Maternal sensitivity during distressing tasks: A unique predictor of attachment security

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Abstract:

The extent to which maternal sensitivity during a non-arousing free play task and during distressing tasks at 6 months predicted infant–mother attachment security was examined. When considered simultaneously, only maternal sensitivity during distressing tasks predicted subsequent attachment security. Infant temperament was unrelated to attachment security.

Keywords: Attachment | Maternal sensitivity | Distress | Temperament | Infancy

Article:

A secure mother‑infant attachment is linked with positive child outcomes such as feelings of self-worth, social competence, and fewer internalizing and externalizing problems (see Weinfield, Sroufe, Egeland, & Carlson, 2008 for a review). The implications of early attachment for long-term positive adjustment and adaptive family functioning illustrate the importance of identifying factors that promote a secure attachment. Sensitive maternal behavior in response to infant signals is believed to be the key precursor to a secure attachment (Bowlby, 1969/1982) and prior evidence supports this view (Ainsworth, Blehar, Waters, & Wall, 1978). In contrast to the robust effect of maternal sensitivity on attachment in Ainsworth et al.'s study which drew from extensive home observations of maternal behavior, de Woolf and van IJzendoorn's (1997) meta-analysis of studies linking maternal sensitivity to attachment security demonstrated that the effect size is moderate regardless of the duration of the observation.

The modest association between maternal sensitivity and mother‑infant attachment security has led a number of authors to call for a narrower view of attachment and maternal sensitivity. In particular, as the function of the attachment system is to promote safety and protection, how mothers respond to their infants while distressed or during times of threat may be the most

salient predictor of attachment security (Goldberg et al., 1999 and Thompson, 1997). Drawing from this perspective, McElwain and Booth-LaForce (2006)demonstrated that when considered simultaneously, maternal sensitivity to infant distress cues but not sensitivity to non-distress cues at 6 months (both assessed in a free play procedure) predicted subsequent attachment security (McElwain & Booth-LaForce, 2006). However, an important limitation of this study was that infants in the subsample in which maternal sensitivity to distress was observed at 6 months were rated as more temperamentally difficult raising the possibility that the significant effect of sensitivity to distress may only be apparent, or may be stronger, among temperamentally reactive infants compared to less reactive infants.

In this study, rather than focusing on sensitivity to infant distress versus non-distress cues, maternal sensitivity was rated in two different types of observational contexts; a brief non-arousing free play period and two brief emotion-eliciting tasks designed to elicit infant distress. It was anticipated that sensitivity during the distressing tasks would be a more robust predictor of subsequent mother‑infant attachment security than sensitivity during the free-play task because how mothers respond to infants in potentially threatening environments offers infants the best evidence as to whether or not they can count on their mother to meet their needs for safety, comfort, and protection. In addition, infant temperament was measured via maternal report and direct observation in order to examine the possibility that the effects of maternal sensitivity during distressing contexts on attachment security varies as a function of infant temperament. This also allows for examination of the possibility that temperament is indirectly related to attachment security via the effect is has on maternal sensitivity. That is, mothers of more temperamentally reactive infants may behave less sensitively given the greater challenge of responding consistently and appropriately to an infant who is frequently and intensely distressed and difficult to soothe, which in turn contributes to an insecure attachment. However, given prior evidence that the association between temperament and maternal sensitivity is quite modest (Paulussen-Hoogeboom, Stams, Hermanns, & Peetsma, 2007), and that temperament appears to predict attachment subtypes rather than security versus insecurity (i.e., temperamentally reactive infants are not more likely to be insecurely attached, but if they are they are more likely to be resistant than avoidant; see Vaughn, Bost, & van Ijzendoorn, 2008 for a review), it seems unlikely that infant temperament will be related to subsequent attachment security.

The sample consisted of 101 mothers and infants. Mothers were 15‑37 years old ($M = 27.79$), most (64%) had a college degree, and annual income ranged from $6000 to $190,000 (median = $65,000). Most mothers were European American (72%) or African American (25%) and married, living with, or dating their child's father (90%). Infants were full-term; 56 were male. At the 16-month follow-up observational data were available for 70 of these families because six families had moved from the area, three agreed to complete the questionnaires only, 17 declined to participate, and five could not be located. Families who attrited did not differ from those with complete data on demographics, maternal sensitivity, or infant temperament.

At 6 months postpartum, mothers and infants visited the research laboratory and engaged in a 10 min free play period followed by two emotion-eliciting tasks. During the *free play* mothers were instructed to interact with their infants as they wished. A basket of toys was within reach, and a soft blanket was spread on the floor. Each emotion-eliciting task lasted four minutes. During the first minute mothers were instructed to remain uninvolved, during the last three minutes mothers were allowed to interact with their infants as they wished. During the *fear task* a remote-control truck was placed on a wooden table in front of the infant. The truck approached the infant, made a series of loud sounds with flashing lights, and then backed away from the infant. This sequence was repeated 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, fear, and anger tasks was rated on a 5 point scale adapted from the Parent Caregiver Involvement Scale (Farran, Kasari, Comfort, & Jay, 1986). The timing, appropriateness, and quality of the response (e.g., the mother's tone of voice, quality of touch-gentle versus rough, and her affective tone-positive, neutral, negative) were considered in relation to the infant's cue in rating the sensitivity of maternal behavior. Inter-rater reliability was calculated based on 25 tapes; weighted kappa was .74 for the free-play and .78 for the distress tasks. Maternal sensitivity during the fear and anger tasks correlated highly, $r(99) = .52$, $p < .01$ and were averaged to form a single measure of sensitivity during distressing tasks.

Infant affect was continuously coded on a 7 point scale (1 = high positive, 4 = neutral, 7 = high negative) during the emotion eliciting tasks using the Observer 5.0 (Noldus Information Technology, Wageningen, The Netherlands) and inter-rater reliability was calculated based upon 33 double coded tapes (Kappa = .79). The average level of affect across the emotion-eliciting tasks was calculated; high scores indicate greater observed distress. All but 4 infants became distressed demonstrating the effectiveness of the tasks at eliciting distress, but the average duration of distress was fairly brief ($M = 55.19$, SD = 58.00 s). Mothers rated their infants' temperament using the Infant Behavior Questionnaire-Revised (Gartstein & Rothbart, 2003). The negative affect score was used as the measure of maternal reported temperamental reactivity ($\alpha = 89$). Observed negative affect and maternal reported temperament correlated positively, $r(99) = .25$, $p < .05$, demonstrating convergent validity.

Mothers and infants returned to the laboratory when infants were 16 months old and mother-infant attachment was assessed via the Strange Situation (Ainsworth et al., 1978). Two certified reliable coders double coded 25 videos using the traditional 3 category coding system; agreement was 88%, $k = .78$. Sixty-five percent of infants were secure, 24% were avoidant, and 11% were resistant. In the current paper, the dependent variable was the dichotomous secure versus insecure (avoidant and resistant combined) score.

Missing data were imputed using the NORM (Schafer, 1999a) software program. Predictor variables, dependent variables, and demographics were included in the imputation model to maintain unbiased associations between the variables of interest. Because 6% of data was missing overall, three complete data sets were constructed using NORM and data were analyzed separately with each (Schafer, 1999b). Results averaged across these data sets are presented. Potential covariates were screened by examining associations between maternal age, minority status, income, and child gender with measures of maternal sensitivity, infant temperament, and attachment security. None of the demographics were associated with attachment security. Thus, no covariates were included in subsequent analyses.

Next, correlations among maternal sensitivity during each type of task and infant temperament were examined. Maternal sensitivity was positively correlated across the free play and distress tasks, $r(99) = .38, p < .01$. Observed infant temperament was unrelated to sensitivity during the free play and distress tasks, $r(99) = .10$ and $-.09$, respectively. In contrast, mother reported temperament was modestly negatively correlated with sensitivity during the free play and distressing tasks, $r(99) = -.19, p < .10$ and $-.22, p < .05$, respectively.

To test the hypothesis that maternal sensitivity during distressing tasks would be more predictive of attachment security than sensitivity during the non-arousing free play, three logistic regressions were calculated. Model 1 included sensitivity during the free play, observed and mother reported temperament, and interaction terms between sensitivity and temperament measures. Model 2 included sensitivity during the distressing tasks, temperament measures and interaction terms between sensitivity and temperament. Model 3 included sensitivity during each task, temperament, and all temperament and sensitivity interaction terms. Interaction terms were created by multiplying centered main effect terms (Aiken & West, 1991). As displayed in Table 1, when considered in isolation of one another (Models 1 and 2) and simultaneously (Model 3), only sensitivity during the distress tasks was significantly associated with attachment security such that infants of mothers who were highly sensitive during the distress tasks were more likely to be securely attached. Mother reported temperament was marginally linked with attachment security only when sensitivity during the distress tasks was not included in the equation, such that infants who were perceived to be more reactive were somewhat less likely to be securely attached. Across models, observed infant temperament was unrelated to attachment, and none of the interactions between either measure of temperament and sensitivity were significant.

Table 1. Binary logistic regressions predicting attachment security.

	Model 1	Model 2	Model 3

	Sensitivity during free play			Sensitivity during distress tasks			Sensitivity during both tasks		
	Waldχ^2	Odds ratio	95% CI odds ratio	Waldχ^2	Odds ratio	95% CI odds ratio	Waldχ^2	Odds ratio	95% CI odds ratio
Sen free play	.23	1.01	.55–1.89	–	–	–	.95	.73	.35–1.52
Sen distress tasks	–	–	–	5.66[**]	2.58	1.18–5.63	6.22[**]	2.98	1.27–7.04
Obs temperament	.85	2.21	.41–11.82	1.38	3.41	.44–26.58	1.64	4.21	.46–39.89
MR temperament	4.37[*]	.40	.16–.97	1.96	.52	.21–1.30	2.51	.47	.18–1.21
Obs Temp × SenFP	1.52	1.34	.82–2.21	–	–	–	.55	1.15	.60–2.23
Obs Temp × SenDT	–	–	–	2.66	1.83	.89–3.79	2.51	1.89	.87–4.19
MR Temp × SenFP	.15	1.18	.68–2.03	–	–	–	.75	1.30	.71–2.39
MR Temp × SenD	–	–	–	.54	.90	.51–1.61	.64	.84	.44–1.59

Note: Sen = sensitivity, Obs = observed, MR = mother reported, Temp = temperament, FP = free play task, DT = distress tasks, CI = confidence interval. If the confidence interval for the odds ratio spans 1, the variable is not a meaningful predictor of attachment security. Attachment security was coded such that 1 = secure, 0 = insecure. $N = 101$.

Finally, because mother reported infant temperament was significantly correlated with sensitivity during the distress tasks, the possibility that infant temperament had an indirect effect on attachment via sensitivity during the distressing context was examined using Preacher and Hayes' (2008) SPSS Macro for bootstrapping. The average indirect effect and the 95% bias-corrected confidence interval were calculated as the mean across 1000 bootstrapped samples of 101 units for each imputed data set. These were then averaged across imputed data sets. The average indirect effect was $B = -.16$ and the 95% bias corrected confidence interval was $-.60$ to .06. As the interval spanned 0, there was not a significant indirect effect of mother reported temperamental reactivity on attachment security via sensitivity during the distressing task.

The goal of this study was to determine whether maternal sensitivity in distressing contexts was a more robust predictor of attachment security than maternal sensitivity during a non-arousing free-play. Consistent with prediction, sensitivity during the distressing contexts but not sensitivity during the free play task was linked with subsequent attachment. This supports the argument that taking a narrower view of attachment by focusing on maternal behavior in contexts that are arousing and hence most relevant to the function of the attachment relationship is advantageous (Grusec and Davidov, 2010, McElwain and Booth-LaForce, 2006 and Thompson, 1997). However, it is important to acknowledge that other features of the observational context and rating systems used to evaluate sensitivity may also affect the extent to which sensitivity predicts attachment. For example, Pederson and colleagues have reported larger than average associations between sensitivity and attachment when sensitivity was observed during a brief competing demands task that required mothers to balance infant needs with other demands for their attention, likely because this task allows for the observation of subtle but meaningful differences in mothers' responsiveness to infant cues (Pederson et al., 1990 and Smith and Pederson, 1988). Likewise, large effects of sensitivity on attachment security have been demonstrated when the Maternal Behavior Q-Sort, a rating system that emphasizes how mothers respond to attachment-related signals like infant bids for proximity and comfort, has been used to rate maternal sensitivity during home observations (Pederson and Moran, 1996 and Pederson et al., 1998). This pattern suggests that careful observation of maternal sensitivity to attachment relevant cues, even in non-threatening situations, can be a robust measure of attachment. A systematic analysis of the extent to which multiple features of the observational context (i.e., competing demands for mothers, imposed emotional distress on the infant) and the nature of the rating system (i.e., global ratings of sensitivity, ratings of sensitivity in response to various types of infant cues) moderate the effect of sensitivity on attachment security is warranted in future research. This approach would yield the best evidence as to the most salient origins of attachment, a question of theoretical import, and offer insight as

to best methods to observe and rate meaningful differences in maternal sensitivity, a question of methodological and practical import.

Assessing maternal sensitivity in distressing and non-distressing contexts would also allow for examination of the joint influence of the two types of sensitivity on infant attachment security via interaction effects or person-oriented approaches in which different patterns of the two types of sensitivity are used to define groups of mothers. Drawing from Cassidy's (1994) work linking patterns of emotion communication to attachment, it seems likely that some mothers might minimize negative emotions by behaving insensitively in distressing contexts but not in non-distressing contexts promoting an avoidant attachment, and other mothers might heighten negative emotions by behaving sensitively in distressing contexts but insensitively in non-distressing contexts promoting a resistant attachment. Large samples with a sufficient number of infants in each attachment group are needed to test this possibility.

The lack of temperament effects on attachment security is consistent with much of the prior literature (Vaughn, Bost, & van IJzendoorn, 2008). That both indirect effects via maternal sensitivity and moderating effects were considered and that both observed and mother-reported measures of infant temperament were examined are important strengths of this study. However, one cannot simply conclude that temperament is irrelevant to the development of the mother‑infant attachment relationship as subtypes of security and insecurity were not examined.

In sum, the results of this study demonstrate that sensitive maternal behavior during distressing contexts is a unique predictor of attachment security over and above sensitivity during a non-arousing free play task. The moderate correlation between sensitivity in the non-arousing context and the distressing context and their differential role in predicting attachment underscores the importance of identifying the factors that predict maternal sensitivity in distressing contexts, a unique aspect of maternal sensitivity (Leerkes, 2010).

References

Aiken, L., & West, S. (1991). Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage.

Ainsworth, M. D., Blehar, M. C., Waters, E., & Wall, S. (1978). Patterns of attachment. Hillsdale, NJ: Erlbaum.

Bowlby, J. (1969/1982). Attachment and loss: Vol. I. Attachment. NY: Basic Books.

Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. In N. A. Fox (Ed.), The development of emotion regulation: Biological and behavioral considerations. Monographs of the Society for Research in Child Development, 59 (2–3, Serial No. 240) (pp. 228–249).

de Woolf, M. S., & van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. Child Development,68, 571–591.

Farran, D., Kasari, C., Comfort, M., & Jay, S. (1986). The Parent/Caregiver Involvement Scale training manual. Chapel Hill, NC: Frank Porter Graham Child Development Center.

Gartstein, M., & Rothbart, M. (2003). Studying infant temperament via the revised infant behavior questionnaire. Infant Behavior & Development, 26, 64–86.

Goldberg, S., Grusec, J. E., & Jenkins, J. M. (1999). Confidence in protection: Arguments for a narrow definition of attachment. Journal of Family Psychology, 13, 475–483.

Grusec, J., & Davidov, M. (2010). Integrating different perspectives on socialization theory and research: A domain-specific approach. Child Development, 81, 687–709.

Leerkes, E. M. (2010). Predictors of maternal sensitivity to infant distress. Parenting: Science and Practice, 10, 219–239.

McElwain, N. L., & Booth-LaForce, C. (2006). Maternal sensitivity to infant distress and nondistress as predictors of infant–mother attachment security. Journal of Family Psychology, 20, 247–255.

Paulussen-Hoogeboom, M. C., Stams, G. J., Hermanns, J. M., & Peetsma, T. T. (2007). Child negative emotionality and parenting from infancy to preschool: A meta-analytic review. Developmental Psychology, 43, 438–453.

Pederson, D. R., Gleason, K. E., Moran, G., & Bento, S. (1998). Maternal attachment representations, maternal sensitivity, and the infant–mother attachment relationship. Developmental Psychology, 34, 925–933.

Pederson, D. R., & Moran, G. (1996). Expressions of the attachment relationship outside of the Strange Situation. Child Development, 67, 915–927.

Pederson, D. R., Moran, G., Sitko, C., & Campbell, K. (1990). Maternal sensitivity and the security of infant–mother attachment: A Q-sort study. Child Development, 61, 1974–1983.

Preacher, K., & Hayes, A. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 40, 879–891.

Schafer, J. L. (1999a). NORM: Multiple imputation of incomplete multivariate data under a normal model (Version 2.0) [Computer software]. Available from http://www.stat.psu.edu/~jls/misoftwa.html.

Schafer, J. L. (1999). Multiple imputation: A primer. Statistical Methods in Medical Research, 8, 3–15.

Smith, P. B., & Pederson, D. R. (1988). Maternal sensitivity and patterns of infant–mother attachment. Child Development, 59(4), 1097–1101.

Thompson, R. A. (1997). Sensitivity and security: New questions to ponder. Child Development, 68, 595–597.

Vaughn, B., Bost, K., & van IJzendoorn, M. (2008). Attachment and temperament: Additive and interactive influences on behavior, affect, and cognition during infancy and childhood. In Handbook of attachment: Theory, research, and clinical applications (2nd ed.). New York, NY, US: Guilford Press., pp. 192–216

Weinfield, N., Sroufe, L., Egeland, B., & Carlson, E. (2008). Individual differences in infant–caregiver attachment: Conceptual and empirical aspects of security.

In Handbook of attachment: Theory, research, and clinical applications (2nd ed.). NY: Guilford Press., pp. 78–101.