

Greater Maternal Insensitivity in Childhood Predicts Greater Electrodermal Reactivity During Conflict Discussions With Romantic Partners in Adulthood

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Abstract

In this study, we drew on prospective, longitudinal data to investigate the long-term predictive significance of the quality of early parent-child relationship experiences for adults' sympathetic nervous system (SNS) activity during conflict discussions with their romantic partners. Maternal sensitivity was repeatedly assessed across childhood via direct observations of mother-child interactions. When the children in the study became adults (34–37 years old), electrodermal activity—an index of SNS arousal and a psychophysiological marker of behavioral inhibition—was recorded for 37 participants while at rest and while they attempted to resolve conflicts in their romantic relationships. Individuals who had experienced less sensitive maternal caregiving during childhood had greater increases in electrodermal activity during conflict discussions with their adult partners, relative to resting conditions. This longitudinal association was not accounted for by observed or self-reported romantic-relationship quality, gender, ethnicity, or early socioeconomic factors.

Keywords

interpersonal relationships, childhood development, marital conflict

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One of the earliest and most provocative ideas in developmental science is that the quality of early parent-child relationships has long-term implications for individuals' interpersonal functioning across the life course, including their functioning in romantic relationships during adulthood (Bowlby, 1988; Collins & Sroufe, 1999; Hazan & Shaver, 1987). Although this hypothesis remains controversial (Kagan, 1996; Lewis, 1997), evidence from prospective, longitudinal studies in the past two decades demonstrates that childhood experiences with caregivers do predict adults' observed behaviors and self-reported thoughts and feelings in their romantic relationships (Conger, Cui, Bryant, & Elder, 2000; Roisman, Madsen, Hennighausen, Sroufe, & Collins, 2001; Simpson, Collins, & Salvatore, 2011).

In recent years, researchers interested in close-relationship processes have emphasized the value of also

examining adults' physiological responses during interactions with romantic partners. This expanding research agenda is motivated in part by the expectation that physiological measures can provide unique insights into adults' emotional responses during dyadic interactions. Specifically, these measures are thought to reflect automatic processes operating outside conscious awareness, and they are less susceptible to response biases than are self-report questionnaires and behavioral observations. Within this line of research, the autonomic nervous system in general and the sympathetic nervous system (SNS) in particular have been the focus of the most empirical

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inquiry, in part because changes in autonomic nervous system activity can be measured continuously and noninvasively. Electrodermal reactivity (i.e., changes in skin conductance levels, or SCLs) has been an especially valuable marker of SNS arousal because of its well-characterized involvement in the effortful inhibition of behavior (Fowles, 1980, 1988) and its role in deception (Meijer, Selle, Elber, & Ben-Shakhar, 2014).

Early research in this area established cross-sectional and longitudinal associations between SNS reactivity and the quality of adults' interactions with their romantic partners (e.g., Levenson & Gottman, 1983, 1985). To date, research addressing whether early interpersonal experiences play a role in organizing SNS reactivity in adults' interactions with their romantic partners has been limited to studies examining the association between the security of adults' mental representations (i.e., states of mind) of their childhood caregiving experiences and their autonomic responses during interactions with their romantic partners. Such investigations have consistently demonstrated that adults who have less secure states of mind respond to potential attachment-related threats, including conflict discussions with romantic partners, with greater electrodermal reactivity (e.g., Holland & Roisman, 2010; Roisman, 2007). Although these findings suggest that adults' early parent-child relationship experiences help organize their SNS responses during interactions with romantic partners, longitudinal data including assessments of caregiving experiences during childhood are needed.

To this end, we drew on prospective, longitudinal data from the Minnesota Longitudinal Study of Risk and Adaptation (MLSRA; Sroufe, Egeland, Carlson, & Collins, 2005), an ongoing 37-year longitudinal study of development from infancy to adulthood. We used these data to investigate the degree to which less supportive caregiving experiences during childhood predict greater SNS arousal—as indexed by electrodermal reactivity—during conflict discussions with romantic partners during adulthood. In light of the evidence that observational and self-report indices of romantic-relationship quality are associated with early parent-child relationships and with electrodermal reactivity, we also examined whether the longitudinal association between early parent-child relationships and adults' electrodermal responses was independent of the quality of the concurrent romantic relationship. Finally, we tested whether the association between early relationships and SNS reactivity was robust with respect to a set of commonly examined potential demographic confounds.

Method

Participants

Between 1975 and 1977, pregnant mothers who were living below the poverty line and receiving prenatal

services through the local health department in Minneapolis, Minnesota, were recruited to participate in the MLSRA. At the time of their first child's birth, 48% of the mothers were teenagers, 65% were single, and 42% had not completed high school. The children have participated in the study from their infancy through adulthood, and they are the target participants in this study. The current subsample consisted of 37 target participants (46% female, 54% male) who took part in an assessment of romantic-relationship functioning when they were 33 to 37 years old. All participants were contacted, and those who were in a relationship of at least 6 months' duration and living near the University of Minnesota were invited to participate in the study. (This second criterion was necessary because the physiological assessments had to be completed in person, either in the laboratory or in a participant's home.) No data were excluded. The average length of participants' romantic relationships was 8.1 years (range = 8 months to 18 years). This subsample did not differ significantly from the original sample ($N = 267$) with respect to maternal age, marital status, or maternal education at the time of the child's birth. In this subsample, 69% of the participants were non-Hispanic White, 4% were African American, 22% were multiracial, and 5% were Native American, Hispanic, or Asian American.

Procedure for the romantic relationship assessment

As part of an assessment of romantic relationship functioning, each adult participant and his or her partner separately completed a set of questionnaires regarding their perceptions of their current romantic relationship, including a form on which they listed the top three sources of conflict in the relationship. Both individuals were told that their partner would see their responses to only this questionnaire. Shortly after completing the relationship-conflict form, the partners were reunited, and physiological sensors were attached to each of them. After a brief habituation period, they completed a nontalking baseline task for approximately 3 min, during which they were asked to empty their minds of all thoughts and feelings and to breathe along with a tone that rose and fell in pitch. This paced-breathing procedure is commonly used to acquire a measure of resting physiological activity while holding respiration rate constant (e.g., Butler, Wilhelm, & Gross, 2006). After this, the couple completed a standard relationship-conflict discussion in which they identified a major area of disagreement in their relationship using the relationship-conflict forms they had completed previously. The couple then talked about and tried to resolve this problem as best they could. Each videotaped conflict discussion lasted 8 min.

Measures

Electrodermal reactivity. Electrodermal activity was measured continuously during both the baseline task and the conflict discussion. A small, constant voltage was passed between electrodes attached to the palmar surface of the distal phalanges of the second and fourth fingers of the nondominant hand. As in prior work (Holland & Roisman, 2010; Roisman, 2007), electrodermal reactivity was calculated by subtracting mean SCL during the baseline task from mean SCL during the conflict discussion. Electrodermal data were collected from both individuals; however, because information about early parent-child relationships was not available for the partners of the target participants, only data for the target participants were included in the analyses.

Observed romantic-relationship functioning. The conflict discussions were videotaped, and each partner's behavior was coded using the Positive and Negative Affect rating scales from the Interactional Dimensions Coding System (Kline et al., 2004). Affect ratings were made separately for each partner on scales from 1 to 9; lower scores reflected less expressed affect and higher scores reflected more expressed affect. All observations were double-coded, and intraclass correlations (two-way mixed, average measures) ranged from .84 to .89. Ratings for positive and negative affect were negatively correlated for target participants ($r = -.54, p < .01$) and their partners ($r = -.53, p < .01$). Thus, as in prior research (e.g., Holland & Roisman, 2010; Roisman, 2007), scores for observed romantic-relationship functioning were created by subtracting negative-affect ratings from positive-affect ratings.

Perceived romantic-relationship quality. Before the conflict discussion, each partner individually completed the Perceived Relationship Quality Components Scale (Fletcher, Simpson, & Thomas, 2000). This questionnaire assesses six interrelated components of perceived relationship quality: satisfaction, commitment, intimacy, trust, passion, and love. Each component was assessed by three questions, and responses were made on scales from 1 (lower) to 7 (higher). Fletcher et al. (2000) confirmed that these components are correlated and that they tap a higher-order relationship quality factor. Thus, responses to all 18 items were averaged to form a measure of overall relationship quality; higher scores indicated greater perceived relationship quality ($\alpha = .92$ for target participants; $\alpha = .89$ for their partners).

Maternal sensitivity during childhood. Developmentally appropriate ratings of maternal sensitivity were completed by trained coders. The ratings were based on

observational assessments of mother-child interactions conducted at seven ages: 3, 6, 24, 30, 42, and 72 months and 13 years. At the 3- and 6-month assessments, mother-infant pairs were observed in their homes during a feeding situation. Mothers were instructed to interact with their infants as they normally did. At the 6-month assessment, mother-infant interactions were also videotaped during semistructured play interactions. Each mother's ability to perceive and accurately interpret her infant's signals and respond appropriately and promptly was rated using Ainsworth's sensitivity scale, which ranges from 1 (lower) to 9 (higher; Ainsworth, Blehar, Waters, & Wall, 1978). At the 6-month assessment, the maternal sensitivity ratings from the feeding and play interactions were averaged.

At the 24- and 42-month assessments, mother-child interactions were observed in a laboratory setting while the children attempted to solve a series of tasks that were of gradually increasing complexity and ultimately became too difficult for the children to complete independently. Mothers were instructed to first allow their children to try to solve each task independently and then to give the children any help they thought was needed. The extent to which each mother was positively engaged while interacting with her child and helped the child feel comfortable with the task by providing a secure base (i.e., supportive presence) was rated using a scale from 1 (lower) to 7 (higher).

At the 30- and 72-month assessments, maternal caregiving quality was assessed using the Home Observation for Measurement of the Environment (Caldwell & Bradley, 1984), which measures the quality of the child's home environment and includes a protocol for naturalistic home observations and semistructured interview questions. The extent to which the mother recognized and appropriately responded to the child's behavior was indexed using the Emotional and Verbal Responsivity of Mother subscale (30 months: 11 items, $\alpha = .72$; 72 months: 6 items; $\alpha = .68$). At age 13 years, the target participants completed a set of collaborative problem-solving tasks with their mothers in a laboratory setting, and maternal supportive presence during these interactions was rated.

Interrater agreement for the 3-month sensitivity ratings was calculated using the Lawlis-Lu index (Tinsley & Weiss, 1975); agreement was defined as a discrepancy of 2 points or less. The T value was significant at .75, $p < .05$, for these ratings. This indicates moderate-to-high agreement. Interrater reliability for the 6-month sensitivity rating and the three supportive presence ratings (i.e., 24 months, 42 months, and 13 years) was calculated using intraclass correlations, which ranged from .84 to .89. A principal component analysis with all available data was used to reduce the measures of maternal caregiving quality. Results indicated that only one component had an eigenvalue greater than 1. This single component

Table 1. Descriptive Statistics for the Focal Variables

Variable	<i>M</i>	<i>SD</i>	Range
Electrodermal reactivity (μ S)	2.18	1.80	-0.25–7.58
Observed relationship functioning			
Target	-1.82	2.49	-7.00–2.50
Partner	-1.18	2.57	-6.00–4.00
Perceived relationship quality			
Target	6.13	0.77	3.87–7.00
Partner	6.22	0.55	4.64–6.94
Maternal sensitivity during childhood	-0.06	0.66	-1.41–1.19
Gender	0.46	0.51	0.00–1.00
Ethnicity	0.68	0.47	0.00–1.00
Maternal education (years)	12.61	1.54	10.00–16.14
Childhood socioeconomic status	22.33	8.49	10.00–43.64

Note: Observed relationship functioning was rated on a scale from 1 to 9. Perceived relationship quality was rated on a scale from 1 to 7. Maternal sensitivity was a standardized composite of ratings completed at seven different times. Higher values indicate better relationship quality and greater sensitivity. Gender was coded as 1 for female and 0 for male. Ethnicity was coded as 1 for non-Hispanic White and 0 for non-White. Childhood socioeconomic status was rated on a scale from 1 to 100, and higher scores reflected higher socioeconomic status.

accounted for 41% of the variance in the ratings of sensitive caregiving collected at the seven assessments, and loadings ranged from .53 to .70. Thus, the observational ratings from the seven assessments were standardized and averaged to create a composite measure reflecting each individual's cumulative experiences of sensitive maternal care during childhood ($\alpha = .74$).

Covariates. We selected four potential control variables that have been used consistently in research on the predictive significance of early maternal sensitivity (e.g., Fraley, Roisman, & Haltigan, 2013): child gender, child ethnicity, maternal education, and childhood socioeconomic status. Because most of the children in the MLSRA are non-Hispanic White, a binary variable was created to represent ethnicity (1 = non-Hispanic White, 0 = other). Information about the number of years of education each mother had completed was collected eight times during her child's life (3 months before the child's birth, birth, 42 months, grade 1, grade 2, grade 3, grade 6, and age 16). These data were averaged to create a composite measure of maternal education. Maternal socioeconomic status was assessed using the revised version of the Duncan Socioeconomic Index (Stevens & Featherman, 1981), a widely used indicator of occupational ranking. Scores can range from 1 to 100, and higher scores reflect greater occupational prestige. A composite measure of socioeconomic status was created by averaging scores at seven

points during the children's lives (42 months, 54 months, grade 1, grade 2, grade 3, grade 6, and age 16).

Results

Descriptive information for the variables used in this study is presented in Table 1. The positive average for electrodermal reactivity indicates that participants' SCLs were typically higher during the conflict discussion than during the baseline task. Both indicators of observed relationship functioning were negative, which indicates that, on average, participants and their partners demonstrated more negative than positive affect during the conflict discussions. On average, participants and their partners reported relatively high levels of perceived relationship quality. There was acceptable variability in the maternal sensitivity composite; 24% of the values were more than 1 standard deviation below the mean, and 16% were more than 1 standard deviation above the mean. For all variables, all values were within 3 standard deviations of the mean.

Results of the regression analyses are presented in Table 2; standardized regression coefficients are included as effect size estimates. First, greater maternal sensitivity during childhood predicted lower electrodermal reactivity during the conflict discussion¹ (Step 1). Individuals who experienced less sensitive, responsive, and supportive caregiving exhibited greater increase in skin conductance activity, relative to resting conditions, during the conflict discussions with their adult romantic partners.

Second, maternal sensitivity remained a statistically significant predictor of electrodermal reactivity after we controlled for observed and self-reported indicators of current relationship quality obtained from both target participants and their partners (Step 2). In contrast to the associations between electrodermal reactivity and earlier caregiving experiences, associations between electrodermal reactivity and current romantic relationship quality were not statistically significant.

Third, the association between maternal sensitivity during childhood and later electrodermal reactivity remained statistically significant when we controlled for early socioeconomic factors as well as child gender and ethnicity. Participants' gender was also associated with electrodermal reactivity, such that women had significantly greater skin conductance responses than did men. However, this gender difference did not explain the negative association between maternal sensitivity during childhood and electrodermal reactivity in adulthood. Moreover, the interaction between gender and sensitivity of maternal caregiving also was not significant in predicting target participants' electrodermal reactivity. Thus, the association between maternal sensitivity and later electrodermal reactivity was similar for men and women.

Table 2. Results of the Regression Analyses: Predicting Participants' Electrodermal Reactivity During the Conflict Discussions From the Maternal Sensitivity They Experienced in Childhood

Predictor	<i>b</i>	<i>SE</i>	β	<i>p</i>
Step 1				
Maternal sensitivity during childhood	−0.94	0.43	−0.33	.03
Step 2				
Maternal sensitivity during childhood	−0.98	0.46	−0.36	.02
Observed relationship functioning				
Target	0.05	0.13	0.07	.70
Partner	0.04	0.13	0.07	.69
Perceived relationship quality				
Target	−0.11	0.41	−0.05	.79
Partner	0.13	0.56	0.04	.82
Step 3				
Maternal sensitivity during childhood	−1.05	0.51	−0.38	.04
Observed relationship functioning				
Target	0.16	0.13	0.22	.19
Partner	0.01	0.12	0.01	.96
Perceived relationship quality				
Target	−0.04	0.38	−0.02	.92
Partner	0.08	0.53	0.02	.88
Gender	1.43	0.54	0.40	.01
Ethnicity	−0.92	0.60	−0.24	.12
Maternal education	0.08	0.30	0.07	.78
Childhood socioeconomic status	0.03	0.04	0.12	.55

Note: Gender was coded as 1 for female and 0 for male. Ethnicity was coded as 1 for non-Hispanic White and 0 for non-White.

Discussion

This longitudinal study provides novel evidence that the quality of individuals' experiences with caregivers during childhood predicts their electrodermal responses during interactions with their romantic partners during adulthood. Specifically, adults who had experienced more insensitive maternal care manifested greater increases in electrodermal activity—an index of SNS arousal and a psychophysiological marker of behavioral inhibition—during conflict discussions with their romantic partners relative to baseline. This longitudinal association was not attributable to quality of the romantic relationship or to a range of demographic covariates (i.e., gender, ethnicity, and childhood socioeconomic factors).

These findings extend understanding of the long-term significance of early caregiving experiences for adults' functioning in romantic relationships. They demonstrate that early supportive parent-child experiences may play a

role in organizing not only adults' observed and self-reported emotional responses during interactions with their romantic partners—as other reports have documented (e.g., Roisman et al., 2001; Simpson, Collins, & Salvatore, 2011)—but also their sympathetically mediated electrodermal responses. Moreover, we found that the sensitivity of early caregiving predicted our adult participants' electrodermal responses after we accounted for self-report and observational measures of participants' romantic relationship functioning. This finding indicates that early parent-child relationships may have a unique role in shaping adults' autonomic responses (over which conscious control is thought to be relatively limited) during dyadic interactions.

By providing evidence that early caregiving is associated with electrodermal reactivity in adulthood, the current study provides a necessary foundation for future research, which should focus on (a) identifying subsets of individuals for whom the magnitude of the effect is larger or smaller and (b) explaining the developmental processes that account for this association. In particular, adults' mental representations of their earlier caregiving experiences and their emotional well-being (e.g., neuroticism, depression, or anxiety) might be mechanisms by which maternal insensitivity during childhood influences SNS responses in romantic relationships during adulthood. Because relatively large sample sizes are required for adequately powered tests of mediation and moderation, future studies with samples larger than ours are best suited for investigating these issues.

Given the potential importance of these findings and the relatively small sample size of this study, these results need to be replicated with additional longitudinal data in larger samples. In addition, in future work, researchers could study a wider range of physiological systems (e.g., central nervous system activity or hypothalamic-pituitary-adrenal axis functioning) within a wider range of adult relationship contexts (e.g., parent-child relationships) than was possible in the current study. Such efforts are important directions for refining understanding of the long-term significance of early parent-child relationships for interpersonal functioning across the life course.

Author Contributions

K. L. Raby, J. A. Simpson, and W. A. Collins developed the study concept. All authors contributed to the study design. K. L. Raby performed the data analyses. K. L. Raby drafted the manuscript, and all authors provided critical revisions. All authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Note

1. Follow-up analyses indicated that measures of maternal sensitivity at (a) early childhood (average of ratings at 3, 6, 24, 30, and 42 months), (b) later childhood (72 months), and (c) early adolescence (13 years) did not differ in their ability to predict electrodermal reactivity.

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