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The Role of Negative Affect and Physiological Regulation in maternal attribution

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SYNOPSIS

Objective—Mothers who attribute child misbehaviors to children’s intentions, and not to situational causes, show more hostile parenting behaviors. Why are some mothers more likely than others to make more hostile attributions (i.e., high intentional attributions and low situational attributions) when confronted with child challenging behaviors? We examined the relation between mothers’ perception of child challenging behaviors and their hostile attributions of child misbehaviors, with an emphasis on how maternal negative affect and resting vagal activity moderated this relation.

Design—160 mothers of 3- to 7-year-old children reported their perceptions of child problem behaviors, their attributions regarding child misbehaviors, and their temperamental negative affect. Mothers’ respiratory sinus arrhythmia (RSA) was measured during resting state.

Results—Maternal perceptions of child challenging behaviors were positively related to hostile maternal attributions, and this relation was strongest in mothers with high negative affect and low resting RSA.

Conclusions—These findings indicate the importance of considering mothers’ affective and physiological attributes when examining social-cognitive processes in parenting.

Keywords

attribution; perception of challenging child behaviors; negative affect; RSA; parenting

INTRODUCTION

Maternal social cognitive processes, and attribution processes in particular, are important mechanisms linking parenting behavior and child development. Parental attribution refers to the interpretation of causations of perceived child behaviors. Children’s misbehaviors can be

interpreted as either intentional and controllable by themselves or situational and accidental in nature. Hostile and blame-oriented attribution is defined as the tendency to rely on intentional explanations and neglect situational explanations in ambiguous situations (de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002; Nix et al., 1999). Parental hostile attributions are of concern to researchers, practitioners, and policy makers because they have been shown to be consistently related to harsh and ineffective disciplines in parents and development of problem behaviors in children (Nix et al., 1999; Snyder, Cramer, Af Frank, & Patterson, 2005).

In particular, maternal hostile attributions of child misbehaviors contribute to the development of harsh parenting and child problem behaviors (Johnston, Hommersen, & Seipp, 2009; Nix et al., 1999). Children's problem behaviors, in turn, contribute to the growth of subsequent maternal hostile attributions (Snyder et al., 2005; Wilson, Gardner, Burton, & Leung, 2006). Therefore, it is likely that the relation between child challenging behaviors and maternal attributions is transactional and that both the mother and child contribute to the formation and maintenance of each other's social cognitive information processing and related behaviors (Johnston et al., 2009). However, in the developmental and parenting literatures, the focus has been on the role that parental attributions play in various aspects of family functioning, with few studies examining the etiology of individual differences in maternal attributions. To address this gap, the current study aimed to examine the under-studied component of this theorized reciprocal process. Specifically, we studied the role of perceived child behavior problems on maternal attributions, with an emphasis on how mother's negative affect and physiology together modulate this link.

Historically, research has focused on two sources of influences on parental attribution. First, parents' attributions can be viewed as memory-based stable knowledge structures that arise from their long-term social experiences with their own parents and that are present prior to their history with their own children (Bugental, Johnston, New, & Silvester, 1998; Grusec & Mammone, 1995). Second, parents' attributions are sensitive to the effects of new information, in particular to specific characteristics of their own children (Himelstein, Graham, & Weiner, 1991; Snyder et al., 2005; Wilson et al., 2006). Accordingly, parental attributions are customized to each individual child (Himelstein et al., 1991) and are continuously modified throughout the parents' interactions with their children (Snyder et al., 2005; Wilson et al., 2006). While acknowledging the importance of parental developmental history in their own attribution formation, the current study focused on how parents' hostile attributions were related to characteristics of their own children.

According to the social cognition literature on attribution formation, the more *consistent* (i.e., repeated occurrence) and *salient* (i.e., noticeable and having significant impact) a behavior is to the perceiver, the more likely it is for the perceiver to make strong inferences of internal causes and weak inferences of external causes of that behavior (Harvey, 1984; Kelley, 1973; McArthur, 1972). Children's challenging behavioral problems (e.g., angry outbursts, aggression, hyperactivity, inattention, and noncompliance) are highly salient and aversive to others, as behavioral problems are often the most powerful elicitors of parental attention and arousal, creating sometimes acute feelings of distress or anger in the parent (Deater-Deckard, 2004). Therefore, according to the *consistency* and *salience* principles, a

mother is expected to use more hostile attributions in interpreting child misbehaviors when frequently exposed to these highly aversive challenging problem behaviors. Findings from several longitudinal studies spanning early and middle childhood provide supporting evidence in showing that maternal perceptions of their own children's severity of conduct problems statistically and temporally predict greater subsequent maternal hostile attributions about those problem behaviors (Snyder et al., 2005; Wilson et al., 2006).

On its own, examining the link between maternal perceptions of challenging child behaviors and maternal hostile attributions is only the first step. An important piece largely missing from the extant literature is how parental characteristics are involved in their attribution processes. Given the profound influence of affective dispositions on social information processing (Mischel & Shoda, 1995), the current study focused on the role of parental affective characteristics—specifically, dispositional negative affect and physiological regulation—in the processes linking perceived child challenging behavior problems and parental attributions about those behaviors. Children's frequent and consistent challenging behaviors are highly noticeable to mothers, but any given level of child behavior problems may be differentially salient and aversive and differentially associated with maternal attributions about those behaviors, as a function of the mothers' negative affect and physiological regulation.

Negative affect is a temperamental attribute that is broadly defined as stable individual differences in the latency, intensity, and duration of negative emotion reactivity. In general, negatively valenced information, stressors, and other types of aversive stimuli are more salient and noticeable to individuals with higher levels of dispositional negative affect, operating via enhanced attention to, memory of, and emotional and physiological reactions to such stimuli (Canli, 2004; Robinson, Ode, Moeller, & Goetz, 2007; Ruiz-Caballero & Bermudez, 1995). Therefore, according to the *salience* principle, given the same levels of child behavior problems, mothers with higher negative affect would be more likely to draw intentional and less likely to draw situational attributions about child problem behaviors compared to mothers with lower negative affect. Thus, maternal dispositional negative affect may moderate the link between perceived child challenging behaviors and maternal hostile attributions, whereby a stronger association would be found for mothers who are higher in negative affect.

The hypothesized moderating effect of dispositional negative affect may not be sufficient on its own. Stressors are more salient to those who are higher in negative affect (Canli, 2004; Robinson et al., 2007), to the degree that those individuals also are physiologically reactive and poor at regulating the arousal induced by these stressors. In particular, vagal activity is known to mitigate emotional and physiological vigilance and reactivity to stressors by reinstating the body's homeostatic functioning (Porges, Doussard-Roosevelt, & Maiti, 1994). Resting vagal activity is usually measured using heart-rate variability within the frequency band that corresponds with the frequency of respiration—that is, respiratory sinus arrhythmia or RSA during resting states (Berntson, Cacioppo, & Quigley, 1993). RSA is considered as an indicator of the physiological processes underlying emotion regulation (Porges et al., 1994). Higher resting RSA reflects the capacity to restore the body's functions more rapidly after challenges (Scarpa, Haden, & Tanaka, 2010), and is related to less

reactive negative emotional arousal and better emotion regulation measured at the behavioral level (Fabes & Eisenberg, 1997; Gyurak & Ayduk, 2008; Thayer, Ahs, Fredrikson, Sollers, & Wager, 2012). Given the important role that vagal activity plays in regulating reactive negative affect, vagal activity may work together with maternal dispositional negative affect in moderating the link between perceived challenging child behaviors and maternal attributions. We hypothesized that resting RSA would further moderate the link between perceived challenging child behaviors and maternal attributions, but only among mothers with higher negative affect. Specifically, we expected that, among mothers with high negative affect, those with higher RSA would be most able to mitigate the aversive effect that frequent challenging child behaviors have, because they are more capable of regulating their negative reactivity and hypervigilance toward such stressors. This in turn would “break the link” between perceptions of child behavior problems and hostile attributions. In contrast, among mothers who are high in negative affect who have low RSA, perceived challenging behaviors of their children would be much more strongly tied to hostile attributions. With respect to mothers who are low in negative affect, individual differences in their RSA would not be that important as a further moderator of the link between perceived child problem behaviors and hostile attributions, because these mothers generally would be least reactive to such aversive child behaviors and are less in need of such regulation.

In summary, the current study hypothesized that maternal negative affect and resting RSA together moderate the link between maternal perception of child challenging problem behaviors and maternal hostile attributions. Specifically, perceived child challenging behaviors would more strongly predict hostile attributions in mothers with high negative affect and low RSA as compared to all other mothers.

METHOD

Participants

One hundred and sixty mother-child dyads participated. Mothers were 32.44 years old on average ($SD = 6.17$, range = 21 to 52), and children were 56.97 months old on average ($SD = 15.64$, range = 33 to 88; 51% female). Among all participating families, 112 families participated in the study in a small urban area. These families were recruited through community agencies and organizations and advertisements including flyers given to parents through publicly funded preschools and schools, flyers placed up in common areas throughout the community, and university website and email announcements. Forty-eight families participated in the study in a nearby rural university laboratory. These families were from another ongoing longitudinal community study and were invited to participate in the present study. Study “site” (urban = 1, rural university = 2) was included as a covariate in the analyses.

The current sample included a group of ethnically and socioeconomically diverse families that were broadly representative of the population in this region of the state. The ethnicity of the child’s biological mother/father was: 75/70% European American, 13/20% African American, 2/2% Asian American, 6/5% multiple ethnicities, and 5/5% other. Four percent of mothers and 2% of fathers were Latin American. Sixty-nine percent of the mothers was cohabiting or married and living with the child’s biological father, and the remaining were

not living with the child's biological fathers. For mother/father education: 23/33% high school diploma/GED or less; 30/31% some college or an Associate's degree; 28/16% 4-year degree; and 20/20% post-graduate degree. Seventy percent of the families lived in detached single family homes, and 30% lived in an apartment, duplex, townhouse, or mobile home. Nineteen percent of the fathers were unemployed.

Procedures

Mothers completed a series of questionnaires prior to the laboratory visit. During the laboratory visit, mothers were asked to complete several cognitively challenging tasks while their continuous electrocardiography (ECG) data were collected. Prior to the cognitive tasks, mothers' physiology data were also collected during a 2-min baseline period.

Measures

Socioeconomic risks—A socioeconomic risk index was computed by summing across four binary (0 = risk absent, 1 = risk present) indicators: single mother, low paternal and maternal education (high school/GED or less), and paternal unemployment. The indicators were correlated with each other, Spearman $\rho = .24$ to $.43$, $p < .01$. The distribution of risks was: 0 risks ($n = 75$), 1 ($n = 35$), 2 ($n = 28$), 3 ($n = 11$), 4 ($n = 11$). The socioeconomic risk index was included as a covariate in the analyses.

Maternal attributions—Mothers reported their attributions about children's misbehaviors using the Parenting Possibilities Questionnaire (Nix et al., 1999). This measure includes 9 vignettes describing common events in everyday life in which a child misbehaves. When completing the questionnaire, mothers are asked to imagine that the child in the vignette is their own child. Mothers are given two possible explanations to account for each child behavior vignettes, and then asked to rate the degree to which both explanations explain the child's misbehavior. One explanation is that the child's misbehavior is intentional, and the second explanation is that the child's misbehavior is situational or accidental. All items are rated on a 4-point Likert-type scale with 1 = *not why* to 4 = *probably why*. According to Nix et al. (1999), maternal hostile attribution score was computed by subtracting mothers' ratings of the likelihood of the situational attribution ($\alpha = .66$) from their ratings of the likelihood of the intentional attribution ($\alpha = .75$). Higher scores represent higher hostile attributions.

Mothers' negative affect—Mothers reported their own negative affect using the negative affectivity scale from the Adult Temperament Questionnaire (ATQ; Derryberry & Rothbart, 1988). Items in the ATQ are rated on a 7-point Likert-type scale (1 = *extremely untrue* to 7 = *extremely true*). The negative affectivity scale ($\alpha = .61$) is comprised of anger/frustration, sadness, fear, and discomfort subscales.

Maternal perception of children's challenging problem behaviors—Maternal perception of children's challenging behaviors were measured using a composite computed using mother's report on the conduct problems ($\alpha = .63$) and hyperactive/inattentive problems ($\alpha = .79$) scales from the Strengths and Difficulties Scale (SDQ; Goodman, 1997). Items in the SDQ are rated on a 3-point Likert type scale (0 = *not true* to 2 = *certainly true*).

The conduct problems and hyperactive/inattentive problems scales each included 5 items. The two scales were moderately correlated with each other, $r = .48$, $p < .001$, and were averaged to create a composite challenging problem behavior score.

Respiratory sinus arrhythmia (RSA)—Resting vagal activity was measured using RSA collected during a 2-min baseline (1 min eyes open and 1 min eyes closed) while mothers were asked to clear their thoughts, sit quietly, and relax. ECG was measured from two disposable electrodes using modified lead II alignment (right collarbone and lower left rib cage; Stern, Ray, & Quigley, 2001), grounded at the scalp near electrode site Fz. The cardiac electrical activity was acquired using Snapshot-Snapstream (HEM Data Corp.; Southfield, MI), amplified using a SA Instrumentation Bioamp (San Diego, CA), and analyzed using IBI Analysis System software developed by James Long Company (Caroga Lake, NY). The cardiac electrical activity was bandpassed from 0.1 to 100 Hz. The QRS complex was digitized at 512 samples per s. R waves were detected offline with a four-pass peak detection algorithm. Movement artifact was designated by the absence of at least three consecutive R-waves and was eliminated from all calculations. The edited R-wave was converted to heart period in which spectral analysis was used to calculate high frequency variability (i.e., RSA; .12–.40 Hz; Grossman, van Beek, & Wientjes, 1990) using a discrete Fourier transform with a 16-s Hanning window and 50% overlap. The RSA data were transformed using natural log to normalize the distribution. Resting RSA was computed by averaging RSA during eyes-open and eyes-closed baseline (correlation between RSA during two baseline periods: $r = .87$, $p < .001$).

RESULTS

Descriptive statistics and bivariate correlations are presented in Table 1. On average, mothers reported a moderate level of negative affect, a modest level of perceived child challenging behaviors, and a modest level of hostile attribution. All variables were distributed normally and widely. Higher maternal negative affect was modestly associated with more perceived child challenging behaviors. Higher perceived child challenging behaviors were moderately correlated with higher hostile attribution scores. RSA was not significantly associated with any other variable.

Next, we used structural equation modeling to test our hypothesis. Because the number of missing values varied across variables (Table 1 for effective sample size for each variable), structural equation modeling was preferred as it allowed us to estimate all parameters using full information maximum likelihood. Specifically, maternal hostile attribution was statistically predicted from four study covariates (study site, socioeconomic risks, maternal age, and child age), three main effects (maternal perception of child challenging behaviors, maternal negative affect, and RSA), three two-way interactions (between maternal perception of child challenging behaviors and maternal negative affect, between maternal perception of child challenging behaviors and RSA, and between maternal negative affect and RSA), and the three-way interaction among child challenging behavior, RSA, and maternal negative affect. All variables in the model were manifest variables, and all exogenous variables (i.e., predictors) were correlated with one another. Standardized path estimates and the amount of explained variance by each group of variables are shown in

Table 2. The model is saturated and fits the data perfectly. The four covariates together explained 8% of the total variance in maternal attribution. However, the socioeconomic risk index was the only significant predictor of maternal hostile attribution among the four covariates. Perceived child challenging behaviors and baseline RSA both positively predicted maternal hostile attribution over and above the effects of the covariates. The main effect of negative affect was not significant. The main effects of the three predictors accounted for an additional 12% of the variance in maternal hostile attribution. In addition, none of the two-way interaction terms significantly predicted maternal hostile attribution. Finally, the three-way interaction term was significant and explained another 3% of the total variance in maternal hostile attribution. Subsequently, the three-way interaction was subjected to post-hoc analyses.

To interpret the significant three-way interaction terms, we estimated simple slopes of the statistical prediction of maternal hostile attribution from maternal perception of child challenging behaviors at $1SD$ above (high) and below (low) the sample mean for RSA and at $1SD$ above (high) and below (low) the sample mean for maternal negative affect (Aiken & West, 1991). Results of the post-hoc analyses are shown in Figure 1. Consistent with our hypothesis, standardized simple slope estimate of perceived child challenging behaviors was the largest ($\beta = .70$) in the low RSA and high negative affect condition. None of the other simple slope estimates was statistically significant.

DISCUSSION

Maternal hostile attribution of child misbehaviors is consistently linked with harsh and abusive parenting and child problem behaviors (Dix, Ruble, & Zambarabo, 1989; Nix et al., 1999). Why are some mothers more likely than others to attribute their own children's misbehaviors to their intentions and not to situations? In the present study, we examined the relation between mothers' perception of child challenging problem behaviors and their hostile attributions of child misbehaviors, with an emphasis on how maternal negative affect reactivity and physiological regulation moderated this relation.

On average, higher perceived child challenging behaviors were modestly associated with more hostile attribution in all mothers, a finding that is consistent with previous studies (Dadds, Mullins, & McAllister, & Atkinson, 2003; Halligan, Cooper, Healy, & Murray, 2007; Nix et al., 1999; Snyder et al., 2005). Notably, such a relation was strongest in mothers with high negative affect and low RSA. The attribution processes of child misbehaviors seem to be distinct in mothers with high negative affect and low RSA—as levels of perceived child challenging behaviors increased, these mothers came to rely more on intentional explanations and neglect situational explanations in interpreting child misbehaviors in ambiguous situations; the other mothers did not make significantly higher hostile attributions at higher levels of perceived child challenging behaviors. Given that stressors are generally more aversive to individuals with higher negative affect (Canli, 2004; Robinson et al., 2007), frequent challenging child behaviors may be more emotionally and physiologically arousing and burdensome for mothers with higher negative affect. In addition, as indicated by low RSA, lacking the capacity to regulate such emotional and physiological reactivity may further heighten the salience of and hypervigilance toward

these challenging child behaviors. This in turn may result in stronger coupling between perceived levels of challenging child behaviors and hostile attributions when the child misbehaves.

In addition, some studies suggest that individuals with better regulatory capacities are more able to take into consideration alternative explanations of the observed behaviors to adjust their initial attribution bias (Gilbert, Pelham, & Krull, 1988; Trope & Gaunt, 2000). These researchers argue that attribution processes involve two stages: a reflexive stage dominated by default internal attribution and a reflective stage of effortful adjustment that takes into account external attribution (Lieberman, Gaunt, Gilbert, & Trope, 2002). However, suboptimal conditions, such as cognitive load and lack of attentional resources, may impede sufficient adjustment, leaving the final attribution biased. Our findings accord with this view. In mothers with high negative affect and low RSA, the cognitive and regulatory capacities required for the final adjustment in attribution processes may be impaired by chronic hyperarousal and heightened physiological stress responses induced by frequent exposure to high levels of child challenging behaviors and other stressors (Kensinger & Corkin, 2003; Schoofs, Preuss, & Wolf, 2008). Impairment of these cognitive and regulatory capacities may result in insufficient adjustment in attribution processes and yield biased and hostile attributions when interpreting child misbehaviors. However, the current attribution measure does not allow us to explore the possibility of this multi-stage attribution process. Future studies should focus on investigating these proposed multi-stage cognitive-emotional-physiological processes in individual differences in parental hostile attributions.

The current study supports findings from a handful of prior studies that pointed to the significance of maternal affective and physiological characteristics in maternal hostile attributions (Bolton et al., 2003; Bugental et al., 1993; Dix, Reinhold, & Zambarano, 1990). However, the present study is also distinctive from the existing literature in important ways. The first study that examined the role of emotion in maternal attribution was by Dix et al (1990). This study experimentally induced three different emotional states in mothers and found that mothers in angry condition were more likely to make hostile attribution regarding children's noncompliant behaviors compared to mothers in happy or neutral conditions. This study differs from ours in that it investigated emotional state rather than dispositional affect, and that it examined between-group differences rather than within-group individual differences. The second study by Bugental et al (1993) showed that females with lower perceived control over an unresponsive child were more reactive as indicated by changes in heart rate and electrodermal activities. Because the present study focused on parasympathetic nervous system activity (RSA), it is unclear how the sympathetic nervous system reactivity found in Bugental et al (1993) relates to the current findings. Finally, the third study that examined affective-related attributes in maternal attribution showed that mothers with higher depressive symptoms were more likely to make hostile attribution (Bolton et al., 2003). However, depressive symptoms are quite different from dispositional negative affect which encompasses a broad variety of negatively valenced affective dimensions. Overall, because there have been so few studies in this literature with which we can compare the present findings, replication of the main findings of the present study (i.e., magnitude and direction of main effects, lower- and higher-order interactions) is greatly needed.

The present study is also in line with the growing literature that points to the importance of parental self-regulation in parenting practices (Bridgett, Burt, Edwards, & Deater-Deckard, 2015; Crandall, Deater-Deckard, & Riley, 2015; Rutherford, Wallace, Laurent, & Mayes, 2015). Mothers with lower emotional and cognitive self-regulation capacity has been found to demonstrate more negative parenting behaviors including ineffective communication and discipline, overreactivity, more rejection, and less warmth (Bridgett, Laake, Gartstein, & Dorn, 2013; Saritas, Grusec, & Gencoz, 2013). The role of these emotional and cognitive regulatory processes is particularly salient in mothers in stressful situations such as those residing in a chaotic environment or those caring for a child with behavioral problems (Deater-Deckard, Sewell, Petrill, & Thompson, 2010; Deater-Deckard, Wang, Chen, & Bell, 2012). Because stressful environments are particularly distress-provoking, they place great demands on mother's self-regulatory capacity to manage their own distress while providing sensitive care to their children at the same time. As a result, mothers with poor self-regulation capacities are more likely to exhibit harsh reactivity toward their misbehaving children under stressful environments (Deater-Deckard, Li, Bell, 2015; Deater-Deckard et al., 2012). The present study extends this literature by showing that maternal affective and self-regulatory processes are important in modulating parenting not only at the behavioral level, but also at the mental processes involved in understanding and interpreting child behaviors.

Several limitations should be considered when interpreting the present results. First, the current study examined maternal attributions regarding child misbehaviors. Future studies examining maternal attributions of other aspects of children's behaviors, such as positive/adaptive behaviors, may reveal different patterns. Second, only baseline RSA was examined in the present study. Mothers' RSA changes during a challenging interaction with their children may be a more direct indicator of their physiological regulatory efforts. An important direction for future research in maternal attribution would be to incorporate changes in RSA between different states. Third, the correlational and cross-sectional nature of the current study limits the causal inference that can be made from the results. Because prior knowledge or beliefs serve as important filters in information processing (Nickerson, 1998), it is possible that existing maternal attributions may bias maternal perception of child behaviors. Therefore, experimental and quasi-experimental evidence combined with longitudinal designs are much needed to better explain causal relations between child challenging behaviors and maternal perception and attribution of such behaviors. Fourth, the current findings are based on a community sample, and may not be generalizable to clinical populations such as families with children with ADHD diagnoses. Overall, given these practical limitations, the complexity of three-way interaction effects, as well as the novelty of the present study, it is crucial for future studies to examine the replicability and generalizability of the present findings.

IMPLICATIONS FOR PRACTICE, APPLICATION, THEORY, AND POLICY

The current study demonstrates that, when confronted with child problem behaviors, high negative affect and poor physiological regulation in parents may serve as risk factors in the formation of hostile blame-oriented attribution style that heavily rely on intentional explanations and neglect situational explanations. Therefore, intervention programs that aim

at reducing problematic parenting through changes in parental attribution (e.g., Sanders et al., 2004) may gain the most efficiency from focusing on these emotionally poorly regulated parents. In addition, training on affective regulatory skills may also indirectly mitigate parental hostile attributions in these parents through modifying their hypervigilance toward aversive child behaviors and other stressors. The current findings point to the importance of taking into consideration parental personal attributes, in addition to parental developmental history and child characteristics, in the etiology of parental attribution processes, as the attribution processes of child challenging behaviors may be substantially different among mothers with different affective reactive and regulatory characteristics.

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Figure 1.

Simple slopes for statistical prediction of maternal hostile attribution from maternal perception of child challenging behaviors at low ($-1\ SD$) and high ($+1\ SD$) levels of maternal negative affect and low ($-1\ SD$) and high ($+1\ SD$) levels of baseline RSA. *** $p < .001$.

TABLE 1

Descriptive Statistics and Bivariate Correlations

	Negative affect	RSA	Child behaviors	Hostile attribution
RSA	-.01			
Child behaviors	.16 *	-.09		
Hostile attribution	.15	.08	.37 ***	--
<i>M</i>	4.09	6.37	3.13	-.74
<i>SD</i>	.67	1.29	1.83	.84
Skewness	.17	-.02	.70	.16
Kurtosis	1.00	.92	.40	-.27
Min	2.33	2.03	.00	-2.78
Max	5.97	10.52	9.00	1.33
<i>N</i>	156	130	155	150

*
 $p < .01$.

 $p < .001$.

TABLE 2

Standardized Path Estimates Predicting Maternal Hostile Attribution and Amount of Explained Variance

	Covariates	Main effect	2-way interaction	3-way interaction
Site	.05			
Maternal age	-.01			
Child age	.11			
Socioeconomic risks	.16 [*]			
Negative affect		.09		
RSA		.17 [*]		
Child behaviors		.29 ^{***}		
RSA x Child behaviors			-.15	
RSA x Negative affect			-.03	
Child behaviors x Negative affect			.06	
Three-way interaction				-.17 [*]
R ²	.08	.12	.03	.03

Note. *M* and variance for each variable and correlations between predictors are not shown in Table 2 for clarity of presentation, but are available upon request.

^{*}
p < .05.

^{***}
p < .001.