The role of sociodemographic risk and maternal behavior in the prediction of infant attachment disorganization

By: Lindsey R. Gedaly and Esther M. Leerkes

Abstract:

Predictors of infant attachment disorganization were examined among 203 primiparous mothers (52% European American, 48% African American) and their infants (104 female). The Strange Situation Procedure was administered at one year. Global maternal insensitivity and overtly negative maternal behavior were observed during distress-eliciting tasks when infants were six months and one year old. Mothers reported on their demographics to yield a measure of sociodemographic risk (i.e., age, education, income-to-needs). Overtly negative maternal behavior was positively associated with the infant attachment disorganization rating scale score, but did not predict being classified as disorganized. Global maternal insensitivity was associated with higher attachment disorganization, both the rating and the classification, when sociodemographic risk was high but not when sociodemographic risk was low. The pattern of results did not vary by maternal race. The results provide some support for the view that negative maternal behavior and the combination of sociodemographic risk and global maternal insensitivity play a role in the development of infant attachment disorganization.

Keywords: Attachment | disorganized attachment | maternal behavior | maternal sensitivity | sociodemographic risk

Article:

Disorganized attachment in infancy and early childhood is linked to many negative outcomes from infancy through adulthood. During childhood and adolescence these include externalizing problems (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010; Kochanska, 2001; Lyons-Ruth & Jacobvitz, 2008) and academic and school related problems (Moss & St-Laurent, 2001; O'Connor, Bureau, McCartney, & Lyons-Ruth, 2011). The stability of disorganized classifications in early childhood (van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999), and the negative outcomes associated with them, indicate a need for identifying the factors that predict attachment disorganization in order to best understand how to prevent it. Parenting behaviors have been identified as being predictive of disorganized infant attachment, with fearful, frightening, and atypical behaviors playing the largest role (Madigan et al., 2006). In the current study, we examine the roles of overtly negative maternal behavior and global maternal insensitivity during distress-eliciting tasks in relation to attachment

disorganization and test the extent to which sociodemographic risk moderates associations between these aspects of maternal behavior and infant attachment disorganization. We also test race as a moderator of these links to determine if the predictors of attachment disorganization vary in African American and European American dyads.

John Bowlby (1980) conceptualized attachment theory in order to better understand the early relationships between infants and their mothers. Bowlby (1969) described attachment as an evolutionary behavioral system that promotes infant survival and protection through the use of behaviors meant to maintain contact between infants and the caregivers who protect them. When an infant is distressed, the goal of the attachment system is to gain proximity to and comfort from the mother. In order to examine these behaviors and their associations with specific types of infant–mother relationships, Ainsworth and colleagues created the Strange Situation Procedure (Ainsworth, Blehar, Waters, & Wall, 1978), and divided the infants who participated into three classifications based on how the infants responded to their mothers during a stressful absence and reunion designed to elicit attachment behaviors. There was the secure group, and two insecure groups: avoidant and resistant. Subsequent research has demonstrated that secure infants have more positive outcomes from infancy to adulthood than insecure infants (Weinfield, Sroufe, Egeland, & Carlson, 2008).

However, not all infants fit neatly into one of the three categories, and therefore Main and Solomon (1990) later revisited this group's data and found that the majority of unclassifiable infants exhibited odd behaviors during the Strange Situation Procedure that were not clearly organized towards reaching a goal, whether of gaining proximity to their mothers or avoiding it. Therefore, Main and Solomon labeled this fourth group "disorganized". In order to more fully describe the behaviors of disorganized infants during the strange situation, Main and Solomon (1990) compiled a non-exhaustive list of seven themes of behaviors including sequential displays of contradictory behavior patterns, such as calling for mother during separation, but actively avoiding mother upon her return, and direct indices of apprehension regarding the parent, such as flinging hands over face with fearful expression when mother enters room.

Many of the infants who displayed these behaviors came from samples characterized as high-risk due to low-incomes, maternal depression or other psychiatric disorders, maternal substance abuse, and parental maltreatment (Lyons-Ruth & Jacobvitz, 2008). Thus, Main and Hesse (1990) argued that disorganized behaviors may be the result of having mothers who engage in frightening or atypical behavior and who are themselves frightened while caregiving. For these infants, stressful situations become complicated because their mothers are both a source of fright as well as a potential source of safety. Because these infants cannot easily approach their frightening or frightened mothers, it appears that they develop working models in which they are unsure of how, or whether, they want to approach them. This "fright without solution" is thought to be the essence of disorganized attachment (Hesse & Main, 1999, p. 484; van IJzendoorn et al., 1999, p. 226).

Predictors of attachment disorganization

Given the link between attachment disorganization and subsequent problems, efforts have been made to identify factors that predict attachment disorganization. Much of this work has focused

on examining links between infant disorganization and maternal behavior and/or maternal characteristics and contexts that increase the likelihood of insensitive or pathological maternal behavior.

Maternal sensitivity and anomalous behaviors

When examining predictors of attachment security, maternal sensitivity has consistently been found to play a role. Sensitivity is defined as a caregiver's ability to accurately perceive and interpret her infant's signals, as well as her ability to respond both promptly and appropriately to them (Ainsworth et al., 1978). Infants with sensitive mothers are more likely to be securely attached, while infants with insensitive mothers are more likely to be insecurely attached (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2005). However, the link between sensitivity and disorganization is less consistent (NICHD Early Child Care Research Network, 1997; Spangler, 2013; van IJzendoorn et al., 1999). The inconsistent findings may be due to two methodological factors. First, in many studies of attachment, maternal sensitivity has been observed during brief, non-stressful, play interactions. However, maternal sensitivity during situations that elicit infant distress may be most central to the development of the attachment relationship because the attachment system is activated in situations in which infants are distressed or scared (Leerkes, 2011; McElwain & Booth-LaForce, 2006). Thus maternal sensitivity during distressing tasks may be a more robust predictor of attachment outcomes including disorganization than maternal sensitivity during non-distressing tasks. As such, we predict that global maternal insensitivity during distress-eliciting tasks will predict higher attachment disorganization.

It may also be the case that specific types of insensitive behaviors predict attachment disorganization more so than others, reducing the extent to which global indices of sensitivity predict attachment disorganization. Lyons-Ruth, Bronfman, and Parsons (1999) have argued, and demonstrated empirically, that infants whose parents engage in negative-intrusive behaviors, affective communication errors, disorientation, withdrawal, role confusion, and controlling behaviors are more likely to be disorganized. In fact, meta-analyses have demonstrated that children who have experienced anomalous parenting behaviors such as these, as well as frightened, threatening, or dissociative behaviors (Main & Hesse, 1990) are nearly four times more likely to form disorganized attachments than other infants (Madigan et al., 2006). However, Out, Bakermans-Kranenburg, and van IJzendoorn (2009), argued that extreme maternal insensitivity, including parental withdrawal and neglect, as well as intrusiveness, negative, aggressive, or otherwise harsh parenting behaviors predict attachment disorganization based on the observation that in other studies these behaviors predicted attachment disorganization even in the absence of frightened, frightening, disoriented, and role-reversed behaviors (Lyons-Ruth et al., 1999).

However, in their own study, Out et al. (2009) found that extreme insensitivity was not related to attachment disorganization. This may be due to the inclusion of passive forms of insensitivity, such as maternal withdrawal and non-responsiveness, which may be less predictive of disorganization than more overt forms of insensitivity. Consistent with this view, Wang, Cox, Mills-Koonce, and Snyder (2015) demonstrated that negative intrusiveness, a composite of negative regard, which included harshness, dismissiveness, or negative affect towards the child,

and intrusiveness, which included behaviors that the parents used to impose their own agendas on their children, assessed when infants were six months of age, predicted infant attachment disorganization at one year. Additionally, Beebe et al. (2012) has used a measure that includes a dimension for dyadic affective conflict when infants are distressed. This dimension includes maternal behaviors such as showing smiles or surprised faces in response to infant distress. According to Beebe and colleagues (2012), these reactions confuse infants and heighten their distress, making it more difficult for infants to feel that their mothers sense and acknowledge how they are feeling. These findings suggest that more overtly negative behaviors, such as negative-intrusiveness and behaviors in which mothers' affective responses are in conflict with their infants, put infants at an elevated risk for developing disorganized attachments.

In the current study, we examine whether three types of overtly negative maternal behaviors predict attachment disorganization. Negative behaviors such as the use of a harsh tone or insults, as well as physical intrusiveness or behaviors that interfere with the infant's autonomous efforts, such as insisting the infant touch a frightening toy, are behaviors that may confuse or scare infants when they are distressed. Additionally, maternal behaviors that reflect mismatched affect from infant behaviors, such as smiling or laughing at an infant's distress, are also insensitive, confusing, and even frightening and reflect affective communication errors. Mothers' utilization of these overtly negative maternal behaviors may be particularly likely to lead to infant disorganization.

Sociodemographic risk

Sociodemographic risk, defined as having a young, poorly educated mother and a low family income, may also play a role in the development of attachment disorganization. van IJzendoorn and colleagues (1999) found that in middle class, nonclinical samples, 14% of infants were classified as disorganized. The number rose to 24% in low SES samples. This may be a result of the greater number of life stressors that families with higher sociodemographic risk deal with on a daily basis. As these mothers must allocate more energy to dealing with these stressors, that may give them less energy to allocate to adaptive parenting, explaining the greater incidence of disorganization in low SES samples. Consistent with this view, Cyr and colleagues (2010) found that infants who were exposed to the cumulative effects of multiple socioeconomic risks (defined as exposure to five risks, including low income, low education, and adolescent mothers) were almost as likely to be disorganized as infants who were maltreated.

Sociodemographic risk may also moderate the extent to which maternal sensitivity and negative maternal behaviors are linked with infant attachment disorganization. Bernier and Mein's (2008) threshold model is consistent with this perspective. They postulated that infants have individual threshold levels, which at a higher level protect them from, and at a lower level make them more vulnerable to, disorganization caused by a breach in their thresholds by parenting behaviors. These levels are determined by individual infant characteristics or by social–environmental risk factors. According to this model, infants with higher sociodemographic risk will have lower threshold levels, making them more vulnerable to both overtly negative maternal behavior and global insensitivity. Infants with higher sociodemographic risk may be more likely to live in homes and neighborhoods with more chaos in the forms of noise, household crowding, and violence (Evans, Eckenrode, & Marcynyszyn, 2010), which can be considered fear inducing or

frightening. Global insensitivity and overtly negative maternal behavior may be especially damaging for infants dealing with truly fearful or frightening situations because their needs for safety may be more frequent and more salient than is the case for infants in more benign home contexts. This environment-by-environment interaction may explain why some infants become disorganized while others do not, as it is not just the presence of one negative factor, but of two, that leads to the development of a disorganized attachment.

Consistent with this view, careful inspection of the sample characteristics and effect sizes for the association between global insensitivity and infant attachment disorganization in the studies summarized in van IJzendoorn et al.'s meta-analysis (1999) demonstrate that the effect size is larger among low income samples (mean r weighted by sample size = .29) compared to middle income samples (mean r weighted by sample size = .13). Thus, we predict that global maternal insensitivity and overtly negative maternal behavior will be more strongly linked with attachment disorganization among infants living in high sociodemographic risk conditions (i.e., having a young, poorly educated mother and limited family income) relative to infants living in less risky sociodemographic conditions.

The present study

The goal of the present study is to examine whether two types of environmental factors, maternal behavior/sensitivity and sociodemographic risk, predict infant attachment disorganization. The following hypotheses will be tested: (1) high sociodemographic risk, global maternal insensitivity, and overtly negative maternal behavior will predict higher infant attachment disorganization; and (2) sociodemographic risk will moderate the relationships between both maternal sensitivity and overtly negative maternal behavior with infant disorganization such that global maternal insensitivity and negative maternal behavior will be more strongly linked with attachment disorganization in dyads at high sociodemographic risk than in dyads at low sociodemographic risk. In addition, given our sample is approximately half African American and half European American, we test race as a moderator of all associations. Based on prior research, we did not anticipate race differences in the pattern of associations (Bakermans-Kranenburg, van IJzendoorn, & Kroonenberg, 2004; Mesman, van IJzendoorn, & Bakermans-Kranenburg, 2012).

Method

Participants

The current sample was drawn from a larger study examining predictors of maternal sensitivity. The original sample included 259 primiparous mothers (128 European American, 131 African American). Mothers in the sample ranged from 18 to 44 (Mean = 25.1). Approximately 65% had at least some college level schooling, and annual family income ranged from poverty to over US$100,000, Median = US$35,000. The majority (71%) of mothers were married or living with their child's father, 11% were in a relationship but not living with their child's father, and 18% were single. All infants were full term and healthy; 125 (49%) were male and 129 (51%) were female.

The Strange Situation Procedure was completed by 208 participant dyads, but five were uncodeable due to video malfunctions, resulting in an analytic sample of 203.

Key reasons for attrition, missing data, or being withdrawn from the study include infant mortality (two cases), moving from the area and an inability to return for behavioral observations (19 cases), withdrawing from the study (five cases), and failure to schedule or complete data collection after multiple attempts to schedule (25 cases). There were no differences between those in the analytic sample and those not included, based on race, maternal age, family income, and child gender.

Procedures

Expectant mothers were recruited from childbirth classes, obstetric practices, and prenatal breastfeeding classes offered by the Special Supplemental Nutrition Program for Women Infants and Children (WIC), via flyers and presentations given by research staff members. Upon enrolling in the study, women were mailed their consent forms and a packet of questionnaires, including a demographic form. They were instructed to return their completed questionnaires to us when they visited the laboratory for an interview 6–8 weeks prior to their due dates. Upon completion of the questionnaires and the interview, participants received US$50 and a small gift. Mother were contacted by phone and visits were scheduled in our laboratory within two weeks of the child's six month birthday and one month of the child's 13 month birthday. Prior to each visit, mothers were mailed questionnaires to complete including updated demographic forms. At the six month and one year visits mothers and infants participated in a series of videotaped interactive tasks designed to elicit infant distress and to assess maternal behavior. Additionally, during the one-year visit, mothers and infants participated in the Strange Situation Procedure to assess infant–mother attachment security. For completing each visit, mothers received US$50 and US$100, respectively, and infants received a small toy.

Measures

Sociodemographic risk. Mothers' demographic risk was measured by self-report on the demographic form, and included income-to-needs, education, and maternal age. Mothers reported on their total family income and the number of household members. Income-to-needs is a measure of a family's cash income divided by the official poverty line for a family that size. Scores less than 1 reflect that a family is below the poverty line, scores between 1 and 2 reflect poverty/low income. Mothers reported their age in years. Education was scored from 1 to 7, with 1 indicating "some high school" education, 4 indicating a "2 year college degree," and 7 indicating a "graduate degree." Income-to-needs, education, and mother's age were standardized and averaged, and then multiplied by −1 to yield a single score in which high values reflect greater sociodemographic risk (Cronbach's alpha = .69).

Observed maternal sensitivity and behavior at six months and one year. During the six-month laboratory visit, infants and mothers participated in three videotaped distress-eliciting tasks. During the *arm restraint task*, designed to elicit frustration, infants were seated in a car seat while the experimenter kneeled in front of them and held their arms still while not interacting. During the *novelty task*, designed to elicit fear, infants were seated in their car seats in front of a

table with a short barrier that prevented a toy from falling into the infant's lap. A remote controlled dump truck with an action figure in it moved across the table and approached the infant twice. While sitting immobile in front of the infant, the truck vibrated and flashed its light while a voice sounded and the truck made sounds to mimic a horn and ignition. This sequence was repeated twice, and then the truck sat silent and immobile in front of the infant for one minute. Both of these tasks lasted for four minutes. Mothers were seated beside the infants and within reach of a toy basket. They were instructed for the first minute to stay in their chair and be neutral, unless they wanted to end the activity. For the remaining three minutes the mothers could do whatever they wanted except get the infant out of the seat or touch the toy truck during the novelty task.

Next, dyads participated in the *still-face task* (Tronick, Als, Adamson, Wise, & Brazelton, 1978). This task lasted for six minutes. The infants were seated in their car seats and the mothers were seated across from them so they were at eye level. For the first two minutes the mothers played with their infants as they normally would using their voice and hands. Then mothers were instructed to look away briefly and then look back at their infant with a still face for two minutes. Finally, the mothers looked away briefly and then were instructed to play with their infant as they normally would for two minutes. For this task, maternal behavior and sensitivity during the reengagement portion is the focus because infants were most likely to be distressed following the still-face episode.

During the one-year laboratory visit, infants and mothers participated in two videotaped distress-eliciting tasks. At the onset of both tasks the infants were seated on a rug on the floor. Before the *limitations task* began, a toy phone that lit up and played music was introduced to the infants and the infants were allowed to play with it for a minute. Once the infants seemed interested, the experimenter gently took the phone from the infants and put it in a clear plastic jar that the infants could not open on their own. The task began when the experimenter placed the jar on the floor near the infant. The infants were prompted by the experimenter to get the phone during the entire phone task. After the task, the jar was opened and the infants were allowed to play with the phone.

During the *novel character approach*, a research assistant dressed in a green ogre costume entered the room and stood quietly near the door for 10 seconds. The research assistant then spoke from a script in a neutral voice ("Hello, I'm an ogre. Do you know what an ogre is?") and addressed the infant by name. The research assistant slowly approached within two feet of the infant and crouched down while repeating the script. Then she crossed the room and danced while humming a nursery rhyme, and next slouched in a chair pretending to sleep while snoring loudly. After pretending to wake up, the research assistant approached the infant again, crouched down, and repeated the script until the task ended. Both of these tasks lasted for four minutes. Mothers were seated beside the infants and within reach of a toy basket. They were instructed for the first minute to stay in their chair and remain neutral/uninvolved. For the remaining three minutes the mothers could do whatever they wanted except open the jar during the first task or talk to or touch the research assistant dressed as the ogre during the second task.

Observed maternal sensitivity. Trained raters rated maternal sensitivity separately for each distressing task (six month: mother involved portions of arm restraint and novelty tasks, still face

reengage; and one year: mother involved portions of limitations and novel character approach tasks) using Ainsworth's global 9-point sensitivity 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, with the kappa = .77 at the six-month time point and .80 at the one-year time point. An overall maternal sensitivity during distress-eliciting tasks score was calculated by averaging the sensitivity ratings across six month and one year tasks to yield a highly reliable measure that reflects the quality of caregiving across the first year of life (Cronbach's alpha = .82).

Observed maternal behavior. Discrete maternal behaviors during the distress eliciting tasks at six-month and one-year 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. Maternal behavior was coded using 12 mutually exclusive categories described in Leerkes (2010), including: negative, intrusive, withdraw, mismatched affect, distracted from toddler, persistent ineffective, monitor, task focused, calming, supportive, non-task focused engagement, and routine care. Thirty cases were double-coded for reliability with kappa = .77 at the six-month time point and .80 at the one-year time point. Given the goals of the current report, we focused on the most overtly negative maternal behaviors in our coding scheme that most closely map onto behaviors found to predict attachment disorganization in other studies. These were negative (directs negative affect toward the infant), intrusive (forces own agenda on the infant), and mismatched affect (primarily, laughing or smiling in response to infant's distress). These behaviors were identified as being predictive of attachment disorganization in other studies about the origins of attachment disorganization. Scores reflecting the percentage of time mothers engaged in each of these three interactive behaviors across tasks were computed for both the six-month (arm restraint task, novelty task, and still-face) and one-year time points (limitations task and novel character approach) and then averaged over time to yield measures of the percentage of observation time in which mothers engaged in these overtly negative parenting behaviors.

The Strange Situation Procedure. Infant–mother attachment security was assessed at one year using the Strange Situation Procedure (Ainsworth, Blehar, Waters, & Wall, 1978; Ainsworth & Wittig, 1969). The Strange Situation Procedure is a 25-minute procedure, which contains brief episodes of increasing stress for the infant, including two mother–infant separations and reunions. The Strange Situation was administered according to standard procedures, and E. Carlson coded videotapes of all Strange Situations using both the standard three-way coding system and the four-way coding system, which includes rating the degree of disorganization for the entire SSP on a 9-point scale (Main & Solomon, 1990). Based on the four-way classification, 145 children were secure, eight insecure-avoidant, six insecure-resistant, and 44 disorganized (5 or higher on the disorganization scale). The disorganization scale ratings were chosen as the primary dependent variable, given that greater statistical power is afforded by using a continuous measure. However, we ran follow-up analyses using the D classification as well (0 = not disorganized, 1 = disorganized). Inter-rater reliability was established based on 30 double coded cases and was adequate: ICC = 0.6 for the D rating, Kappa = .66 for the four-way attachment classifications, .58 for the D classification.

Results

Preliminary analysis

Descriptive statistics were calculated for all primary variables and potential covariates and appear in Table 1. A total of 21.7% ($n = 44$) of the infants in the study scored a 5 or above on the disorganization scale. Additionally, there was a moderate correlation between overtly negative maternal behavior and maternal sensitivity ($-.32$), indicating that there is more unique than shared variance between the two scores. The majority of mothers (86.7%, $n = 176$) engaged in some amount of overtly negative maternal behavior, with 28 mothers (13.8%) engaging in it for 5% of the time or more. Maternal race and child gender were examined as possible covariates by examining their associations with attachment disorganization maternal sensitivity, overtly negative maternal behavior, and sociodemographic risk. European American women were rated as more sensitive, and had lower sociodemographic risk relative to African American women. Child gender was unrelated to all variables. Thus, maternal race was included as a covariate in primary analyses.

Table 1. Descriptive statistics for study variables.

Continuous Variables	N	Min	Max	Mean	Std. Dev
Race[a]	203			48.3	
Sociodemographic Risk	203	−2.15	1.43	−0.03	0.88
Maternal Age	202	18.00	44.00	25.33	5.41
Maternal Education	201	1.00	7.00	3.94	1.80
Income-to-needs	190	0.04	6.81	2.69	2.01
Global Maternal Insensitivity	203	1.50	7.92	5.03	1.45
Overtly Negative Maternal Behavior[b]	203	0.00	14.73	2.26	2.93
Disorganization	203	1.00	7.00	3.00	1.85

[a]Percentage of African American participants.
[b]Percentage of time mothers engaged in this behavior.

Zero-order correlations among primary variables and identified covariates are displayed in Table 2. As expected, maternal sensitivity and overtly negative maternal behavior were moderately negatively correlated. Overtly negative maternal behavior correlated positively with attachment disorganization, but global maternal insensitivity and sociodemographic risk were unrelated to disorganization.

Table 2. Intercorrelations among key variables.

	1	2	3	4	5
1. Race[a]	–				
2. Sociodemographic Risk	−.45**	–			
3. Global Maternal Insensitivity	.48**	−.62**	–		
4. Overtly Negative Maternal Behavior	−.10	.06	−.32**	–	
5. Disorganization Rating	.05	.09	−.11	.17*	–
6. Disorganization Classification	.05	.10	−.06	.01	.72**

[a]0 = African American, 1 = European American
*$p \le .05$, **$p \le .01$.

Hypothesis testing

All continuous variables to be involved in the interactions were centered (global maternal insensitivity, overtly negative maternal behavior, and sociodemographic risk). Two-way interactions were created by multiplying centered sociodemographic risk by centered global maternal insensitivity and overtly negative maternal behavior. Two regressions were run, a linear regression predicting disorganization scale scores, as well as a logistical regression predicting disorganization classification. Race, sociodemographic risk, global maternal insensitivity, and overtly negative maternal behavior were entered in step 1. Then, the two-way interactions between sociodemographic risk and both global maternal insensitivity and overtly negative maternal behavior were entered in step two. Results are presented in Table 3.

Table 3. Results of multiple linear regression and logistic regression predicting attachment disorganization.

		Linear Regression D Scale				Logistical Regression D Classification[a]		
		B	*SE B*	*β*	*R2*	*B*	*Odds Ratio*	*95% CI*
1.	Race[b]	.51	.30	.14	.05	.61	1.84	.85, 3.99
	SES	.20	.19	.10		.37	1.45	.86, 2.46
	Global Maternal Insensitivity	−.09	.13	−.07		−.05	.95	.68, 1.33
	Overtly Negative Maternal Behavior	.10	.05	.15*		.01	1.01	.89, 1.14
2.	SES X Maternal Insensitivity	−.32	.11	−.21**	.10	−.33*	.72	.51, .99
	SES X Maternal Behavior	.05	.06	.06		.15	1.16	.93, 1.46

[a]0 = Not disorganized, 1 = Disorganized
[b]0 = African American, 1 = European American
*$p \leq .05$, **$p \leq .01$.

Linear regression. Consistent with prediction, overtly negative maternal behavior predicted higher infant attachment disorganization independent of the covariates and global maternal insensitivity. This effect was not qualified by an interaction with sociodemographic risk. In contrast, global maternal insensitivity did not predict attachment disorganization as a main effect, but did interact with sociodemographic risk to predict attachment disorganization. As illustrated in Figure 1, global maternal insensitivity was only negatively associated with attachment disorganization among infants of mothers with higher sociodemographic risk, $β = −.21, p = .01$, and not lower sociodemographic risk, $β = .17$, ns. This model predicted 10% of the variability in attachment disorganization.

Logistic regression. Overtly negative maternal behavior did not predict the odds of being classified as disorganized. However, consistent with the results of the linear regression, the interaction between global maternal insensitivity and sociodemographic risk was a significant predictor of the odds of being classified as disorganized. The interaction was consistent with the slopes presented in Figure 1 such that global maternal insensitivity was only negatively associated with the odds of being classified as disorganized among high SES risk dyads, but not among low SES risk dyads.

Finally, we ran a third and fourth regression in which we tested all possible two-way and three-way interactions with maternal race in relation to the D rating and classification. None were significant, indicating that the effects were comparable for European American and African American dyads.
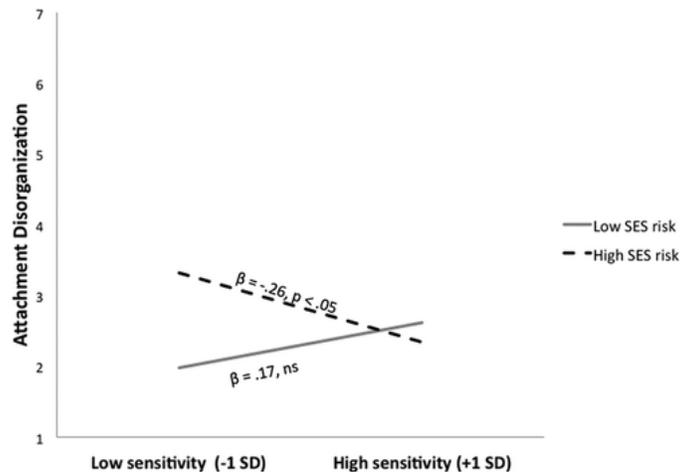

Figure 1. Moderating effect of sociodemographic risk in the association between global maternal insensitivity and attachment disorganization.

Discussion

The goal of this study was to examine predictors of infant attachment disorganization, which has been linked to negative outcomes into adulthood. Sociodemographic risk, global maternal insensitivity during distress-eliciting tasks, and overtly negative maternal behavior were identified as possible predictors. That overtly negative maternal behavior was linked to higher attachment disorganization is highly consistent with prior research as outlined below. Additionally, that global maternal insensitivity was linked with attachment disorganization only in the context of high sociodemographic risk is consistent with a dual-risk perspective and the threshold model.

The first goal of the study was to determine if sociodemographic risk, global maternal insensitivity to distress, and overtly negative maternal behavior predicted higher infant attachment disorganization. No main effects were found for sociodemographic risk or global maternal insensitivity. That we did not find an association between global maternal insensitivity and attachment disorganization may be due to the fact that the measure included both passive and overt forms of insensitivity. However, results of the linear regression indicated that infants whose mothers engaged in more overtly negative maternal behavior were rated higher on disorganization relative to infants whose mothers engaged in fewer of these types of behaviors, indicating that more overt forms of insensitivity may present a unique risk to infants. As these behaviors can be confusing or scary to infants, particularly when infants are already in a stressful situation such as the distress-eliciting observational tasks we employed, overtly negative behavior may make infants fearful of their mothers to whom they should be able to rely on for comfort, believed to be a key feature of disorganization's "fright without solution" dilemma (Hesse & Main, 1999, p. 484). This finding is consistent with prior research done by Wang et al.

(2015) in which negative intrusive parenting predicted attachment disorganization. Additionally, as the current coding scheme included mismatched affect behaviors, this result is consistent with Beebe's (2012) finding that infants were more likely to be disorganized if their mothers smiled or laughed when they were distressed. Therefore, these findings provide support to the view that more overt forms of negative maternal behavior are particularly relevant to the development of attachment disorganization.

However, the effect size for this association was small, and overtly negative maternal behavior did not predict the disorganization classification. This suggests that negative maternal behavior predicted variability in low levels of D behavior (i.e., scores between 1 and 4), but not the high levels of behavior that warrant a D classification (5 or greater). Thus overtly negative maternal behavior during distress eliciting tasks was not as strong a predictor of disorganization as has been the case in studies in which the full set of AMBIANCE or FR behaviors have been included. The small effect size may also be due to the fact that while the current sample is diverse, it was not an at-risk sample. Additionally, while the majority of mothers exhibited at least some negative behavior, the proportion of time they engaged in the behavior was relatively low. Therefore, although these findings suggest that even limited exposure to these types of negative maternal behaviors has the potential to contribute to low levels of disorganized behavior, more comprehensive inventories are needed to capture the maternal behaviors associated with higher levels and classifications of infant disorganization.

The second goal of the study was to determine if links between maternal insensitivity/behavior and infant disorganization varied as a function of sociodemographic risk. The association between overtly negative maternal behavior and disorganization, as described above, was not qualified by an interaction with sociodemographic risk, suggesting that it is problematic for the infant regardless of other stresses in the family system. Additionally, that maternal race was not associated with overtly negative maternal behavior suggests this type of behavior is equally prevalent across racial groups. Therefore, overtly negative maternal behavior is a promising indicator for inclusion in future work that attempts to identify larger arrays of maternal behaviors for screening purposes.

In contrast, sociodemographic risk interacted with global maternal insensitivity to predict both the disorganization rating and classification. Specifically, global maternal insensitivity was associated with higher attachment disorganization for infants of mothers with higher sociodemographic risk, but not for those of mothers with lower sociodemographic risk. This is consistent with van IJzendoorn et al.'s (1999) finding that the association between sensitivity and infant attachment disorganization is stronger in low SES samples relative to high SES samples. Additionally, these findings are consistent with the threshold model (Bernier & Meins, 2008) in which contextual characteristics, such as higher sociodemographic risk, may lower an individual's threshold, making it easier for negative parenting behaviors, such as global insensitivity, to breach the threshold and lead to disorganization. That this effect was significant independent of overtly negative maternal behavior suggests that other types of insensitivity such as non-responsiveness may play a role in the formation of attachment disorganization among families at heightened sociodemographic risk. In families in which there are more daily life stressors and chaos, as characteristic in families with greater sociodemographic risk (Evans et al., 2010), mothers may not be able to respond to every bid from their infants. Infants in these

contexts may be exposed to more fearful or frightening stimuli and need help from their mothers to deal with it. Therefore, having a non-responsive mother in these contexts may be especially harmful. It may also be the case that the nature of insensitive behaviors varies between mothers in high SES versus low SES families, with mothers in low SES families engaging in a higher rate of the types of insensitive behaviors linked with disorganization. Efforts to understand the mechanisms by which low SES amplifies the risk for disorganization among children of less sensitive mothers is an important direction for future research. We believe examining household chaos and typologies of insensitive behavior will be useful in this regard.

The current study contributes to our knowledge of the factors that predict infant attachment disorganization. The strengths of this study include the uniquely diverse sample in regards to sociodemographic risk and race, the relatively high rate of disorganization for a community sample, and the use of the Strange Situation Procedure, a gold standard measure. To our knowledge we are the first study to demonstrate that the predictors of disorganization do not vary based on race. That none of the study's results varied by race, indicating that these relationships were similar among European and African American dyads, further confirms the universality of attachment theory principles (Bakermans-Kranenburg et al., 2004; Mesman et al., 2012). Of unique interest is the careful coding of maternal behavior over two time points, and use of both a traditional global measure of sensitivity and micro coding of specific negative maternal behaviors in distressing contexts, which are highly likely to activate the attachment system. On the other hand, that this was a community sample rather than a risk sample could be viewed as a limitation as disorganization is particularly likely to develop in at-risk samples characterized by more chaotic child rearing arrangements and a greater number of life stressors (van IJzendoorn et al., 1999). Additional limitations include the relatively brief observations of maternal behavior in a laboratory setting as opposed to lengthier and more naturalistic home observations.

As infant attachment disorganization is associated with negative outcomes from infancy through adulthood, efforts are being made to identify the predictors in order to inform prevention and intervention programs. The most successful programs have focused on interventions with the aim of increasing maternal sensitivity (Bakermans-Kranenburg et al., 2005), which the current findings have indicated plays a role in disorganization for infants in higher sociodemographic risk environments. Programs focusing on maternal sensitivity should target younger, less educated mothers, and mothers with lower income-to-needs ratios, as infants of such mothers are at an elevated risk for disorganization if their mothers respond to their cues insensitively. The results of this study also indicate that even the presence of infrequent overtly negative maternal behavior contributes to infant disorganization. Parenting programs may need to address the effects that negative maternal behaviors have on infant development, in order to reduce the occurrence of such behaviors. Findings by Raby, Steele, Carlson, and Sroufe (2015), indicating that mothers who were disorganized as infants had a higher likelihood of having infants who were disorganized in the Strange Situation Procedure, suggest further the importance of examining the effects of maternal behaviors on infant attachment disorganization in order to prevent behaviors that may lead to intergenerational transmission. Additional research is also needed to identify factors that predict mothers' use of these more egregious behaviors in addition to unresolved states of mind with respect to attachment (Lyons-Ruth & Jacobvitz, 2008).

References

Ainsworth, M., Blehar, M.C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Oxford: Lawrence Erlbaum. [Google Scholar]

Ainsworth, M.D.S., Bell, S.M., & Stayton, D. (1974). Infant-mother attachment and social development. In M. P. Richards (Ed.), *The introduction of the child into a social world* (pp. 99–135). London: Cambridge University Press. [Google Scholar]

Ainsworth, M.D.S., & Wittig, B.A. (1969). Attachment and the exploratory behaviour of one-year-olds in a strange situation. In B.M. Foss (Ed.), *Determinants of infant behaviour* (Vol. 4, pp. 113–136). London: Methuen. [Google Scholar]

Bakermans-Kranenburg, M.J., van IJzendoorn, M.H., & Juffer, F. (2005). Disorganized infant attachment and preventive interventions: A review and meta-analysis. *Infant Mental Health Journal*, 26, 191–216. doi:10.1002/imhj.20046 [Crossref], [Web of Science ®], [Google Scholar]

Bakermans-Kranenburg, M.J., van IJzendoorn, M.H., & Kroonenberg, P.M. (2004). Differences in attachment security between African-American and white children: Ethnicity or socio-economic status? *Infant Behavior & Development*, 27, 417–433. doi:10.1016/j.infbeh.2004.02.002 [Crossref], [Web of Science ®], [Google Scholar]

Beebe, B., Lachmann, F.M., Markese, S., Buck, K.A., Bahrick, L.E., Chen, H., … Jaffe, J. (2012). On the origins of disorganized attachment and internal working models: Paper II. An empirical microanalysis of 4-month mother–infant interaction. *Psychoanalytic Dialogues*, 22, 352–374. doi:10.1080/10481885.2012.679606 [Taylor & Francis Online], [Web of Science ®], [Google Scholar]

Bernier, A., & Meins, E. (2008). A threshold approach to understanding the origins of attachment disorganization. *Developmental Psychology*, 44, 969–982. doi:10.1037/0012-1649.44.4.969 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Bowlby, J. (1969). *Attachment and loss: Vol. 1: Attachment*. New York, NY: Basic Books. [Google Scholar]

Bowlby, J. (1980). *Attachment and loss, Vol. 3: Loss, sadness and depression*. New York, NY: Basic Books. [Google Scholar]

Cyr, C., Euser, E.M., Bakermans-Kranenburg, M.J., & van IJzendoorn, M.H. (2010). Attachment security and disorganization in maltreating and high-risk families: A series of meta-analyses. *Development and Psychopathology*, 22, 87–108. doi:10.1017/S0954579409990289 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Evans, G.W., Eckenrode, J., & Marcynyszyn, L.A. (2010). Chaos and the macrosetting: The role of poverty and socioeconomic status. In G.W. Evans, T.D. Wachs, G.W. Evans, & T.D. Wachs (Eds.), *Chaos and its influence on children's development: An ecological perspective* (pp. 225–238). Washington, DC: American Psychological Association. doi:10.1037/12057-014 [Crossref], [Google Scholar]

Fearon, R.P., Bakermans-Kranenburg, M.J., van IJzendoorn, M.H., Lapsley, A., & Roisman, G.I. (2010).The significance of insecure attachment and disorganization in the development of children s externalizing behavior: A meta-analytic study. *Child Development*, 81, 435–456. doi:10.1111/j.1467-8624.2009.01405.x [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Hesse, E., & Main, M. (1999). Second-generation effects of unresolved trauma in nonmaltreating parents: Dissociated, frightened, and threatening parental behavior. *Psychoanalytic Inquiry, 19*, 481–540. doi:10.1080/07351699909534265 [Taylor & Francis Online], [Google Scholar]

Kochanska, G. (2001). Emotional development in children with different attachment histories: The first three years. *Child Development*, 72, 474–490. doi:10.1111/1467-8624.00291 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Leerkes, E.M. (2010). Predictors of maternal sensitivity to infant distress. *Parenting: Science and Practice*, 10, 219–239. doi:10.1080/15295190903290840 [Taylor & Francis Online], [Web of Science ®], [Google Scholar]

Leerkes, E.M. (2011). Maternal sensitivity during distressing tasks: A unique predictor of attachment security. *Infant Behavior & Development*, 34, 443–446. doi:10.1016/j.infbeh.2011.04.006 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Lyons-Ruth, K., Bronfman, E., & Parsons, E. (1999). Maternal frightened, frightening, or atypical behavior and disorganized infant attachment patterns. *Monographs of the Society for Research in Child Development*, 64, 67–96. doi:10.1111/1540-5834.00034 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Lyons-Ruth, K., & Jacobvitz, D. (2008). Attachment disorganization: Genetic factors, parenting contexts, and developmental transformation from infancy to adulthood. In J. Cassidy & P.R.

Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 666–697). New York, NY: Guilford Press. [Google Scholar]

Madigan, S., Bakermans-Kranenburg, M.J., van IJzendoorn, M.H., Moran, G., Pederson, D.R., & Benoit, D. (2006). Unresolved states of mind, anomalous parental behavior, and disorganized attachment: A review and meta-analysis of a transmission gap. *Attachment & Human Development*, 8, 89–111. doi:10.1080/14616730600774458 [Taylor & Francis Online], [Web of Science ®], [Google Scholar]

Main, M., & Hesse, E. (1990). Parents' unresolved traumatic experiences are related to infant disorganized attachment status: Is frightened and/or frightening parental behavior the linking mechanism? In M. T. Greenberg, D. Cicchetti, E. M. Cummings (Eds.), *Attachment in the preschool years: Theory, research, and intervention* (pp. 161–182). Chicago, IL: University of Chicago Press. [Google Scholar]

Main, M., & Solomon, J. (1990). Procedures for identifying infants as disorganized/disoriented during the Ainsworth strange situation. In M.T. Greenberg, D. Cicchetti, & E. Cummings (Eds.), *Attachment in the preschool years: Theory, research, and intervention* (pp. 121–160). Chicago, IL: University of Chicago Press. [Crossref], [Google Scholar]

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. doi:10.1037/0893-3200.20.2.247 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Mesman, J., van IJzendoorn, M.H., & Bakermans-Kranenburg, M.J. (2012). Unequal in opportunity, equal in process: Parental sensitivity promotes positive child development in ethnic minority families. *Child Development Perspectives*, 6, 239–250. doi:10.1111/j.1750-8606.2011.00223.x [Crossref], [Web of Science ®], [Google Scholar]

Moss, E., & St-Laurent, D. (2001). Attachment at school age and academic performance. *Developmental Psychology*, 37, 863–874. doi:10.1037/0012-1649.37.6.863 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

NICHD Early Child Care Research Network. (1997). The effects of infant child care on infant–mother attachment security: Results of the NICHD study of early child care. *Child Development*, 68, 860–879. doi:10.1111/j.1467-8624.1997.tb01967.x [Crossref], [Web of Science ®], [Google Scholar]

O'Connor, E., Bureau, J.-F., McCartney, K., & Lyons-Ruth, K. (2011). Risks and outcomes associated with disorganized/controlling patterns of attachment at age three years in the national institute of child health & human development study of early child care and youth development. *Infant Mental Health Journal*, 32, 450–472. doi:10.1002/imhj.20305 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Out, D., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2009). The role of disconnected and extremely insensitive parenting in the development of disorganized attachment: Validation of a new measure. *Attachment & Human Development, 11*, 419–443. doi:10.1080/14616730903132289 [Taylor & Francis Online], [Google Scholar]

Raby, K.L., Steele, R.D., Carlson, E.A., & Sroufe, L.A. (2015). Continuities and changes in infant attachment patterns across two generations. *Attachment & Human Development*, 17, 414–428. doi:10.1080/14616734.2015.1067824 [Taylor & Francis Online], [Web of Science ®], [Google Scholar]

Spangler, G. (2013). Individual dispositions as precursors of differences in attachment quality: Why maternal sensitivity is nevertheless important. *Attachment & Human Development*, 15, 657–672. doi:10.1080/14616734.2013.842065 [Taylor & Francis Online], [Web of Science ®], [Google Scholar]

Sroufe, L.A., Egeland, B., Carlson, E.A., & Collins, W.A. (2005). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. New York, NY: Guilford Publications. [Google Scholar]

Tronick, E., Als, H., Adamson, L., Wise, S., & Brazelton, T.B. (1978). Infants response to entrapment between contradictory messages in face-to-face interaction. *Journal of the American Academy of Child and Adolescent Psychiatry*, 17, 1–13. doi:10.1016/S0002-7138(09)62273-1 [Crossref], [Web of Science ®], [Google Scholar]

van IJzendoorn, M.H., Schuengel, C., & Bakermans-Kranenburg, M.J. (1999). Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development and Psychopathology*, 11, 225–249. doi:10.1017/S0954579499002035 [Crossref], [PubMed], [Web of Science ®], [Google Scholar]

Wang, F., Cox, M.J., Mills-Koonce, R., & Snyder, P. (2015). Parental behaviors and beliefs, child temperament, and attachment disorganization. *Family Relations: An Interdisciplinary Journal of Applied Family Studies*, 64, 191–204. doi:10.1111/fare.12120 [Crossref], [Web of Science ®], [Google Scholar]

Weinfield, N.S., Sroufe, L.A., Egeland, B., & Carlson, E. (2008). Individual differences in infant–caregiver attachment: Conceptual and empirical aspects of security. In J. Cassidy & P.R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 78–101). New York, NY: Guilford Press. [Google Scholar]