able to capture maternal physiological reactivity to child distress "in the moment" may shed light on this link.

One must also consider that, as was previously discussed, the methodological limitation of being unable to time lock stimulus presentations to electrodermal recordings may have blunted the electrodermal responses of some of my mothers. Thus, it is possible that many mothers who evinced little change between baseline and the videos of crying infants may have actually had much higher reactivity scores had I been able to time lock my data. In this case, the relation between maternal *non*reactivity and supportive maternal responses to child distress, or the link between maternal reactivity and distress reactions to child distress, may have emerged. This is a methodological limitation I intend to address in future studies of this nature.

Study Strengths and Limitations

This study has both strengths and limitations, some of which were already discussed. One strength of this study is that it was the first to examine how maternal attachment organization relates to maternal attributions about infant distress. Although one other study explored a similar link (Leerkes & Siepak, 2006), the sample used was a non-parent population. By using a population of women with child rearing experience, I provide a more valid assessment of the way attachment actually guides attribution processes in parents. Additionally, this was the first study to examine electrodermal reactivity in the context of infant distress in a non-abusive population. This is particularly striking, given that the results were in a similar vein to those using abusive populations. Another strength of this study is the heterogeneity of the sample

characteristics. My sample was rather socioeconomically and racially diverse, increasing generalizability. Finally, the measures used in this study were all well validated, standard measures for the constructs I intended to explore, and were a mix of self-report and physiological measures. This allowed me to explore both conscious and unconscious reactions to infant distress.

There were, however, some limitations that must be considered. First, sample size was fairly small given the complexity of the model I wished to test. This did not allow me to explore any covariates, such as race or parent age. In future studies, I plan to address this with a larger sample, adequate to include covariance paths in my models. Additionally, although these models were presented as causal models (as is always the case with meditational models), the findings should only be causally interpreted very cautiously, given the cross-sectional nature of my design. Future work should consider longitudinal designs or experimental manipulations, which allow for much stronger causal inferences.

Finally, as I mentioned, I was unable to time lock the stimulus presentation to the electrodermal recordings. This was a substantial limitation, as smaller effects and electrodermal responses may have been washed out. However, given that I did find one significant relation with electrodermal reactivity (i.e., that higher electrodermal reactivity was related to more unsupportive maternal responses to child distress), there are two possibilities regarding this limitation. First, it is possible that this limitation was not, in fact, detrimental to the ability to detect relations, and that the null results in this study (e.g., those regarding attachment related differences in electrodermal reactivity) reflect null relations in the sample. Second, it is possible that the limitation does wash out

smaller effect sizes, but that the effect I found was strong enough to withstand some deterioration. Future work regarding attachment-related differences in electrodermal reactivity to infant distress and its effect on parenting should employ much larger sample sizes and should time-lock stimulus events to electrodermal recordings.

Finally, it is important to note that in running three complex models with multiple links in each, I ran the risk of generating significant findings by chance alone. Therefore, replication of these findings is an important goal for future research and will add strength to the validity of my conclusions.

Conclusions

The present findings shed new light on parental behavior in the context of child distress. Although only three significant links emerged, they were illuminating and substantial contributions to the literature. The link between maternal attachment-related anxiety and maternal distress responses invites future researchers to further explore this link, examining possible mediating mechanisms that could be targets of intervention. Teaching mothers to reappraise their children's distress in a way that makes it less threatening and more manageable may help countless mothers deal with potentially distressing events in a calm, supportive manner. Similarly, the negative link between negative attribution biases and supportive maternal responses to distress should be further examined. Interventions aimed at changing maternal attributions about child distress could increase a mother's ability to provide a safe haven for her child in times of trouble, leading to positive outcomes for her child in a number of developmental domains (Leerkes et al., 2009). Additionally, the knowledge that increased electrodermal reactivity in the face of infant distress correlates with unsupportive parental responses to child

distress, even in non-abusive populations, can have implications for future interventions aimed at restructuring the effects child distress has on a parent. Additionally, this opens the door for future researchers to examine the parental characteristics associated with such increases. Given the monumental importance of parental responses to their children's distress for later child outcomes (Leerkes et al., 2009), elucidating these characteristics will help researchers to create interventions aimed at helping parents deal effectively with distress, thus helping their children to achieve the best possible developmental outcomes.

Appendix A: Tables

Table 1

Order of Laboratory Tasks

Mother and Child	
Informed Consent (5 min)	
GSR, ECG, and RSP electrodes on Mother (3 min)	
GSR, ECG, and RSP electrodes on Child (3 min)	

Mother	Child
Mother and Child Demographics (5 min)	Language Ability Assessment (10 min)
	Secure Base Script Knowledge (10 min)
Rest period (3 min)	Rest Period (2 min)
CBQ (10 min)	Emotion Labeling Task (10 min)
Secure Base Script Knowledge (10 min)	
ECR (10 min)	

Mother & Child break (5 min)	

Mother	Child
Crying Infant Videos and Leerkes Negative Attribution Bias Assessment (20 min)	Computer game, picture presentation, and self-reported affective states (45 min)
CCNES (20 min)	
CryBaby (10 min)	

Mother & Child	
GSR, ECG, and RSP electrodes off (5 min)	

Note. Bolded tasks are those tasks that are included as a part of the present study. Tasks presented in separate columns indicate that mother and child are separated in adjacent rooms.

Table 2

Rotated Component Matrix with Loadings for All Subscales of the CCNES

Subscale	Component	
	1	2
Distress Reactions	-.13	.59
Punitive Reactions	-.07	.83
Minimization Reactions	-.04	.88
Expressive Encouragement	.74	-.33
Emotion-Focused Reactions	.87	.07
Problem-Focused Reactions	.84	-.11

Table 3

Rotated Component Matrix with Loadings for Five Subscales of the CCNES

Subscale	Component	
	1	2
Punitive Reactions	-.10	.88
Minimization Reactions	-.07	.90
Expressive Encouragement	.75	-.27
Emotion-Focused Reactions	.87	.11
Problem-Focused Reactions	.84	-.13

Table 4

Means, Standard Deviations, Skewness, and Kurtosis of Key Study Variables

Variable	*M* (*SD*)	Skewness (*SE)*	Kurtosis (*SE)*
Maternal Attachment-Related Avoidance	3.37 (1.08)	.22 (.26)	-.94 (.51)
Maternal Attachment-Related Anxiety	3.11 (1.19)	.43 (.26)	-.51 (.51)
Maternal Negative Attribution Bias	-7.00 (1.02)	-.27 (.27)	-.07 (.54)
Maternal Skin Conductance Level Change Score	.04 (.55)	-1.56 (.28)	19.40 (.56)
Maternal Distress Reactions to Child Distress	3.07 (.75)	.50 (.26)	.23 (.51)
Supportive Maternal Responses to Child Distress	5.46 (.63)	-.83 (.25)	.46 (.51)
Unsupportive Maternal Responses to Child Distress	2.68 (.77)	.54 (.25)	-.12 (.51)

Table 5

Correlation Matrix for Key Study Variables

	1	2	3	4	5	6	7
1. Maternal Attachment-Related Avoidance	-						
2. Maternal Attachment-Related Anxiety	.11	-					
3. Maternal Negative Attribution Bias	-.02	-.20	-				
4. Maternal Skin Conductance Level Change Score	.01	-.02	-.01	-			
5. . Maternal Distress Reactions to Child Distress	.11	.32**	-.14	-.01	-		
6. Supportive Maternal Responses to Child Distress	-.05	-.03	-.22	.05	-.21*	-	
7. Unsupportive Maternal Responses to Child Distress	.14	.11	.10	.26*	.33*	-.22*	-

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

Table 6

Unstandardized Path Coefficients and Standard Errors for Maternal Self-reported Distress Reactions to Child Distress

	Unstandardized	
	b	*SE*
Maternal Anx to MNAB	-.17[+]	.10
Maternal Avo to MNAB	.01	.11
Maternal Anx to MSCL	-.01	.05
Maternal Avo to MSCL	.00	.04
Maternal Anx to MDR	.19*	.09
Maternal Avo to MDR	.05	.09
MNAB to MDR	-.06	.09
MSCL to MDR	-.01	.17

Notes: * $p < .05$. [+] marginal. Anx = attachment-related anxiety. Avo = attachment-related avoidance. MNAB = Maternal negative attribution biases. MSCL = Maternal skin conductance level change. MDR = Maternal self-reported distress reactions to child distress.

Table 7

Unstandardized Path Coefficients and Standard Errors for Supportive Maternal Self-reported Responses to Child Distress

	Unstandardized	
	b	*SE*
Maternal Anx to MNAB	-.17	.10
Maternal Avo to MNAB	.02	.11
Maternal Anx to MSCL	-.01	.05
Maternal Avo to MSCL	.02	.11
Maternal Anx to Sup MR	-.03	.07
Maternal Avo to Sup MR	-.03	.08
MNAB to Sup MR	-.14*	.07
MSCL to Sup MR	.05	.21

Notes: * *p* = .05. Anx = attachment-related anxiety. Avo = attachment-related avoidance.

MNAB = Maternal negative attribution biases. MSCL = Maternal skin conductance level

change. Sup MR = Supportive maternal self-reported responses to child distress.

Table 8

Unstandardized Path Coefficients and Standard Errors for Unupportive Maternal Self-reported Responses to Child Distress

	Unstandardized	
	b	*SE*
Maternal Anx to MNAB	-.17[+]	.10
Maternal Avo to MNAB	.01	.11
Maternal Anx to MSCL	-.01	.05
Maternal Avo to MSCL	.01	.04
Maternal Anx to Unsup MR	.08	.07
Maternal Avo to Unsup MR	.09	.08
MNAB to Unsup MR	.10	.09
MSCL to Unsup MR	.35*	.15

Notes: * $p < .05$. [+] marginal. Anx = attachment-related anxiety. Avo = attachment-related avoidance. MNAB = Maternal negative attribution biases. MSCL = Maternal skin conductance level change. Unsup MR = Unsupportive maternal self-reported responses to child distress.
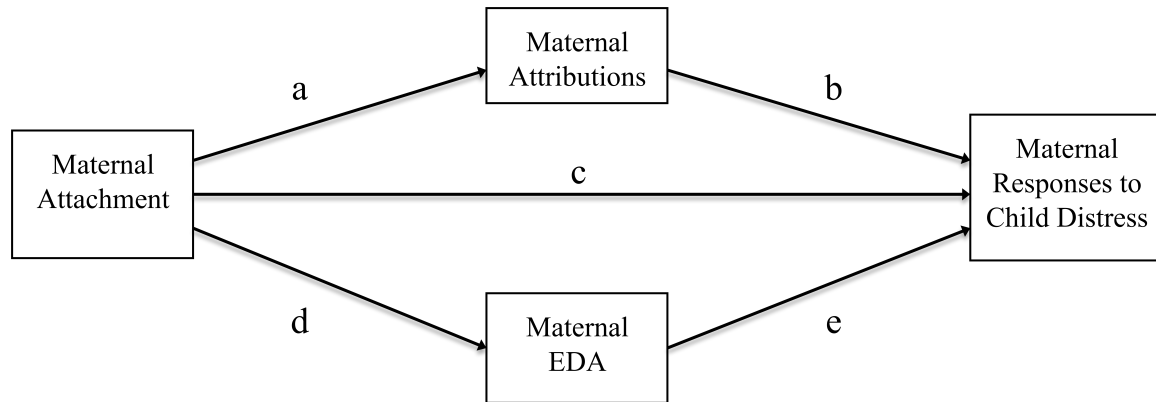
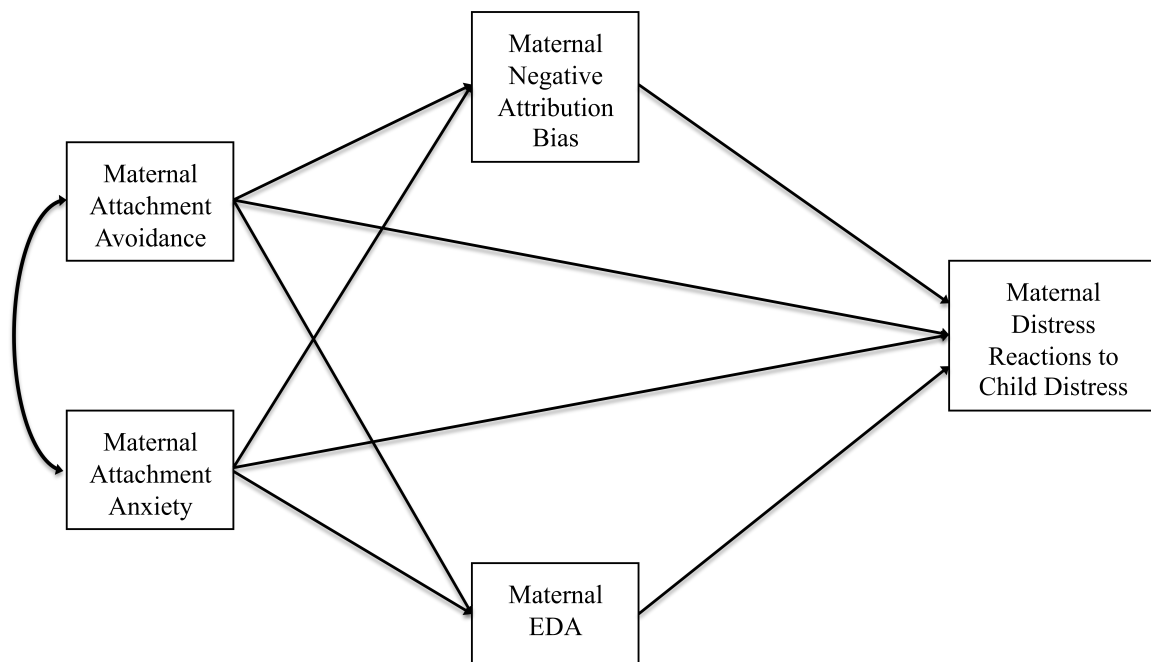*Figure 1.* Conceptual Model of Maternal Responses to Child Distress

Figure 2. Path Model of Maternal Distress Reactions to Child Distress.
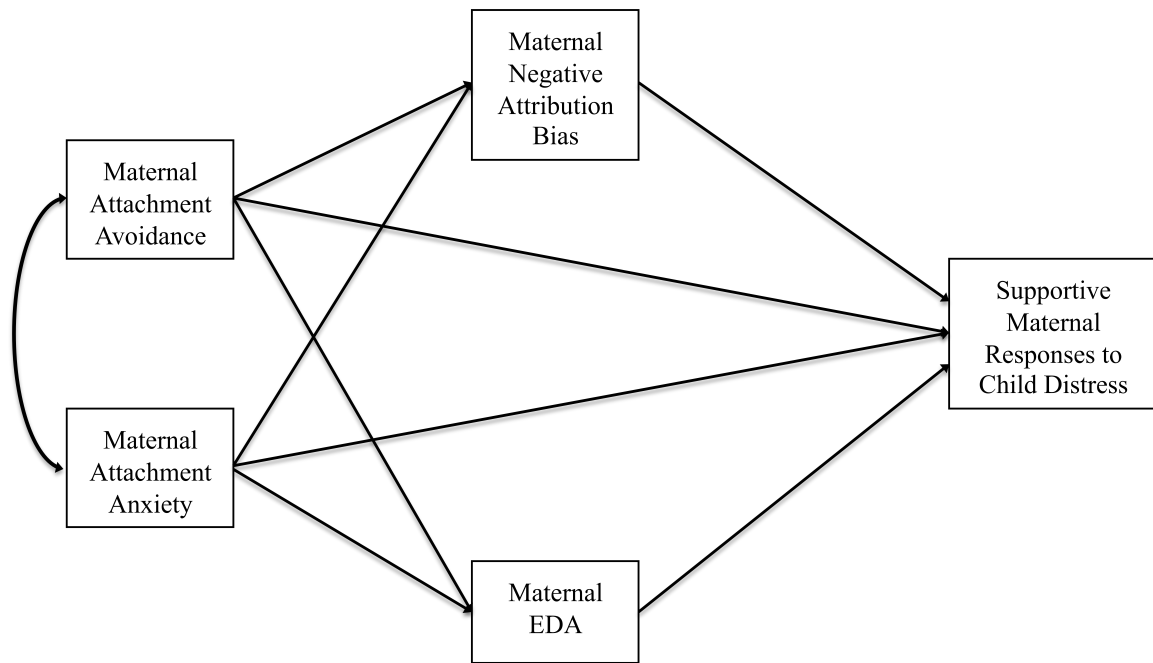
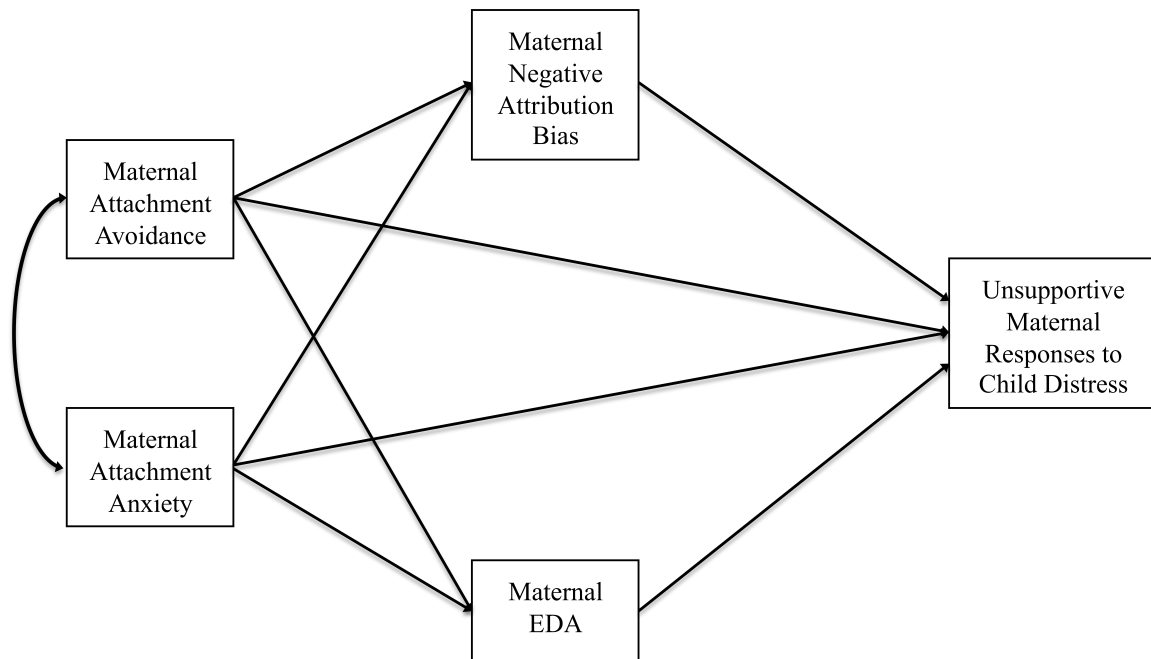*Figure 3.* Path Model of Supportive Maternal Responses to Child Distress.

Figure 4. Path Model of Unsupportive Maternal Responses to Child Distress.

Figure 5. Path Model of Maternal Distress Reactions to Child Distress

Notes. * *p* < .05. + marginal. Solid lines indicate significant and marginally significant

paths. MNAB = Maternal negative attribution biases. MDR = Maternal distress reactions

to child distress.

Figure 6. Path Model of Supportive Maternal Response to Child Distress

Notes. * *p* = .05. Solid lines indicate marginally significant paths. MNAB = Maternal

negative attribution biases. Sup MR = Supportive maternal self-reported responses to
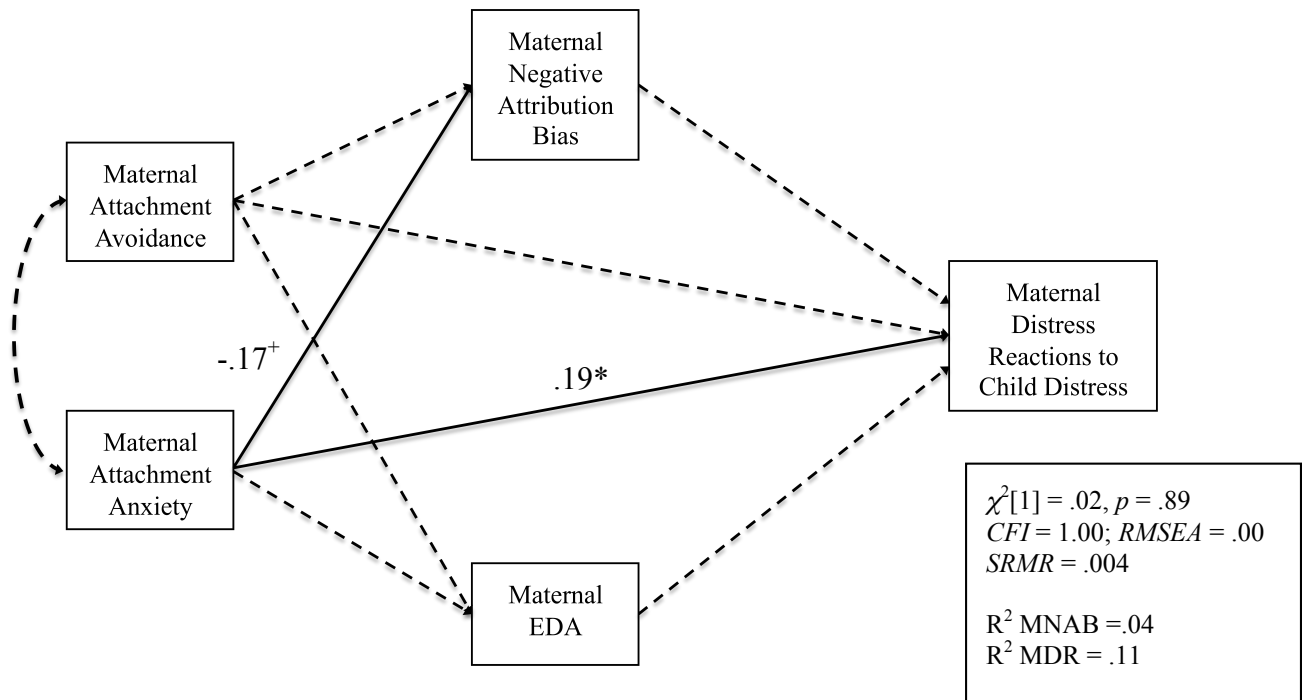
child distress..

Figure 7. Path Model of Unsupportive Maternal Response to Child Distress

Notes. * $p < .05$. + marginal. Solid lines indicate significant and marginally significant

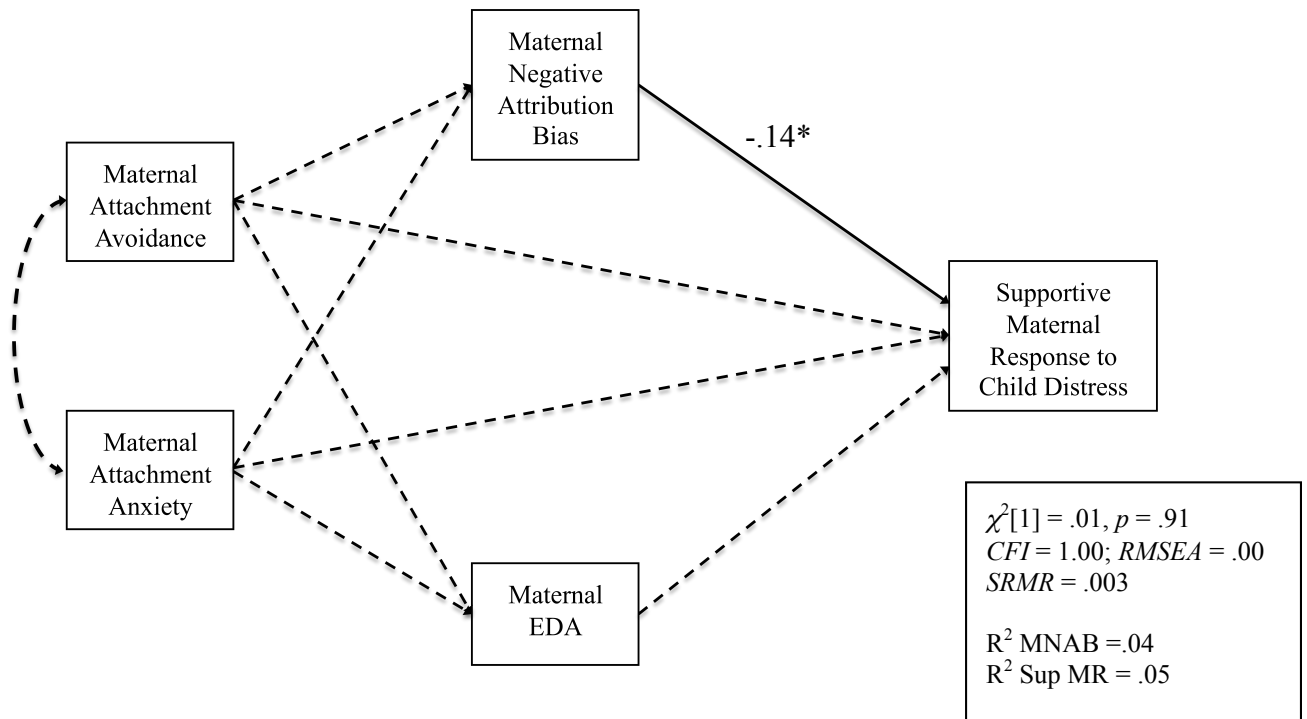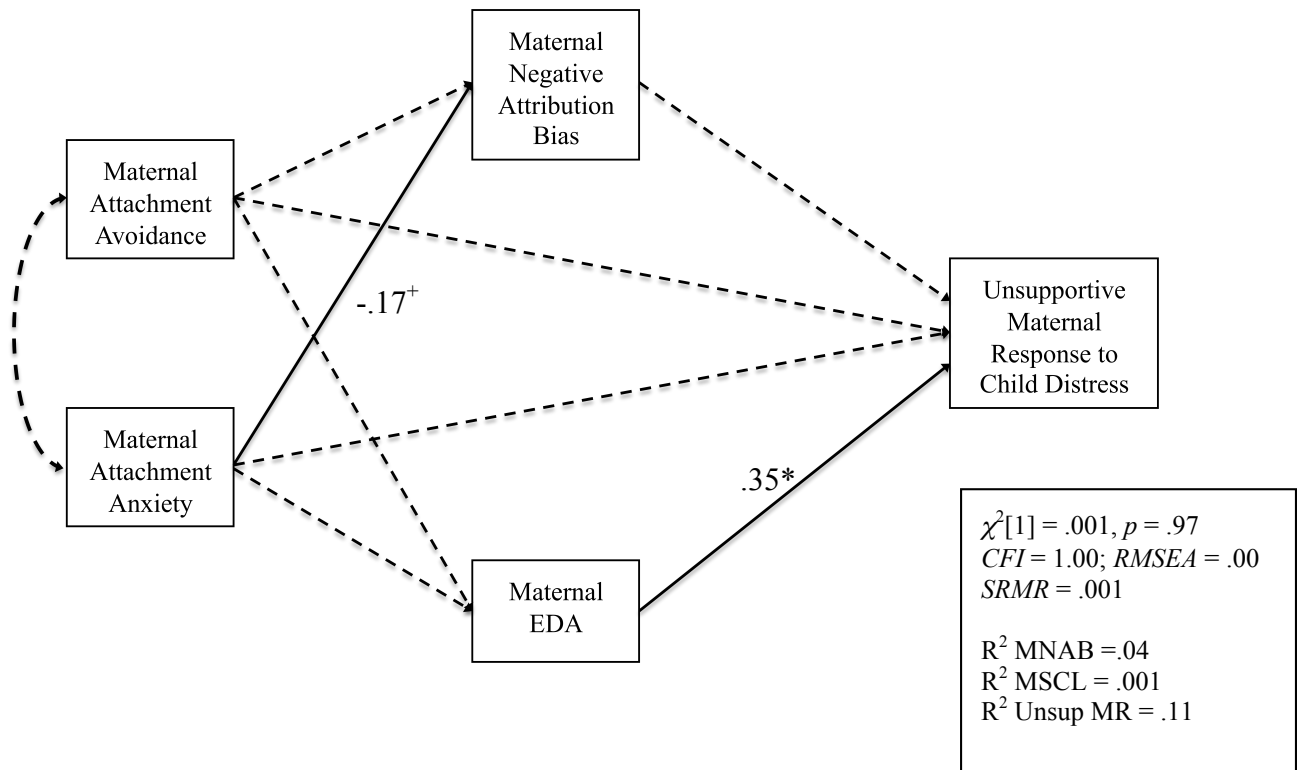paths. MNAB = Maternal negative attribution biases. MSCL = Maternal skin

conductance level change. Unsup MR = Unsupportive maternal self-reported responses to

child distress.

Appendix C

Experiences in Close Relationships Scale

The following statements concern how you feel in important close relationships. We are interested in how you generally experience close relationships, not just in what is happening in your current important close relationships. Respond to each statement by indicating how much you agree or disagree with it, using the following rating scale:

1	2	3	4	5	6	7
Disagree			Neutral/			Agree
Strongly			Mixed			Strongly

___ 1. I prefer not to show a partner how I feel deep down.

___ 2. I worry about being abandoned.

___ 3. I am very comfortable being close to romantic partners.

___ 4. I worry a lot about my relationships.

___ 5. Just when my partner starts to get close to me I find myself pulling away.

___ 6. I worry that romantic partners won't care about me as much as I care about them.

___ 7. I get uncomfortable when a romantic partner wants to be very close.

___ 8. I worry a fair amount about losing my partner.

___ 9. I don't feel comfortable opening up to romantic partners.

___ 10. I often wish that my partner's feelings for me were as strong as my feelings for him/her.

___ 11. I want to get close to my partner, but I keep pulling back.

___ 12. I often want to merge completely with romantic partners, and this sometimes scares them away.

___ 13. I am nervous when partners get too close to me.

___ 14. I worry about being alone.

___ 15. I feel comfortable sharing my private thoughts and feelings with my partner.

___ 16. My desire to be very close sometimes scares people away.

___ 17. I try to avoid getting too close to my partner.

___ 18. I need a lot of reassurance that I am loved by my partner.

___ 19. I find it relatively easy to get close to my partner.

___ 20. Sometimes I feel that I force my partners to show more feeling, more commitment.

___ 21. I find it difficult to allow myself to depend on romantic partners.

___ 22. I do not often worry about being abandoned.

___ 23. I prefer not to be too close to romantic partners.

___ 24. If I can't get my partner to show interest in me, I get upset or angry.

___ 25. I tell my partner just about everything.

___ 26. I find that my partner(s) don't want to get as close as I would like.

___ 27. I usually discuss my problems and concerns with my partner.

___ 28. When I'm not involved in a relationship, I feel somewhat anxious and insecure.

___ 29. I feel comfortable depending on romantic partners.

___ 30. I get frustrated when my partner is not around as much as I would like.

___ 31. I don't mind asking romantic partners for comfort, advice, or help.

___ 32. I get frustrated if romantic partners are not available when I need them.

___ 33. It helps to turn to my romantic partner in times of need.

___ 34. When romantic partners disapprove of me, I feel really bad about myself.

___ 35. I turn to my partner for many things, including comfort and reassurance.

Appendix D

Leerkes Negative Attribution Bias Assessment

Rate the extent to which you agree with the following statements about why the baby from the clip was crying on a 7 point scale ranging from strongly disagree to strongly agree.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

Having a bad day

In a bad mood

Tired

Hungry

Not feeling well

Spoiled

Difficult temperament

Trying to make mother's life difficult

Unreasonable

Selfish

Just wanted attention

Upset by the situation

No one was helping the baby

Trying to show he/she needs help

Appendix E

Coping with Children's Negative Emotions Scale

In the following items, please indicate on a scale from 1 (very unlikely) to 7 (very likely) the likelihood that you would respond in the ways listed for each item. Please read each item carefully and respond as honestly and sincerely as you can.

1. If my child becomes angry because he/she is sick or hurt and can't go to his/her friend's birthday party, I would:

a. send my child to his/her room to cool off

b. get angry at my child

c. help my child think about ways that he/she can still be with friends (e.g., invite some friends over after the party)

d. tell my child not to make a big deal out of missing the party

e. encourage my child to express his/her feelings of anger and frustration

f. soothe my child and do something fun with him/her to make him/her feel better about missing the party

2. If my child falls off his/her bike and breaks it, and then gets upset and cries, I would:

a. remain calm and not let myself get anxious

b. comfort my child and try to get him/her to forget about the accident

c. tell my child that he/she is over-reacting

d. help my child figure out how to get the bike fixed e. tell my child it's OK to cry

f. tell my child to stop crying or he/she won't be allowed to ride his/her bike anytime soon

3. If my child loses some prized possession and reacts with tears, I would:

a. get upset with him/her for being so careless and then crying about it

b. tell my child that he/she is over-reacting

c. help my child think of places he/she hasn't looked yet

d. distract my child by talking about happy things

e. tell him/her it's OK to cry when you feel unhappy

f. tell him/her that's what happens when you're not careful

4. If my child is afraid of injections and becomes quite shaky and teary while waiting for his/her turn to get a shot, I would:

a. tell him/her to shape up or he/she won't be allowed to do something he/she likes to do (e.g., watch TV)

b. encourage my child to talk about his/her fears

c. tell my child not to make big deal of the shot

d. tell him/her not to embarrass us by crying

e. comfort him/her before and after the shot

f. talk to my child about ways to make it hurt less (such as relaxing so it won't hurt or taking deep breaths).

5. If my child is going over to spend the afternoon at a friend's house and becomes nervous and upset because I can't stay there with him/her, I would:

a. distract my child by talking about all the fun he/she will have with his/her friend

b. help my child think of things that he/she could do so that being at the friend's house without me wasn't scary (e.g., take a favorite book or toy with him/her)

c. tell my child to quit over-reacting and being a baby

d. tell the child that if he/she doesn't stop that he/she won't be allowed to go out anymore

e. feel upset and uncomfortable because of my child's reactions

f. encourage my child to talk about his/her nervous feelings

6. If my child is participating in some group activity with his/her friends and proceeds to make a mistake and then looks embarrassed and on the verge of tears, I would:

a. comfort my child and try to make him/her feel better

b. tell my child that he/she is over-reacting

c. feel uncomfortable and embarrassed myself

d. tell my child to straighten up or we'll go home right away

e. encourage my child to talk about his/her feelings of embarrassment

f. tell my child that I'll help him/her practice so that he/she can do better next time

7. If my child is about to appear in a recital or sports activity and becomes visibly nervous about people watching him/her, I would:

a. help my child think of things that he/she could do to get ready for his/her turn (e.g., to do some warm-ups and not to look at the audience)

b. suggest that my child think about something relaxing so that his/her nervousness will go away

c. remain calm and not get nervous myself

d. tell my child that he/she is being a baby about it

e. tell my child that if he/she doesn't calm down, we'll have to leave and go home right away

f. encourage my child to talk about his/her nervous feelings

8. If my child receives an undesirable birthday gift from a friend and looks obviously disappointed, even annoyed, after opening it in the presence of the friend, I would:

a. encourage my child to express his/her disappointed feelings

b. tell my child that the present can be exchanged for something the child wants

c. NOT be annoyed with my child for being rude

d. tell my child that he/she is over-reacting

e. scold my child for being insensitive to the friend's feelings

f. try to get my child to feel better by doing something fun

9. If my child is panicky and can't go to sleep after watching a scary TV show, I would:

a. encourage my child to talk about what scared him/her

b. get upset with him/her for being silly

c. tell my child that he/she is over-reacting

d. help my child think of something to do so that he/she can get to sleep (e.g., take a toy to bed, leave the lights on)

e. tell him/her to go to bed or he/she won't be allowed to watch any more TV

f. do something fun with my child to help him/her forget about what scared him/her

10. If my child is at a park and appears on the verge of tears because the other children are mean to him/her and won't let him/her play with them, I would:

a. NOT get upset myself

b. tell my child that if he/she starts crying then we'll have to go home right away

c. tell my child it's OK to cry when he/she feels bad

d. comfort my child and try to get him/her to think about something happy

e. help my child think of something else to do

f. tell my child that he/she will feel better soon

11. If my child is playing with other children and one of them calls him/her names, and my child then begins to tremble and become tearful, I would:

a. tell my child not to make a big deal out of it

b. feel upset myself

c. tell my child to behave or we'll have to go home right away

d. help my child think of constructive things to do when other children tease him/her (e.g., find other things to do)

e. comfort him/her and play a game to take his/her mind off the upsetting event

f. encourage him/her to talk about how it hurts to be teased

12. If my child is shy and scared around strangers and consistently becomes teary and wants to stay in his/her bedroom whenever family friends come to visit, I would:

a. help my child think of things to do that would make meeting my friends less scary (e.g., to take a favorite toy with him/her when meeting my friends)

b. tell my child that it is OK to feel nervous

c. try to make my child happy by talking about the fun things we can do with our friends

d. feel upset and uncomfortable because of my child's reactions

e. tell my child that he/she must stay in the living room and visit with our friends

f. tell my child that he/she is being a baby

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