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Disrupting the Dyad:

Effects of Parenting Stress on Infant Social-Emotional Development

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A Master's Thesis in Public Health

Yale University
School of Public Health
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Global Health Concentration

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Abstract

BACKGROUND. Social-emotional development in infancy can be compromised by exposure to violence, parental mental illness and other factors that interfere with a caregiver’s ability to anticipate and respond to an infant’s needs. Parenting stress may influence social-emotional development in the same way. In the context of disturbances to parental care, stress on the caregiver is known to adversely affect infant social-emotional development. However, there is limited empirical evidence explicitly examining the impact of parenting stress (as it is measured in this analysis).

OBJECTIVES. To examine the effect of maternal parenting stress on the social-emotional development of infants born to young, urban mothers, and to investigate the role of infant temperament as a potential mediator of this relationship.

METHODS. Data come from postpartum interviews with 711 participants in a prospective, randomized controlled trial promoting reproductive health through group prenatal care. At baseline, participants were in their second trimester of pregnancy and ranged in age from 14 to 25 years old. Baron and Kenny’s (1986) four-step methodology was used to determine whether infant temperament mediates the association between parenting stress and any of six indicators of social-emotional development: sleeping dysregulation, eating dysregulation, inhibition and separation problems, attention skills, negative emotionality and positive emotionality.

RESULTS. Lower levels of parenting stress predicted better infant temperament at six months and better social-emotional development at one year. Infant temperament also mediated the relationship between parenting stress and each social-emotional development indicator.

CONCLUSIONS. Findings demonstrate that parenting stress is a risk factor for suboptimal social-emotional development. Infant temperament appears to mediate the impact on the mother-infant dyad, which drives the adverse effects of parenting stress on infant development.

Key Words

Infant development, infant temperament, parenting stress, social emotional development, young mothers



Introduction

The first year of life is a period of unparalleled growth, but it does not happen on its own. Just as infants require proper nutrition to thrive physically, their social and emotional development depends on a stimulating and nurturing care environment. Although the social and emotional components of development are distinct from one another—and are often studied as such—the two are “fundamentally intertwined,”¹ particularly in early childhood. The nature of a child’s engagement with his or her environment and the people in it evolves rapidly during infancy. This social-emotional competence encompasses the ability to experience and express emotions, and to interact and form relationships with caregivers and other members of the infant’s family and community.^{2,3} In this study, we examine the effect of parenting stress on six indicators of social-emotional development among infants born to young, urban mothers and consider the possible mediating effect of infant temperament.

Social-emotional competence achieved in infancy and early childhood sets the stage for mental health and wellbeing throughout a child’s development. Although suboptimal social-emotional competence in the first few years of life does not guarantee any specific adverse outcomes in later years, inhibition of

social-emotional development in infancy does increase the likelihood of future difficulties in social development and emotional regulation.⁴

Contemporary models of early social-emotional development emphasize the interaction between emerging infant perceptual and cognitive skills and individual differences in parenting and the care environment.⁴ Characteristics of the caregiver-infant dyad play a central role in determining the parameters of an infant's social-emotional competency; parenting behaviors that negatively affect development have a lasting impact on a child's wellbeing.⁵⁻⁸ However, risk factors for suboptimal development can be found in all levels of the infant's social-emotional environment: concerns related to general surroundings, including poverty⁹⁻¹² and exposure to violence;¹³ determinants of the parent's wellbeing, such as psychiatric illness¹⁴⁻¹⁶ and substance abuse;¹⁷⁻¹⁹ and biological considerations like prematurity.²⁰⁻²² A mother's maturity and decision-making capacity can also be critical, as demonstrated by the specific dynamics of the adolescent mother-infant dyad.^{23,24}

Whereas an individual risk factor may act independently on infant social-emotional development, understanding of the interactions that lead to suboptimal development is increasingly informed by a model of cumulative risk.²⁵ This paradigm implies that the best prediction of adverse effects comes from the overall level of risk, determined by the aggregate number of risk factors present.

Each risk factor represents a negative influence imposed on one or both members of the caregiver-infant dyad. Similarly, parenting stress—stress directly related to being a parent (e.g., unexpected lifestyle changes, feelings of isolation, dissatisfaction with parenthood, etc.)—may impact the relationship between parent and child. In fact, the premise that disturbances to parental care negatively influence infant development is well established.²⁶ However, these interferences that impose stress on the caregiver and affect parenting come in many forms. Parenting stress, as it is measured in this analysis, has not been studied as extensively as some other stressors that have an impact on parenting. In addition, there is a known association between parenting stress and perception of infant temperament. Caregivers with high levels of parenting stress are more likely to perceive their infants as having difficult behavior,^{27,28} which can interfere with parental care.²⁹ Perceived infant temperament may mediate the effect of parenting stress on social-emotional development.

The objectives of this study are to: examine the effect of maternal parenting stress on the social-emotional development in the first year of life; and investigate the role of infant temperament as a potential mediator of this relationship. To our knowledge, this is both the first investigation of the association between parenting stress and social-emotional development in a population exclusively composed of young, urban mothers and their infants, and the first attempt to examine the involvement of infant temperament in the mechanism through which this effect occurs.

Methods

PARTICIPANTS AND PROCEDURES

Data from this study come from baseline and follow-up interviews with adolescent girls and young women participating in a prospective, randomized controlled trial designed to promote optimal reproductive and general health through group prenatal care. The participants, who ranged in age from 14 to 25 years old at baseline, were followed from the second trimester of pregnancy (<24 weeks gestation at the initial assessment) through one year postpartum. The trial was conducted in public clinics in New Haven, Connecticut and Atlanta, Georgia. All procedures were approved by the Human Investigation Committees at Yale University and Emory University, as well as by the Institutional Review

Boards at the study centers. This study, including its participant selection process and data collection methods, has been described previously.^{30,31}

Of the 1,047 participants, 730 (70%) completed the child psychosocial and behavioral sections at the six-month and one-year postpartum assessments. Nineteen of these participants were not included due to missing data from the third-trimester assessment, resulting in a final sample size of 711. There were no significant demographic differences between the participants included in the final sample and those excluded ($n = 336$). All analyses controlled for experimental group membership.

MEASURES

Parenting Stress

Parenting stress was evaluated at six months postpartum using the short form of the Parental Stress Index.³² Our assessment included the 24 items that make up the parental stress and parent-child dysfunction subscales. Responses were recorded using a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). For this study, we used the measure of total parenting stress—indicating more parental stress and greater parent-child dysfunction ($\alpha = 0.88$).

Infant Temperament

Infant temperament was evaluated at six months postpartum using the Revised Infant Temperament Questionnaire (R-ITQ).³³ Developed as a screening tool to assess difficult temperament in infancy, the R-ITQ is a shorter version of the original Infant Temperament Questionnaire. Our assessment included 10 items that were 1) relevant to the infants' age and 2) included in the positive or negative emotionality subscales. Using a six-point scale, ranging from 1 (almost never) to 6 (almost always), participants were asked to rate their infant's behavior in different situations. For this study, we used the measure of total positive infant temperament—a sum of the positive emotionality subscale items and the reverse scores of the negative emotionality items ($\alpha = 0.70$).

Infant Social-Emotional Development Outcomes

Infant social-emotional development was evaluated using five subscales from the Infant-Toddler Social Emotional Assessment (ITSEA), which was designed to assess typical and potentially problematic social behaviors in early childhood.³⁴ The subscales each measure one element of social-emotional development: dysregulation (10 items), inhibition and separation problems (8 items, $\alpha = 0.79$), attention skills (5 items, $\alpha = 0.63$), negative emotionality (5 items, $\alpha = 0.81$) and positive emotionality (3 items, $\alpha = 0.74$). The dysregulation subscale has two components, sleeping (5 items, $\alpha = 0.66$) and eating (5 items, $\alpha = 0.65$), which we considered independently. Responses were given using a three-point scale, ranging from 0 (not at all true) to 2 (very true).

Demographic Variables

All demographic variables were evaluated during the baseline assessment. Participants' age and level of education attained at the time of enrollment were recorded. Participants were also asked if they were currently in school. Race was categorized as African-American, Latina, White or other. Employment status at enrollment was recorded as working full time, working part time or not working. Participants' main source of financial support was categorized as own job, husband or boyfriend, parent or guardian, other relatives and other.

DATA ANALYSIS

To establish whether parenting stress is associated with any of the six social-emotional development indicators, and whether infant temperament mediates any of these relationships, we followed the steps

recommended by Baron and Kenny.³⁵ These steps involve a series of linear regressions to estimate the paths shown in *Figure 1* and are described in detail in the Results section. The Sobel test³⁶ was used to assess the statistical significance of mediation.

It is important to note that directionality varies among the measures included in these models. Parenting stress, sleeping dysfunction, eating dysfunction, inhibition and separation problems, and negative emotionality are all negative measures. That is, a higher score in each of these scales indicates greater problems: more parenting stress, more dysfunction, etc. In contrast, infant temperament, attention skills and positive emotionality are positive measures. A higher score in each of these scales indicates a more favorable outcome: more positive temperament, better attention skills, etc.

All analyses were conducted using SPSS version 19.0 (SPSS, Inc., Chicago, IL).

Results

DESCRIPTION OF THE SAMPLE

Upon enrollment in the study, the participants ranged in age from 14 to 25 years, with an average age of 20 years ($M = 20.42$, $SD = 0.46$). More than 75% of the participants self-identified as African-American. The mean level of education attained at baseline was just over 11 years ($M = 11.29$, $SD = 1.55$), indicating that the average participant had not, or had not yet, completed high school at the start of the study; 63.71% stated that they were not currently in school. Nearly 30% of participants described themselves as their main source of financial support. Similar, though slightly lower, percentages of participants reported support by a husband or boyfriend, parent or guardian, and other source (not a relative); 68.50% of participants indicated that they were unemployed at enrollment (*Table 1*).

EFFECTS OF PARENTING STRESS AND MEDIATION BY INFANT TEMPERAMENT

According to Baron and Kenny,³⁵ the first step for testing mediation is to examine the main effect of the independent variable on the outcome variable: Path C in *Figure 1*. We therefore conducted a series of linear regressions including parenting stress as the predictor and the social-emotional development indicators (sleeping dysregulation, eating dysregulation, inhibition and separation problems, attention skills, positive emotionality and negative emotionality) as the outcome variables. Results of these linear regressions are included in *Table 2*, in the Path C column. As hypothesized, parenting stress was inversely associated with attention skills ($\beta = -0.13$) and positive emotionality ($\beta = -0.17$), but positively associated with sleeping dysregulation ($\beta = 0.31$), eating dysregulation ($\beta = 0.26$), inhibition and separation problems ($\beta = 0.21$), and negative emotionality ($\beta = 0.34$). That is, greater parenting stress was associated with more profound sleeping dysregulation, eating dysregulation and inhibition and separation problems; more limited attention skills; as well as more negative emotionality and less positive emotionality.

The second step for testing mediation is to examine the effect of the independent variable on the mediator: Path A in *Figure 1*. We therefore conducted a linear regression including parenting stress as the predictor and infant temperament as the outcome. Results, included in *Table 2* in the Path A column, demonstrate that parenting stress is negatively associated with infant temperament. That is, participants who reported greater parenting stress reported that their infant had poorer temperament. Because the mediation model for each infant outcome includes the same predictor (parenting stress) and mediator (infant temperament), the value of Path A remains unchanged for each outcome ($\beta = -0.36$).

The third step of this methodology is to determine if the mediator affects the outcome, controlling for the effect of the independent variable: Path B in *Figure 1*. We therefore conducted a series of linear

regressions including infant temperament and parenting stress as predictors of the social-emotional development indicators. Results are included in the Path B column of *Table 2*. Infant temperament was positively associated with attention skills ($\beta = 0.17$) and positive emotionality ($\beta = 0.08$), but negatively associated with sleeping dysregulation ($\beta = -0.23$), eating dysregulation ($\beta = -0.12$), inhibition and separation problems ($\beta = -0.16$), and negative emotionality ($\beta = -0.24$). That is, better temperament was associated with less sleeping dysregulation, eating dysregulation and inhibition and separation problems; better attention skills; as well as less negative emotionality and greater positive emotionality.

Finally, the fourth step for testing mediation is to examine whether including the mediator decreases the magnitude of the relationship between the independent variable and the outcome variable: Path *C'* in *Figure 1*. Step 4 is estimated using the same linear regressions conducted for Step 3, but examining the associations between parenting stress and the social-emotional development indicators. A comparison of Paths *C* and *C'* indicated that the magnitude of the relationships between parenting stress and all of the social-emotional development indicators were reduced after controlling for infant temperament. According to Baron and Kenny, the Sobel test is then used to determine whether the magnitude of the relationship between the independent variable and outcome variable significantly decreased after accounting for the mediator variable. If the Sobel test is significant and the *C'* path is non-significant, there is evidence for full mediation. If the Sobel test is significant and the *C'* path remains significant, there is evidence for partial mediation. Results of the Sobel test are included in *Table 2*. The results show that the relationship between parenting stress and attention skills may be fully mediated by infant temperament, whereas the relationship between parenting stress and each of the other indicators may be only partially mediated by infant temperament.

Figure 1. Mediation model

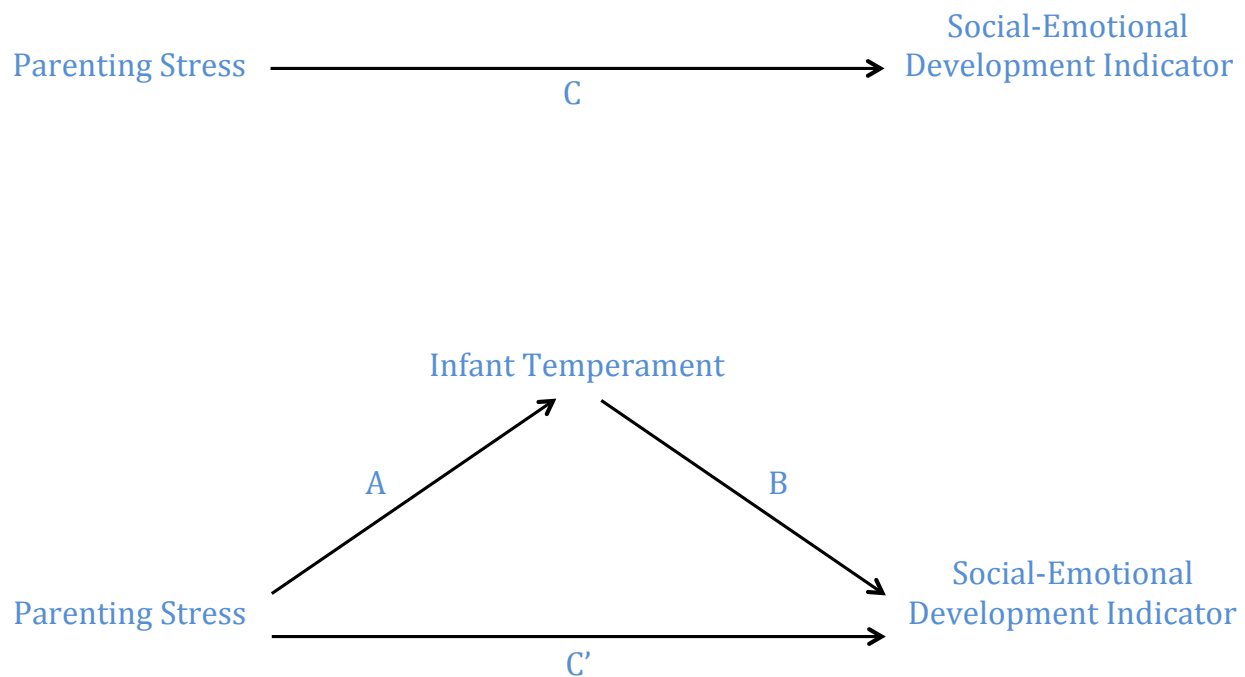


Table 1. Description of the sample (n = 711)

Characteristic	Description
DEMOGRAPHICS	
Age (years)	20.42 ± 0.46
Race	
<i>African-American</i>	543 (76.37)
<i>Latina</i>	107 (15.05)
<i>White</i>	49 (6.89)
<i>Other</i>	12 (1.69)
Level of education attained (years)	11.29 ± 1.55
Currently in school	
<i>Yes</i>	258 (36.29)
<i>No</i>	453 (63.71)
Employment status	
<i>Working full time</i>	78 (10.97)
<i>Working part time</i>	146 (20.53)
<i>Not working</i>	487 (68.50)
Main source of financial support	
<i>Own job</i>	209 (29.40)
<i>Husband or boyfriend</i>	147 (20.68)
<i>Parent or guardian</i>	157 (22.08)
<i>Other relatives</i>	27 (3.80)
<i>Other</i>	171 (24.05)
PREDICTOR	
Parenting stress	45.30 ± 13.28
MEDIATOR	
Infant Temperament	48.07 ± 7.40
OUTCOMES	
Dysregulation	
<i>Sleeping</i>	2.03 ± 1.89
<i>Eating</i>	0.97 ± 1.50
Inhibition and separation problems	5.99 ± 3.60
Attention skills	6.07 ± 2.16
Negative emotionality	2.66 ± 2.31
Positive emotionality	5.39 ± 1.10

Table values are mean ± standard deviation for continuous variables and n (percent) for categorical variables.

Table 2. Multiple linear regression models testing for mediation

Outcome	Path A	Path B	Path C	Path C'	Sobel (SE)
Dysregulation					
<i>Sleeping</i>	-0.36**	-0.23**	0.31**	0.23**	5.02 (0.007)**
<i>Eating</i>	-0.36**	-0.12*	0.26**	0.21**	2.98 (0.005)*
Inhibition and Separation Problems	-0.36**	-0.16**	0.21**	0.15**	3.84 (0.013)**
Attention Skills	-0.36**	0.17**	-0.13**	-0.06	-3.85 (0.008)**
Negative Emotionality	-0.36**	-0.24**	0.34**	0.25**	5.64 (0.008)**
Positive Emotionality	-0.36**	0.08*	-0.17**	-0.14**	-1.96 (0.004)*

Table values are betas or Sobel statistic (standard error); ** $p \leq 0.001$, * $p \leq 0.05$.

In all regression models, the following covariates were controlled for: age, current school status, employment status, level of education attained, main source of financial support, race and RCT experimental group.

Discussion

Our results support the hypothesis that parenting stress can influence the critical connections between mothers and their infants that foster optimal social-emotional development in the first year of life. Less parenting stress was associated with better temperament at six months of age and better social-emotional development at one year. Importantly, results suggest that infant temperament fully mediates the relationship between parenting stress and infant attention skills, and partially mediates the relationships between parenting stress and sleeping dysregulation, eating dysregulation, inhibition and separation problems, negative emotionality and positive emotionality.

Existing evidence indicates that parenting stress affects a caregiver's perception of infant temperament.^{27,28} Our findings suggest that this association may be part of a larger pathway. That is, parenting stress affects perceived infant temperament, which, in turn, is predictive of social-emotional development. By illustrating this process, our results empirically demonstrate one pathway through which parenting stress, which is known to affect parental care,²⁹ has an adverse effect on social-emotional development in infancy and early childhood. The findings presented here also have important implications from a public health perspective. Specifically, the suggestion that the pathway through which parenting stress influences social-emotional development has multiple steps indicates that there are multiple opportunities to intervene in order to minimize risk. The design and implementation of effective interventions hinge not only on knowledge of the risk factor and outcome involved, but more importantly on understanding the process by which the risk factor affects the outcome. Our results address both of these components in that they identify parenting stress as a risk factor for suboptimal social-emotional development and propose a possible mechanism through which parenting stress can have an adverse effect.

This study has several limitations that must be addressed in future research that considers these associations and processes. The evaluation of infant temperament and all six social-emotional development indicators were based on parent reports. Parental perception influences the classification of an infant's behavior and may be particularly problematic when considering the assessment of infant temperament. Parents with higher parenting stress may be more sensitive to their infant's disposition and reactivity, causing them to perceive, and therefore report, worse infant temperament.^{27,28} This problem can be overcome by categorizing temperament based on independent observation, but such data were not available for this study. In addition, the data presented here cannot be used to clearly establish causality due to issues of temporality of measurement. Although the social-emotional development indicators were evaluated approximately six months after the assessment of parenting stress and infant temperament, the latter two were evaluated simultaneously. This is problematic, given that the difficult behavior of infants with worse temperament has been found to increase levels of parenting stress.²⁹ Ideally, the measurement of parenting stress would occur at multiple instances over the period from birth to the measurement of the infant outcomes; at the very least, it should be measured at a time point distinct from that of the temperament evaluation. Parenting stress is inherently dynamic. Thus, a multi-point assessment, rather than the single-measurement approach used in this study, would allow for a more accurate representation.

Although it was not possible to obtain such data for this study, we did construct a reverse mediation model, in which infant temperament was the predictor and parenting stress the mediator, to account for the temporal issues inherent in the data set. However, when controlling for parenting stress, infant temperament did not predict the social-emotional outcomes as consistently as in the original model. This does not eliminate concerns related to directions of effects or causality, but these results confirm that parenting stress is a viable predictor of infant social-emotional development and, as such, is worthy of further exploration.

Despite the stated limitations, this study has several notable strengths. The data come from a longitudinal, prospective randomized controlled trial in which all participants were vulnerable young women. In addition, our results contribute to the understanding that disturbances to parental care increase an infant's risk for suboptimal social-emotional development, providing empirical evidence that specifically considers the adverse effects of parental stress that emerge in relation to the job of being a parent. Beyond this, the findings contribute to the understanding of the pathways that lead to variations in social-emotional development. The importance of identifying risk factors for poor developmental outcomes in early childhood should not be understated. However, the ultimate goal should be to minimize the negative impact of these risk factors. To this point, the value of these data is in the identification of a possible mechanism through which social-emotional development is influenced. Understanding the processes that disrupt development is the first step to determining how to protect against, or even prevent, such interferences.

To our knowledge, this study is among the first to consider the effect of parenting stress on infant social-emotional development and, more specifically, to address a possible mechanism for this effect. In order to determine effective methods of risk reduction and prevention, future research should aim to better define this process and identify additional pathways through which parenting stress adversely affects social-emotional development. Our results build support for the suggestion that parenting stress can influence infant development by disrupting the caregiver's ability to anticipate and respond to the infant's needs—the same mechanism through which many better-documented risk factors operate.⁵⁻⁸ Given the wide and growing acceptance of the cumulative risk model in the field of infant mental health,²⁵ it should be noted that there is no evidence to suggest that parenting stress has more predictive value of suboptimal outcomes in infants than does any other risk factor. Rather, parenting stress is one of many stressors that should be included among those that can, in the aggregate, significantly affect infant social-emotional development.

When considering ways to promote social-emotional development in infancy, interventions that focus on reducing parenting stress have the potential to be very effective. Parenting stress, like parental psychiatric illnesses or substance abuse, can be addressed directly. Thus, interventions can be designed specifically to identify causes and limit consequences of parenting stress using a targeted and personalized approach. In this way, parenting stress is conducive to being isolated and reduced, unlike broader environmental factors like exposure to violence and poverty, which are inherently multifactorial and extremely complex. Reducing parenting stress among new mothers can be beneficial to infants at all levels of risk for suboptimal social-emotional development. Even among those who are exposed to multiple risk factors, taking parenting stress out of the equation reduces cumulative risk and may, therefore, significantly improve outcomes.

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