

Differentiating Maternal Sensitivity to Infant Distress and Non-Distress

By: [Esther M. Leerkes](#), Jennifer M. Weaver, [Marion O'Brien](#)

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Abstract:

Drawing from a domain specificity perspective, we assert that maternal sensitivity to infant distress cues is distinct from maternal sensitivity to non-distress cues. We review evidence from prior research demonstrating that the two constructs have more unshared than shared variance and that sensitivity to infant distress is a unique predictor of infants' early emotional well-being when both types of sensitivity are examined as simultaneous predictors. In addition, we present new evidence to test the hypothesis that maternal sensitivity to infant distress and non-distress have different origins. We draw on data from a subset of mothers and infants who participated in Phase I of the National Institute of Child Health and Human Development Study of Early Child Care (Study 1) and from 101 mother–infant dyads who participated in a longitudinal study of the origins of maternal sensitivity (Study 2). In both studies, maternal sensitivity to distress and non-distress were rated when infants were six months old. In both studies, socio-demographic risk (i.e., young, unmarried, low income mothers) was a stronger predictor of sensitivity to non-distress than of sensitivity to distress. In Study 2, mothers' emotional and cognitive responses to videotapes of crying infants during the prenatal period predicted maternal sensitivity during tasks designed to elicit infant fear and frustration but were unrelated to maternal sensitivity in a non-arousing free play context. Maternal sensitivity during infancy can be further divided into specific sub-types that have unique origins and unique effects on subsequent child well-being. Methodological, theoretical, and applied implications of such an approach are discussed.

Keywords: Parenting | Maternal Sensitivity | Infants | Behavior | Mothers | Emotions | Infant Crying | Distress Cues

Article:

INTRODUCTION

From attachment and evolutionary perspectives (Bowlby, 1969/1982), infant crying is a highly salient social cue that signals the infant's need for safety, protection, and comfort. Infant crying is believed to serve the purpose of survival by bringing the caregiver back into proximity with the

infant and eliciting caregiving and protective behaviors. According to Bowlby, sensitive responses to infants' signals, particularly for safety and comfort, contribute to a secure internal working model or the sense that one is worthy of care and trust in the caregiver to meet important needs. This secure working model, or schema of self and other, influences children's behavior and their interpretation of others' social behavior in other contexts.

Subsequently, Ainsworth, Blehar, Waters, and Wall (1978) defined maternal sensitivity as a mother's ability to attend and respond to her infant in ways that are well-matched to that infant's needs. Thus, sensitivity is a relational construct in which optimal maternal behavior is assessed not as a set of discrete, definable acts, but in response to or in anticipation of the child's expressed cues or broader needs in context. In the years since Bowlby and Ainsworth et al.'s seminal work, the importance of maternal sensitivity has been confirmed given its consistent relations with attachment security, adaptive emotion regulation, and fewer behavioral problems (see Crockenberg & Leerkes, 2011, for a review). However, across studies, sensitivity has been measured in myriad ways and has been examined in relation to a variety of child outcomes resulting in a broad range of effect sizes that have been viewed as disappointing by some. This has led to a call for greater specificity in the definition and measurement of sensitivity in light of the child outcomes of interest and the theoretical based mechanisms purported to underlie such associations (Grusec & Davidov, 2010).

DIFFERENTIATING FORMS OF MATERNAL SENSITIVITY

Given our interest in children's early social-emotional adjustment, we believe that maternal sensitivity is a key parenting behavior of interest, but that it can be further differentiated by attending to the nature of the *infant cue* to which the mother is responding or to the demands of the *context* in which the mother–infant interaction is embedded. We focus on sensitivity during the first half of the infant's first year of life, when negative emotions are still becoming differentiated, and prior to the onset of social emotions such as pride, shame, and guilt (Lewis, 2000). Thus, we define sensitivity to distress broadly to include the sensitivity with which mothers respond to *distress cues* that reflect fear, sadness, anger, or non-differentiated distress or the sensitivity with which mothers respond to their infants in *emotionally arousing contexts* that are likely to elicit fear, sadness, anger or non-differentiated distress. We define sensitivity to non-distress to include the sensitivity with which mothers respond to infant neutral or positive affect cues or the sensitivity with which they respond to their infants in contexts that are unlikely to elicit distress (e.g., free-play tasks). Considering the nature of the context, in addition to the infant cue, is important because some infants do not become distressed, or are distressed only briefly, in stressful contexts because their mothers are skilled at preventing and reducing their distress, important elements of sensitivity to distress (Leerkes, 2010).

We view maternal sensitivity to infant distress cues versus non-distress cues, or maternal sensitivity in emotionally arousing contexts versus non-arousing contexts, as distinct dimensions of sensitivity because they serve different socialization goals. Sensitivity to distress, centers around comfort and protection; whereas sensitivity to non-distress centers around reciprocity and

learning (e.g., providing social and object stimulation) (Grusec & Davidov, 2010), as such each may be guided by different underlying beliefs and values and primarily consist of distinct behaviors. Furthermore, infant distress and non-distress cues may activate different schema that influence how mothers feel and behave in the moment. Infant cries may be particularly likely to activate mothers' attachment-related schema and memories of the manner in which their own emotional needs were or were not met in childhood, which in turn may affect how aversive mothers find crying, the manner in which they perceive infant cry signals, and their underlying beliefs about emotions and how best to respond to them (Leerkes & Crockenberg, 2006; Leerkes, Parade, & Burney, 2010). The extent to which maternal sensitivity to infant distress is distinct from sensitivity to non-distress or that both are dimensions of general sensitivity is important both theoretically and practically. That is, if the two are distinct from one another, they likely have different origins and may be related to different domains of child adjustment. And, if the two are distinct, intervention efforts could be developed to target the most relevant domain of parenting given the problem at hand.

Three questions are key to the assertion that sensitivity to distress and non-distress are unique dimensions of parenting: (1) How highly correlated are they?; (2) Do they predict different child outcomes?; and (3) Do they have different origins? We briefly summarize prior evidence in relation to the first two questions and then present new data relevant to the third. We rely primarily on data from two studies: the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD) in which maternal sensitivity to distress cues and non-distress cues were rated separately during a free-play procedure when infants were 6 months old (see Leerkes, Blankson, & O'Brien, 2009) and in a project in which sensitivity was rated during a free-play procedure and during tasks designed to elicit infant distress when infants were six months old (see Leerkes, 2010, 2011).

How Highly Correlated are Sensitivity to Distress and Non-distress?

We propose that maternal sensitivity to distress and sensitivity to non-distress are distinct dimensions of parenting that will be somewhat related as both may reflect general parenting competence or skill. For example, both require the ability to attend to the infant's cues and take the infant's perspective. However, there is accumulating evidence that infant distress cues elicit different neurological, physiological, and self-reported responses from adults than infant neutral and positive cues (Groh & Roisman, 2009; Swain et al., 2012). Moreover, there are individual differences in the extent to which adults find distress cues arousing and aversive based on their attachment-related experiences and schema (Groh & Roisman, 2009; Spangler, Maier, Geserick, & von Wahlert, 2010). As such, we believe infant distress activates a unique set of emotion schema which can compromise mothers' ability to attend to, interpret, and respond effectively to their infant. Additionally, contexts that are potentially distressing may be sufficient to activate these emotion schema as mothers may anticipate that their infants will become distressed and behave according to this expectation. For example, mothers who find crying aversive may become anxious whenever they and their infant encounter a potentially frightening situation.

This preoccupation with the possibility of distress may undermine sensitivity even in the absence of infant distress. Finally, infant distress calls for a different set of responses than infant positive or neutral bids (i.e., comfort versus stimulation), and mothers may vary in their ability to respond to each. Thus, we predict that sensitivity to distress and non-distress are related but distinct features of parenting.

Consistent with this view, across studies, maternal sensitivity to distress and non-distress were significantly positively associated, but had more unshared than shared variance. In the subsample from the NICHD SECCYD for whom ratings of sensitivity to distress and non-distress were available, the correlation was large in magnitude, $r(395) = .67, p < .001$; but there was more unshared than shared variance, $R^2 = .45$ (Leerkes et al., 2009). In our own study, sensitivity during the free play task and sensitivity during the emotion-eliciting tasks, correlated moderately, $r(99) = .38, p < .01, R^2 = .14$ (Leerkes, 2011).

The conclusion that maternal sensitivity in infancy is multi-dimensional rather than uni-dimensional is consistent with Bornstein's (2012) findings that early maternal responsiveness is characterized by multiple dimensions. The higher association in the NICHD SECCYD sample is likely a function of both types of sensitivity being rated during the same task, which increased the dependency between the measures. To best address the factor structure of maternal sensitivity in future research, sensitivity to distress and non-distress cues should be rated separately across a variety of contexts (e.g., free play, caregiving, arousing tasks) so that various measurement models of sensitivity can be compared using confirmatory factor analysis. Three models should be compared: a single sensitivity factor on which all measures of sensitivity load; a two factor cue model in which sensitivity to distress cues in each context loads on one factor and sensitivity to non-distress cues in each context loads on a second factor; and a three-factor context model in which sensitivity to both distress and non-distress cues loads onto a factor best described by the nature of the observational context in which they are observed (i.e., sensitivity to all cues in the: play context, caregiving context, and emotion-arousing context).

Do Sensitivity to Distress and Non-distress Predict Different Child Outcomes?

Because situations involving negative emotions are highly salient for the infant as well, mothers' responses to infants' negative emotions are likely to have important developmental implications (Leerkes et al., 2009). Sensitive responses to negative emotions (i.e., scaffolding self-soothing by providing security objects, fostering attention shifting by providing something appealing to look at, or modeling and encouraging adaptive problem-oriented responses) may help infants learn to self-regulate and to perceive the expression and sharing of negative emotions as acceptable rather than problematic, which in turn facilitates social competence and positive relations with others. In contrast, insensitive responses such as rejection, dismissing, or ignoring negative emotions may lead to two distinct maladaptive regulatory styles, the minimization/over-regulation or the heightening/under-regulation of negative emotions, and to negative beliefs and cognitions about the social environment. Thus, the sensitivity with which mothers respond to

infant distress cues or in distressing contexts may be more predictive of children's early social emotional well-being than is how mothers respond to infant non-distress cues or in non-distressing contexts.

Consistent with this view, maternal sensitivity during distressing tasks at 6 months, but not during a free-play task, predicted infant attachment security assessed via the Strange Situation when children were 16 months old (Leerkes, 2011). This finding is consistent with evidence from the NICHD SECCYD that maternal sensitivity to distress cues but not to non-distress cues at 6 months predicted infant attachment security at 15 months (McElwain & Booth-LaForce, 2006). Thus, differentiating maternal sensitivity to distress versus non-distress, provides useful information as to the origins of a secure attachment with mother. In addition, when both measures of sensitivity at 6 months were examined simultaneously, only maternal sensitivity to infant distress was associated with fewer behavior problems at 24 and 36 months and with greater social competence at 24 months (Leerkes et al., 2009). Moreover, sensitivity to distress was linked with less affect dysregulation at 24 and 36 months among temperamentally reactive infants only, likely because temperamentally reactive infants are particularly dependent on external assistance with emotion regulation given the greater frequency and intensity of their negative emotions.

In sum, evidence is accumulating to support the notion that maternal sensitivity to distress is a more salient predictor of infants' subsequent social-emotional well-being than sensitivity to non-distress. Hane and Philbrook's findings (2012) are consistent with this view. That is, the quality of maternal caregiving during tasks that are physically aversive and hence emotionally stressful for infants (e.g., undressing, bathing) is highly salient in relation to the acquisition of regulatory skills that in turn promote subsequent social-emotional adjustment. In contrast, sensitivity to non-distress cues may be more predictive of cognitive abilities such as attention and symbolic play (Bornstein & Tamis-LeMonda, 1997).

Do Sensitivity to Distress and Non-distress Have Different Origins?

Traditional risk factors such as low income, limited education, and single parent status are linked with less sensitive maternal behavior. Given that infant crying is a powerful social stimulus as noted above, individual differences in the extent to which mothers find crying aversive, the manner in which they perceive infant cry signals, and their underlying beliefs about emotions are likely important predictors of sensitivity to infant distress over and above these risk factors. These emotional and cognitive responses are key aspects of the social information processing model (Crick & Dodge, 1994; Lemerise & Arsenio, 2000) and are highly compatible with Ainsworth et al.'s (1978) description of the skills that underlie sensitivity. That is, mothers who are angry or anxious in response to crying, misread their infant's distress cues, and/or believe that crying is a nuisance that interferes with their own goals are unlikely to respond sensitively when their infants are distressed because they prioritize their own needs over the needs of their infants. Hence, we predict that traditional demographic risk factors may be more

predictive of sensitivity to non-distress than sensitivity to distress, and mothers' emotional and cognitive reactions to distress will predict unique variation in sensitivity to distress, but not non-distress, over and above traditional risk factors.

Consistent with this view, in the NICHD SECCYD data, maternal demographic risk (low income to needs ratio, younger, less educated, unmarried mothers, without father involvement in caregiving; $\alpha = .61$) was more strongly correlated with sensitivity to non-distress, $r(395) = -.41, p < .01$, than with sensitivity to distress, $r(395) = -.30, p < .01$, and the difference was significant, $Z = 3.04, p < .01$. Moreover, maternal demographic risk was a significant predictor of sensitivity to non-distress, $\beta = -.23, p < .01$, but not sensitivity to distress $\beta = -.02, ns$, when the shared variance between the two types of sensitivity was controlled.

Next, we turned to our data set to determine if the same pattern held for demographic risk and to examine the proposition that the manner in which mothers process cry signals would predict variation in sensitivity to distress but not non-distress. These data are based on a diverse sample of 101 primiparous mothers described in Leerkes (2010). In that report, mothers' emotional (i.e., empathy, self-focused anxiety and anger) and cognitive responses (i.e., distress detection, infant-oriented emotion goals) to videos of crying infants predicted maternal sensitivity to distress independent of maternal depression. Below, we build on these findings by including an observation of maternal sensitivity during a non-distressing free play task and examining the extent to which demographic risk and social information processing of the cry stimuli predict each type of sensitivity when their shared variance is controlled.

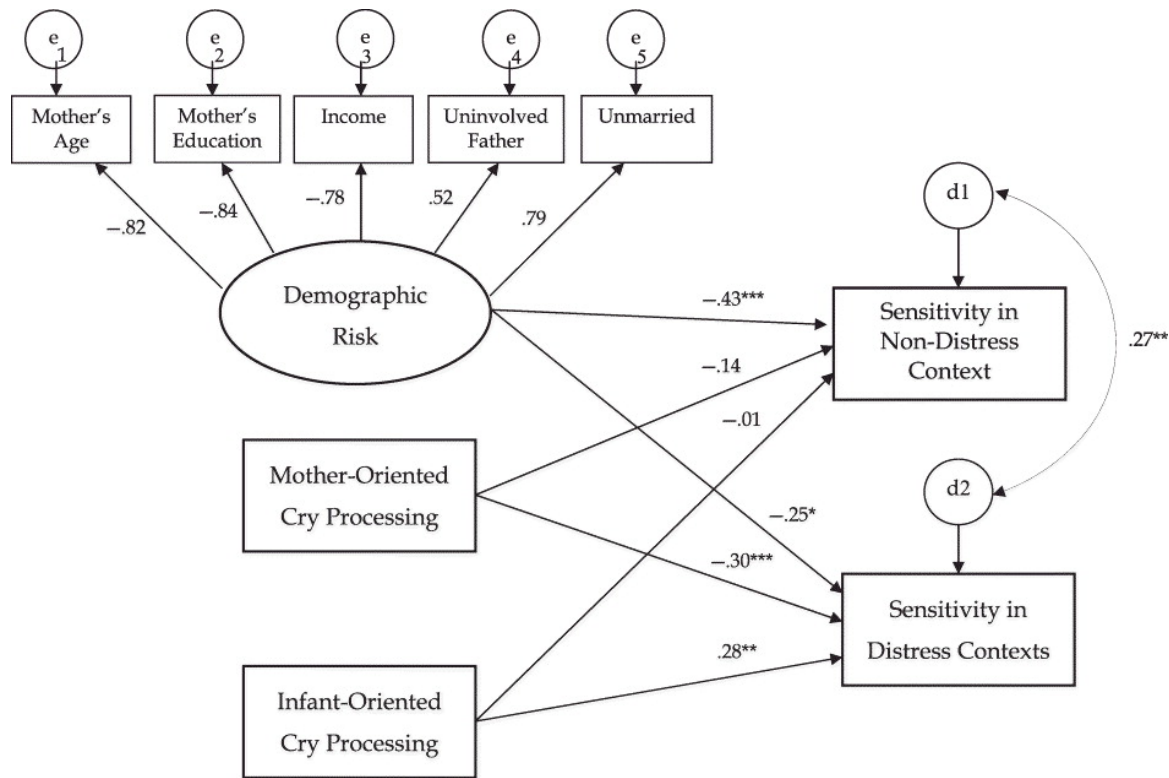
During the prenatal period mothers completed a demographic questionnaire and were interviewed about their reactions to videoclips of two different six-month-old infants who were crying; one displayed fear, the other displayed anger. Mothers were also asked how they would respond behaviorally to their own infants in similar situations and the underlying goals of those responses. The audiotaped interviews were transcribed and then coded. Details about the interview procedure, coding, reliability, and scoring are described in Leerkes (2010). Based on the findings in that report, and the goals of this paper, we include four measures derived from the interview that assess core features of how mothers process infants' cry signals. *Accurate distress detection* reflects the extent to which mothers accurately rated the intensity of infant distress in comparison to trained raters and the extent to which mothers accurately noted that the dominant emotion expressed in each video clip was a negative emotion. *Mother-oriented negative emotional reactions to crying* reflects the extent to which mothers reported feeling angry or anxious in response to the videos for self-oriented reasons (e.g., the sound of the crying irritated me; all that crying made feel nervous—like I am supposed to know what to do). *Infant-oriented emotion goals* reflect a prioritization of the infant's needs, desires, and well-being (e.g., I want my child to feel safe and secure; learn to value emotions; my response now will contribute to my child's future well-being). In contrast, *mother-oriented emotion goals* reflect a prioritization of mothers' needs and well-being (e.g., I want my child to stop crying because it bothers me) and negative beliefs about emotions (e.g., crying and negative emotions should be avoided). An

exploratory factor analysis yielded two cry processing factors with eigenvalues greater than 1 that accounted for 63% of the variability. The first factor was labeled *infant-oriented cry processing* and consisted of accurate distress detection (.79; factor loading) and infant-oriented emotion goals (.68). The second factor was labeled *mother-oriented cry processing* and consisted of mother-oriented negative emotions (.71) and mother-oriented emotion goals (.80). Measures were standardized and averaged to create these composites.

At 6 months postpartum, mothers and infants visited the research laboratory and engaged in a 10-min free play period followed by two 4-min emotion-eliciting tasks. During the *free play* mothers were provided with toys and instructed to interact with their infants as they wished. During the first min of the emotion-eliciting tasks mothers were instructed to remain uninvolved, during the last 3 min mothers were instructed to interact with their infants as they wished. During the *fear task* a remote-control truck approached the infant, made a series of loud sounds with flashing lights, and then backed away from the infant three times. Then the silent and still truck was placed within the infant's reach for 1 min. During the *frustration task*, the experimenter gently held the infant's forearms still and did not interact with the infant. Maternal sensitivity during the free play, and the mother-involved portions of the fear and frustration tasks was rated on a 5-point scale based on the timing, appropriateness, and quality of the response in relation to the infant's cue. Inter-rater reliability based on 25 tapes was .74 (weighted kappa) for the free-play and .78 for the distress tasks. Sensitivity during the fear and anger tasks correlated highly, $r(99) = .52, p < .01$, and were averaged to form a measure of sensitivity during distressing tasks.

As illustrated in Figure 1, demographic risk was a stronger predictor of maternal sensitivity during the non-distressing free play task ($\beta = -.43; b = -.08, SE = .02, p < .001$) than during the distress-eliciting tasks ($\beta = -.25; b = -.04, SE = .02, p < .05$). Moreover, high infant-oriented cry processing and low mother-oriented cry processing during the prenatal period predicted higher maternal sensitivity during the distress tasks ($\beta = .28; b = .20, SE = .06, p < .05; \beta = -.30; b = -.21, SE = .06, p < .001$, respectively) but were unrelated to maternal sensitivity during the non-distressing free-play task at 6 months. Fit indices indicated that the model fit the data well, $\chi^2(24) = 34.71, p > .05$; comparative fit index = .96; Tucker Lewis Index = .95; root mean square error of approximation = .07, $p > .05$.

FIGURE 1 Structural equation model predicting maternal sensitivity during distressing and non-distressing contexts with standardized estimates. * $p < .05$. ** $p < .01$. *** $p < .001$.



Thus, results from both data sets are consistent with the view that sensitivity to distress and non-distress have different origins and that traditional risk factors are more predictive of sensitivity to distress than non-distress. Moreover, results from the latter study provide compelling evidence that applying a social information-processing approach is a useful framework from which to identify predictors of sensitivity to distress.

WHAT DOES THIS AREA OF RESEARCH TELL US ABOUT PARENTING?

First, during infancy, sensitive maternal behavior, characterized by prompt and appropriate responses to infant cues, particularly distress cues, is optimal. Consistent with this view, comfort and nurturance are common responses to infant distress vocalizations across cultures (see Bornstein, 2012), and even when mean differences between ethnic or cultural groups arise in sensitivity, the prediction from sensitivity to relevant child outcomes has been consistent across groups (Crockenberg & Leerkes, 2011). However, as infants mature into their second year of life, their ability to self-regulate increases, their need for autonomy increases, and the expectations that they behave according to social norms emerges. As such, the nature of sensitive responding to distress changes and may be more culturally bound. In Western cultures in which independence is a culturally valued developmental goal, mothers of older infants may use more distal strategies to comfort, engage in more scaffolding, and wait longer to intervene in an effort to promote independence. Such behaviors may be deemed more sensitive in these cultures than

in cultures that value interdependence. Firm control, in contrast, may be more valued and common in cultures that value interdependence and are characterized by valuing respect for elders. Cultural differences in the types of behaviors mothers engage in when their infants are not distressed may be apparent earlier (see Bornstein, 2012). As long as operational definitions of sensitivity incorporate the appropriateness of maternal behavior in light of the infant's cue, developmental stage, and the *context*, including the cultural context, then maternal sensitivity to distress and maternal sensitivity to non-distress are universally optimal parenting behaviors.

Second, there is utility in applying a dimensional or domain specific approach to the study of parenting, and maternal sensitivity has at least two distinct dimensions in early infancy: sensitivity to distress and sensitivity to non-distress (see Grusec & Davidov, 2010, for further differentiation of domains of non-distress). Importantly, even when parenting dimensions are highly correlated, they may predict different outcomes and have different origins. In an era in which statistical models that rely on collapsing multiple indicators of parenting into single latent factors are preferred, it is important to remember that maintaining specificity has certain advantages. Understanding this complexity is critically important for refining our theories of development and designing interventions that are clearly targeted and hence more effective. In fact, we suspect that sensitivity to distress could be further differentiated into sensitivity to specific negative emotions (e.g., sensitivity to fear, anger, sadness) if sufficient measures were available. Such an approach could be useful in identifying pathways to emotion-specific behavioral problems such as anxiety and aggression.

IMPLICATIONS FOR PRACTICE

The findings from this body of work have several implications for intervention. First, intervention efforts aimed at promoting secure attachment, social competence, and emotional and behavioral regulation should focus on enhancing maternal sensitivity to distress or in distressing contexts. Second, focusing on sensitivity to distress may be especially important for temperamentally reactive infants who are particularly dependent on their mothers for assistance in regulating their emotions. Third, mothers at risk for insensitive parenting could be identified prenatally by screening their emotional and cognitive responses to infant crying. This would allow interventions to begin prior to negative response patterns becoming habitual. Finally, the results suggest three avenues to pursue in an effort to enhance maternal sensitivity to distress: training mothers' to accurately identify infant distress signals, using desensitization or cognitive behavioral therapy to reduce mothers' anger and anxiety in response to crying, and altering mothers' goals about infant crying via parent education or other methods. If other traditional risk factors, such as poverty, are also present, these emotion-oriented interventions should be embedded within a more holistic set of services.

FUTURE DIRECTIONS FOR THIS RESEARCH

Given the pattern of findings, observing maternal behavior in contexts that are likely to elicit infant distress is critically important for scholars who study children's social-emotional adjustment. However, because eliciting distress from all infants in a sample is unlikely, and the average duration of distress is relatively brief, it may be important to complement behavioral observations with self-reports of maternal behavior. In fact, mothers' reports of how they responded to their distressed toddlers predicted variation in attachment security over and above observed maternal sensitivity (Leerkes, Parade, & Gudmundson, 2011).

Another difficulty inherent in observational research is that mothers may engage in similar behaviors for different reasons. For example, some mothers engage in comforting behaviors because they want their infant to feel better, whereas others engage in comforting behaviors because they want the crying to stop because they find crying aversive. Although the observed behavior is the same, the former may be more sensitive than the latter because the mother is prioritizing her infant's needs. Mothers who prioritize their infants' needs may be sensitive more consistently (i.e., beyond the brief observational context that is subject to social desirability and other demand features), or there may be subtle differences in how these mothers enact "sensitive" behaviors that affect infants even if we cannot readily see them (e.g., self-focused mothers' touch may be more rigid). Measuring the affective or cognitive motives underlying maternal behavior may provide an index of the degree of infant prioritization and improve the measurement and hence predictive validity of sensitivity.

Next steps in this area of research are highly compatible with themes that have emerged from this Special Issue. First, we suspect mothers' perceptions of and attributions about the crying infant and their interpretation of their own arousal are important mediators of the associations between neuroendocrinological reactions to infant stimuli and maternal sensitivity (see Feldman, 2012; Numan, 2012). That is, the meaning human mothers ascribe to their arousal in response to infant stimuli is likely the process by which physiological mechanisms influence maternal behavior. Second, consistent with results from the animal literature (Jensen Peña & Champagne, 2012), experiencing maternal insensitivity in childhood may compromise mothers' emotional arousal and regulation which in turn undermines their parenting. However, consistent with Conger, Schofield, and Neppl's work (2012), buffers, such as a caring partner, may attenuate intergenerational continuity in insensitive parenting (Leerkes & Crockenberg, 2006; Leerkes et al., 2010).

In sum, viewing maternal sensitivity to distress and non-distress as unique dimensions of parenting has proved fruitful in relation to identifying aspects of parenting that are most relevant to children's early social-emotional well-being and identifying salient predictors of sensitivity to distress, both of which have important applied implications. Expanding approaches to measure sensitivity to distress and identifying the factors that predict how mothers process infant distress cues are important directions for future research.

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