

## **Infant negative affect and maternal interactive behavior during the still-face procedure: the moderating role of adult attachment states of mind**

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### **Abstract:**

The current study examined associations between attachment state of mind measured prenatally (N = 259) and maternal behavior in the reunion episode of the still-face procedure when infants were six months of age both as a main effect and in conjunction with infant negative affect. Using a dimensional approach to adult attachment measurement, dismissing and preoccupied states of mind were negatively associated with maternal sensitivity, and each correlated with distinct parenting behaviors. Positive associations were found between dismissing states of mind and maternal monitoring and preoccupied states of mind and maternal withdraw. Maternal preoccupation moderated associations between infant negative affect and maternal intrusive, withdrawn, and monitoring behaviors, supporting the notion that maternal attachment influences parenting behavior via a modulatory process in which infant distress cues are selectively filtered and responded to. Analyses using a traditional AAI scale and classification approach also provided evidence for distinct parenting behavior correlates of insecure adult attachment representations. The importance of measuring global and stylistic differences in maternal behavior in contexts which allow for the activation of the entire range of infant affective states is discussed.

**Keywords:** Adult Attachment Interview | dismissing | preoccupied | infant affect | still-face procedure

### **Article:**

A core tenet of attachment theory is that early experiences with the primary caregiver form the basis for an internal representational model of attachment that guides future relationships and

social-emotional development (Bowlby, 1969/1982). A central question in attachment theory concerns how such representations of early attachment experiences, as measured in adulthood by the Adult Attachment Interview (AAI; Main & Goldwyn, 1984–1998), influence caregiver interactions with their children. Such interactions, in turn, are thought to affect the quality of the attachment relationship the child develops with their caregiver (van IJzendoorn, 1995) and is the basis for the concept of the intergenerational transmission of attachment (Main, Kaplan, & Cassidy, 1985). Main and Goldwyn (1984–1998) have suggested that a mother's working model of attachment relationships is likely to be associated with her ability to read, interpret, and respond to her infant's needs. Specifically, these attachment states of mind, or emotion regulation strategies in talking about early attachment relationships, can be understood as a set of rules for processing attachment-relevant information (Main et al., 1985). Despite a number of studies and meta-analytic evidence suggesting a positive association between secure/autonomous states of mind and more optimal parenting behaviors (e.g., more sensitive-responsiveness, less intrusiveness; Pederson, Gleason, Moran, & Bento, 1998; van IJzendoorn, 1995; Ward & Carlson, 1995), there are relatively fewer studies that have explored links between the insecure dismissing and preoccupied states of mind and parenting behavior (Adam, Gunnar, & Tanaka, 2004). The current study examines whether insecure dismissing and preoccupied states of mind are linked with distinct maternal behaviors and moderate relations between infant negative affect and distinct maternal behaviors during the reunion episode of the face-to-face/still-face paradigm (Tronick, Adamson, Wise, & Brazelton, 1978).

### **Dismissing and preoccupied attachment states of mind and parenting behavior**

Based in large part on the coherence, or internal consistency and emotional balance, of Adult Attachment Interview discourse regarding childhood attachment experiences with primary caregivers, individuals are assigned to one of four adult attachment categories that are thought to reflect their state of mind with respect to attachment. Secure individuals coherently describe their childhood experiences, whether described as more or less supportive in childhood. Dismissing individuals defensively distance themselves from the emotional content of the AAI by normalizing, minimizing, or idealizing harsh or adverse early memories with caregivers. Least commonly, preoccupied individuals are unable to discuss their childhood without becoming emotionally entangled or overwhelmed by early relational experiences with primary caregivers. Finally, in addition to classification into these three mutually exclusive categories, individuals can also be classified as unresolved with respect to loss (i.e., death) or abuse if their discourse becomes psychologically confused while talking about loss or abuse experiences (see Hesse, 2008). In addition to these characteristic discourse features, insecure individuals classified as dismissing or preoccupied are often characterized by different types of early experiences with their caregivers. Individuals classified as preoccupied often report childhood experiences of role-reversal and guilt induction whereas dismissing individuals often report experiences of rejection, or other adverse experiences, with their caregivers.

Although hampered in part by the low base rates of preoccupied classifications in the population, work demarcating distinct parenting correlates of dismissing and preoccupied states of mind, and their potential developmental significance for social and emotional adaptation in the next generation, remains an important endeavor. Moreover, attachment theory advances claims that such behavioral differences may exist (Cassidy, 1994; Cassidy & Berlin, 1994; Kobak, Cole, Ferenz-Gillies, & Fleming, 1993; Main, 1981, 1990; Main & Goldwyn, 1984–1998). Distinct parenting correlates associated with dismissing and preoccupied states of mind might be expected based on the notion of distinct emotional and behavioral regulation strategies in the service of the attachment system (Main, 1990). Reflecting the idea that attachment theory may be viewed as a theory of affect regulation (Kobak, 1986; Sroufe & Waters, 1977), Kobak and colleagues (Kobak & Sceery, 1988; Kobak et al., 1993) theorized that emotional and interpersonal differences between dismissing and preoccupied individuals could be understood in terms of the emotion regulation strategies of deactivation and hyperactivation, respectively. Whereas insecure dismissing individuals are theorized to display a pattern of emotional deactivation to minimize or restrict access to attachment memories, thoughts, and feelings, insecure preoccupied individuals are theorized to display a pattern of hyperactivation, characterized in part by uncontrolled, angry, and emotionally entangled discourse that interferes from achieving a balanced perspective on self and parents.

Integrating Thompson's (1994) perspective that emotions can be adaptively regulated in order to achieve specific goals, Cassidy (1994) viewed these attachment-based emotion regulation strategies as emphasizing either a minimization (dismissing) or maximization (preoccupied) of attachment-related thoughts, feelings, and emotion. Such attachment-based emotion regulation strategies as manifest during the AAI interview may also be expected to emerge in the context of mother–infant interactions, especially those in which emotional communication is emphasized. As the emotion regulation strategy associated with dismissing states of mind is thought to include behaviors that de-emphasize attachment and emotional needs, and in which negative emotions are restricted, maternal behaviors associated with dismissing states of mind might involve deficits in the capacity for sensitive-responsiveness and limited affective engagement with their infants. On the other hand, as the emotional regulation strategy associated with preoccupied states of mind is thought to be characterized by a maximization or hyperactivation of attachment-relevant affect, maternal behaviors associated with preoccupied states of mind may include behaviors that foster excessive or exaggerated emotional displays which are intrusive and interfere with their infant's autonomy, as well as those that are relatively inconsistently responsive to their infant's attachment behaviors and which may both elicit and maintain infant negative affect.

Accumulating research supports this perspective. For example, Crowell and Feldman (1991) found that preoccupied mothers were more likely to behave prior to a separation from their child in a manner marked by anxiety and efforts to prolong the departure. In contrast, they found that dismissing mothers were more likely to abruptly depart from their child and failed to adequately

prepare them for departure, thus minimizing the affective salience of interaction prior to separation. Similarly, Adam et al. (2004) found that mothers classified as preoccupied were more angry and intrusive toward their children in mildly stressful interactive tasks whereas the dismissing attachment classification was associated with lower warmth/responsiveness among mothers with higher levels of depressive symptoms. Bosquet and Egeland (2001) found that a continuous rating of attachment preoccupation derived from AAI scales was associated with maternal intrusiveness. Lastly, Whipple, Bernier, and Mageau (2011) found negative associations between dismissing states of mind and prospectively observed maternal sensitivity and between preoccupied states of mind and prospectively observed maternal autonomy support.

### **Maternal attachment representations and response to infant negative affect**

Infants are particularly dependent on the expression of emotion to communicate affective internal states to their caregivers. In particular, infant crying is a highly salient social cue that indicates the infant's need for physical safety, protection, and comfort and serves to signal the caregiver into closer proximity to provide parenting and protective behaviors (Leerkes, Parade, & Gudmundson, 2011). Maternal behavior is known to vary as function of infant emotion. In particular, empirical evidence (Crockenberg, 1981; Miller, McDonough, Rosenblum, & Sameroff, 2002) indicates that infant negative affect (e.g., distress, irritability) is negatively associated with mothers' ability to interact and respond to their children in a sensitive manner.

It has been argued that it may be more difficult to respond sensitively when an infant is distressed because infant crying is a stressor and is perceived as a highly aversive stimulus by adults (Leerkes, 2010; Murray, 1985). However, both the extent and particular stylistic manner in which mothers respond to infant cry cues and other attachment signals is thought to be influenced by mothers' own internal working models of attachment experiences (Cassidy, 1994; Haft & Slade, 1989; Main & Goldwyn, 1984–1998). Specifically, Cassidy (1994; see also Blokland, 1999) suggested that mothers' attachment-based emotional needs and preferences are communicated to infants both by the manner in which mothers display their own affect and by the manner in which they respond to their infants' affect, *particularly negative affect*. Whereas dismissing mothers might be thought to parent in ways that serve to downplay or minimize the emotional needs of the infant, preoccupied mothers might be expected to behave in ways that serve to "play up" or exaggerate (i.e., maximize) their infant's negative affect so as to meet their own emotional regulatory needs in an effort to preserve their habitual state of mind with respect to attachment. Both strategies, minimizing and maximizing, have been suggested as *failed attempts to integrate negative affect* (Tobias, 1995). Slade (1993) has noted that this failure to integrate negative affect is fundamental to insecure attachment organizations. Thus, adult attachment may moderate the extent to which infant negative affect is linked with specific maternal parenting behaviors. For example, mothers with elevations in preoccupied states of mind may engage in *intrusive or interfering* behaviors when their infants are calm so as to restrict their infant's autonomy and elicit negative affect and may *withdraw* from interaction when their infants are distressed so as to maintain their infant's negative affect. In contrast,

mothers with elevations in dismissing states of mind may simply *monitor* (i.e., passively watch) their infants when they are calm and *disengage* or ignore (i.e., minimize) their attachment bids when they are distressed. Crucial to understand from this perspective is that how a mother with a given insecure state of mind comes to interact with her infant is dependent on her infant's affective state which is, at least in part, likely to be influenced by situational and contextual features (Miller et al., 2002) that activate or terminate the attachment system.

### **Overview of the current study**

The aim of the current investigation was to examine how maternal representations of their early attachment relationships may both directly and interactively with infant negative affect influence maternal behavior toward their infant in a challenging or stressful situation. Stressful situations may be more likely to sensitize mothers' to their own experiences in past interactions with caregivers and thus activate their attachment working models (e.g., Fraiberg, Adelson, & Shapiro, 1975). Moreover, individual differences in maternal (and infant) expressive styles are also most likely to be observed during stressful situations (Malatesta, Culver, Tesman, & Shepard, 1989).

The face-to-face/still-face procedure (Tronick et al., 1978) is a versatile interactive protocol useful for assessing both the positive and negative emotional expressivity of infants (Adamson & Frick, 2003; Mesman, van IJzendoorn, & Bakermans-Kranenburg, 2009) and thus is an ideal paradigm in which to also examine distinct parenting correlates of dismissing and preoccupied states of mind. In particular, the reunion episode of the still-face procedure, which follows the still-face episode of the procedure during which infant's negative affect often increases (Tronick et al., 1978), provides a unique opportunity to examine how attachment representations may serve to modulate maternal behavior in response to infant negative affect (Rosenblum, McDonough, Muzik, Miller, & Sameroff, 2002). Although earlier pioneering work has examined links between mother–infant interaction in the still-face procedure and subsequent *infant* attachment security (e.g., Beebe et al., 2010; Cohn, Campbell, & Ross, 1991; Jaffe, Beebe, Feldstein, Crown, & Jasnow, 2001; Kiser, Bates, Maslin, & Bayles, 1986; Kogan & Carter, 1996) we are aware of only two research efforts that have examined links between mother–infant interaction in the still-face procedure and *adult* attachment representations as measured by the AAI (Blokland, 1999; Slade et al., 1995).

In addition to our use of the still-face procedure, the current study incorporates a dimensional perspective to attachment states of mind in light of work which has suggested that, rather than representing a unitary construct, secure states of mind actually reflect a synthetic blend of low levels of dismissing and preoccupied discourse (Haltigan, Roisman, & Haydon, 2013). One advantage of conceptualizing adult attachment security from the dimensional perspective is that researchers are not constrained by small dismissing and preoccupied classification group sizes that limit statistical power in categorical analysis. That said, we supplement this dimensional perspective using traditional AAI state of mind scales and classifications to provide a point of

comparison with earlier work examining differences in parenting behaviors as a function of adult attachment classification and also in response to Bakermans-Kranenburg's and van IJzendoorn's (2009) call for researchers to consider the predictive significance of the AAI state of mind scales in future research. We also examine maternal parenting behaviors both in terms of global sensitivity as well as more specific maternal interactive behaviors, such as intrusiveness, abruptly terminating interaction (withdraw), and passively watching the infant (monitoring), that might more clearly capture stylistic individual differences in parenting thought to be associated with dismissing and preoccupied states of mind. By examining associations between maternal attachment state of mind and maternal behaviors other than global sensitivity, it may be possible to identify additional aspects of maternal parenting behavior that partly account for the transmission gap between adult and infant attachment security (van IJzendoorn, 1995).

## **Hypotheses**

### **AAI state of mind dimensions**

#### **Main effects**

We hypothesized that infant negative affect during the still-face procedure would be negatively associated with mothers' ability to sensitively respond to her infant during the reunion episode. We also expected distinct main effects for maternal dismissing and preoccupied state of mind dimensions. We hypothesized that higher levels on the dismissing dimension would be negatively associated with sensitivity and active engagement with the infant and positively associated with passively monitoring the infant. In some contrast, we hypothesized that higher levels on the preoccupied dimension would show negative associations with sensitivity and positive associations with maternal intrusiveness and maternal withdraw (i.e., abruptly terminating interactions).

#### **Interaction effects**

We also hypothesized that associations between infant negative affect and specific maternal behaviors would be moderated by maternal levels of dismissing and preoccupied states of mind. First, for mothers with elevations on the preoccupied dimension we expected infant negative affect in the face-to-face and still-face episodes of the still-face procedure would be *negatively* associated with intrusiveness but *positively* associated with withdraw in the reunion episode. Said differently, preoccupied mothers would engage in intrusive behavior during the reunion if their infants displayed limited distress in the face-to-face and still-face episodes in an effort to *elicit* distress, and would engage in a pattern of interacting and then abruptly terminating their interactions (withdraw) if their infants had been distressed in the face-to-face and still-face episodes in an effort to *maintain* that distress. In contrast, among mothers lower on the preoccupied dimension, we expected that infant negative affect in the face-to-face and still-face episodes would show *positive* associations with intrusiveness and *negative* associations with

withdraw because they are challenged by their infants' distress yet are motivated to intervene to reduce it (the normative response).

Second, given dismissing mothers' need to maintain a state of mind in which emotional affect is minimized and attention is shifted away from attachment information, we anticipated that for mothers with elevations on the dismissing dimension infant negative affect in the face-to-face and still-face episodes would show stronger *negative* associations with maternal engagement and stronger *positive* associations with passively monitoring the infant in the reunion episode. Among mothers lower on the dismissing dimension however, we expected infant negative affect in the face-to-face and still-face episodes would show *positive* associations with maternal engagement and *negative* associations with passive monitoring as these mothers will be more likely motivated to intervene to reduce their infants distress (the normative response).

## **AAI state of mind scales and classifications**

### **AAI state of mind scales**

As we are aware of only one published study that has examined associations between the full set of individual AAI state of mind scales and maternal interactive behavior (Cowan, Cohn, Cowan, & Pearson, 1996), correlational analyses between AAI state of mind scales and maternal behavior in the reunion episode of the still-face procedure were largely exploratory. That said, given the centrality of coherence ratings in the concept of secure-autonomous adult attachment which in turn has been shown to be associated with parental responsiveness (van IJzendoorn, 1995), we anticipated that coherence ratings would be positively associated with maternal sensitivity and engagement and negatively associated with maternal intrusiveness and withdraw. Similarly, given that the unresolved loss and abuse scales are used to determine unresolved classifications, along with work that has shown links between unresolved classifications and maternal frightened/frightening (FR) behavior (Hesse & Main, 2006), we anticipated that higher scores on both the unresolved loss and abuse state of mind scales would be positively associated with maternal intrusiveness and withdraw and negatively associated with maternal sensitivity and engagement.

### **AAI classifications**

Based on the extant work examining AAI classification differences in maternal parenting behaviors, we made the following hypotheses: (1) mothers classified as secure-autonomous would show the highest levels of engagement and sensitivity relative to dismissing and preoccupied mothers; (2) mothers classified as preoccupied and unresolved would show higher levels of intrusiveness and withdraw relative to secure and dismissing mothers; and (3) mothers classified as dismissing would show the lowest levels of maternal sensitivity and engagement and the highest levels of monitoring behavior relative to the other attachment groups.

## **Methods**

## **Participants**

Participants in the current study were drawn from a prospective longitudinal study in the southeastern United States investigating the origins of maternal sensitivity during infancy. Expectant mothers were recruited from child birth education classes, breast-feeding classes, local obstetric practices, clinics, and by referrals from other participants via informational flyers or presentations by members of the research team. Women who were interested in learning more about the study either signed a consent form to be called at a later time or called our research office to hear the details of the study. Inclusion criteria required that women were 18 or older, African American or European American, fluent in English, and expecting their first child. The final prenatal sample included 259 participants. All procedures were approved by the university's institutional review board.

The analytic sample for this project was inclusive of the full prenatal sample of 259 primiparous mothers (128 European American, 131 African American) and their infants. At recruitment, participants ranged in age from 18 to 44 years ( $M = 25.1$  years,  $SD = 5.4$ ). Twenty-seven percent had a high school degree or less, 27% had some college, and 46% had a 4-year college degree or beyond. The majority of mothers were married or living with their child's father (57%), 24% were in a relationship but not living with their child's father, and 19% were single. Annual family income ranged from less than US\$2000 to over US\$100,000; median income was US\$35,000. All infants were full term and healthy, 51% were female.

## **Procedure**

Upon enrollment, women were mailed consent forms and a packet of questionnaires including a demographic measure. Women returned their completed consent forms and questionnaires when they visited the laboratory for a prenatal interview 6 to 8 weeks prior to their due date. Of 259 participants who completed the AAI at the prenatal interview, 211 participants (101 European American, 110 African American) returned for a six-month assessment during which the still-face procedure (Tronick et al., 1978) was administered. Of these 211, two of the dyads did not complete the still-face procedure to completion due to infant distress, thus leaving 209 dyads in which maternal and infant data were available for all episodes of the still-face procedure. Mothers who did not participate in the still-face procedure at six months did not differ from those who did on maternal age, family income-to-needs, or by ethnicity although they were less well educated than those who participated in the still-face procedure at the six-month assessment,  $t(255) = -2.87, p < .01$ . In addition, mothers who did not participate in the still-face procedure at the six-month assessment showed elevations on the dismissing state of mind dimension relative to those who did  $t(257) = 3.25, p < .01$ .

## **Maternal socioeconomic status (SES)**

Information pertaining to mothers' SES was obtained using a questionnaire where mothers were asked to provide sociodemographic information such as their level of education and their family

income. Family income information was used to construct a family income-to-needs variable based on government issued poverty threshold guidelines as well as participant self-reported family income and family size. Given the moderately high correlation ( $r = .55, p < .01$ ) between maternal education and family income-to-needs, these two variables were standardized and then averaged, yielding a global index of maternal SES.

### **Adult Attachment Interview (AAI)**

At the prenatal interview, women were administered the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1984–1996), which assesses adults' current states of mind regarding earlier attachment experiences with primary caregivers. The AAI is a semistructured interview in which participants are asked to describe their early childhood relationships with their primary caregivers and the influences and/or effects they perceive those experiences to have had on their development. Coders used the primary AAI scoring method developed by Main and Goldwyn (1984–1998), consisting of a set of inferred experience and state-of-mind ratings on each transcript that inform assignment into adult attachment classifications of secure-autonomous, insecure-dismissing, insecure-preoccupied, and unresolved with respect to loss or abuse experiences (for more information see Hesse, 2008).

According to established protocol, AAIs were transcribed verbatim and all identifying information was removed from the transcripts before they were coded by coders trained through and reliable with the lab of Dr. Mary Main using the AAI Scoring and Classification System (Main & Goldwyn, 1994). Interrater reliability for AAI classifications was assessed based on a randomly selected 19% of double coded transcripts ( $n = 50$ ). For three-way AAI classification agreement was 82% ( $\kappa = .67, p < .01$ ) and for four-way classification agreement was 74% ( $\kappa = .57, p < .01$ ). The three-way AAI classification distribution in our sample was 69% secure ( $n = 179$ ), 26% dismissing ( $n = 67$ ), and 5% ( $n = 13$ ) preoccupied. The four-way AAI classification distribution was 67% ( $n = 173$ ) secure, 25% ( $n = 65$ ) dismissing, 4% ( $n = 11$ ) preoccupied, and 4% ( $n = 10$ ) unresolved. All unresolved cases were classified as unresolved with respect to loss.

The dismissing and preoccupied states of mind dimensions used in this report were based on recent work (Haltigan et al., 2013) demonstrating that the AAI state of mind scales load on two modestly correlated dimensions of dismissing and preoccupied discourse. The dismissing dimension is comprised of state-of-mind scales tapping lack of memory, mother and father idealization, and overall coherence of transcript (reversed). The preoccupied dimension is comprised of state-of-mind scales tapping mother and father anger, passivity, unresolved trauma, and overall coherence of transcript (reversed). All AAI state of mind scales were scored reliably by AAI coders (ICCs  $> .60$ ) with the exception of paternal anger and metacognitive monitoring. For paternal anger, range restriction was a problem in that 98.7% of the sample scored between scale points 1 and 3. However, percent agreement was satisfactory (83% exact agreement) and it was retained. Similarly, for metacognitive monitoring, range restriction was also a problem in

that 97% of the sample scored between scale points 1 and 2. However, percent agreement was adequate (68% exact agreement) and it also was retained. The dismissing and preoccupied dimensions were computed as unweighted averages of the scales described above. Prior work using this sample has also demonstrated the measurement invariance of these dimensions across African Americans and European American mothers (Haltigan, Leerkes, et al., 2013).

### **The still-face procedure: infant and maternal behaviors**

Dyads participated in the still-face procedure (Adamson & Frick, 2003; Tronick et al., 1978) when infants were six months of age. For the two minute face-to-face episode, mothers were asked to play with their infant as they normally would using their voice and hands. Next, mothers were asked to stop playing and maintain a still face with a neutral expression for two minutes (still-face episode), and then finally resume play for another two minutes in the reunion episode. Infant negative affect and maternal behavior during the still-face procedure were continuously coded from digital media files using INTERACT 9 (Mangold, Arnstorf, Germany). Event based coding was used, meaning once a code was activated, it remained active until another code was selected. Infant affect was rated on a 7-point scale ranging from (1) high positive affect (open mouth, intense smile, can be laughing or squealing) to (7) high negative affect (screams, wails, sobs intensely; mouth wide). This system was adapted from Braungart-Rieker and Stifter (1996) based on infants' vocalizations, facial expressions, and body tension. For purposes of the current project, the average level of negative affect within each episode of the still-face procedure was computed as an index of infant temperamental reactivity because it captures both intensity and duration of observed distress. Coders were blind to other data, reliability cases were selected at random, and disagreements were resolved via consensus. Inter-rater reliability was good (weighted kappa = .76) based on 34 double-coded tapes.

Maternal behaviors during the face-to-face and reunion episodes of the still-face procedure were continuously coded using 12 mutually exclusive categories developed by Leerkes (2010). Given the hypotheses of the current project, we focused on a subset of four specific maternal behavioral variables from a larger pool of coded maternal behaviors. The behaviors along with a brief description of each are as follows: (1) maternal engagement – mother interacts with, plays with, or makes/maintains eye contact with the infant; (2) maternal intrusive – mother forces her own agenda on the infant *or* blocks the infant's goal (maternal behavior must be more intense or egregious than would otherwise be coded as maternal engagement); (3) maternal monitor – mother watches infant without interacting; and (4) maternal withdraw – mother physically moves away from the infant or abruptly stops interacting with the infant. For all maternal behavioral codes, the percentage of time the mother engaged in the behavior during the reunion episode of the still-face procedure was calculated. Coders were blind to other data, reliability cases were selected at random, and disagreements were resolved via consensus. Thirty cases were double-coded for reliability with 75% agreement (kappa = .67). In addition to these event-based maternal codes, maternal sensitivity was coded during the face-to-face and reunion episodes of the still-face procedure using Ainsworth's original 9-point Sensitivity/Insensitivity scale from (1)

highly insensitive to (9) highly sensitive (Ainsworth, Bell, & Stayton, 1974). The focus of this scale is the extent to which the mother reads and responds to her infant's cues and demonstrates an awareness of the infant's state by adjusting her own behavior. Twenty percent of the current sample was double-coded for reliability. The intraclass correlation for the reunion episode of the still-face procedure was high (.88).

## Results

First, missing data from the still-face procedure was computed for 48 dyads using multiple imputations in SPSS version 20.0 (IBM, Armonk, NY, 2011) using an iterative Markov chain Monte Carlo method. Demographic variables, predictor variables, and dependent variables were included in the imputation models to preserve relationships among the focal variables. In addition, interaction terms were included in the imputation model to avoid a known problem where the linear imputation model biases interaction effects toward zero (Graham, 2009; von Hippel, 2009). Each substantive analysis was conducted separately with each imputed data set; results were combined by computing the average across the five imputed data sets. Second, maternal SES was screened as a potential covariate by examining whether it correlated with infant distress during the still-face procedure, the AAI dimensions, and maternal behaviors in the reunion episode of the still-face procedure. Additionally, maternal race, measured as African American (race = 0) or European American (race = 1) was screened by examining potential mean differences on infant distress, the AAI dimensions, and maternal behaviors. Maternal SES was significantly negatively associated with both of the AAI dimensions and maternal monitoring behaviors in the reunion episode of the still-face procedure and significantly positively associated with maternal engagement and sensitivity in the reunion episode of the still-face procedure. In addition, the preoccupied dimension and maternal sensitivity in the reunion episode differed by maternal racial status. Therefore, both maternal SES and maternal race were controlled for in all analytic models described below. Descriptive statistics for all study variables are presented in Table 1.

Table 1. Descriptive statistics for study variables.

<b>Study variable</b>	<b>Range</b>	<b><i>M</i></b>	<b><i>SD</i></b>
AAI Dismissing Dimension	1.25–7.00	3.13	1.25
AAI Preoccupied Dimension	1.20–5.20	2.16	.56
AAI Maternal Idealization <sup>a</sup>	1.00–7.00	2.82	1.55
AAI Paternal Idealization <sup>a</sup>	1.00–6.00	2.17	1.29
AAI Maternal Anger <sup>b</sup>	1.00–8.00	1.20	.79

AAI Paternal Anger <sup>b</sup>	1.00–7.00	1.18	.65
AAI Maternal Derogation	1.00–3.00	1.04	.21
AAI Paternal Derogation	1.00–3.00	1.06	.29
AAI Overall Derogation	1.00–3.00	1.10	.39
AAI Lack of Memory <sup>a</sup>	1.00–9.00	2.64	1.60
AAI Passivity <sup>b</sup>	1.00–7.00	2.49	1.07
AAI Metacognitive Monitoring	1.00–4.00	1.18	.48
AAI Unresolved Loss	1.00–7.00	1.95	1.30
AAI Unresolved Trauma <sup>b</sup>	1.00–4.00	2.05	.97
AAI Coherence of Transcript	2.00–8.00	5.38	1.44
AAI Coherence of Mind <sup>ab</sup>	2.00–8.00	5.31	1.46
Infant Negative Affect: Face-to-Face	2.94–5.87	4.14	.58
Infant Negative Affect: Still-Face	3.70–6.79	4.83	.68
Infant Negative Affect: Reunion	2.56–6.87	4.70	.89
Maternal Engagement	0.00–100.00	68.23	27.87
Maternal Intrusiveness	0.00–34.51	3.71	6.12
Maternal Monitor	0.00–68.11	5.25	9.68
Maternal Withdraw	0.00–4.66	.19	.57
Maternal Sensitivity	1.00–9.00	4.54	1.56

Notes: Descriptive statistics are based on all available data for each variable prior to imputation. There was no AAI fear of loss variation in this sample. AAI State of Mind scales denoted with the superscript <sup>a</sup> comprise the dismissing dimension. AAI State of Mind scales denoted with the superscript <sup>b</sup> comprise the preoccupied dimension (see Haltigan, Roisman & Haydon, 2013, for more details). For all maternal behaviors except maternal sensitivity, means and standard deviations are expressed in terms of percentages of time engaged in the behavior during the reunion episode of the still-face procedure.

As a manipulation check to document the well-replicated infant “still-face” effect, a repeated measures analysis of variance examining infant negative affect across the still-face procedure was conducted, with episode as the within subjects factor. A significant main effect of episode emerged  $F(2, 516) = 175.36, p < .00$ . Difference contrasts revealed that infants displayed more negative affect in the still-face episode ( $M = 4.84, SD = .69$ ) than either of the face-to-face ( $M = 4.16, SD = .59$ ) or reunion ( $M = 4.72, SD = .90$ ) episodes  $F(1, 258) = 214.72, p < .00$ , thus documenting a “still-face” effect.

### AAI dimensions

Associations among dismissing and preoccupied dimensions and maternal and infant behaviors during the still-face procedure are presented in Table 2. Higher levels of infant negative affect in each of the individual episodes of the still-face procedure were significantly and negatively associated with maternal engagement and sensitivity. In contrast, a significant and modest positive association was observed between infant negative affect in the reunion episode and maternal withdraw. In general, associations between the AAI dismissing and preoccupied dimensions and maternal behaviors were also modest. Consistent with prediction, significant negative associations were observed between the dismissing dimension and maternal engagement and sensitivity and a significant positive association was observed between the dismissing dimension and maternal monitoring behavior in the reunion episode. Also, consistent with previous findings in the literature regarding links between the preoccupied classification and maternal sensitivity, the preoccupied dimension was modestly negatively associated with maternal engagement and sensitivity.

Table 2. Correlations between maternal behaviors in the reunion episode of the still-face procedure, infant negative affect during the still-face procedure, and Adult Attachment Interview dismissing and preoccupied state of mind dimensions.

	<b>Infant negative affect face-to-face</b>	<b>Infant negative affect still-face</b>	<b>Infant negative affect reunion</b>	<b>Dismissing dimension</b>	<b>Preoccupied dimension</b>
Engagement	-.39**	-.51**	-.77**	-.19**	-.13*
Intrusive	.02	.12	.14	-.13	.09
Withdraw	.15	.11	.16*	-.05	.12
Monitor	.02	-.02	.10	.34**	.13
Sensitivity	-.23**	-.34**	-.37**	-.16*	-.21**

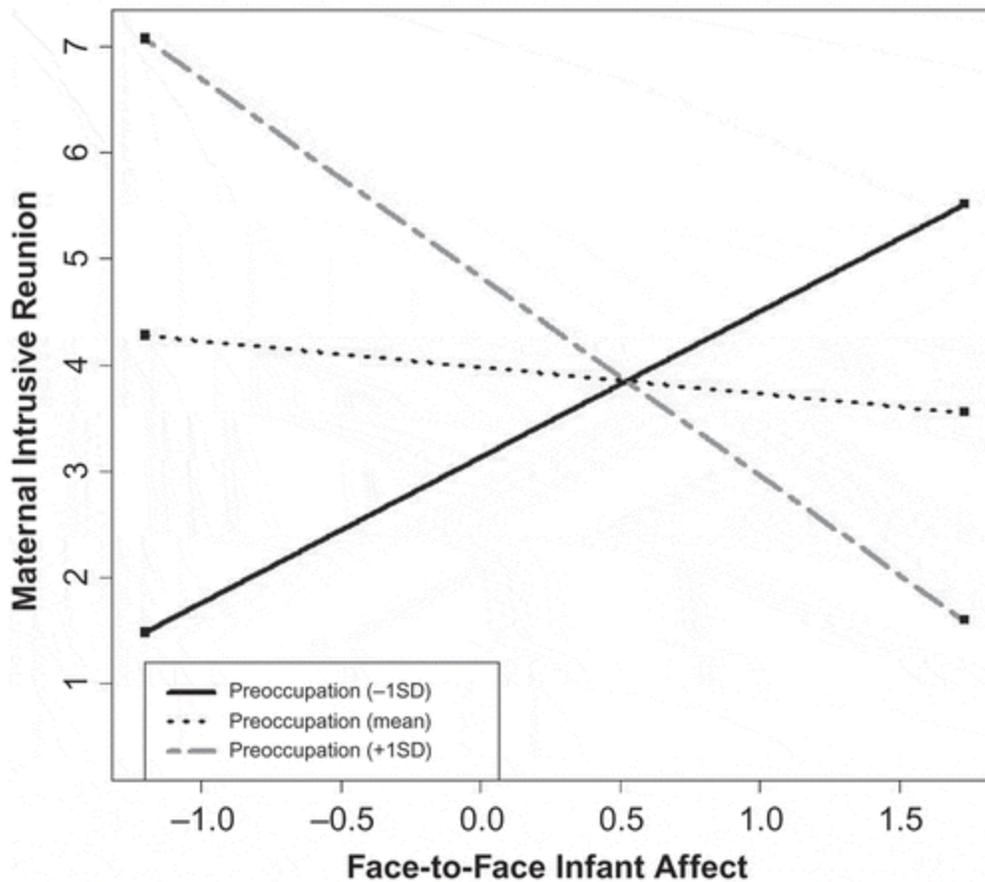
Notes: \*\* $p < .01$ ; \* $p < .05$ .

For each maternal behavior in the reunion episode, two hierarchical multiple regressions were conducted: one including infant negative affect during the face-to-face episode and one including infant negative affect during the still-face episode. The focal predictor (infant negative affect) in the face-to-face or still-face episodes was multiplied by the moderators (AAI preoccupied and dismissing dimensions) to obtain the interaction terms (all interaction variables were mean centered prior to creating the interaction term). To control for the possibility that maternal behavior in the reunion episode could not be fully explained by concurrent infant negative affect, infant negative affect in the reunion was entered with maternal SES and race in the first step as covariates, followed by the dismissing and preoccupied dimensions and infant face-to-face or still-face negative affect, and finally by the interactions between infant negative affect and the dismissing and preoccupied dimensions in the last step. In total, 10 hierarchical regressions were conducted, two each for five maternal behaviors. When significant interaction effects emerged, they were plotted and simple slopes were probed according to guidelines outlined in Aiken and West (1991). Given the difficulty of identifying interactions in non-experimental work, trend level interactions ( $p < .10$ ) were also probed (McClelland & Judd, 1993).

### **Main and interaction effects: face-to-face episode**

Main and interaction effects for infant negative affect in the face-to-face episode, the dismissing and preoccupied dimensions, and the interaction of infant negative affect in the face-to-face episode with the AAI state of mind dimensions are presented in Table 3. For *maternal intrusiveness*, there were main effects for the dismissing and preoccupied dimensions. The dismissing dimension was significantly negatively, and the preoccupied dimension significantly positively, associated with maternal intrusiveness in the reunion episode. In addition, there was a significant interaction between the preoccupied dimension and infant negative affect in the face-to-face episode. As demonstrated in Figure 1, infant negative affect during the face-to-face episode demonstrated a negative association ( $\beta = -.17, p = .07$ ) with maternal intrusiveness in the reunion episode among mothers higher on the preoccupied dimension but a positive association ( $\beta = .12, ns$ ) among mothers lower on the preoccupied dimension.

**Face-to-Face Infant Affect \* Preoccupied Dimension**



**Figure 1.** Maternal preoccupation moderates relations between infant negative affect in the face-to-face episode and maternal intrusiveness in the reunion episode of the still-face procedure.

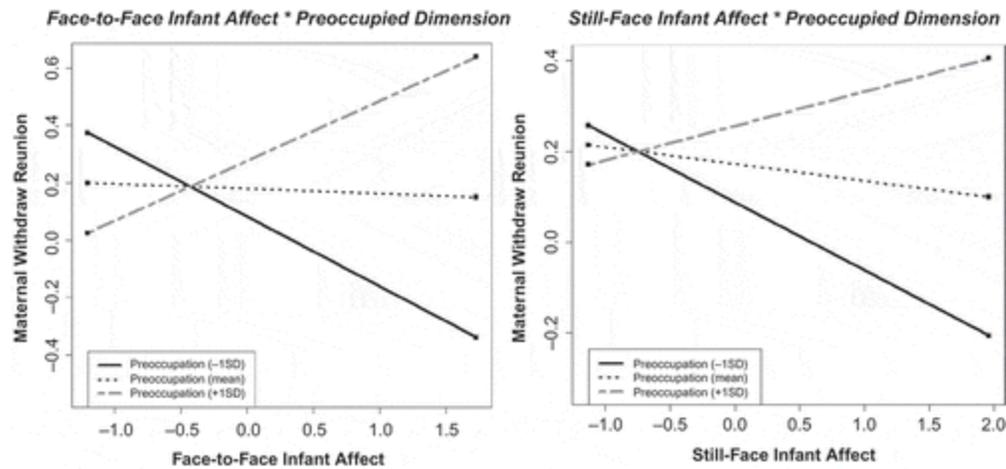
**Table 3.** Results of hierarchical multiple regressions predicting maternal interactive behavior in the reunion episode from the combination of AAI state of mind dimensions, infant negative affect in the face-to-face episode, and relevant interactions.

Predictors	Intrusive			Withdraw			Monitor		
	<i>B (SE)</i>	$\beta$	$\Delta R^2$	<i>B (SE)</i>	$\beta$	$\Delta R^2$	<i>B (SE)</i>	$\beta$	$\Delta R^2$
Step 1			.03			.03			.08**
Maternal Race	-.68 (.94)	-.06		.00 (.09)	.02		-.38 (1.54)	-.02	
Maternal SES	.16 (.59)	.02		-.01 (.05)	-.02		-2.06 (.92)	-.18*	
Infant Negative	1.15	.16*		.11	.17*		1.25	.11	

Affect: Reunion Episode	(.58)			(.05)			(.93)		
Step 2			.05*			.03			.08**
AAI Dismissing Dimension	-.99 (.44)	-.20*		-.05 (.04)	-.11		2.27 (.62)	.29**	
AAI Preoccupied Dimension	1.53 (.75)	.14*		.17 (.07)	.17*		-.54 (1.25)	-.03	
Infant Negative Affect: Face-to-Face Episode	-.25 (.91)	-.02		-.02 (.09)	-.02		-1.89 (1.45)	-.11	
Step 3			.03*			.07**			.02
Dismissing × Infant Negative Affect	-.06 (.66)	-.01		-.09 (.06)	-.10		-.11 (.92)	-.01	
Preoccupied × Infant Negative Affect	-2.92 (1.11)	-.17**		.41 (.11)	.27**		3.40 (1.64)	.13*	

Notes: Values reflect final pooled regression estimates across imputed data sets. \*\* $p < .01$ ; \* $p < .05$ .

For *maternal withdraw*, there was a significant main effect for the preoccupied dimension which was qualified by a significant interaction with infant negative affect. As demonstrated in the left panel of Figure 2, infant negative affect during the face-to-face episode was significantly positively associated ( $\beta = .21, p < .05$ ) with withdraw among mothers higher on the preoccupied dimension but negatively associated ( $\beta = -.19, ns$ ) with withdraw among mothers lower on the preoccupied dimension. For *maternal monitor*, there was a significant main effect for the dismissing dimension such that the dismissing dimension was positively associated with maternal monitoring behavior in the reunion. In addition, there was a significant preoccupied × infant negative affect interaction. As shown in the left panel of Figure 3, infant negative affect during the face-to-face episode was negatively associated ( $\beta = -.21, p = .08$ ) with maternal monitoring behavior in the reunion among mothers lower on preoccupation, but not among mothers high on preoccupation ( $\beta = -.03, ns$ ) There were no significant main or interaction effects for *maternal engagement* or *sensitivity*.



**Figure 2.** Maternal preoccupation moderates relations between infant negative affect in the face-to-face and still-face episodes and maternal withdraw in the reunion episode of the still-face procedure.

**Main and interaction effects: still-face episode**

Main and interaction effects for infant negative affect in the still-face episode, the dismissing and preoccupied dimensions, and the interaction of infant negative affect in the still-face episode with the AAI state of mind dimensions are presented in Table 4. For *maternal intrusiveness*, there were significant main effects for the dismissing and preoccupied dimensions. As in the face-to-face episode, the dismissing dimension was negatively ( $\beta = -.20, p < .05$ ), and the preoccupied dimension positively ( $\beta = .15, p < .05$ ), associated with maternal intrusiveness in the reunion.

**Table 4.** Results of hierarchical multiple regressions predicting maternal interactive behavior in the reunion episode from the combination of AAI state of mind dimensions, infant negative affect in the still-face episode, and relevant interactions.

Predictors	Intrusive			Withdraw			Monitor		
	B (SE)	$\beta$	$\Delta R^2$	B (SE)	$\beta$	$\Delta R^2$	B (SE)	$\beta$	$\Delta R^2$
Step 1			.03			.03			.08**
Maternal Race	-.81 (.95)	-.07		.01 (.09)	.01		-.76 (1.54)	-.04	
Maternal SES	.22 (.59)	.03		-.02 (.05)	-.04		-1.95 (.90)	-.17*	
Infant Negative Affect:	1.13	.16		.12	.19*		2.36	.21*	

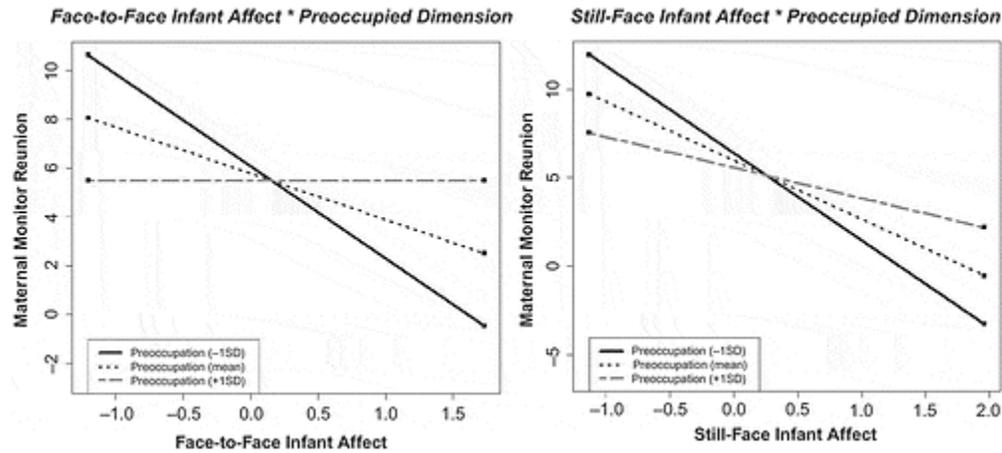
Reunion Episode	(.77)			(.06)			(1.17)		
Step 2			.04*			.03			.09**
AAI Dismissing Dimension	-1.00 (.44)	-.20*		-.06 (.05)	-.12		2.34 (.67)	.30**	
AAI Preoccupied Dimension	1.72 (.76)	.15*		.15 (.08)	.15*		-.72 (1.27)	-.04	
Infant Negative Affect: Still-Face Episode	-.11 (.98)	-.01		-.04 (.09)	-.04		-3.33 (1.59)	-.23*	
Step 3			.02			.02			.01
Dismissing × Infant Negative Affect	-.43 (.56)	-.06		-.01 (.05)	-.02		-.89 (.78)	-.08	
Preoccupied × Infant Negative Affect	-1.69 (1.11)	-.10		.20 (.11)	.14 <sup>†</sup>		2.87 (1.63)	.11 <sup>†</sup>	

Notes: Values reflect final pooled regression estimates across imputed data sets. \*\* $p < .01$ ; \* $p < .05$ ; <sup>†</sup> $p < .10$ .

For *maternal withdraw* there was a significant positive main effect for the preoccupied dimension. There was also a marginally significant interaction between the preoccupied dimension and infant negative affect in the still-face episode. As shown in the right panel of Figure 2, infant negative affect during the still-face episode was positively associated ( $\beta = .10$ , *ns*) with maternal withdraw in the reunion for mothers higher on the preoccupied dimension but negatively associated ( $\beta = -.17$ , *ns*) with maternal withdraw in the reunion for mothers lower on the preoccupied dimension. Note that the directions of these simple slope effects are similar to those observed in the face-to-face episode.

For *maternal monitor*, there were significant main effects for both the dismissing dimension and infant negative affect in the still-face. The dismissing dimension was positively, and infant negative affect in the still-face episode negatively, associated with maternal monitoring in the reunion episode. In addition, there was a marginally significant interaction between the preoccupied dimension and infant negative affect. As the right panel in Figure 3 demonstrates, relative to the significant negative association ( $\beta = -.29$ ,  $p < .06$ ) between infant negative affect in the still-face episode and maternal monitoring behavior in the reunion episode among mothers with lower levels of preoccupation, among mothers with higher levels of preoccupation the negative association ( $\beta = -.19$ , *ns*) between infant negative affect in the still-face episode and maternal monitoring behavior in the reunion episode was less strong. Lastly, for *maternal engagement*, there was a significant positive main effect for infant negative affect in the still

face, such that higher levels of infant negative affect in the still-face were associated with increases in maternal engagement during the reunion episode ( $\beta = .16, p < .01$ ). There were no significant main or interaction effects for maternal sensitivity.



**Figure 3.** Maternal preoccupation moderates relations between infant negative affect in the face-to-face and still face episodes and maternal monitoring in the reunion episode of the still-face procedure.

### AAI scales and classifications

#### AAI state of mind scale associations with maternal behavior

Associations of AAI state of mind scales with maternal behaviors are shown in Table 5. Where significant correlations emerged they were generally modest in magnitude (Cohen, 1992). That said, significant associations between AAI scales and maternal interactive behaviors were in the theoretically expected direction. In particular, both coherence scales were positively associated with maternal engagement and sensitivity and negatively associated with maternal monitoring behavior in the reunion episode of the still-face procedure.

**Table 5.** Correlations between maternal behaviors in the reunion episode of the still-face procedure and AAI states of mind scales.

	<b>Engagement</b>	<b>Intrusive</b>	<b>Withdraw</b>	<b>Monitor</b>	<b>Sensitivity</b>
Maternal Idealization <sup>a</sup>	-.11	-.12	-.06	.23**	-.11
Paternal Idealization <sup>a</sup>	-.07	-.10	-.03	.12	-.05
Maternal Anger <sup>b</sup>	.01	.02	.13*	-.05	-.09
Paternal					

Anger <sup>b</sup>	-.03	.12	-.03	.01	-.03
Maternal Derogation	-.03	.07	-.02	-.05	-.03
Paternal Derogation	-.06	.02	-.04	.04	-.00
Overall Derogation <sup>a</sup>	-.06	.04	-.03	.01	-.04
Lack of Memory <sup>a</sup>	-.15	-.09	-.04	.22**	-.13
Passivity <sup>b</sup>	-.01	.14*	.08	.02	-.02
Metacognitive Monitoring	.11	-.02	.01	-.07	.12
Unresolved Loss	-.08	.09	.01	.04	-.04
Unresolved Trauma <sup>b</sup>	-.30	.05	.15	.13	-.12
Coherence of Transcript	.18*	-.01	-.02	-.23**	.28**
Coherence of Mind <sup>ab</sup>	.20**	-.04	-.02	-.22**	.28**

Notes: There was no AAI fear of loss variation in this sample. AAI State of Mind scales denoted with the superscript <sup>a</sup>comprise the dismissing dimension. AAI State of Mind scales denoted with the superscript <sup>b</sup>comprise the preoccupied dimension (see Haltigan, Roisman, & Haydon, 2013, for more details). \*\* $p < .01$ ; \* $p < .05$ .

### AAI classifications and maternal behavior

For comparisons between attachment groups, significance levels as well as effect size statistics (Cohen's  $d$ ) are provided. Cohen (1992) suggests that a  $d$  of .2 can be considered small, .5 medium, and .8 or above a large effect size. A multivariate analysis of covariance (MANCOVA) with three-way AAI classification as the between subjects factor and (as with regression analyses) maternal SES, maternal race, and infant negative affect in the reunion episode entered as covariates revealed a significant association comparing the three attachment groups on the five maternal parenting behaviors, Wilks  $F(10, 498) = 2.60, p < .01$ , partial  $\eta^2 = .05$  (see Table 6). Examination of univariate tests for each of the maternal interactive behaviors revealed significant mean differences between adult attachment classification and maternal withdraw,  $F(2, 253) = 3.61, p < .05$ , and maternal monitoring,  $F(2, 253) = 4.56, p < .05$ . In addition, there was a marginally significant difference between adult attachment classification and maternal intrusiveness  $F(2, 253) = 2.98, p = .06$ . Bonferroni-corrected pairwise main effects comparisons between the attachment classifications showed that preoccupied mothers were significantly higher than dismissing mothers on maternal withdraw  $p < .05, d = .46$ , and marginally higher than dismissing mothers on maternal intrusiveness  $p = .07, d = .59$ . In addition, dismissing

mothers were significantly higher than secure-autonomous mothers on maternal monitoring behavior  $p < .05$ ,  $d = .52$ .

**Table 6.** Maternal interactive behavior during the reunion episode of the still-face procedure by three-way adult attachment classification.

	Adult attachment classification				
Maternal interactive behavior	Dismissing (Ds, N = 67)	Secure-Autonomous (F, N = 179)	Preoccupied (E, N = 13)	$F^a$	Main effect pairwise comparisons <sup>b</sup>
Engagement	58.83 (30.65)	71.72 (26.92)	58.70 (26.27)	1.47	
Intrusive	3.11 (6.03)	3.68 (5.98)	7.55 (8.84)	2.98 <sup>t</sup>	E > Ds <sup>tt</sup>
Withdraw	.13 (.46)	.19 (.52)	.57 (1.27)	3.64*	E > Ds*
Monitor	9.34 (14.29)	3.90 (7.20)	3.74 (5.04)	4.62*	Ds > F*
Sensitivity	3.94 (1.41)	4.79 (1.59)	4.17 (1.34)	1.42	

Notes: Values outside parentheses are means, inside are standard deviations; values on the maternal interactive behavior scales are percentages of time the behavior was engaged in; values on the sensitivity scale are based on raw scores. <sup>a</sup>For univariate  $F$ -tests, degrees of freedom are (2, 253). <sup>b</sup>Bonferroni-corrected. \* $p < .05$ ; <sup>t</sup> $p = .06$ ; <sup>tt</sup> $p = .07$ .

We next conducted an identical MANCOVA, this time using the four-way attachment classification as the between subjects variable. The multivariate effect was significant, Wilks  $F(15, 685.02) = 2.13$ ,  $p < .05$ , partial  $\eta^2 = .04$  (see Table 7). Univariate tests again revealed a significant mean difference between four-way attachment classification and maternal withdraw,  $F(3, 252) = 3.75$ ,  $p < .05$ . In addition there was a marginal difference between four-way attachment classification and maternal monitoring behavior,  $F(3, 252) = 2.56$ ,  $p = .07$ . Bonferroni-corrected pairwise main effects comparisons between the attachment classifications showed that preoccupied mothers showed elevations in maternal withdraw during the reunion episode relative to dismissing mothers,  $p < .05$ ,  $d = .48$ . There were no significant Bonferroni-corrected pairwise main effects between the attachment classifications for maternal monitoring behavior.

**Table 7.** Maternal interactive behavior during the reunion episode of the still-face procedure by four-way adult attachment classification.

	Adult attachment classification		
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Maternal interactive behavior	Dismissing (Ds, N = 65)	Secure-Autonomous (Fs, N = 173)	Preoccupied (Es, N = 11)	Unresolved (Us, N = 10)	F <sup>a</sup>	Main effect pairwise comparisons <sup>b</sup>
Engagement	58.91 (30.52)	71.68 (26.91)	59.59 (28.64)	65.67 (28.23)	2.54	
Intrusive	3.11 (6.07)	3.63 (5.98)	7.22 (9.56)	5.68 (5.69)	2.10	
Withdraw	.10 (.43)	.19 (.53)	.61 (1.37)	.34 (.57)	3.75*	E > Ds*
Monitor	9.06 (14.37)	3.84 (7.15)	4.01 (5.38)	7.50 (9.33)	2.56 <sup>†</sup>	
Sensitivity	3.99 (1.40)	4.80 (1.61)	4.02 (1.41)	4.30 (1.34)	1.06	

Notes: Values outside parentheses are means, inside are standard deviations; values on the maternal interactive behavior scales are percentages of time the behavior was engaged in; values on the sensitivity scale are based on raw scores. <sup>a</sup>For univariate *F*-tests, degrees of freedom are (3, 252). <sup>b</sup>Bonferroni-corrected. \**p* < .05; <sup>†</sup>*p* = .07

## Discussion

The purpose of the current study was to examine distinct parenting correlates of dismissing and preoccupied adult attachment states of mind and more specifically the process by which dismissing and preoccupied states of mind may influence maternal interactive behaviors toward their infants during an emotionally arousing situation. Main and Goldwyn (1984–1998) have proposed that secure and insecure attachment representations are distinctly associated with a selective filtering of infant cues which in turn are likely associated with distinct parenting behaviors. Both main and interaction results of this study lend support to this view. These results also furnish evidence supporting Cassidy's (1994; Cassidy & Berlin, 1994) view that mothers with elevations in attachment preoccupation may behave in a manner which serves to heighten or maximize their own and their infants emotional reactions in order to preserve their preoccupied state of mind with respect to attachment. Below we discuss the results of AAI dimensional and traditional measurement (i.e., scale scores and classifications) analyses in turn.

### AAI dimensional analyses

Consistent with prior research, both dismissing and preoccupied dimensions were associated with lower maternal engagement and lower maternal sensitivity based on Ainsworth's rating scale. However these effects were not significant after controlling for maternal race and SES and concurrent infant negative affect in the reunion episode (see Haltigan, Leerkes, et al., 2013 for similar findings regarding the negative association between the dismissing dimension and

maternal sensitivity after controlling for SES using this same sample). The negative associations between infant negative affect and maternal engagement and sensitivity in the reunion episode support the notion that infant irritability and crying are stressors that may make it more difficult for mothers to be more engaged and sensitive with their infants (Crockenberg, 1981; Leerkes, 2010). Additionally, main effects for the dismissing and preoccupied dimensions on maternal behavior in the reunion episode of the still-face procedure provide some additional, theory-consistent support for distinct parenting behavior correlates of dismissing and preoccupied states of mind.

### **Main effects**

Dismissing states of mind were linked with less maternal intrusiveness and more maternal monitoring behaviors in the reunion. In the case of both maternal behaviors, we believe that these findings are consistent with the emotional regulatory strategy of deactivation that dismissing mothers employ in the context of the AAI (Kobak et al., 1993). That is, decreases in intrusiveness and increases in maternal monitoring behavior, in which the mother does not attempt to interactively engage the infant, suggest a deactivation process by which dismissing mothers may be attempting to de-escalate or divert attention away from the emotional salience of interactive processes in the reunion episode. In contrast, preoccupied states of mind were uniquely positively associated with maternal withdraw in the reunion episode of the still-face procedure (though see below regarding preoccupied  $\times$  infant negative affect interaction effects). In the case of mothers with elevations in preoccupied states of mind, withdraw behaviors in the reunion episode of the still-face procedure when infants typically demonstrate more negative affect than in the face-to-face episode would likely serve to maintain the infant's distress and perpetuate an interactive context in which negative affect is maximized, perhaps enabling these mothers to preserve their own habitual state of mind with respect to attachment. As Cassidy (1994; see also Cassidy & Berlin, 1994) notes, a mother with a conscious or unconscious desire to prolong the baby's need for her may use a strategy of failing to help the infant effectively regulate negative emotions as the prolonged negative emotionality keeps the infant embroiled with her.

### **Interaction effects**

In addition to main effects for dismissing and preoccupied states of mind, we also found that preoccupied states of mind, but not dismissing states of mind, moderated relations between infant negative affect and maternal behavior in the reunion episode of the still-face procedure. Among mothers with higher levels of preoccupation, low infant negative affect in the face-to-face episode was linked with higher levels of intrusiveness in the reunion episode. Moreover, high infant negative affect in both the face-to-face and still-face episodes was linked with higher levels of maternal withdraw in the reunion episode among these same mothers. Additionally, mothers with higher levels of preoccupation were more likely to passively watch their infants

during the reunion if they had been distressed in earlier episodes than were mothers with lower levels of preoccupation.

We interpret our interaction findings involving preoccupied states of mind as consistent with Main and Goldwyn's (1984–1998) ideas surrounding the selective filtering of infant cues as the process by which attachment states of mind organize parental behavior and further suggest that the behavior of preoccupied mothers is organized by emotional regulatory strategies that emphasize the maximization of emotion expression and lead them to interpret and respond to their infant's behavior in ways that may serve to elicit and maintain a negative emotional state (Cassidy, 1994; Cassidy & Berlin, 1994). Each of the conditional associations uncovered suggest that preoccupied mothers may be strategically deploying attentional and behavioral processes in the service of eliciting increases in infant negative emotional arousal through intrusive behaviors (when infants are not distressed or low in negative affect) and maintaining infant negative affect (when infants are distressed) through withdraw and passive infant monitoring. Thus, interactions between mother and infant that involve a maximization of negative emotional affect appear to be a signature feature of the legacy of preoccupation and mirror the hyperactive stance taken by preoccupied mothers during the AAI (Cassidy & Berlin, 1994; Crowell & Feldman, 1991; Kobak et al., 1993). Importantly, the influence of mothers' preoccupation levels on her own behavior in the reunion episode of the still-face procedure was independent of her infants' contemporaneous affect in the reunion episode. This suggests that the processes by which maternal state of mind interact with infant negative affect to shape subsequent maternal behavior during the still-face paradigm carry forward temporally in addition to being influenced by concurrent interactive dynamics. Said differently, the relative presence or absence of infant negative arousal during the face-to-face or still-face episodes may serve as a catalyst that activates latent preoccupied attachment representations and their associated emotionally heightened self-regulatory states in these mothers. In turn, these preoccupied representations functionally influence maternal behavior during the reunion episode of the still-face procedure. That the dismissing dimension did not interact with infant negative affect in the prediction of maternal behavior in the reunion episode is also noteworthy. One interpretation of this lack of a moderating effect of the dismissing dimension is that mothers higher on this dimension did not tailor their subsequent reunion behavior to greater or lesser degrees in response to infant negative affect in the face-to-face and still-face episodes because of an unconscious or conscious minimization of both their own and their infant's affective state. Such a possibility is consistent with the emotional deactivation stance noted as characteristic of individuals classified as dismissing (Kobak et al., 1993).

## **AAI scale and classification analyses**

### **AAI state of mind scales**

Although generally modest in magnitude, associations between AAI state of mind scales and maternal interactive behaviors in the reunion episode were in the theoretically expectable

direction and provided additional evidence for distinct parenting behavior correlates of dismissing and preoccupied attachment representations. Scales tapping dismissing states of mind were significantly and positively associated with maternal monitoring and may reflect an emotional deactivation process while scales tapping preoccupied states of mind were significantly and positively associated with maternal interactive behaviors suggesting an emotional maximization process (e.g., maternal intrusiveness, maternal withdraw in the context of infant negative affect). That both coherence scales were significantly and positively associated with maternal engagement and sensitivity and significantly and negatively associated with maternal monitoring is consistent with meta-analytic evidence (van IJzendoorn, 1995) that the ability to coherently talk about early attachment experiences is associated with parental responsiveness. Finally, the range restriction apparent in the unresolved loss and abuse scales in the current sample likely contributed, at least in part, to our inability to uncover significant associations between these scales and maternal withdraw and intrusiveness.

### **AAI classifications**

Using the three-way classification system, preoccupied mothers showed higher levels of intrusiveness and withdraw in the reunion episode of the still-face procedure relative to dismissing mothers. These results are again consistent with the notion that preoccupied mothers engage in behaviors with their infant that may serve to prolong infant distress and keep the infant embroiled with them, thus enabling the mother to maintain her habitual preoccupied state of mind with respect to attachment. They are also partly consistent with the work of Adam et al. (2004) and Bosquet and Egeland (2001) who found associations between maternal intrusiveness and preoccupied states of mind. As discussed above, that dismissing mothers showed higher levels of maternal monitoring behaviors relative to secure-autonomous mothers, is also consistent with the notion that dismissing mothers may engage in behaviors that serve to keep attachment-related emotional thoughts and feelings from being activated (i.e., emotional deactivation). Although not significant, dismissing mothers also showed the lowest levels of maternal sensitivity and engagement.

Using the four-way classification system we again found evidence that preoccupied mothers engage in higher levels of maternal withdraw behaviors during the reunion episode of the still-face procedure relative to dismissing mothers. However, we did not find distinct maternal interactive behavior differences for unresolved mothers. One possibility is that the small size of this group ( $n = 10$ ) limited our statistical power to find maternal behavior differences. It is worth noting, however, that unresolved mothers' mean levels of both intrusiveness and withdraw were elevated relative to secure and dismissing mothers. Whether such elevations among intrusiveness and withdraw among unresolved mothers reflect elements of frightened/frightening (FR) behavior (Hesse & Main, 2006) or rather suggests empirical overlap in the constructs of attachment preoccupation and disorganization (Haltigan et al., 2013) is an important question for future research.

## **Limitations and future directions**

Currently there are few datasets of this size available to test theoretical claims regarding the functional process linking maternal attachment states of mind with distinct stylistic maternal parenting behaviors. Nonetheless, the current findings should be considered in the context of the limitations of the current study. First, our observations of maternal behavior in the reunion episode of the still-face paradigm are brief (2 min) and caution should be exercised when generalizing these behaviors to other contexts. Second, by examining separate regression models for the face-to-face and still-face episodes, the possibility is increased that some of the current findings may be due to chance. Third, the data preclude definitive conclusions with regard to the direction of causal processes between infant negative affect, maternal attachment, and maternal parenting behavior. Nevertheless, we believe that our regression analyses leveraged the temporal structure of the still-face procedure with respect to the focused prediction of maternal behavior in the reunion episode. We intentionally did not examine interactions between maternal state of mind and infant negative affect in the reunion episode because bi-directional associations between infant negative affect and maternal behavior preclude directional causal inference. We also controlled for infant negative affect in the reunion in all substantive analyses.

Findings of this study provide some theory-consistent evidence for distinct parenting behavior correlates of dismissing and preoccupied states of mind. Dismissing states of mind were uniquely positively associated with passively watching the infant and preoccupied states of mind were uniquely positively associated with abruptly terminating interaction or proximity with the infant. The findings also suggest that mothers with preoccupied states of mind interpret and respond to their infants' affective state in ways that serve to induce or maintain the expression of negative affect. In contrast, mothers with dismissing states of mind may possess less flexibility in adjusting their behavior in response to infant affective cues. Our findings utilizing the traditional AAI state of mind scales and classification approach paralleled our main effect findings using the dimensional system and were consistent with prior research examining links between adult attachment and parenting behavior. Collectively, these findings also demonstrate the utility of measuring maternal behaviors in a manner that elucidates stylistic differences in maternal insensitivity. That is, unique states of mind with respect to attachment were not robust predictors of global maternal sensitivity, but they were useful in predicting individual differences in specific types of maternal insensitivity during the reunion episode.

Future work seeking to understand the predictive significance adult attachment for parenting behavior and the intergenerational transmission of attachment security should be conducted with economically diverse samples. Such work will permit a sharper understanding of the nature of the association between socioeconomic status and adult attachment states of mind and the robustness of attachment state of mind associations with maternal sensitivity. Ultimately, a better understanding of how attachment states of mind come to influence specific parenting behaviors will provide clues to better understanding the "transmission gap" (van IJzendoorn, 1995), while

also informing targets for intervening with infant–parent dyads at-risk for or demonstrating problematic relationship dynamics.

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## Notes

Notes: Descriptive statistics are based on all available data for each variable prior to imputation. There was no AAI fear of loss variation in this sample. AAI State of Mind scales denoted with the superscript <sup>a</sup>comprise the dismissing dimension. AAI State of Mind scales denoted with the superscript <sup>b</sup>comprise the preoccupied dimension (see Haltigan, Roisman & Haydon, 2013, for more details). For all maternal behaviors except maternal sensitivity, means and standard deviations are expressed in terms of percentages of time engaged in the behavior during the reunion episode of the still-face procedure.

Notes: \*\* $p < .01$ ; \* $p < .05$ .

Notes: Values reflect final pooled regression estimates across imputed data sets. \*\* $p < .01$ ; \* $p < .05$ .

Notes: Values reflect final pooled regression estimates across imputed data sets. \*\* $p < .01$ ; \* $p < .05$ ; <sup>t</sup> $p < .10$ .

Notes: There was no AAI fear of loss variation in this sample. AAI State of Mind scales denoted with the superscript <sup>a</sup>comprise the dismissing dimension. AAI State of Mind scales denoted with the superscript <sup>b</sup>comprise the preoccupied dimension (see Haltigan, Roisman, & Haydon, 2013, for more details). \*\* $p < .01$ ; \* $p < .05$ .

Notes: Values outside parentheses are means, inside are standard deviations; values on the maternal interactive behavior scales are percentages of time the behavior was engaged in; values on the sensitivity scale are based on raw scores. <sup>a</sup>For univariate  $F$ -tests, degrees of freedom are (2, 253). <sup>b</sup>Bonferroni-corrected. \* $p < .05$ ; <sup>t</sup> $p = .06$ ; <sup>tt</sup> $p = .07$ .

Notes: Values outside parentheses are means, inside are standard deviations; values on the maternal interactive behavior scales are percentages of time the behavior was engaged in; values on the sensitivity scale are based on raw scores. <sup>a</sup>For univariate  $F$ -tests, degrees of freedom are (3, 252). <sup>b</sup>Bonferroni-corrected. \* $p < .05$ ; <sup>t</sup> $p = .07$

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