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Maternal Insensitivity in Childhood Predicts Greater Electrodermal Reactivity during Conflict Discussions with Adult Romantic Partners

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Abstract

This study leveraged 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. During adulthood (ages 34–37 years), electrodermal activity—an index of SNS arousal and a psychophysiological marker of behavioral inhibition—was recorded for 37 participants at rest and while they attempted to resolve a conflict in their romantic relationships. Compared to individuals who had more sensitive maternal caregivers during childhood, individuals who experienced less sensitive early care experienced greater electrodermal activity during conflict discussions with their adult partners over resting conditions. This longitudinal association was not accounted for by concurrent romantic relationship quality, gender, ethnicity, or early socioeconomic factors.

One of the earliest and most provocative ideas in developmental science is that the quality of early parent-child relationship experiences has long-term implications for individuals' interpersonal functioning across the life-course, including in relationships with romantic partners in adulthood (Bowlby, 1988; Collins & Sroufe, 1999; Hazan & Shaver, 1987). Although this hypothesis remains controversial (Kagan, 1996; Lewis, 1997), in the last two decades prospective, longitudinal evidence has accumulated demonstrating 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, & Salvatore, 2011).

In recent years, romantic relationship scholars 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 provide unique insights into adults' emotional responses during dyadic interactions, both because these measures reflect automatic processes operating outside conscious awareness and because they are less susceptible to response biases compared to self-report questionnaires and behavioral observations. Within romantic relationship research, the autonomic nervous system (ANS) generally and the sympathetic nervous system (SNS) in particular have been the focus of the most empirical inquiry, in part because changes in the activity of the ANS can be measured continuously in a non-invasive manner. Electrodermal reactivity (i.e., changes in skin conductance levels) has been an especially valuable marker of SNS arousal due to 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 on the autonomic correlates of adults' romantic relationships established cross-sectional and longitudinal associations between SNS reactivity and the quality of adults' interactions with romantic partners (e.g., Levenson & Gottman, 1983; Levenson & Gottman, 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 autonomic correlates of adults' secure versus insecure states of mind about their childhood caregiving experiences. 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' histories of parent-child relationship experiences help organize their SNS responses during interactions with romantic partners, longitudinal data of prospectively assessed caregiving experiences are needed.

To this end, the current study leveraged 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, 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 summarized earlier that romantic relationship quality is associated with early parent-child relationship experiences and electrodermal reactivity, we also examined whether the longitudinal association between early parent-child relationship experiences and adults' electrodermal responses was independent of concurrent romantic relationship quality. Finally, we tested whether the association between early relationship experiences and SNS reactivity was robust with respect to a set of “usual suspect” 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 completed less than a high school education. These children were followed from infancy into adulthood, and they represent the target participants in this study. The current subsample consisted of 37 target participants (46% female) who were recruited for a romantic relationship assessment when they were between the ages of 33 and 37 years. All participants who were in a relationship of at least 6 months and living within proximity of the University of Minnesota were recruited 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 each participant's home). The current subsample consists of all couples that participated—no data were excluded. The average romantic relationship length was 8.1 years (range = 8 months to 18 years). Importantly, 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 individuals were White/non-Hispanic, 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, adult participants and their partners separately completed a set of self-report questionnaires regarding their perceptions of their current romantic relationship, including a form on which they listed the top three sources of conflict in their relationship. Both individuals were informed that this form would be the only questionnaire that their partner would see. Shortly after completing the relationship problem questionnaire, both individuals were reunited and physiological sensors were attached to each of them. Following a brief habituation period, both individuals participated in a non-talking baseline task for approximately 3 minutes 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). Following this, each couple completed a standard relationship conflict discussion in which they identified a major area of disagreement in their relationship using the problem-topic forms they had completed previously. Couples then talked about and tried to resolve this problem as best they could. Each videotaped conflict discussion lasted 8 minutes.

Measures

Electrodermal reactivity—Electrodermal activity was measured continuously during both the resting period and the conflict discussion. A small, constant voltage was passed between electrodes attached to the palmar surface of the last phalanxes of the second and fourth fingers of the non-dominant hand, and skin conductance levels (SCL) were measured

in microsiemens. Consistent with prior work (Holland & Roisman, 2010; Roisman, 2007), electrodermal reactivity was calculated by subtracting mean SCL during the baseline task from mean levels during the conflict discussions. Electrodermal data were collected from both individuals but, because information about earlier parent-child relationship experiences was not available for partners, only data for target participants were included in analyses.

Observed romantic relationship functioning—Each partner's behavior during the conflict discussion task was coded from the videotapes using the Positive and Negative Affect rating scales from the Interactional Dimensions Coding System (Kline et al., 2004). Both affect ratings were made separately on a 9-point scale for each partner, with lower scores reflecting less and higher scores reflecting 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 above -.50 for target participants and their partners. Thus, consistent with prior research (e.g., Holland & Roisman, 2010; Roisman, 2007), observed romantic relationship functioning scores were created by subtracting negative from positive affect.

Perceived romantic relationship quality—Before the conflict discussion, both partners individually completed the Perceived Relationship Quality Components Scale (PRQC; 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 7-point scales. Fletcher et al. (2000) confirmed that these components are correlated and tap a higher-order relationship quality factor. Thus, responses to all 18 items were averaged to form a measure of overall relationship quality, with higher scores indicating 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 based on observational assessments of mother-child interactions collected at seven assessments, spanning infancy to early adolescence. When participants were three and six months old, mother-infant pairs were observed in the home during a feeding situation in which mothers were instructed to interact with their infant as they normally did; at six months, mother-infant interactions were also videotaped during semi-structured 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 9-point sensitivity scale (Ainsworth, Blehar, Waters, & Wall, 1978). When participants were 24 and 42 months old, mother-child interactions were observed in a laboratory while children attempted to solve a series of tasks that gradually increased in complexity, ultimately becoming too difficult for the child to complete independently. Mothers were instructed to first allow the child to try to independently solve each task and then to give the child 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 was assessed with a 7-point rating of each mother's supportive presence. When participants were 30 months and 72 months old,

maternal caregiving quality was assessed using the Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984), which measures the quality of the child's home environment based on naturalistic home observations and semi-structured interview questions. The extent to which the mother recognized and appropriately responded to the child's behavior was indexed using the emotional and verbal responsiveness sub-scale (30 months: 11 items, $\alpha = .72$; 72 months: 6 items; $\alpha = .68$). At age 13 years, maternal supportive presence was rated based on observations of adolescent participants and their parents completing a set of collaborative problem-solving tasks in a laboratory setting.

Interrater agreement for the three-month sensitivity ratings was calculated using the Lawlis-Lu index (Tinsley & Weiss, 1975), with agreement defined as a discrepancy of 2 points or less. The Lawlis-Lu χ^2 was significant at $p < .05$, with a T value of .75, indicating moderate-to-high agreement. Interrater reliability for the six-month sensitivity rating and the three supportive presence ratings was calculated using intraclass correlations, which ranged from .84 to .89. A principal components 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 accounted for 41% of the variance in the ratings of sensitive caregiving collected across the seven ages with loadings ranging from .53 to .70. Thus, the observational ratings from infancy to early adolescence 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 consistently used 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 White/non-Hispanic, a binary variable was created to represent ethnicity (1 = White/non-Hispanic, 0 = otherwise). Information about the number of years of education each mother had completed was collected at eight assessments during childhood and adolescence (3 months before the child's birth, birth, 42 months, grades 1–3, grade 6, and age 16) and was averaged to create a composite measure of maternal education. Socioeconomic status was assessed with Duncan's Socioeconomic Index (Stevens & Featherman, 1981), a widely used indicator of occupational ranking. A composite measure of socioeconomic status was created by averaging information regarding the mother's occupational status collected at seven assessments during childhood and adolescence (42 months, 54 months, grades 1–3, grade 6, and age 16).

Results

Descriptive information for the variables used in this study is presented in Table 1. The average for electrodermal reactivity was positive, indicating that participants' skin conductance levels were typically higher during the conflict discussions relative to the baseline task. Both indicators of observed relationship functioning were negative, indicating 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. More specifically, 24% of the values were less than one *SD* below the mean, and 16% were higher than one *SD* above the mean. For all variables, all values were within 3 *SDs* of the mean.

Results of the regression analyses are presented in Table 2, and standardized regression coefficients were included as effect size estimates. First, maternal sensitivity during childhood predicted lower electrodermal reactivity during the adult romantic relationship interactions¹ (Step 1). Individuals who experienced less sensitive, responsive, and supportive caregiving experienced more skin conductance activity during the conflict discussions with their adult romantic partners relative to resting conditions. Second, maternal sensitivity remained a statistically significant predictor of electrodermal reactivity after controlling for observed and self-reported indicators of current relationship quality from both target participants and their partners (Step 2). In contrast to the associations with 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 was robust to controls for early socioeconomic factors as well as child gender and ethnicity. In these analyses, participants' gender also was associated with electrodermal reactivity, such that females had significantly greater skin conductance responses than males. 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 sensitive caregiving also was not significant in predicting target participants' electrodermal reactivity, indicating that the predictive effect of maternal sensitivity for later electrodermal reactivity was similar for males and females.

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 adult romantic partners. Specifically, adults with histories of insensitive maternal care manifested greater electrodermal activity—an index of sympathetic nervous system arousal and a psychophysiological marker of behavioral inhibition—during conflict discussions with their romantic partners over resting conditions. This longitudinal association was *not* attributable to current romantic relationship quality or a range of demographic covariates, including gender, ethnicity, and socioeconomic factors during childhood.

These findings extend our understanding of the long-term significance of early caregiving experiences for adult romantic relationship functioning by demonstrating that early supportive parent-child experiences may play a role in organizing not only adults' observed and self-reported emotional responses during romantic relationship interactions—as other reports have documented (e.g., Roisman et al., 2001; Simpson et al., 2011)—but also their sympathetically-mediated electrodermal responses. Moreover, the evidence that early

¹Follow-up analyses comparing the predictive significance of early maternal sensitivity (average of ratings between 3- and 42-months) and maternal sensitivity during later childhood (72 months) and early adolescence (13 years) provided no evidence that any of the maternal sensitivity variables were better or worse predictors of electrodermal reactivity.

sensitive caregiving predicts adults' electrodermal responses after accounting for self-report and observational aspects of romantic relationship functioning indicates that early parent-child relationships may have a unique role in shaping adults' autonomic responses during dyadic interactions, which are thought to be under less conscious control.

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

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. Such efforts—combined with efforts to study a wider range of physiological systems (e.g., central nervous system activity or HPA axis functioning) and additional adult relationship contexts (e.g., parent-child relationships) than was possible in the current study—are important directions for refining our understanding of the long-term significance of early parent-child relationships for interpersonal functioning across the life-course.

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Table 1

Descriptive Statistics for Focal Variables

	<i>M</i>	<i>SD</i>	Min	Max
Electrodermal reactivity	2.18	1.80	-0.25	7.58
Target: observed relationship functioning	-1.82	2.49	-7.00	2.50
Partner: observed relationship functioning	-1.18	2.57	-6.00	4.00
Target: perceived relationship quality	6.13	0.77	3.87	7.00
Partner: perceived relationship quality	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	12.61	1.54	10.00	16.14
Childhood socioeconomic status	22.33	8.49	10.00	43.64

Note: Gender was coded 1=female, 0=male. Ethnicity was coded 1=White/non-Hispanic, 0=non-White.

Table 2

Predicting Electrodermal Reactivity during Adult Romantic Conflict Discussions from Maternal Sensitivity in Childhood

	B	SE	β	p
Step 1				
Maternal sensitivity during childhood	-0.94	0.43	-.33	.03
Step 2				
Maternal sensitivity during childhood	-0.98	0.46	-.36	.02
Target: observed relationship functioning	0.05	0.13	.07	.70
Partner: observed relationship functioning	0.04	0.13	.07	.69
Target: perceived relationship quality	-0.11	0.41	-0.05	.79
Partner: perceived relationship quality	0.13	0.56	.04	.82
Step 3 Partner: observed relationship functioning				
Maternal sensitivity during childhood	-1.05	0.51	-.38	.04
Target: observed relationship functioning	0.16	0.13	.22	.19
Partner: observed relationship functioning	0.01	0.12	0.01	.96
Target: perceived relationship quality	-0.04	0.38	-.02	.92
Partner: perceived relationship quality	0.08	0.53	.02	.88
Gender	1.43	0.54	.40	.01
Ethnicity	-0.92	0.60	-.24	.12
Maternal education	0.08	0.30	.07	.78
Childhood socioeconomic status	0.03	0.04	.12	.55

Note Gender was coded 1=female, 0=male. Ethnicity was coded 1=White, 0=non-White.