

## ABSTRACT

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TRANSMISSION GAP WITH MATERNAL  
MIND-MINDEDNESS AND INFANT  
TEMPERAMENT

Laura Jernigan Sherman, Master of Science, 2009

Directed By: Professor Jude Cassidy, Psychology

The goal of this study was to test (a) whether maternal mind-mindedness (MM) mediates the link between maternal attachment (from the Adult Attachment Interview) and infant attachment (in the Strange Situation), and (b) whether infant temperament moderates this model of attachment transmission. Eighty-four racially diverse, economically stressed mothers and their infants were assessed three times: newborn, 5, and 12 months. Despite robust meta-analytic findings supporting attachment concordance for mothers and infants in community samples, this sample was characterized by low attachment concordance. Maternal attachment was unrelated to maternal MM; and, maternal MM was related to infant attachment differences for ambivalent infants only. Infant irritability did not moderate the model. Possible reasons for the discordant attachment patterns and the remaining findings are discussed in relation to theory and previous research.

BRIDGING THE ATTACHMENT TRANSMISSION GAP WITH MATERNAL  
MIND-MINDEDNESS AND INFANT TEMPERAMENT

By

Laura Jernigan Sherman

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Advisory Committee:  
Professor Jude Cassidy, Chair  
Professor Tracy Riggins  
Professor Amanda Woodward

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## Preface

In the second volume of his trilogy *Attachment and Loss*, the founder of attachment theory, John Bowlby (1973), wrote about the transmission of attachment from parent to child:

Children tend unwittingly to identify with parents and therefore to adopt, when they become parents, the same patterns of behaviour towards children that they themselves have experienced during their own childhood, patterns of interaction are transmitted, more or less faithfully, from one generation to another. (p. 323)

In support of these assertions, early attachment research found strong concordance between adult attachment and infant attachment classifications (Main, Kaplan, & Cassidy, 1985). That is, there is a strong link between the quality of a parent's attachment and the quality of an infant's attachment to that parent, such that infants of secure parents develop secure attachments to them and conversely, infants of insecure parents develop insecure attachments to them. Attachment theory suggests that the mechanism of transmission across generations is parenting behavior, specifically parental sensitivity (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969, 1973; see Figure 1).

This model of intergenerational transmission has found empirical support (van IJzendoorn, Juffer, & Duyvesteyn, 1995), yet in their meta-analysis of 66 studies examining parental antecedents of attachment security, De Wolff and van IJzendoorn (1997) demonstrated that maternal sensitivity cannot fully explain the transmission of attachment from parent to infant, therefore resulting in a "transmission gap" (van IJzendoorn, 1995) of attachment. Thus, recent research has focused on parenting behaviors other than sensitivity that might mediate the link between parent and infant

attachment. In particular, researchers have examined how the caregiver's ability to ascribe mental states to his or her infant (i.e., mind-mindedness; Meins, 1997) might contribute to the development and transmission of attachment (Arnott & Meins, 2007; Bernier & Dozier, 2003; Meins, Fernyhough, Fradley, & Tuckey, 2001). This growing attention to maternal mind-mindedness has provided evidence that the caregiver's sensitivity to her infant's mental states, as opposed to physical or emotional needs, is more predictive of infant attachment security (Meins et al., 2001), and that the caregiver's own attachment is related to her mind-mindedness (Arnott & Meins, 2007; Bernier & Dozier, 2003). To date, no study has tested whether parental mind-mindedness is the mechanism of attachment transmission from parent to infant, that is, whether mind-mindedness mediates the link between parent attachment and infant attachment.

In addition to exploring other potential mediators in the transmission of attachment, it is also important to examine potential moderators of this model. For instance, research has shown that infant temperament can moderate the relation between parenting behavior and infant attachment (e.g., Belsky & Rovine, 1987; Crockenberg, 1981). Little research, however, has examined the contribution of infant temperament to the model. By examining adult attachment, parental mind-mindedness, infant temperament, and infant attachment, a more complete model of attachment transmission may be found.

Therefore, the goal of this study was to test (a) a model of attachment transmission whereby maternal mind-mindedness mediates the link between parent attachment and infant attachment, and (b) whether infant temperament moderates this model of attachment transmission (see Figure 2).

This paper is organized in four main sections: the introduction, method, results and discussion. The introduction begins with a review of the empirical literature about attachment transmission, followed by a review of the empirical literature linking mind-mindedness and attachment. The introduction continues with an explanation of the moderating role that infant temperament plays in the relation between parenting behavior and infant attachment. Next, is a summary of the limitations of previous work and a description of how the present study can address these limitations and extend their findings. The introduction concludes with a summary of the presents study's research goals. Next, the method section details the design of the proposed study including descriptions of the participants, procedure, and measures. The results section presents the findings of the statistical tests of the moderated mediated model of attachment transmission. I conclude with a discussion of the findings, highlighting how the current findings mesh with previous research and discussing the implications of these findings.

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## Chapter 1: Introduction

### *The Intergenerational Transmission of Attachment*

*Definition of intergenerational transmission of attachment.* A major tenet of attachment theory is the intergenerational transmission of attachment patterns (Bowlby, 1973). Intergenerational transmission of attachment can be broadly construed as the process by which a parent's pattern of attachment is transferred to her infant<sup>1</sup>. John Bowlby, the founder of attachment theory, noted that adults tend to parent the same way they themselves were parented as a child, and therefore, "patterns of interaction are transmitted, more or less faithfully, from one generation to another" (p. 323). As each individual in a new generation assumes the role of parent, she too will pass the pattern of interaction on to her children, thus creating a cycle of intergenerational transmission. According to the theory, it is specifically the caregiver's "internal working model" of attachment (IWM; Bowlby, 1973) that is transmitted to the infant (Main et al., 1985). IWMs have been defined as "a set of conscious and/or unconscious rules for the organization of information relevant to attachment and for obtaining or limiting access to that information, that is, to information regarding attachment-related experiences, feelings, and ideations" (Main et al., p. 66). These experience-based "rules" are built upon the individual's experiences in attachment relationships, specifically with parents, and govern how the individual thinks, feels, and acts in attachment relationships, including relationships with her own children. As a result, an infant will experience countless interactions with his caregiver that are governed by the parent's IWM of attachment (described later in detail), and will subsequently learn to adapt his attachment-related behavior in accord with these rules (also described later in detail). Therefore, to

clarify the earlier definition, intergenerational transmission is the process through which a parent's IWM of attachment is transferred to her infant through countless parent-child interactions.

*The link between parent attachment and infant attachment.* An adult's IWM of attachment is most commonly tapped with the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985). This semi-structured 60-minute interview measures an adult's "current state of mind with respect to attachment." During the interview, the adult is asked to produce and reflect upon memories related to attachment while simultaneously maintaining coherent discourse with the interviewer (Hesse, 1996, 1999). The interview is designed to reveal the adult's unconscious and "deeply internalized strategies for regulating emotion and attention when discussing attachment-related experiences" (Hesse, 2008). By analyzing verbatim transcripts of the interview, trained coders can place individuals into one of three "organized" attachment classifications (secure/autonomous, insecure-dismissing, and insecure-preoccupied) or into a fourth, "disorganized" attachment classification (unresolved/disorganized).

Main (1993, 2000; Main, Hesse, & Kaplan, 2005) has conceptualized the organized patterns of adult attachment in terms of attentional flexibility, described below for each pattern. Individuals are classified as secure/autonomous when they provide a coherent and collaborative narrative about attachment experiences that indicates they value attachment relationships and regard attachment-related experiences as influential. These individuals can easily shift their attention between describing past attachment experiences and evaluating their influences during the interview (Hesse, 1996, 1999, 2008). In contrast, there are two organized, yet insecure adult attachment classifications

evidenced by “major contradictions and inconsistencies in the narrative as well as passages that [are] short, long, irrelevant, or difficult to follow” (Hesse, 2008). Individuals are classified as dismissing when they provide internally inconsistent and markedly terse narratives that are aimed at minimizing the importance of attachment-related experiences. In terms of Main’s attentional flexibility framework, they demonstrate attentional inflexibility that is pointed away from attachment-related experiences. Conversely, preoccupied individuals demonstrate attentional inflexibility that is predominantly shifted toward attachment-related experiences. For instance, the individual is able to produce and reflect upon memories related to attachment, but is unable to maintain focus on the specific question, providing long and confusing responses that veer away from the specific request of the interviewer (see Hesse, 1999, for full descriptions of the patterns coded in the AAI). Researchers (Hesse & Main, 1999; Main & Hesse, 1990) later identified anomalous transcripts in which the speaker failed to adapt a singular strategy during the interview. These individuals are classified as unresolved/disorganized because they exhibit lapses in thinking and reasoning regarding attachment-related experiences. This classification is often seen in survivors of sexual or physical abuse as well as in adults who have experienced the unresolved loss of an attachment figure. These four categories represent adults’ “current state of mind with respect to attachment,” that is, their overarching cognitive stance regarding attachment relationships, not the quality of their attachment to a particular person.

These patterns of discourse observed in adulthood parallel the patterns of behavior observed in Ainsworth’s classic paradigm to assess infant attachment security, the Strange Situation (Ainsworth et al., 1978). The Strange Situation is a structured

laboratory procedure of separations and reunions between an infant and his caregiver. Patterns of infant behavior are observed during reunion with the parent, and the infant's attachment to his parent is classified into one of three organized patterns (secure, avoidant, or resistant/ambivalent) or into a fourth, disorganized pattern (disorganized/disoriented). Secure infants typically show distress upon separation, seek proximity during reunion, and are able to be comforted by the parent; avoidant infants often show little distress upon separation, ignore the parent during reunion, and actively avoid proximity and contact with the parent; and resistant infants display high distress upon separation and are difficult to soothe during reunion (see Weinfield, Sroufe, Egeland, & Carlson, 1999, for full descriptors). Whereas secure, avoidant, and resistant infants have a singular, organized strategy for interacting with their attachment figure, disorganized infants often display odd, contradictory, and stereotyped behaviors during the Strange Situation that lack a coherent pattern of behavior. In contrast to the patterns of discourse measured in the AAI, the patterns of infant behavior observed in the Strange Situation measure the quality of the infant's attachment to a particular person.

As mentioned earlier, attachment theory suggests that the parent-child relationship will be largely governed by the rules of the parent's IWM of attachment (Sroufe, 1996). As such, the infant will experience countless interactions with the parent that are structured by these rules, and will subsequently learn to behave in accord with the rules to maintain a safe proximity to the caregiver. Thus, the infant will develop a pattern of attachment to his parent that assimilates and complements that of the parent's "current state of mind with respect to attachment." For example, an adult who minimizes the importance of attachment-related experiences (i.e., a parent classified as dismissing) is

likely to have an infant who, at 12 months, has learned also to minimize attention to attachment-related experiences as evidenced by the infant's inattention to separation and avoidance of mother during reunion in the Strange Situation (i.e., avoidant attachment). Similarly, an adult who maximizes the influence of attachment-related experiences (i.e., a parent classified as preoccupied) is likely to have an infant who has learned also to maximize attention to attachment-related experiences as evidenced by the infant's vigilant attention to separation and preoccupation with mother upon reunion (i.e., resistant attachment). Therefore, the intergenerational transmission of attachment would be evidenced by a connection between the parent's AAI classification and the infant's Strange Situation classification.

In fact, the existence of a link between parent attachment and infant attachment has received considerable support. A meta-analysis of 18 studies (combined  $N = 854$ ) that examined the concordance between parent AAI classification and infant Strange Situation classification found large effect sizes in the predicted direction (van IJzendoorn, 1995). Due to the nature of the studies, analyses were run using a secure vs. insecure dichotomy (two-way) for all 18 studies (effect size = 1.06) and a three-way split (secure – dismissing/avoidant – preoccupied/resistant) for 10 studies (effect size = 0.72). For example, Fonagy, Steele, Steele, Moran, and Higgitt (1991) administered the AAI to 100 pregnant women who later participated in the Strange Situation when their infants were 12 months old. Their results revealed a 75% match between parent attachment and infant attachment for the two-way classifications, suggesting that the AAI is a powerful tool to predict infant attachment, and yet, it cannot account for all of the observed attachment differences. Alternatively, Benoit and Parker (1994) used the three-way classification

system for pregnant women and later for their 11-month-old infants, and found that 81% of the dyads corresponded on the quality of parent attachment and infant attachment. Consistent with these results, Pederson, Gleason, Moran, and Bento (1998) calculated the two-way concordance rates at 80% and the three-way rates at 73% within a sample not included in the meta-analysis. Furthermore, the meta-analysis revealed a medium-to-large effect size (0.65) for the relation between the unresolved adult classification and the disorganized infant classification, demonstrating a 63% concordance rate when utilizing the four-way classification system (van IJzendoorn, 1995).

Van IJzendoorn's (1995) meta-analysis contained diverse samples, including father-infant dyads, mother-infant dyads across six countries, clinical populations, and mothers of low socioeconomic status. More recent research has replicated and extended these findings in other diverse samples. For instance, similar concordance rates were found for adolescent mothers and their infants (Ward & Carlson, 1995), infant-father dyads (Steele, Steele, & Fonagy, 1996), foster mother-infant dyads (Dozier, Stovall, Alus, & Bates, 2001), as well as dyads living in kibbutz (Aviezer, Sagi, Joels, & Ziv, 1999). Based on these many wide-ranging and converging studies, as well as on the results of the meta-analysis, it is evident that an adult's attachment is a strong predictor of her infant's attachment, thus supporting Bowlby's hypothesis of intergenerational transmission of attachment.

*The mechanism of intergenerational transmission of attachment.* As a result of the meta-analysis examining the link between parent attachment and infant attachment, van IJzendoorn (1995) noted that although the link is well established, the mechanism that accounts for the transmission of attachment is only partially understood, resulting in what

he termed “the transmission gap.” According to attachment theory and the pioneering work of Mary Ainsworth, an adult’s IWM of attachment is transmitted to the infant through parenting behavior, specifically maternal sensitivity (see Figure 1). That is, the parent’s IWM of attachment guides her ability or willingness to sensitively respond to her own infant and maternal sensitivity, in turn, is the major determinant of infant attachment security. Ainsworth and her colleagues (Ainsworth et al., 1971; 1978; Ainsworth, Bell, & Slayton, 1974) completed extensive observations of mother-infant interactions in the home during the first year. Their results indicated that four rating scales (sensitivity, acceptance, cooperation, and accessibility) were strongly correlated to later infant attachment security, concluding that “the most important aspect of maternal behavior commonly associated with the security-anxiety dimension of infant attachment is manifested in different specific ways in different situations, but in each it emerges as sensitive responsiveness to infant signals and communications” (Ainsworth et al., 1978, p. 152). Therefore, most of the research designed to understand the mechanism of attachment transmission from parent to infant focused on the mediating role of maternal sensitivity (e.g., Bailey, Moran, Pederson, & Bento, 2007; Grossmann, Fremmer-Bombik, Rudolph & Grossmann, 1988; Pederson et al., 1998; Raval et al., 2001).

Although attachment theory depicts maternal sensitivity as the pathway of attachment transmission, studies indicate that the transmission of attachment cannot be fully explained by measures of sensitivity. Of the 18 studies in van IJzendoorn’s (1995) meta-analysis testing the relation between parent attachment and infant attachment, only three studies (combined N = 154) included direct measures of parental sensitivity. Although the findings indicate that parental attachment explains 12% of the variance in

parental sensitivity, the link between sensitivity and infant attachment was not as strong. In a test of the full model, the mediated path could not fully explain the variance in infant attachment. Based on these results, van IJzendoorn (1995) speculated, “the largest part of the influence would operate through mechanisms other than responsiveness as rated by the Ainsworth scales” (p. 398). Given that this statement was based on the results of only three studies, and each had major limitations (see Pederson et al., 1998, for a summary of those limitations), van IJzendoorn’s conclusion may have been premature. De Wolff and van IJzendoorn (1997), however, conducted a meta-analysis of 66 studies (N = 4,176) on parental antecedents of attachment security, showing only a moderate effect size ( $d = .24$ ) for sensitivity, therefore concluding, “in normal settings sensitivity is an important but not exclusive condition of attachment security” (p. 571). These two meta-analyses indicate that contrary to attachment theory, maternal sensitivity may not be the main contributor to infant attachment, nor the mechanism of transmission.

The results of these two meta-analyses spurred extensive research to understand the transmission of attachment from parent to child by testing adult attachment, parental sensitivity, and infant attachment with mediational models. Keeping the limitations from previous work in mind, Pederson et al. (1998) designed a study to test the model of attachment transmission through the mechanism of maternal sensitivity. Researchers observed 60 low-risk mother-infant dyads in their homes at 13 months to assess maternal sensitivity and in the laboratory Strange Situation two weeks later to assess infant attachment to mother; in addition, mothers completed the AAI within 6 months of the observational assessments. Each pathway in the model was supported, such that autonomous mothers were more sensitive than non-autonomous mothers, and mothers of

secure infants were more sensitive than mothers of insecure infants. As a mediator, however, sensitivity could account for only 17% of the relation between AAI and Strange Situation classifications, and the direct link between AAI and Strange Situation classification was still a significant predictor, accounting for approximately 5 times the variance accounted for by the mediated path. Consistent with these findings, Raval et al. (2001) found that maternal sensitivity only partially mediated the link between maternal attachment and infant attachment. Alternatively, Bailey et al. (2007) found no support for the mediating role of maternal sensitivity. Even in studies where maternal sensitivity is a significant mediator, the gap remains, such that the parent's AAI (Raval et al., 2001) or other global factors (e.g., maternal satisfaction with paternal support, Tarabulsky et al., 2005) explain more of the variance in infant attachment than maternal sensitivity.

The extensive research examining the mechanism of sensitivity has shown that although mothers of securely attached children are more sensitive than mothers of insecurely attached children, and that secure/autonomous mothers are more sensitive than insecure/nonautonomous mothers, sensitivity cannot fully mediate the transmission of attachment. Researchers have therefore turned to aspects of parenting other than sensitivity to explain the link between parent attachment and infant attachment. One such factor that could mediate this relation is parental mind-mindedness.

#### *Parental Mind-mindedness*

*Definition of mind-mindedness.* Parental mind-mindedness refers to a parent's "proclivity to treat her infant as an individual with a mind, rather than merely as a creature with needs that must be satisfied" (Meins et al., 2001, p. 638). A mind-minded mother considers the mental states that are governing her infant's behavior. For instance,

a mind-minded mother would acknowledge her infant's frustration and infer the cause, rather than scolding him for the behavior. She would also consider his likes and wants during play, rather than pushing him towards certain toys or behaviors that she enjoys. Although maternal mind-mindedness is thought to be related to maternal sensitivity, mind-mindedness is focused specifically on the mother's sensitivity to the infant's mental states. Therefore, two mothers could score the same on a general measure of sensitivity, but vary on their mind-mindedness. For example, two mothers may notice their infants' interest in a toy and hand them that toy. A mind-minded mother might say, "Here, you want this toy" (acknowledging that he has mental states governing his behavior), whereas a less mind-minded mother might say, "Here, you couldn't reach this toy." In each instance, the mother sensitively responds to her infant's signal, however, the mind-minded mother demonstrates a tendency to consider her infant as an individual with a mind. The less mind-minded mother, on the other hand, considered the physical and behavioral characteristics of her infant.

In her research, Meins has used two measures to assess mind-mindedness by coding maternal speech (Meins et al., 2001; Meins, Fernyhough, Russell, & Clark-Carter, 1998). The first is an interview in which mothers are asked to talk about their children and the second is an observation of mothers interacting with their infant (studies utilizing both methods will be discussed later). Mothers vary in terms of how often and how accurately they comment on their children's internal states, such that although a mother may frequently comment on her child's mental states, her comments may not always be appropriate given the child's behavior.

*Conceptual Issues.* Researchers have hypothesized that a mother's tendency to consider and her accuracy while considering the mental states of her infant (i.e., mind-mindedness) are critical to the development of a secure attachment relationship (Fonagy, Steele, Steele, Higgitt, & Target, 1994; Meins, 1997; Meins, 1999). Specifically, Meins (1997) hypothesized that “maternal behaviors that betray a sensitivity to infants’ mental states [*italics added*], rather than responsiveness to their physical and emotional needs, will be more useful than a generalized construct of maternal sensitivity in predicting the security of the attachment relationship” (Meins et al., 2001, p. 638). As Ainsworth observed, mothers of secure versus insecure infants were better able to “read” their infant’s signals (Ainsworth et al., 1974, p. 129), suggesting that a mother’s response should not only be prompt, but must also be appropriate to the infant’s signals, the context, and the interaction. Research has consistently shown that mothers who are more attuned to their infants are more likely to have securely attached infants (e.g., Isabella, Belsky, & Von Eye, 1989; Scholmerich, Fracasso, Lamb, & Broberg, 1995). The construct of mind-mindedness offers a unique form of mother’s attunement to her infant – that is, attunement to his mental states – which in fact, captures Ainsworth et al.’s (1971) original description of a sensitive mother as “capable of perceiving things from [the child’s] point of view” (p. 43) and behaving “in different specific ways in different situations, but in each it emerges as sensitive responsiveness to infant signals and communications” (p. 152). Because mind-minded mothers are able to consider the mental states that may be governing their children’s behavior, both positive and negative, they would also be able to respond to the range of infant signals regardless of the situation.

*Empirical studies of mind-mindedness and attachment in childhood.* In their early work on theory of mind performance, Meins and her colleagues noted differences in maternal speech between mothers of infants classified as secure and mothers of infants classified as insecure. In one such study, infant attachment to mother was measured at 12 months, and two years later, mothers were asked an open-ended question to describe their children (Meins et al., 1998). As compared to mothers of children who has been insecurely attached as infants, mothers of children who had been securely attached were more likely to comment on their child's mental characteristics (e.g., "caring" and "smart"), rather than physical (e.g., "blond" and "three years old") or behavioral characteristics (e.g., "talkative" and "loud"). (Interestingly, the child's theory of mind performance was related to maternal mind-mindedness, but not to the child's earlier attachment security, current executive capacity, or maternal sensitivity; see Meins, Fernyhough, Wainwright, Das Gupta, Fradley, & Tuckey, 2002, for a replication). Following the interview, mothers and their children also participated in an interaction task in which children were asked to complete a difficult puzzle. Prior to beginning the task, researchers told the mother that the task was too difficult for her child to complete alone and that she could provide assistance if she liked. Researchers coded each mother's "sensitivity to feedback," which was defined as the ability to incorporate the child's verbal and behavioral responses into subsequent instructions. As compared to mothers of children who had been insecurely attached as infants, mothers of children who had been securely attached scored higher on sensitivity to feedback. This suggests that while interacting with their children, as opposed to simply describing their children during an

interview, secure group mothers are more likely to consider their children's mental states and to appropriately respond based on those mental states.

These results provide evidence for a link between maternal mind-mindedness and infant attachment; however, they must be extended to determine whether maternal mind-mindedness predicts attachment security. It is possible that mothers of securely attached infants become more mind-minded over time as their children develop higher cognitive abilities such as language. Furthermore, by using the interview measure of mind-mindedness, these data show that mothers of securely attached infants talk about their child in mental terms, but cannot answer whether the mother is accurate in her assessment of her child.

The relation between the interview measure of maternal mind-mindedness and observed parenting also emerged in another study in which researchers assessed mothers' emotional availability (EA; Biringen, Robinson, & Emde, 1998) during a 20-minute play session with their four-year-old children, and asked mothers the open-ended question to describe their children (Lok & McMahon, 2006). Mothers with proportionally more mind-minded comments were more likely to have higher ratings on two of the four EA subscales: non-intrusiveness and non-hostility, but not sensitivity or structuring. The authors question the use of the interview measure because it cannot determine the appropriateness of the mother's comments and this ambiguity could be causing the lack of relation to the remaining EA subscales. For instance, a mother who describes her child in terms of mental attributes that are completely inappropriate given her child's characteristics would not be predicted to score high on the EA scales, and yet the interview measure is not sensitive enough to pick up these differences. Regardless, the

results of these studies suggest that during childhood, mind-mindedness, as measured by a maternal interview, is related to both observed parenting, and infant attachment security (Lok & McMahon, 2006; Meins et al., 1998).

*Empirical studies of mind-mindedness and attachment in infancy.* To examine the role of mind-mindedness in the development of infant attachment, I review three studies that assessed mind-mindedness during parent-child interaction prior to the formation of attachment. By measuring mind-mindedness during real time interactions between parent and child, researchers can distinguish between the quantity of mind-related comments and the quality (i.e., appropriateness) of those comments. By assessing the quality of mothers' mind-related comments, researchers can test whether mothers' use of appropriate mind-related comments and their use of inappropriate mind-related comments are important for predicting attachment. For instance, two mothers may both make 10 appropriate mind-related comments when interacting with their infants; however, one mother may also make 10 inappropriate mind-related comments, whereas the other mother may never comment inappropriately. Clearly, these two mothers differ in their accuracy when considering the mental states of their infants. As such, the appropriateness of mothers' mind-related comments is not characterized as a continuum from inappropriate to appropriate, but rather as two separate indices.

In a study to develop a measure of maternal mind-mindedness that could be assessed during parent-infant interaction, Meins et al. (2001) assessed 71 mother-infant dyads in a 20-minute laboratory free play session at 6 months and the Strange Situation at 12 months. Mothers' mind-related comments during free play were dichotomously coded as appropriate or inappropriate based on the infant's behavioral signals when the mother

made the comment, and the entire 20-minute session was coded for maternal sensitivity. The results indicated that maternal mind-mindedness, as measured during parent-infant interaction at six months, was a better predictor of infant attachment security at 12 months than Ainsworth et al.'s (1971) 9-point maternal sensitivity measure. Results of the forward logistic regression, with a secure versus insecure dichotomous outcome, revealed that maternal sensitivity accounted for a significant 6.5% of the variance in attachment security, whereas mothers' appropriate mind-related comments accounted for an additional 12.7% of the variance. Furthermore, the effect size of the link between maternal sensitivity and attachment security was medium (0.57-0.64), whereas the effect size of the link between appropriate mind-related comments and security was large (1.00-1.50). Moreover, exploratory analyses indicated that maternal mind-mindedness could distinguish infants classified as insecure-avoidant, secure, and insecure-resistant whereas maternal sensitivity could not differentiate securely attached infants from insecure-resistant infants. These findings support Meins's (1997) hypothesis that "sensitivity to infants' mental states...will be more useful than a generalized construct of maternal sensitivity in predicting the security of the attachment relationship" (Meins, 2001, p. 638).

Further analyses for a sub-sample of 57 mother-infant dyads demonstrated that attachment security at 12 months was not only positively correlated with mother's appropriate mind-related comments at 6 months, but was also negatively correlated with mother's inappropriate mind-related comments at 6 months (Meins et al., 2002). Maternal sensitivity was no longer significantly related to infant attachment security in this sub-sample. Maternal sensitivity was, however, related to appropriate mind-related

comments, but not to inappropriate mind-related comments, indicating that measures of appropriate and inappropriate mind-related comments are distinct indices. Together, these results suggest that mothers' appropriate and inappropriate mind-mindedness are more predictive of attachment security than maternal sensitivity.

Although each of the above studies supports a link between maternal mind-mindedness and infant attachment, each has important limitations to consider. First, the mothers in the samples are predominately white, living in an area of the English Midlands, UK. Little is known whether levels of mind-mindedness are comparable across cultures. Though the measure may be predictive of infant attachment in homogeneous, British populations, research is needed from other countries and from more diverse populations to comment on the generalizability and usefulness of mind-mindedness in research. Secondly, the infants were predominately classified as secure with their mothers ( $N = 45$ ) and very few infants were classified as avoidant ( $n = 12$ ), insecure-resistant ( $n = 5$ ), or disorganized ( $n = 3$ ). The results, therefore, must be treated with caution and should be replicated to confirm the specificity of the measure in predicting attachment groups. Also, although the authors made no predictions for the disorganized group, more research is needed to determine whether mind-mindedness (appropriate or inappropriate comments) is a valuable indicator of disorganization.

Lundy (2003) was able to replicate and extend some of Meins et al.'s (2001) findings. Mothers ( $n = 16$ ) and fathers ( $n = 16$ ) were observed separately in the laboratory during 6-minute face-to-face interactions with their infants and later returned to complete the Attachment Q-set (AQS; Waters, 1987) as a measure of infant-parent attachment. Each parent completed the AQS by sorting 90 items that described different types of

infant behavior based on how descriptive they felt the behavior was of their infant with them; higher scores indicate that the infant's behavior with that parent is closer to that of a prototypically secure infant (see Waters, 1987, for description and scoring criteria). For both parents, greater number of mind-related comments at 6 months was related to more secure infant attachment at 13 months. Consistent with the results of Meins et al. (2001), mind-mindedness preceded and predicted attachment security, however, because the AQS yields a continuous attachment security score, rather than categorical classification, this study cannot reproduce the conditions of Meins et al.'s (2001) to determine whether mind-mindedness can differentiate among attachment groups. This study extended previous work on mind-mindedness by including a measure of parental depressive symptoms finding that, for mothers, depressive symptoms were negatively correlated with number of mind-related comments. Caution should be used when interpreting these results because the sample size was very small ( $N = 32$ ), the families were predominately white (96%), and the face-to-face interaction lasted only 6 minutes. In addition, the measure of mind-mindedness assessed only the frequency of comments, rather than their appropriateness, and the parents as opposed to trained observers completed the measure of attachment security. This study is not a replication of Meins et al. (2001) because the methods used lack the specificity and the theoretical basis to test the relation between parental mind-mindedness and infant attachment.

*Mind-mindedness and the transmission of attachment.* Given that maternal mind-mindedness demonstrated more specificity in predicting attachment classification than maternal sensitivity (Meins et al., 2001), it is not surprising that researchers have tested whether mind-mindedness can explain the attachment transmission gap. Two studies

have assessed adult attachment, maternal mind-mindedness, and infant attachment security (Arnott & Meins, 2007; Bernier & Dozier, 2003); however, the design of each study restricts the practical implications of the findings. I describe each study, the findings, and the various limitations that obscure the results.

The first attempt by Bernier and Dozier (2003) sought to bridge the transmission gap using an interview measure of mind-mindedness for foster mothers with foster children aged from 6-30 months ( $N = 64$ ). Mothers were asked the open ended question, “Could you describe (child’s name) for me, what is he (or she) like?” Following the Meins et al. (1998) coding scheme, researchers coded any comment referencing a mental attribute as mind-minded. Although the interview measure provides information about the mother’s tendency to use internal state language, it does not address whether these attributes are appropriate given the child’s actual behavior. The researchers hypothesized that secure/autonomous mothers would use more mind-related comments, and that mind-mindedness would be positively correlated to infant attachment security. Contrary to their prediction, results indicated that insecure mothers used more mental attributes to describe their children than secure/autonomous mothers. The authors attributed this contradictory finding to the methodology, suggesting that the interview measure may not be age-appropriate for the younger children in the sample. For example, it would not be appropriate for mothers to describe their six-month-olds as having advanced mental states, therefore, increased usage of mental attributes in the mothers of young infants may indicate poorer attunement to their infant’s mental states, and thus, less secure attachment relationships. This explanation is, however, a post hoc interpretation of findings that were contra to the theory and needs to be replicated.

In addition, there are limitations related to the sample of foster mothers and children. Foremost, neither the foster mothers, nor the infants, had a typical distribution of attachment patterns compared to a low-risk population. For the mothers, 54.7% were classified as secure/autonomous, 25% as dismissing, and 20.3% as unresolved. The children were classified 45% secure, 45% disorganized, 7% resistant, and 3% avoidant with their foster parent. Additionally, some of the children had been with their foster parent for as little as 3 months, which introduces two major concerns. First, according to attachment theory, attachments take time to develop (Ainsworth et al., 1978; Bowlby, 1969). As such, some of the children may not have had sufficient time to develop an attachment to their foster parent. Second, according to research on mind-mindedness, maternal mind-mindedness is relationship-specific (e.g., mothers who were highly mind-minded with their own children did not exhibit the same level of mind-mindedness with a stranger's child; Meins, Fernyhough, Arnott, & Wilson, 2006), and "requires extensive previous knowledge of the infant" (Arnott & Meins, 2007, p. 147) to learn their likes, dislikes, interests, and moods. Thus, the results of Bernier and Dozier (2003) should be interpreted with caution because of the short durations of foster placement. In addition, although most of the children were in their first foster placement ( $n = 44$ ), many had been in earlier placements ( $n = 20$ ). It is likely, therefore, that many of the children in this sample had experienced disruptions in their attachment relationships. In sum, because of the variation in age of the children, length of time in foster placement, and number of previous placements, this is not the ideal sample with which to test the transmission of attachment.

Despite these limitations, the statistical criterion for complete mediation was satisfied, such that mind-mindedness fully mediated the link between mother's coherence on the AAI and the child's attachment security in the Strange Situation. The direction of associations was, however, counterintuitive with higher coherence predicting lower mind-mindedness on the interview, and higher mind-mindedness predicting lower security scores. As previously stated, the authors argued that the interview measure of mind-mindedness might be inappropriate for use in a sample of young infants.

Recently, Arnott and Meins (2007) published preliminary data from a study investigating links among adult attachment, parental mind-mindedness, and infant attachment in a sample of biological mother- and father-infant pairs. Separately, parents completed the AAI and participated in a 30-minute laboratory free-play session with their 6-month-old infant that was coded for parental mind-mindedness. Mother-infant dyads ( $N = 21$ ) returned to the laboratory when infants were 12 months, and father-infant dyads ( $N = 17$ ) at 15 months to participate in the Strange Situation. Regarding the link between adult attachment and parental mind-mindedness, secure/autonomous mothers and insecure mothers did not differ on their use of appropriate mind-related comments nor on their use of inappropriate mind-related comments; however, secure/autonomous fathers made more appropriate mind-related comments than insecure fathers and did not differ on inappropriate comments. Regarding the link between parental mind-mindedness and infant attachment, there were medium to large effect sizes indicating that mothers of securely attached children made more appropriate mind-related comments ( $d = 1.02$ ) and fewer inappropriate mind-related comments ( $d = 0.55$ ) than mothers of insecurely attached children. For fathers, significant differences were observed between fathers of

secure children versus fathers of insecure children for appropriate mind-related comments, but not for inappropriate mind-related comments. The finding of a connection between parental mind-mindedness and infant attachment replicate the findings of Meins et al. (2001) and Lundy (2003).

Although the Arnott & Meins (2007) sample was too small to test for mediation, the data suggest that mind-mindedness may serve as a pathway of attachment transmission. Patterns consistent with this model of transmission emerged in the data. First, all of the infants of secure/autonomous mothers and fathers whose mind-mindedness was high were classified as secure in their relationship with that parent. In addition, most of the infants of insecure mothers and all of the infants of insecure fathers whose mind-mindedness was low were classified as insecure with that parent. In cases where parents were classified as secure, but their mind-mindedness was low, and in cases where parents were insecure, but their mind-mindedness was high, the infant attachment classifications were mixed. Overall, the direction of associations among secure adult attachment, parental mind-mindedness, and secure infant attachment was positive. In summary, 3 of the 4 links between parental mind-mindedness and infant attachment found statistical support, whereas only 1 of the 4 links between adult attachment and parental mind-mindedness found statistical support. Nonetheless, this mediational model warrants further investigation because the patterns observed in the data support the notion that parental mind-mindedness may be a pathway of attachment transmission.

In a recent study, Laranjo, Bernier, and Meins (2008) examined links among 12-month maternal mind-mindedness, 12-month maternal sensitivity, and 15-month infant attachment, finding that maternal sensitivity mediated the link between maternal mind-

mindfulness and attachment security. For the first time, sensitivity and mind-mindedness were coded from separate contexts, thus reducing any shared method variance that could inflate the results. Their findings, along with Lundy's (2003) earlier results, provide further support for Meins's (1997, 1999) hypothesis that mind-mindedness is a prerequisite for sensitivity. The authors used slightly different variables in their analyses, however, than had been used previously. First, the measure of maternal mind-mindedness included only comments related specifically to the infants' mental states (not infants' mental processes, level of emotional engagement, or speaking for the infant). Second, the authors did not control for overall verbosity in their measure of appropriate comments. Lastly, the authors used an observer-rated attachment Q-sort from a 90-minute home observation. Despite these differences, the results of this study corroborate previous findings that mind-mindedness predicts maternal sensitivity and attachment security.

To summarize, the recent research on parental mind-mindedness has provided sufficient support to consider parental mind-mindedness in the development and transmission of attachment. The link between parental mind-mindedness and infant attachment has been empirically supported in a number of studies. Specifically, maternal mind-mindedness differentiated among secure, avoidant, and resistant group infants (although this finding is yet to be replicated), and accounted for more variance in attachment classifications than maternal sensitivity. Of the two studies that examined adult attachment and parental mind-mindedness, Arnott and Meins (2007) found theoretically consistent patterns in the data, whereas Bernier and Dozier (2003) found contradictory results that reached significance. As such, little is yet known concerning the link between adult attachment and parental mind-mindedness. Much of the published

work assessing mind-mindedness through parent-child interaction has come from the same British sample, and most of the studies suffer from small, homogeneous samples. The remaining studies using parent interviews have shown that the interview method of assessing mind-mindedness is inappropriate for use with young infants. Thus, more research is needed that assesses parental mind-mindedness during parent-child interaction prior to the formation of attachment. Finally, to date, no study has tested whether parental mind-mindedness mediates the link between parent attachment and infant attachment for biological mother-infant pairs.

Although mind-mindedness may be a better predictor of attachment classification than maternal sensitivity, aspects of parenting alone cannot account for all the differences in infant attachment. Infant characteristics, such as temperament, may systematically interact with parenting behaviors to produce predictable patterns of attachment (Belsky, 2005; Thompson & Lamb, 1984).

#### *Infant Temperament as a Moderator*

*Definition of temperament.* Although various definitions of temperament exist, most researchers agree that temperament is an internal characteristic of an individual with a biological or genetic basis that underlies basic behavioral tendencies. Rothbart and Derryberry (1981) defined temperament as individual differences across two domains assumed to have a constitutional basis (i.e., relatively enduring biological makeup): reactivity (i.e., excitability, responsivity, or arousability) to internal and external stimuli, and self-regulation (i.e., neural and behavioral processes to modulate reactivity). In infancy, temperament is manifested in the infant's attention, emotionality, and motor activity, therefore, observational measures of infant temperament have assessed infants'

behavioral, emotional, and motor responses to varying conditions (e.g., novel stimuli, frustrating situations, and fearful stimuli; Laboratory Temperament Assessment Battery, LAB-TAB; Goldsmith & Rothbart, 1991). For very young infants, irritability is “the dimension of infant behavior that is unanimously agreed upon by most temperament theorists as an instance of temperament” (van den Boom, 1989, p. 299). Thus, measures of infant irritability, emotionality, and reactivity are typically used to assess infant temperament.

*Conceptual issues.* For many years, temperament theorists argued that the behaviors measured in the Strange Situation were the result of the infant’s temperament rather than the quality of the parent-child relationship. Although decades of research have allowed this classic nature/nurture debate to subside, and most developmental researchers now agree that both biology and environment play a role in determining behavior, the question of the relative contribution of each factor in the development of attachment remains. Attachment theory suggests that maternal sensitivity is the main determinant of infant attachment to mother; however, research indicates that maternal sensitivity is only part of the puzzle. As such, researchers have not only examined other environmental aspects, but also biological aspects of the infant, such as temperament, that could influence the development of attachment. For instance, Thompson and Lamb (1984) proposed that infant temperament (measured by negative reactivity) distinguishes infants in the sub-classifications B2, B1 (both forms of secure attachment), and A (insecure-avoidant) from infants in attachment sub-classifications B3, B4 (forms of secure attachment), and C (insecure-resistant). They hypothesized that a highly reactive infant would be more likely classified as B3, B4, or C as opposed to B2, B1, or A, but that

maternal behavior would determine whether the attachment was secure or insecure. Conversely, a low reactive infant would be more likely classified as B2, B1, or A as opposed to B3, B4, or C.

When examining the contribution of only parenting behavior to attachment security, researchers are assuming that all children are equally affected by the same parenting behaviors. This assumption has permeated most of the research on infant attachment and is evident even in Thompson and Lamb's (1984) temperament by parenting interaction hypothesis. Although infant temperament is an important aspect in their theory, the hypothesis assumes that all children will be equally influenced by the maternal behaviors that relate to the security/insecurity dimension. Belsky's (2005) differential susceptibility hypothesis, on the other hand, suggests that "children likely vary in their susceptibility to rearing influence" (p. 140). According to Belsky, susceptible children would be highly influenced by parenting (whether good or bad), whereas nonsusceptible children would be relatively unaffected. This notion of susceptibility could explain the weak empirical link between parenting and attachment because previous research tested only the main effect of parenting, and did not test whether infant characteristics interact with parenting to influence attachment.

*Empirical findings.* Considerable research now exists to suggest that parenting interacts with infant temperament to systematically influence attachment classification. Consistent with Thompson and Lamb's (1984) hypothesis, Marshall and Fox (2005) found that infants (N = 119) classified as B3, B4, or C at 14 months had been more negatively reactive on temperament assessments at 4 months than infants classified as B2, B1, or A had been at 4 months. Similarly, Braungart-Rieker, Garwood, Powers and

Wang (2001) found that infants (N = 94) classified B2, B1, or A at 12 months showed higher affect regulation at 4 months than infants classified as B3, B4, or C, and that all mothers of secure infants were more sensitive than mothers of insecure infants. These findings support Belsky and Rovine's (1987) conclusion that "infant temperament affects the manner in which security or insecurity is expressed rather than whether or not the infant develops a secure or insecure attachment" (p. 787).

Empirical evidence also supports Belsky's claim of differential susceptibility and suggests that the factor of susceptibility to rearing influence is negative infant temperament. For instance, in his primate research, Suomi (1997) selectively bred rhesus monkeys to be highly anxious, fearful, and uptight. Then, he cross-fostered these "uptight" infant monkeys and control infant monkeys to either highly skilled or average mothers and later measured the effects of rearing on behavior. For control monkeys, few rearing effects were observed whether fostered by highly skilled or average mothers; for uptight monkeys, however, maximum rearing effects were observed. Uptight monkeys who were randomly assigned to average mothers showed deficits in early exploration and had later poorer social networks, whereas those who were randomly assigned to highly skilled mothers showed an array of positive outcomes and were later considerably better socially adjusted. The same experience of rearing, therefore, affected the monkeys differently based on their biologically based behavioral tendencies (i.e., temperament). Similarly in human research, Kochanska (1997), Feldman, Greenbaum, and Yirmiya (1999), and Belsky, Hsieh, and Crnic (1998) have all found that aspects of parenting (e.g., maternal discipline, synchronous mother-infant interactions, and positive vs. negative parenting) are more strongly related to child outcomes (e.g., restraint, self-

control, and psychosocial functioning) for children with more negative, more fearful, and more difficult temperaments.

Similar findings emerge when infant attachment is examined as the outcome. In her study of parental social support and infant attachment (N = 46), Crockenberg (1981) found that the influences of maternal social support were most predictive of infant attachment for mothers of irritable infants. Furthermore, Klein Velderman, Bakermans-Kranenburg, Juffer, and van IJzendoorn (2006) found differential effects of an attachment-based intervention in a sample of 81 mother-infant pairs. Overall, intervention group mothers were more sensitive than control group mothers, however, the intervention group infants were no more likely to be classified as secure than control group infants. When comparing highly reactive infants to less reactive infants, researchers found that the intervention was effective at increasing attachment security only for highly reactive infants, thus supporting the differential susceptibility hypothesis for infants with negative temperaments.

Taken together, this research suggests that when examining the role of parenting in the development of infant attachment, researchers must consider the contribution that infant temperament plays in either influencing how attachment security is expressed or affecting which infants will be most influenced by aspects of parenting.

### *The Present Study*

As the above literature review reveals, more research is needed to clarify how patterns of attachment are transmitted from parent to child. The present study investigates (a) whether maternal mind-mindedness can explain the relation between adult attachment and infant attachment, and (b) whether this model of attachment transmission is

moderated by temperament. In doing so, this study differs from previous work in several important ways. Primarily, this is the first study to test whether maternal mind-mindedness mediates the link between adult attachment and infant attachment in biological mother-infant pairs. Second, by assessing infant attachment in the Strange Situation, this is the first replication of Meins et al. (2001) to test whether maternal mind-mindedness can distinguish among attachment groups. Also, the Strange Situation is used because it is a well-validated observational measure of attachment security, which is not subject to the parental biases of the AQS. Third, this study measured maternal mind-mindedness during a parent-child interaction, not an interview, which not only allows for the distinction of appropriate versus inappropriate mind-related comments, but is also the most appropriate measure for use in infancy. Fourth, the sample has unique characteristics: the participants of the sample were chosen for being at high risk for the development of insecure attachments (e.g., economically-stressed mothers of irritable infants), and therefore, the sample should have larger numbers of insecurely attached infants, yielding more power to statistical tests of attachment group differences; and, the sample is more diverse than those of previous studies, and thus provides greater generalization of findings. Finally, this study includes a standardized, observational measure of infant temperament (the Neonatal Behavioral Assessment Scale; Brazelton, 1984), measured shortly after the infants' birth, to determine how the effects of maternal mind-mindedness could vary as a function of infant temperament. Although previous research has used parent reports of infant temperament, these measures are subject to parental biases and Vaughn & Bost (1999) noted in their review of attachment and temperament literature that parent reports of infant temperament do not usually relate to

differences in attachment, but that neonatal assessments of irritability have been related to differences in attachment classification.

Data for this study come from a larger, longitudinal study. Data were collected from participants at birth, 5 months, 12 months, 18 months, and 24 months. For purposes of this investigation, data were used from home visits at birth, as well as from laboratory visits at 5 months and 12 months.

The present study had two primary goals. The first goal was to determine whether maternal mind-mindedness mediates the link between parent attachment and infant attachment. Following Meins et al. (2002), I examine mind-mindedness as two separate variables: appropriate mind-related comments, and inappropriate mind-related comments. I predicted that secure/autonomous mothers would be more appropriately mind-minded and less inappropriately mind-minded as compared to insecure mothers, and that more appropriate mind-mindedness would predict secure infant attachment, whereas more inappropriate mind-mindedness would predict insecure infant attachment. I expected to replicate previous concordance rates between maternal attachment measured by the AAI and infant attachment to mother measured in the Strange Situation. Also, I expected to replicate the preliminary findings of Meins et al. (2001) indicating that maternal mind-mindedness can distinguish among the three-way attachment groups.

The second goal of this study was to determine whether infant temperament moderates the model of attachment transmission. I predicted that infant temperament would moderate the link between parenting and infant attachment, such that maternal mind-mindedness would be more predictive of attachment security for highly irritable infants.

## Chapter 2: Method

### *Participants*

Participants were a sub-sample of 84 mothers ( $M$  age = 24.33,  $SD$  = 5.19) and their infants (38 females and 46 males) from an existing longitudinal dataset funded by an NIH grant awarded to Jude Cassidy. Mothers were recruited from hospitals shortly after birth in the Washington, DC metro area and those who met our selection criteria (i.e., economically stressed) were invited to participate in a two-year study consisting of four laboratory visits and four home visits. The majority of the mothers (45.2%) identified themselves as Black/African-American, followed by White/Non-Hispanic (25%), Hispanic (19%), Asian (4.8%), mixed (4.8%), and American Indian/Alaskan (1.2%). Mothers were paid \$500 for their participation in the 2-year longitudinal study. Permission to recruit human subjects was obtained from the University of Maryland's Institutional Review Board (see Appendix A).

### *Procedure*

Data for this study were obtained from 3 assessments: birth, 5 months, and 12 months. Trained researchers visited participants' homes to administer the Neonatal Behavioral Assessment Scales at 10 and 15 days after birth. At 5 months, mothers and their infants visited the laboratory for a 1-hour visit consisting of a variety of videotaped laboratory tasks, including a 4-minute face-to-face interaction, a 10-minute free play session, and the Adult Attachment Interview. At 12 months, mothers and their infants were videotaped in the laboratory for the Strange Situation.

## *Measures*

*Possible covariates.* Mothers reported their highest completed level of education on a demographics questionnaire and age (Appendix B) to be tested as potential covariates for the model (Meins et al., 2001).

*Adult attachment.* The Adult Attachment Interview (AAI; George et al., 1984; Appendix C), which is a 60-minute semi-structured interview, was used to assess maternal “current state of mind with respect to attachment.” At the 5-month visit, trained researchers, who were blind to any information about the mother, administered the AAI to the mothers. In the AAI, mothers are asked to produce and reflect upon memories of attachment-related experiences. For example, mothers are asked to think about their childhood and provide five adjectives that describe their mother or their relationship with their mother. Then, they are asked to explain why they choose each of the adjectives. This is repeated for their father, and any other attachment figures from their childhood. Mothers are also asked to think about times when they were sick, scared, or upset and explain how their attachment figures responded to them, how they felt during these situations, and how they currently feel that those experiences affected them.

The audio-recorded interviews were transcribed verbatim for coding purposes. Five blind coders who were trained and certified by Mary Main and Erik Hesse analyzed the interviews and classified the adults as secure/autonomous, insecure/dismissing, insecure/preoccupied, or insecure/unresolved based on Main and Goldwyn’s (1998) coding scheme. Mothers were classified as secure/autonomous if they coherently described attachment-related experiences, valued attachment relationships, and regarded attachment-related experiences as influential. Mothers were classified as insecure if they

were unable to provide a coherent narrative. Specifically, mothers were rated as dismissing if they minimized the importance of attachment-related experiences and consistently turned their attention away from attachment-related experiences, whereas mothers were rated as preoccupied if they maximized the importance of attachment-related experiences and consistently turned their attention toward attachment-related experiences. Lastly, mothers were classified as unresolved if they demonstrated lapses in thinking and monitoring regarding attachment-related experiences and were therefore unable to adopt an organized strategy for regulating their attention for experiences of trauma or loss. Coders also rated the transcripts for overall coherence on a 9-point scale. This commonly used scale provides a metric summary of the adult's current security (Bernier & Dozier, 2003; Main & Goldwyn, 1998). The AAI coders were blind to the purpose of the study, as well as any information about the participant. Coders overlapped on a randomly selected 20% of cases for reliability and disagreements were resolved by conference. Coder agreement for secure/insecure group placement was 85% ( $\kappa = .62$ ,  $p < .001$ ). The reliability, predictive validity, and discriminant validity of the AAI classifications have been well established (Bakermans-Kranenburg & van IJzendoorn, 1993; Crowell, Waters, Treboux, & O'Connor, 1996; Hesse, 1999). Following Raval et al. (2001), a scaled variable was created using the adult's primary and secondary classification with scores ranging from 0 (least secure) – 5 (most secure).

*Maternal mind-mindedness.* Maternal comments during the face-to-face and free play sessions were coded for maternal mind-mindedness according to Meins et al.'s (2001) coding scheme using an unpublished coding manual (Meins & Fernyhough, 2006) obtained from Elizabeth Meins. Mother's speech was transcribed verbatim from the 4-

minute face-to-face interaction with her infant and the 10-minute free play session.

Comments were considered mind-related if they (a) contained an explicit reference to the infant's internal state, or (b) served to speak on behalf of the infant. Comments that contain an explicit reference to the internal state of the infant - that is, what he may be thinking, feeling, or experiencing - can relate to the infant's desires and preferences (e.g., "You like that toy" and "You want to shake that"), cognitions (e.g., "You think that's neat" and "You recognize that from home"), emotions (e.g., "You're frustrated" and "You are so happy"), and epistemic states (e.g., "You're teasing me"). Comments that are not mind-minded include phrases related to the infant's perceptions (e.g., "You're looking at my watch"), physical states (e.g., "You're hungry"), and non-specific references to the infant's internal states (e.g., "Are you okay?" and "What's wrong?"). Comments that serve to speak on behalf of the infant relate to what the infant might say if he could speak. For example, "Say, 'Mommy, look at this ball'" or "You're saying 'Mommy, get me out of this car seat.'" Comments in which the mother requests that the infant say something, such as "Say, 'excuse me'" after the infant sneezes or "Say, 'hi'" were not coded as mind-related. Six advanced undergraduate research assistants were trained using the Meins and Fernyhough (2006) coding manual. Coders were required to study the manual and were tested on the material. Once all coders demonstrated advanced knowledge of the manual, they began identifying mind-related comments in teams of three.

Following identification of mind-related comments, two coders (an advanced undergraduate research assistant and I) were trained to determine whether each of the mothers' mind-related comments were appropriate or not. Comments were coded as

appropriate if the coder agreed with the mother's reading of the infant's mental state. For example, the mother says, "You like that toy" referring to a toy the infant had been playing with for an extended period of time. Comments were considered inappropriate if the researcher disagrees with the mother's reading of the infant's mental state. For example, the mother says, "You want to play with this ball" while the infant is currently engaged with another toy. Mind-related comments were also coded as inappropriate if the mother references a mental state that is inappropriate given the infant's age, "You miss daddy so much that when he comes home you want to cook him dinner." Trained coders overlapped on a randomly selected 25% of cases for reliability. Disagreements were settled by conference. Reliability was high for identifying appropriate (ICCs = .89; .95) and inappropriate (ICCs = .63; .86) comments for each task. Although this is a relatively new measure, it has good construct and predictive validity evidenced by its relation to theoretically consistent child outcomes (see Meins et al., 2003).

The total number of mother comments was summed across the face-to-face and free play interactions. Following Meins et al. (2002), I assigned mothers a score for appropriate mind-related comments and a score for inappropriate mind-related comments. Each score was expressed as a proportion of appropriate or inappropriate mind-related comments over the total number of all comments made during the interactions to control for verbosity in the mothers.

*Infant attachment.* The Ainsworth Strange Situation (SS; Ainsworth et al., 1978) was used to assess infant attachment to mother. The SS is a 20-minute structured laboratory procedure consisting of two separations and two reunions with the caregiver in an unfamiliar room with a female stranger. The eight episodes are designed to increase

the infant's level of stress and activate the infant's attachment behavioral system (see Appendix D). The entire procedure was videotaped for later coding.

Five coders who were trained and certified coded the videotaped SS procedure based on the Ainsworth et al. (1978) coding scheme to classify infants as secure, avoidant, resistant, or disorganized. Infants were classified as secure if they sought proximity to their mothers in reunion episodes and were able to return to play after being calmed by their mothers' presence. Infants were classified as insecure-avoidant if they ignored their mothers and actively avoided proximity to and contact with their mothers, whereas infants were classified as insecure-resistant if they displayed anger in reunion episodes and protested removal of contact with their mothers.

The coders were kept blind from the purpose of the study and any information regarding the mother or infant. The coders overlapped on 34% of cases for reliability assessment, and discrepancies were settled by conference. Coder agreement for secure/insecure group placement was high: 86% ( $\kappa = .72$ ,  $p < .001$ ). The reliability, predictive validity and discriminant validity of the Strange Situation classifications have been well established (Main et al., 2005; Solomon & George, 2008, for a review; Waters, Merrick, Treboux, Crowell, & Albersheim, 2003). Following Bernier and Dozier (2003), a scaled variable was created using the adult's primary and secondary classification with scores ranging from 0 (least secure) – 5 (most secure) according to Raval et al.'s (2001) scheme.

*Infant temperament.* Trained researchers visited mothers and infants in the home at 10 and 15 days after the infants' birth to administer the Neonatal Behavioral Assessment Scale (NBAS; Brazelton, 1984). After conducting a full examination of each

infant, the researchers rated each infant on a 9-point scale for 28 behavioral items and on a 3-point scale for 18 elicited responses. Following the work of van den Boom (1994) and Crockenberg (1981), I define irritable infants as those with NBAS scores equal to or greater than 6 for a composite score of the variables peak excitement, rapidity of buildup, and irritability (these variables represent a cluster identified by Kaye, 1978). Although previous researchers have used a mean score from two assessments (van den Boom; Crockenberg), I chose to use the 6 or greater criteria for both NBAS assessments because changes in scores “may depict a curve of ‘recovery’” (Brazelton, 1984, p. 5). In this case, averaging the two scores would not be indicative of the infant’s actual level of irritability. For example, an infant who scores an 8 on the first day, and scores only a 4 on the second day, would receive an average score of 6. This infant, however, may be showing “recovery” and may be very different from an infant who scores 6 on each administration. In choosing this criterion, I have more confidence that the infants identified as irritable are in fact different than those identified as less or non-irritable.

## Chapter 3: Results

Results are presented in three sections. In the first section, I present descriptive statistics for the key variables in the model (adult attachment, infant attachment, maternal mind-mindedness, and infant irritability) and possible covariates of the model (infant sex, maternal education, and maternal age). In the second section, I present the results for tests of each path in the model. In the last section, I present results related to the proposed moderated mediation model.

### *Descriptive Statistics*

*Adult attachment.* Data are missing for 3 mothers due to equipment malfunctions, resulting in 81 mothers with AAI data (for the distribution of classifications, see Table 1). Almost half of the mothers (44.4%) in this sample were classified as dismissing. The distribution of adult attachment patterns was significantly different from the distribution that would be expected based on meta-analytic findings for community samples,  $\chi^2(3) = 27.98, p < .0001$  (Chi-square goodness of fit test comparing the observed four-way distribution to that expected based on van IJzendoorn & Bakermans-Kranenburg's [1996] meta-analysis). I examined whether any demographic variables were related to the overrepresentation of the dismissing pattern. Education and income were not related to the attachment distribution, but race was related to adult attachment, such that Black/African American mothers were significantly more likely to be classified as dismissing (53.8%) than the remaining mothers (35.7%),  $z = -1.64, p < .05$ . The remaining mothers were, however, still more likely to be dismissing than expected based on meta-analytic findings for community samples,  $\chi^2(1) = 4.63, p < .05$  (Chi-square goodness of fit test comparing the observed distribution [dismissing vs. other] to that

expected based on van IJzendoorn & Bakermans-Kranenburg's [1996] meta-analysis). Of the 13 mothers who had unresolved and cannot classify codes, 5 had underlying classifications of secure, 6 dismissing, and 2 were preoccupied.

The mean AAI coherence score was 4.54 ( $SD = 1.88$ , range 1-8). As expected, a one-way analysis of variance (ANOVA) revealed that the four classifiable AAI groups differed significantly on mean coherence ( $F = 56.52$ ,  $p < .001$ ). Post-hoc LSD tests of mean differences revealed that secure-autonomous mothers' coherence scores ( $M = 6.50$ ,  $SD = 1.21$ ) were significantly higher than those of insecure mothers: dismissing ( $M = 3.39$ ,  $SD = .70$ ), preoccupied ( $M = 2.88$ ,  $SD = 1.31$ ), and unresolved ( $M = 3.02$ ,  $SD = 1.59$ ) mothers when examined separately. Mothers' coherence scores for each of the insecure groups did not differ from any other insecure group. Because Black/African American mothers were more likely than mothers in other racial groups to be classified insecure, I tested whether they differed from non-Black mothers on AAI coherence. In line with the results using the classifications, Black/African American mothers had significantly lower AAI coherence scores ( $M = 3.77$ ,  $SD = 1.73$ ) than the remaining mothers ( $M = 4.95$ ,  $SD = 1.85$ ),  $t(81) = -2.98$ ,  $p < .01$ . Lastly, the mean for the adult security scale was 2.5 ( $SD = 1.4$ ) and Black/African American mothers did not differ from the other mothers on this scale.

*Infant attachment.* All 84 infants were observed in the Strange Situation (for the distribution of classifications, see Table 2). Of these infants, 42 infants (50%) were classified as secure and 42 (50%) were classified as insecure (including 12 infants who were classified as disorganized and 3 who were insecure-unclassifiable). Of the 12 disorganized and 3 unclassifiable infants, 5 had underlying classifications of secure, 5

avoidant, and 5 ambivalent. The sample distribution for all infants was consistent with meta-analytic findings from community samples,  $\chi^2(3) = 6.14$ .  $p > .05$  (Chi-square goodness of fit test comparing the observed distribution from expected based on van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999), as was the distribution for Black/African American infants and for the remaining infants. The sample mean for the infant security scale was 2.7 ( $SD = 1.55$ ; range = 0 – 5) and Black/African American infants did not differ from the remaining infants on this scale.

*Maternal mind-mindedness.* Data were available for 68 infant-mother dyads who participated in the face-to-face laboratory task (data are missing due to audio malfunctions, mothers speaking a language other than English, and infant distress). On average, the proportion of mind-related comments to total comments during this task was .07 ( $SD = .06$ ; range = 0 – .24), which means that, on average, 7% of maternal comments during the face-to-face session were mind-related. The mean proportion of *appropriate* comments (i.e., appropriate mind-related comments over total) was .04 ( $SD = .04$ ), and of *inappropriate* comments was .03 ( $SD = .04$ ).

For the free-play, data were available for 75 infant-mother dyads who participated in the free-play session (data are missing due to audio malfunctions and mothers speaking a language other than English). The mean proportion of mind-related comments to total comments during this task was .11 ( $SD = .08$ ; range = 0 – .40), which means that 11% of maternal comments during the free-play were mind-related. The mean proportion of *appropriate* comments was .07 ( $SD = .06$ ), and of *inappropriate* comments was .04 ( $SD = .04$ ).

Combined across tasks ( $n = 67$ ), the mean overall proportion of mind-related comments was .09 (i.e., 9% of all observed maternal comments were mind-related);  $SD = .05$ ; range = 0 - .21); the mean overall proportion of *appropriate* comments was .06 ( $SD = .04$ ). The mean proportion of appropriate comments in this study was significantly lower than the mean in the study by Meins et al. (2001;  $M = .09$ ,  $SD = .05$ ),  $t(130) = 3.36$ ,  $p < .001$ . The mean overall proportion of *inappropriate* comments was .03,  $SD = .03$ . Subsequent analyses were conducted using the scores that were combined across tasks.

*Infant irritability.* Data from the NBAS were available from all 84 infants. Of these infants, 38% ( $n = 32$ ) had irritability scores at or above 6 on both administrations of the test, and therefore, are referred to as high-irritable. The remaining infants, 62% ( $n = 52$ ) had scores below 6 on one or both tests and are referred to as less-irritable.

*Infant sex.* Infant sex was not significantly related to infant attachment classifications using any of the categorization schemes (four-way,  $p = .29$ ; three-way,  $p = .73$ ; two-way,  $p = .08$ ) or to maternal mind-mindedness; as such, I did not control for infant sex in any analyses<sup>2</sup>.

*Maternal education and age.* Mothers' education and age were not related to infant attachment or to maternal mind-mindedness; thus, I did not control for either variable in any analyses.

#### *Tests of the Paths of the Proposed Mediated Model*

*Concordance between maternal attachment and infant attachment (path c).* I ran two separate types of analyses to examine concordance between maternal attachment and infant attachment. First, I used the categorical variables to test whether there was a

significant association between the AAI and SS classifications using a Chi-Square cross-tabulation. Following van IJzendoorn (1995), I analyzed these concordance patterns at the four, three, and two-way classifications schemes. The four-way classification forces cannot classify mothers into the unresolved category, and unclassifiable infants into the disorganized category. The three-way system allows for the test of concordance at the level of a person's underlying strategy; cannot classify and unresolved mothers, as well as unclassifiable or disorganized infants, are classified according to their underlying strategy. For example, although a mother may be unresolved due to loss or trauma, her underlying pattern of attachment may be characterized by one of the organized patterns. Lastly, the two-way classification represents people as secure or insecure, with cannot classify, unresolved, disorganized, and unclassifiable patterns under the insecure category.

There were no significant relations between maternal attachment and infant attachment at the four-, three-, or two-way classification schemes. The concordance rate for maternal attachment and infant attachment using the four-way classifications was 26% ( $p = .72$ ; see Table 3), using the three-way classifications was 33.3% ( $p = .22$ ), and the two-way concordance was 52% ( $p = .70$ ). As Table 3 shows, 44.4% of dismissing mothers had secure infants, 53.6% of secure mothers had secure infants, 50% of preoccupied mothers had secure infants, and 61.5% of unresolved mothers had secure infants.

Second, I examined concordance between maternal and infant attachment using alternative continuous variables to maximize statistical power. Using coherence on the AAI, I conducted a one-way ANOVA to test for infant attachment group differences.

There were no significant differences among any of the infant attachment groups. Then, using maternal coherence and the infant security scale, I conducted a linear regression to test whether coherence was linked to infant security. The regression produced an  $R^2$  of .009,  $F(1,79) = .71, p = .40$ . Lastly, I regressed the infant security scale onto the parallel adult security scale, which produced an  $R^2$  of .017,  $F(1,79) = 1.329, p = .25$ . Controlling for infant sex, race, and/or education in any combination of these variables did not yield significant results for concordance.

I conducted further analyses to probe the discordant finding with the categorical variables. Given that infant sex was marginally related to infant attachment, I re-ran the concordance analysis controlling for infant sex and the chi-squares were not significant. Next, I ran the concordance analysis controlling for maternal race, which did not yield significant concordance in any racial group or in the Black/African American or remaining mothers. Controlling for infant sex, race, and/or education in any combination of these variables did not yield significant results for concordance.

*Maternal attachment and maternal mind-mindedness (path a).* First, I established that mothers did not differ in how much they said (i.e., the total number of comments) as a function of their adult attachment status (Table 4),  $F(3,64) = .863, p > .05$ . Then, to test whether maternal mind-mindedness varies as a function of maternal attachment, I conducted one-way ANOVAs using the two-way, three-way, and four-way classification systems. Because the distributions of scores on both overall appropriate comments and overall inappropriate comments were positively skewed, these variables were log transformed to satisfy the assumption of normality for the ANOVAs. Results of the ANOVAs indicated no significant group differences in rates of maternal mind-

mindfulness as a function of maternal attachment classification<sup>3,4</sup>. Additionally, no planned comparisons between groups revealed significant differences. Similarly, coherence was not related to any maternal mind-mindedness variable (correlations ranged from .05 - .11). I also conducted these same analyses for each mother-infant task separately and there were no significant findings within either the face-to-face session or free play sessions separately.

*Maternal mind-mindedness and infant attachment (path b).* First, I established that mothers did not differ in how much they said (i.e., the total number of comments) as a function of their infants' attachment status (Table 4),  $F(3,65) = .825, p > .05$ . Next, to test whether maternal mind-mindedness varies as a function of infant attachment, I conducted one-way ANOVAs using the four-way, three-way (disorganized infants forced into their underlying category), and two-way attachment classification systems. Again, the mind-mindedness variables were log transformed to remedy the non-normality. None of the omnibus tests for any of the ANOVAs indicated significant infant attachment group differences in rates of overall *appropriate* comments or overall *inappropriate* comments as a function of infant attachment classification<sup>3,4</sup>. I also conducted these same analyses for each mother-infant task separately and there were no significant findings within either the face-to-face session or free play sessions separately.

Because Meins et al. (2001) explored differences in mind-mindedness among only the three organized attachment patterns, I conducted t-tests to determine whether any infant attachment group differed significantly from any other attachment group. These tests indicated that mothers of secure infants had significantly greater proportions of overall appropriate comments ( $M = .07, SD = .05$ ) than mothers of ambivalent infants

( $M = .03$ ,  $SD = .02$ ),  $t(39) = 2.22$ ,  $p = .03$  (Figure 3). There were no significant differences between avoidant and secure, or avoidant and ambivalent infants (or any comparisons that included disorganized infants). Additionally, paired-samples t-tests indicated that mothers of ambivalent infants were the only mothers whose overall *appropriate* comments and overall *inappropriate* comments were not significantly different from each other, whereas mothers of avoidant, secure, and disorganized infants had significantly greater proportions of overall *appropriate* comments than overall *inappropriate* comments (Table 4). I also conducted these same analyses for each mother-infant task separately and there were no significant findings within either the face-to-face or free play sessions separately.

#### *Tests of the Proposed Model of Moderated Mediation*

Given that maternal attachment was not linked to either infant attachment (path c) or maternal mind-mindedness (path a; i.e., the prerequisite steps to test for mediation as laid out by Baron and Kenny [1986] were not significant), I did not run any tests for mediation. Thus, the proposed mediated model was not supported.

I also hypothesized that infant irritability would moderate the link between maternal mind-mindedness and infant attachment. Infant irritability was not related to appropriate comments, inappropriate comments, or infant attachment. The interactions between infant irritability and the mind-mindedness variables did not reach significance in the prediction of infant attachment at any level of classification.

## Chapter 4: Discussion

The purpose of this study was to test (a) whether maternal mind-mindedness mediates the link between adult attachment and infant attachment in mother-infant dyads, and (b) whether infant irritability moderates the mediational model. The mediated model was not supported because maternal attachment and infant attachment were not concordant and because maternal attachment did not predict maternal mind-mindedness. Additionally, moderation was not supported because infant irritability did not moderate the link between maternal mind-mindedness and infant attachment.

This section is organized in six sections. First, I discuss the low concordance between maternal attachment and infant attachment and possible reasons for this finding. Next, I discuss possible reasons why maternal attachment was not linked to maternal mind-mindedness. Third, I discuss how maternal mind-mindedness was related to infant attachment. Fourth, I discuss the findings related to infant irritability. Fifth, I explain the strengths and limitations of the present study. I conclude with implications of the findings and directions for future research.

### *The Link between Maternal Attachment and Infant Attachment*

The observed low concordance between maternal attachment and infant attachment was unexpected given the robust meta-analytic findings for concordance in community samples (van IJzendoorn, 1995). This sample, however, cannot be considered a non-selected community sample because mothers were selected to be economically-stressed and to have irritable infants, which resulted in a sample that was predominately minority. The low concordance in this study should not be viewed as a failure to replicate because very few studies have tested whether attachment patterns are concordant in

minority samples. A recent literature search in PSYCinfo yielded 75 studies for “adult attachment interview” AND “strange situation<sup>5</sup>.” Only one sample tested concordance in a predominately minority sample and the data were taken from a larger study of teenage mothers (Levine, Tuber, Slade, & Ward, 1991; Ward & Carlson, 1995). Seventy-six percent of the adolescent mothers were African-American and the majority of the sample was economically disadvantaged. The concordance in this sample was high; 68% of the cases were concordant in the four-way classifications. An unpublished study with a minority sample was identified from van IJzendoorn’s (1995) meta-analysis. The results from this low-SES sample of approximately half Caucasian, half African-American mothers demonstrated low concordance (Kolar, Vondra, Friday, & Valley, 1993). Given the fact that the two samples that have investigated attachment concordance between mothers and infants in minority samples have mixed results, the findings of this study cannot be said to contradict a converging set of findings in the field. More studies are needed to determine whether and how attachment patterns are transmitted from mother to child in minority samples.

There were, however, systematic patterns of discordance between mothers and infants in the four-way classification. Preoccupied mothers did not have resistant infants, most unresolved mothers did not have disorganized infants, and most dismissing mothers had secure infants. The discordance between preoccupied mothers and ambivalent infants may be attributed to the fact that these attachment categories had very few cases. Because no study obtains perfect concordance between maternal attachment and infant attachment (e.g., the meta-analysis demonstrated that 63% of dyads are concordant for the four patterns, which results in a 37% rate of discordance; van IJzendoorn, 1995), it is not

meaningful to interpret the disjoint between preoccupied mothers ( $n = 4$ ) and ambivalent infants ( $n = 12$ ). The discordance observed for unresolved and dismissing mothers, however, deserves attention, and each group is discussed below.

*The discordance between unresolved mothers and disorganized infants.* The finding that only 1 of the 15 disorganized infants in the four-way classification had unresolved mothers and that most had dismissing mothers is consistent with previous research. For instance, van IJzendoorn et al. (1999) found that in low-SES samples, insensitive parenting without any fearful or frightening displays was sufficient to elicit the disorganized pattern in infants. Bernier and Meins (2008) have argued that harsh environmental circumstances may lower the threshold of disorganization in infants. Given the demographics of this sample, it seems likely that any insensitivity on the part of the dismissing mothers could have led to the disorganization of infant attachment.

*The discordance between dismissing mothers and avoidant infants.* The adult dismissing pattern was the most prevalent in this sample, with almost half of the mothers represented by that pattern. As such, according to attachment theory and meta-analytic findings supporting attachment concordance between mothers and infants (van IJzendoorn, 1995), approximately half of the infants should have been classified as avoidant, but this was not the case. In fact, the distribution of infant attachment classifications was similar to that observed in community samples (van IJzendoorn et al., 1999). The fact that most mothers in this sample were dismissing is consistent with some findings in the adult attachment literature. Primarily, van IJzendoorn and Bakermans-Kranenburg's (1996) meta-analysis of over 2,000 AAIs found that the dismissing pattern was overrepresented in very low-SES populations. Although this sample is not very low-

SES, the mothers are economically-stressed, and therefore, the dismissing pattern may be overrepresented in these mothers as well. Furthermore, studies have shown that race/ethnicity is related to adult attachment in both the AAI and self-report measures (although, it is important to note that none of these studies examined race while controlling for SES, so it is unclear whether distributions are related more to race or SES). In a study of predominately African-American adolescent mothers (Ward & Carlson, 1995), the percentage of dismissing mothers (35%; the most common group) was significantly different from that expected based on meta-analytic findings of community samples (21%; van IJzendoorn & Bakermans-Kranenburg, 2006). Also, Allen and colleagues (Allen, Porter, McFarland, McElhaney, & Marsh, 2007) found that the racial/ethnic minority status of adolescents (most of whom were African-American) was associated with lower security scores from the AAI Q-set. Additionally, in a sample of low income, African-American mothers who were all above 18 years of age, Teti, Killeen, Candelaria, Miller, Hess, & O'Connell (2008) found a higher percentage of dismissing adults (32.3%) than would be expected based on meta-analytic community findings. Unlike the study by Ward & Carlson (with 29.7% autonomous), Teti et al. found that the autonomous classification was the most common (45%). These are the only studies that address adult attachment with the AAI in racial/ethnic minority groups, specifically African-American samples. For self-report measures, studies indicate that dismissing/avoidant scores are highest among Black/African-American adults (e.g., Lopez, Melendez, & Rice, 2000; Mickelson, Kessler, & Shaver, 1997; Montague, Magai, Consedine, & Gillespie, 2003; Wei, Russell, Mallinckrodt, & Zakalik, 2004). Given that the sample of the present study is economically stressed and predominately minority

(specifically Black/African-American), the overrepresentation of the dismissing strategy is consistent with the extant literature. Yet the dismissing mothers in this sample did not have insecure-avoidant infants.

Three possible reasons exist for why dismissing mothers and avoidant infants may have been discordant in their attachment patterns. First, the mothers may not actually have a dismissing state of mind. It is possible that the mothers appeared dismissing during the interview because they were not comfortable sharing details of their childhood experiences with the interviewer. For example, Lopez et al. (2000) discussed how experiences with prejudice and discrimination can lead to cultural mistrust of out-group members (see also Terrell, Terrell, & Taylor, 1981). The characteristics of this sample would suggest that the AAI interviewers, who were European-American, educated researchers, were out-group members for these mothers. Given the large body of research that converges on the strong validity of the Adult Attachment Interview (see Hesse, 2008), this explanation, although quite parsimonious, may not explain the extent to which the dismissing pattern was overrepresented.

A second and perhaps more plausible explanation is that the mothers do in fact have dismissing representations of their own attachment-related experiences, but they are able to represent their experiences as a caregiver differently. In explaining their meta-analytic findings for the overrepresentation of the dismissing pattern in low-SES samples, van IJzendoorn and Bakermans-Kranenburg (1996) speculated that reflection on attachment experiences might be a low priority for mothers experiencing harsh socio-economic circumstances. Thus, although reflection on her own experiences is a low priority, this in no way implies that her relationship with her own infant is a low priority.

The discordance observed in the present study, as well as the finding that adult attachment was not related to maternal mind-mindedness would support the claim that economically-stressed mothers' own attachment representations are a low priority, but the parent-child relationship is not a low priority.

Third, and perhaps equally likely is that the way in which attachment is transmitted from mother to infant may differ for mothers in this sample compared to mothers of community samples. The infants may be able to understand and “forgive” insensitive parenting if the culture or environment shifts the emphasis onto other features of the parenting relationship. This reasoning parallels research on parenting styles in older children. For example, harsh parenting (e.g., authoritarian parenting style and physical punishment) is associated with negative child outcomes for European-American, but not African-American children (Baumrind, 1972; Lamborn, Dornbusch, & Steinberg, 1996; Deater-Deckard, Dodge, Bates, & Pettit, 1996). Similar cultural mechanisms may exist in infancy when forming an attachment bond. For example, a mother who works long hours with little pay and lives in a dangerous neighborhood may need to parent differently from a mother in a stable environment in order to protect her infant. Polan and Hofer (2008) recently described features of the mother-infant relationship in non-human animal models that would be difficult to observe and measure in humans (e.g., warmth and tactile stimulation), but may contribute to the development of secure attachment. Thus, although a mother may not appear sensitive or mind-minded in the traditional sense, her infant can still feel secure and calmed by her presence, especially if these “hidden regulators” operate in humans as they do in other animals. Cassidy (2009)

recently discussed the notion of hidden regulators and how future research should consider alternate contributors to secure attachment.

#### *The Link between Maternal Attachment and Maternal Mind-Mindedness*

As mentioned above, maternal attachment was not related to maternal mind-mindedness. This is a failure to replicate the preliminary findings of Arnott and Meins (2007) who showed that the autonomous classification and reflective function (RF) coded from AAI transcripts was related with greater mind-mindedness. RF is defined as a person's ability to reflect on the mental states or intentions governing their own and others' behavior (Fonagy et al., 1991; Slade, 2005) and because the construct closely parallels that of mind-mindedness, it is not surprising that they found such a link. In fact, some have argued that RF and mind-mindedness are governed by the same neurobiological socio-cognitive system (Sharp & Fonagy, 2008). Because there was low concordance between adult attachment and infant attachment, the null result for AAI classifications should be interpreted with caution. The predicted link between maternal attachment and mind-mindedness may have failed to reach significance for many of the same reasons discussed above to explain the discordance. For instance, the attachment patterns coded from the AAI may not predictably relate to differences in parenting if the mothers are not in fact dismissing, or if they are able separate their own attachment-related experiences from those with their infant.

#### *The Link between Maternal Mind-Mindedness and Infant Attachment*

Although the data did not support a link between maternal mind-mindedness and infant attachment, findings did emerge related to maternal mind-mindedness and the ambivalent pattern in infants. Consistent with Meins et al. (2001), mothers of ambivalent

infants had lower scores on appropriate mind-mindedness than mothers of secure infants; however, Meins et al. also found significant differences for mothers of avoidant infants compared to both secure- and ambivalent-group mothers, which I did not.

There are three reasons why the findings from this sample may not parallel those of Meins's study. First, the positive nature of the tasks from which MM was coded may have allowed mothers to be more appropriately MM than they would be in more stressful situations. For example, mothers of avoidant infants may evidence a lack of appropriate MM more strongly when their infants show distress.

Second, the interactions that were coded for the present study were slightly different from those that Meins et al. (2001) used. For the present study, MM was summed across a 10-minute free-play session and a 4-minute face-to-face interaction at infant age 5-months, whereas Meins et al. used a 20-minute free-play session at 6-months. Perhaps observing interactions for a longer period of time, and without interruption, would have been more useful for assessing differences in mind-mindedness. Or perhaps the slightly younger age of the infants in this study had an effect. Mothers might become more mind-mindedness as their infants become more competent or mothers may become better at labeling their infants' mental states appropriately as the relationship develops. Although Arnott and Meins (2008) showed continuity from parents' predictions about their infant during pregnancy to their observed MM at 6-months, there are no published data tracking parental MM during interactions with infants over time. Therefore, though MM may be stable over time – that is, mothers who are high at one time-point are high at another – mothers may have different mean levels

as their children develop. Thus, at varying ages, the differences across infant attachment groups may be more or less apparent.

Third, the fact that maternal attachment and infant attachment were not concordant may have contributed to the finding that mind-mindedness was related to infant attachment for ambivalent infants, and not avoidant infants. Previous research suggests that maternal attachment influences mind-mindedness, which in turn influences infant attachment. It is likely that the mothers and infants of Meins et al.'s (2001) study had concordant attachment patterns. Thus, when Meins et al. found differences in maternal mind-mindedness for the infant attachment patterns, it may have been because maternal mind-mindedness was caused by the mothers' attachment. In the present study, however, dismissing mothers are contributing to the mind-mindedness scores of the secure infants. If the hypothesis is true that dismissing mothers are less appropriately mind-minded than secure mothers, then the presence of dismissing mothers in the secure infant group may have served to reduce the secure group's mean on appropriate MM. As such, mean differences between secure infants and avoidant infants in this sample would be more difficult to detect. For ambivalent infants, on the other hand, most of their mothers were insecure; therefore, the low scores on appropriate mind-mindedness for the ambivalent group are expected due to the presence of insecure mothers in that group.

This study adds to the literature by including *inappropriate* mind-related comments. Unexpectedly, the proportion of *inappropriate* comments did not vary across infant attachment group. There were, however, unpredicted and interesting patterns within groups. The finding that all mothers except the ambivalent-group mothers used more *appropriate* comments than *inappropriate* comments supports the notion that

mothers of ambivalent infants respond inconsistently to their infants' signals (Ainsworth, 1984). These data suggest that mothers of ambivalent infants are unpredictable in how they interpret their infants' mental states, whereas mothers of the other groups were more consistent, as they were more often *appropriate* than *inappropriate*.

#### *Infant Irritability as a Moderator*

This was the first study to determine whether infant irritability moderates attachment transmission or the link between maternal mind-mindedness and infant attachment. As expected, infant irritability was not related to maternal mind-mindedness or to infant attachment directly, suggesting that infant characteristics do not elicit maternal mind-mindedness or infant attachment differences. Unexpectedly, irritability did not moderate the link between mind-mindedness and infant attachment. There are three reasons why infant irritability may not have acted as a moderator.

First, there were relatively few irritable infants within each attachment group. Thus, power may have been an issue in detecting any effects.

Second, the fact that infant irritability was measured within the first month of life may have played a role. This measure of neonatal irritability may reflect how well the infant is adapting to life after being born (Brazelton, 1984) and may play little role in the later months of infant development. If this was the case, then irritability of newborns may not influence how mind-mindedness contributes to infant attachment in the same way as temperament would in later months.

Lastly, it may be that maternal mind-mindedness influences infant attachment independent of infant temperament. If mind-mindedness is a trait of the mother, then her infants' temperament would not affect her level of appropriate comments or inappropriate

comments. In fact, Meins (2009) has shown that mothers who describe their children in mentalistic ways are also those who describe their romantic partner with mentalistic terms. These data support the notion that mind-mindedness is a maternal trait. Research has shown, however, that aspects of parenting are more strongly related to child outcomes for irritable infants than for non-irritable infants (i.e., irritable infants are more susceptible to rearing influences; e.g., Belsky, 2005; Klein Velderman et al., 2006). These data suggest that maternal mind-mindedness influences attachment formation uniformly across infants of varying levels of temperament.

### *Study Strengths and Limitations*

This study had many strengths. First, I used what are considered to be the gold-standard measures of attachment for both adults (the Adult Attachment Interview) and infants (the Strange Situation). The AAI is the measure of adult attachment that is the best predictor of infant attachment and does not suffer from the disadvantages of self-report measures. In fact, research has shown that the AAI and self-report measures are only somewhat related (Roisman, Holland, Fortuna, Fraley, Clausell, & Clarke, 2007). Also, I used the Strange Situation procedure with the categorical coding scheme as opposed to maternal Q-sort reports of infant attachment. By doing so, I can eliminate any bias on the part of the mother that is present in other research. Most importantly, the low attachment concordance cannot be attributed to poor assessments of these constructs. Second, trained researchers coded observed infant and mother behavior for the remaining constructs. Maternal mind-mindedness was coded from on-line mother-infant interactions, not an interview, and infant irritability was measured using a standardized procedure to assess newborns' behavior. Another strength of this study is the longitudinal

design. Maternal attachment and mind-mindedness were measured before the formation of infant attachment. As such, the relation between mind-mindedness and infant attachment cannot be explained as a result of having a securely attached infant, but rather, a predictor.

There are also important limitations to consider when interpreting these data. The data are correlational; therefore, causal conclusions are not possible. Also, the sample size is rather small; eighty-one dyads had both maternal attachment and infant attachment codes. For maternal mind-mindedness, 17 dyads had missing data, resulting in 67 dyads in the test of the link between maternal mind-mindedness and infant attachment (path b). Lastly, many mothers spoke languages other than English as a first language. Although they were asked to speak English during the tasks, many did not and for those who did use English, they may have been less mind-minded because they were less fluent in their second language.

#### *Implications and Future Directions*

Although the results failed to support a moderated mediational model of attachment transmission through maternal-mindedness, the findings add to the current literature, indicating that maternal mind-mindedness can predict systematic differences in infant attachment for the ambivalent pattern, even in more diverse populations. Future research should continue to uncover how a “mother’s proclivity to treat her infant as an individual with a mind (Meins et al., 2001, p. 638)” may contribute to both her parenting behaviors (e.g., Laranjo et al., 2008) and her infant’s socio-emotional development. Specifically, it may be interesting to break down types of inappropriate comments into finer distinctions that could have different consequences for child development (e.g., if a

mother corrects a previous inappropriate comment or not, developmentally inappropriate comments, and inappropriate comments that may be pathological, such as saying an infant likes an object that is frightening him). Attachment-based interventions that focus on changing maternal sensitivity may also benefit from specifically addressing mothers' perceptions of infant mental states, and how those mental states drive infant behavior.

Additionally, future research should continue to examine how adult attachment is related to infant attachment in minority, lower-SES samples. This is only the third sample in which participants were predominately minority to report on attachment concordance. Including the present study, there are now 2 samples with findings of low concordance and 1 with high concordance. Attachment researchers should attend to these mixed findings. More investigation is needed to determine whether these findings challenge or add to attachment theory. Attachment researchers can ask, for example, are these mothers parenting in accord with their representations? Or, are they parenting in accord with their representations, but the influence on the child is different? These findings may not challenge the theory, but they may challenge how the field has conceptualized and measured aspects of parenting. In conclusion, the observed low concordance should not be considered a failure to replicate and should not be ignored as an accidental finding.

## Appendix A



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April 10, 2008

### MEMORANDUM

*Application Approval Notification*

To: Dr. Jude Cassidy  
Katie Babcock  
Laura Jernigan  
Brandi Stupica  
Sarah Halcrow  
Heidi Butler  
Fatima Ramos-Marcuse  
Yair Ziv  
Susan Woodhouse  
Matthew Dykas  
Department of Psychology

From: Roslyn Edson, M.S., CIP *RB for Roslyn Edson*  
IRB Manager  
University of Maryland, College Park

Re: IRB Application Number: # 00556  
Project Title: "At-Risk Irritable Infants"

Approval Date: April 9, 2008

Expiration Date: April 9, 2009

Type of Application: Renewal

Type of Research: Nonexempt

Type of Review  
For Application: Expedited

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The University of Maryland, College Park Institutional Review Board (IRB) approved your IRB application. The research was approved in accordance with 45 CFR 46, the Federal Policy for the Protection of Human Subjects, and the University's IRB policies and procedures. Please reference the above-cited IRB application number in any future communications with our office regarding this research.

**Recruitment/Consent:** For research requiring written informed consent, the IRB-approved and stamped informed consent document is enclosed. The IRB approval expiration date has been stamped on the informed consent document. Please keep copies of the consent forms used for this research for three years after the completion of the research.

**Continuing Review:** If you intend to continue to collect data from human subjects or to analyze private, identifiable data collected from human subjects, after the expiration date for this approval (indicated above), you must submit a renewal application to the IRB Office at least 30 days before the approval expiration date.

**Modifications:** Any changes to the approved protocol must be approved by the IRB before the change is implemented, except when a change is necessary to eliminate apparent immediate hazards to the subjects. If you would like to modify the approved protocol, please submit an addendum request to the IRB Office. The instructions for submitting a request are posted on the IRB web site at:  
[http://www.umresearch.umd.edu/irb/irb\\_Addendum%20Protocol.htm](http://www.umresearch.umd.edu/irb/irb_Addendum%20Protocol.htm).

**Unanticipated Problems Involving Risks:** You must promptly report any unanticipated problems involving risks to subjects or others to the IRB Manager at 301-405-0678 or  
[redson@umresearch.umd.edu](mailto:redson@umresearch.umd.edu).

**Student Researchers:** Unless otherwise requested, this IRB approval document was sent to the Principal Investigator (PI). The PI should pass on the approval document or a copy to the student researchers. This IRB approval document may be a requirement for student researchers applying for graduation. The IRB may not be able to provide copies of the approval documents if several years have passed since the date of the original approval.

**Additional Information:** Please contact the IRB Office at 301-405-4212 if you have any IRB-related questions or concerns.

Appendix B

ID: \_\_\_\_\_

DEMON

1. Involved in romantic relationship?  
 Single (not involved in a steady relationship)  
 Never Married       Separated       Divorced  
 Married  
 Engaged to be married  
 Steady Dating Relationship (but not married)
2. (If not single) Living with romantic partner?
3. (If not single) Relationship length: \_\_\_\_\_
4. Husband's Name or Romantic Partner's Initials: \_\_\_\_\_
5. (If not married) Is this the baby's father?  Yes       No
6. Your age: \_\_\_\_\_ DOB \_\_\_\_\_
7. Your husband's/romantic partner's age: \_\_\_\_\_
8. Your race:
9. Your husband's/romantic partner's race: \_\_\_\_\_
10. Your education: \_\_\_\_\_
11. Your husband's/romantic partner's education: \_\_\_\_\_
12. Your occupation: \_\_\_\_\_
13. Your husband's/romantic partner's education: \_\_\_\_\_
14. Joint Family Income (Use chart & report range): \_\_\_\_\_
15. Who lives with you?  

Relationship to Mother	Age
_____	_____
_____	_____
_____	_____
16. Did you attend any parent education classes?  Yes       No

## Appendix C

### ADULT ATTACHMENT INTERVIEW – Infant Study

5/29/03

#### Microphones on

I'm going to be interviewing you about your childhood experiences, and how those experiences may have affected your current personality. So, I'd like to ask you about your early relationship with your family, and what you think about the way it might have affected you. We'll focus mainly on your childhood, but later we'll get on to your adolescence and what's going on right now. This interview often takes about an hour, but it could be anywhere between 45 minutes and an hour and a half.

1. First I need to ask you some basic information about your early family situation. If you could tell me where you were born, where you lived, whether you moved around much, and what your family did at various times for a living? I just need to get a feel for your family background before I ask you more about your childhood experiences.
  - a. Did you see much of your grandparents when you were little? {if needed All 4 of them?}
    1. {if some grandparents were never met} Did these grandparents die before you were born?
    2. {If yes} Your [mother's father] died before you were born? How old was [she] at the time, do you know?
  - b. Did you have brothers and sisters living in the house, or anybody besides your parents?
    1. {Optional, use only if need more warm up questions. Usually omit... Are they living nearby now or do they live elsewhere?}
  - c. (Optional. Only if not talking) Are your parents still together?
2. I'd like you to try to describe your relationship with your parents as a young child – if you could start from as far back as you can remember?
3. Now I'd like to ask you to choose five adjectives or words that reflect your childhood relationship with your mother starting from as far back as you can remember in early childhood – as early as you can go, but say, age 5 to 12 is fine. I know this may take a bit of time, so go ahead and think for a minute – then I'd like to ask you why you chose them. I'll write each one down as you give them to me.
  - a. Okay, now let me go through some more questions about your description of your childhood relationship with your mother. You say your relationship with her was (you used the phrase) \_\_\_\_\_. Can you tell me a memory or an incident from early childhood that comes to mind from age 5-12 with respect to (word) \_\_\_\_\_?

OR

You described your childhood relationship with your mother as (or “your second adjective was,” or “the second word you used was”) \_\_\_\_\_. Can you think of a memory or an incident from early childhood that would illustrate why you chose \_\_\_\_\_ to describe the relationship?

(For the first adjective that the subject cannot give a specific memory ask 2 probes: can you give me a specific time? For every time after that OR if subject can give a specific memory after the first probe, then only ask one probe: can you give me a specific time?)

4. {Repeat for Father} Now I'd like to ask you to choose five adjectives or words that reflect your childhood relationship with your father starting from as far back as you can remember in early childhood – as early as you can go, but say, age 5 to 12 is fine. I know this may take a bit of time, so go ahead and think for a minute – then I'd like to ask you why you chose them. I'll write each one down as you give them to me.
- a. Okay, now let me go through some more questions about your description of your childhood relationship with your father. You say your relationship with him was (you used the phrase) \_\_\_\_\_. Can you tell me a memory or an incident from early childhood that comes to mind with respect to (word) \_\_\_\_\_?

OR

You described your childhood relationship with your father as (or “your second adjective was,” or “the second word you used was”) \_\_\_\_\_. Can you think of a memory or an incident from early childhood that would illustrate why you chose \_\_\_\_\_ to describe the relationship?

5. Now I wonder if you could tell me, to which parent did you feel the closest, and why?
- a. Why wasn't there this feeling with the other parent?

{Check time}

6. When you were upset as a child, what would you do?
- a. When you were upset emotionally when you were little, what would you do?
1. Can you think of a specific time that happened? (get age and how parents responded)
- b. Can you remember what would happen when you were hurt, physically?
1. Again, do any specific incidents (or, do any other incidents) come to mind? (get age and how parents responded)
- c. Were you ever ill when you were little? (get age and how parents responded)

- 1a. Do you remember what would happen?
  - 1b. Do you remember a specific time?
  - d. {if needed} I was wondering do you remember being held by either of your parents on any of those times – I mean, when you were upset, or hurt, or ill?
  - e. {if only one parent mentioned} I was just wondering if your Dad/Mom was involved when you were upset, hurt, or ill?
7. What is the first time you remember being separated from your parents? {Whatever you think of as your first separation. Whatever comes to mind.}
- a. How did you respond?
  - b. Do you remember how your parents responded?
  - c. Are there any other separations that stand out in your mind?
8. Did you ever feel rejected (by your parents) as a young child? Of course, looking back on it now, you may realize it wasn't really rejection, but what I'm trying to ask about here is whether you remember ever having felt rejected in childhood.
- a. How old were you when you first felt this way, and what did you do?
  - b. Why do you think your parent did those things – do you think he/she realized he/she was rejecting you? (if ignored – leave off last part)
  - c. {if needed} Did you ever feel pushed away or ignored?
- 8a. Were you ever frightened or worried as a child?
- 1. Can you think of a specific time? (get age)
  - 2. How did your parents respond?
9. Were your parents ever threatening with you in any way – maybe for discipline, or even jokingly?
- Note: If type of abuse is unclear, say Sometimes people experience physical, sexual, or verbal abuse, which category (ies) are you talking about?
- If verbal abuse follow up with, tell me more about that? Do not probe further for verbal abuse unless the interviewee says anything about parent threatening to kill the child. If the parent does threaten to kill the child, follow up with the three standard probes listed in 9b.
- If physical abuse, follow up with standard probes, (where on the body, were there any marks and if meet our criteria for abuse follow up with the three standard probes listed in 9b).
- If sexual abuse, ask the three standard probes listed in 9b.
- a. Some people have told us for example that their parents would threaten to leave them or send them away from home.
  - b. Some people have memories of threats or some kind of behavior that was abusive. Did anything like this ever happen to you, or in your family?
    - 1. How old were you at the time?
    - 2. Did it happen frequently?
    - 3. Do you feel this experience affects you now?
  - c. Did you have any such experiences involving threats or abuse involving people outside your family?

10. In general, how do you think your overall experiences with your parents have affected your current personality?
- a. Are there any aspects to your early experiences that you feel were a set-back in your development?
 

{If yes} Are there any other aspects of your early experiences that you think may have held your development back, or had a negative effect on the way you turned out?

{If no} Is there anything about your early experiences that you think might have held your development back , or had a negative effect on the way you turned out?
11. Why do you think your parents behaved as they did during your childhood?
12. Were there any other adults with whom you were close, like parents, as a child?
- a. Or any other adults who were especially important to you, even though not parental?
13. Did you experience the loss of a (parent or) other close loved one while you were a young child – for example, a sibling, or close family member? (Find out all people first for 13, 13a, & 13b. Ask r.e. closeness and interviewee’s age at time of other’s deaths. For each death select deaths you will probe after getting full list. Ask all questions in order even if already mentioned answer).
- a. Could you tell me about the circumstances, (and how old were you at the time)?
  - b. How did you respond at the time?
  - c. Was this death sudden or was it expected?
  - d. Can you recall your feelings at that time?
  - e. Have your feelings regarding this death changed much over time?
  - f. Did you attend the funeral
  - g. {If attended funeral} What was this like for you
  - h. {If loss of parent or sibling or child} What would you say was the effect on your (other parent) and on your household, and how did this change over the years? (only if loss in childhood)
  - i. Would you say this loss has had an effect on your current personality?
- 13a. Did you lose any other important persons during your childhood? (to death)  
{If yes, repeat probes}
- 13b. Have you lost any other close persons in adulthood? (to death) {If yes, repeat probes} {For teens: more recently?}

14. Did you ever have a miscarriage?  
If so:  
Some people don't look upon a miscarriage as a traumatic event, others experience it as the loss of a child. Therefore, I would like to ask you some questions about your miscarriage.
- a. How long ago did this happen to you?
  - b. How many weeks or months had you been pregnant? {Can you tell me the circumstances?}
  - c. Was your miscarriage sudden or somewhat expected?
  - d. Did you bid farewell in some way?
  - e. Have your feelings regarding this miscarriage changed much over time?
  - f. Would you say this experience has had an effect on your adult personality?
  - g. Does it affect your approach to (name child)?
15. Now I'd like to ask you a few more questions about your relationship with your parents. Were there many changes in your relationship with your parents (or remaining parent) after childhood? We'll get to the present in a moment, but right now I mean changes occurring roughly between your childhood and your adulthood?
16. Now I'd like to ask you, what is your relationship with your parents (or remaining parent) like for you now? Here I am asking about your current relationship.
- a. Do you have much contact with your parents at present?
  - b. {If needed} What would you say the relationship with your parents is like currently?
  - c. Could you tell me about any (or any other) sources of dissatisfaction in your current relationship with your parents?
  - d. Could you tell me about any (or any other) sources of special satisfaction?
17. How do you feel when you have to separate from your child?
18. Is there any particular thing which you feel you learned above all from your own childhood experiences?
19. What do you hope your child will learn from his/her experiences of being parented by you?

## Appendix D

### *Episodes of the Strange Situation*

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Episode	Duration	Description
1	1 minute	Parent and infant are introduced to the room.
2	3 minutes	Infant settles in, explores. Parent does not participate.
3	3 minutes	Stranger enters, plays with infant during final minute.
4	3 minutes	First separation: Parent exits room, leaves infant with stranger.
5	3 minutes	First reunion: Parent returns, stranger leaves quietly.
6	3 minutes	Second separation: Parent leaves infant alone in room.
7	3 minutes	Stranger enters, stays with infant, and interacts when necessary.
8	3 minutes	Second reunion: Parent returns, picks up infant, stranger leaves quietly.

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## Footnotes

<sup>1</sup> As a convention, this paper refers to caregivers as female and infants as male.

<sup>2</sup> Because infant sex was marginally related to infant attachment, I also conducted the analyses controlling for infant sex and analyses produced the same pattern of results.

<sup>3</sup> I also tested whether the attachment groups differed on the mean of number of appropriate comments and inappropriate comments (as opposed to proportions controlling for verbosity) and analyses produced the same pattern of results.

<sup>4</sup> There was a large range in the amount that mothers spoke (range: 20 – 315 comments). It is possible that I did not have the opportunity to observe whether mothers who spoke very little are mind-minded or not. It may be that had they spoken more, I would have seen them use mind-related comments. As such, I conducted the analyses a second time after excluding mothers in the lowest 10% of total comments. This corresponded to dropping 6 mothers who used fewer than 50 comments overall. The analyses produced the same pattern of results.

<sup>5</sup> I also searched (a) “adult attachment” AND “infant attachment,” (b) “attachment transmission,” (c) “transmission gap,” and (d) “attachment concordance.” These searches did not produce any additional studies.

Table 1

*Distribution of Maternal Attachment (AAI) Classifications*

Classification	<i>n</i>	%
Dismissing	36	44.4
Secure/Autonomous	28	34.6
Preoccupied	4	4.9
Unresolved	12	14.8
Cannot Classify	1	1.2
Total	81	100

Table 2

*Distribution of Infant Attachment (SS) Classifications*

Classification	<i>n</i>	%
Avoidant	14	16.7
Secure	42	50.0
Ambivalent	13	15.5
Disorganized	12	14.3
Unclassifiable	3	3.5
Total	84	100

Table 3

*Cross Tabulation of AAI and Strange Situation 4-Way Classifications*

Maternal Attachment	Infant Attachment				Total
	A	B	C	D	
Dismissing	5	16	7	8	36
Secure	5	15	4	4	28
Preoccupied	0	2	0	2	4
Unresolved	3	8	1	1	13
Total	13	41	12	15	81

*Note.* Cannot classify mothers were forced into the unresolved category, and unclassifiable infants into the D category. A: avoidant, B: secure, C: ambivalent, D: disorganized.

Table 4

*Means and standard deviations of total number of maternal comments as a function of adult attachment and infant attachment status*

	Adult Attachment Pattern				Infant Attachment Pattern			
	DS	F	E	U	A	B	C	D
<i>M</i>	118.7	129.77	115.25	151.91	133.92	133.62	98.13	122.07
<i>SD</i>	53.70	56.08	55.95	87.65	68.38	64.95	46.36	47.40

*Note:* DS: dismissing, F: secure, E: preoccupied, U: unresolved; A: avoidant, B: secure,

C: preoccupied, D: disorganized.

Table 5

*Differences between overall appropriate comments and overall inappropriate comments within each infant attachment group*

	Appropriate comments		Inappropriate comments		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Avoidant	.054	.039	.026	.046	12	2.22*
Secure	.065	.046	.040	.032	33	2.34*
Ambivalent	.027	.024	.026	.017	7	.15
Disorganized	.048	.029	.025	.025	10	2.55*

\*  $p < .05$

Figure 1

*Model of intergenerational transmission of attachment*

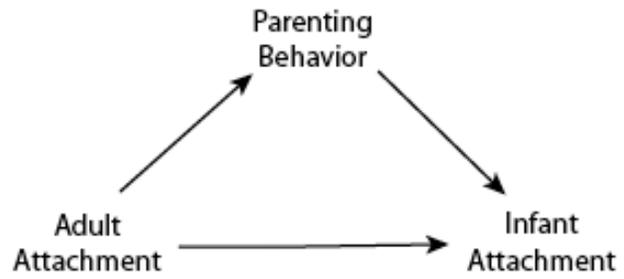


Figure 2

*Proposed model of intergenerational transmission of attachment*

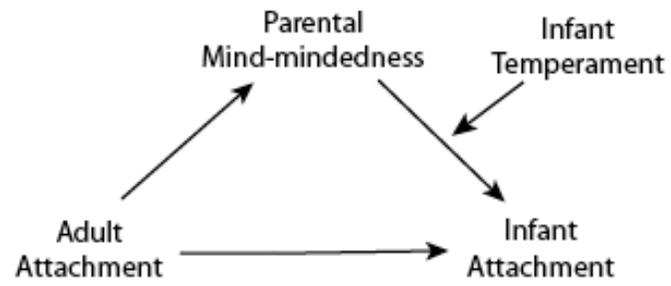
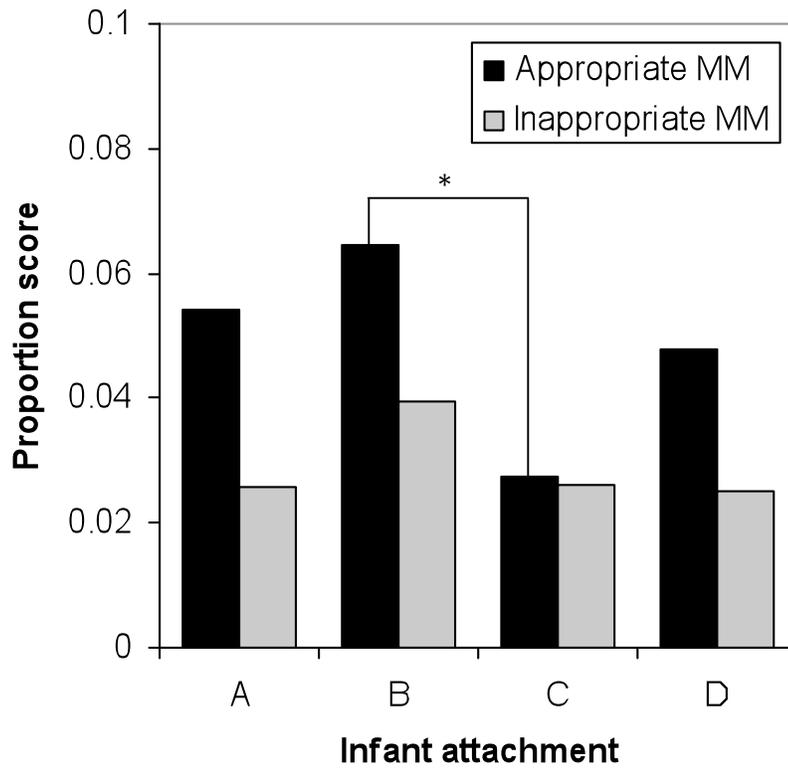


Figure 3

*Proportion of mind-minded comments over total as a function of infant attachment*

*(n = 67)*



*Note.* A: avoidant ( $n = 13$ ), B: secure ( $n = 33$ ), C: ambivalent ( $n = 8$ ), D: disorganized ( $n = 13$ ). MM: mind-mindedness

\*  $p < .05$

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