

The Influence of Interpersonal Aggression on Maternal Perceptions of Infant Emotions: Associations With Early Parenting Quality

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The current study tested the hypothesis that mothers who have experienced child maltreatment and aggression within their adult relationships may be at particular risk for misinterpreting infant emotions, leading to less sensitive parenting behaviors. Participants were 120 pregnant women recruited for a larger, longitudinal study investigating the role of psychosocial and environmental risk on women and their young children. Data were collected during the third trimester of pregnancy, and when children were 1 and 2 years of age. Participants completed a projective test designed to elicit individual differences in perceptions of infant emotions and an observer-rated assessment of parenting behaviors was conducted in the family home. Using structural equation modeling, we tested associations between maternal interpersonal aggression exposure and perceptions of infant emotion and parenting behaviors. Results demonstrated that a history of child abuse and intimate partner conflict were associated with a maternal tendency to view ambiguous infant facial expressions as negative (i.e., negative attribution bias), and in turn, with less parenting sensitivity over time. Findings suggest that negative attributions of infant emotion may be 1 mechanism by which a history of trauma and violence exposure contributes to less sensitive parenting for some mothers. Implications for intervention include the need for trauma-informed clinical services and psychoeducational methods that help mothers more accurately read and respond to infant emotional expression and bids for connection.

Keywords: child maltreatment, interpersonal aggression, early parenting, infant emotion

Early parenting that is attuned and sensitively responsive to the infant sets the foundation for a positive parent–child relationship and supports the healthy social-emotional development of the young child (Sroufe, Egeland, Carlson, & Collins, 2005). The ability to accurately assess infant emotional signals is central to sensitive parenting (Leerkes, Crockenberg, & Burrous, 2004). Healthy human infants contribute actively to this process; infants signal their pleasure, contentment, and distress through discernible physical, vocal, and facial displays. Parents who are successful in reading their infants' emotional signals have the opportunity to

respond in a way that meets the infant's particular need in that moment (Gergely & Watson, 1996). In contrast, mismatches in responses to infant cues result in dyadic dyssynchronous interactions that are experienced as frustrating to both the infant and the parent (Weinberg, Olson, Beehly, & Tronick, 2006). Although dyssynchronies are common within the daily rhythm of parent–infant interactions (Biringen, Emde, & Pipp-Siegel, 1997), when they become chronic and pervasive they may place the parent–infant relationship at risk (Feldman, 2007).

Exposure to interpersonal aggression represents one significant risk factor for maladaptive parenting and the development of parent–infant relationship problems. For instance, maternal exposure to interpersonal aggression that includes physical, psychological, and verbal abuse is associated with harsh and intrusive parenting and a pattern of dyssynchronous parent–infant interactions (Graham, Kim, & Fisher, 2012; Gustafsson, Cox, & The Family Life Project Key Investigators, 2012; Levendosky, Bogat, Huth-Bocks, Rosenblum, & von Eye, 2011; Levendosky, Leahy, Bogat, Davidson, & von Eye, 2006). The mechanisms accounting for this association, however, are not well understood. Neuropsychological and information processing theories of emotion posit the existence of an attentional bias to threat cues in humans that generally serve as a protective mechanism (Buckley, Blanchard, & Neill, 2000; LeDoux, 1996). Empirical work has identified an exaggerated bias response to threat cues (i.e., hypervigilance) that is associated with exposure to interpersonal trauma and trauma-related psychiatric

This article was published Online First December 28, 2015.

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This research was supported by grants from the American Psychoanalytic Association, the International Psychoanalytic Association, Psi Chi—The International Honors Society in Psychology, and Eastern Michigan University to Alissa C. Huth-Bocks. We thank the Parenting Project research assistants for their invaluable help with data collection, as well as the families who participated in the study.

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disorders (e.g., Briggs-Gowan et al., 2015; Pollak, Messner, Kistler, & Cohn, 2009; Schoorl, Putman, Van Der Werff, & Van Der Does, 2014). For mothers exposed to relational aggression, this bias may be one mechanism by which parent–infant relationships are placed at risk. The current longitudinal study tested this hypothesis in a sample of mothers, beginning in pregnancy, the majority of whom reported child maltreatment exposure in their own childhoods and exposure to aggression within their adult romantic relationships immediately before and during the perinatal period.

Parental Perceptions of Infant Emotion and Associations With Parenting Behaviors

Healthy human infants begin life with the biological capacity to signal their emotions to their caregivers (Thompson-Booth et al., 2014), and parents are similarly primed to respond to these signals (Soltis, 2004). In order to respond sensitively, caregivers must detect the infant’s signal, regulate their own emotional reaction to it, and attune their response based on the valence and arousal of the signal (Dix, 1991; Rosenblum, Dayton, & McDonough, 2006). Contingent responses by caregivers modulate infant emotional states thereby regulating the infant’s early biobehavioral and emotional experience (Schore, 2001). Over time, sensitive caregiving entrains the infant’s own capacity for self-regulation, laying the foundation for the healthy social–emotional development of the young child (Doi, Kato, Nishitani, & Shinohara, 2011; Kopp, 1989; Zeman, Cassano, Perry-Parrish, & Stegall, 2006).

There is controversy over the extent to which adults can reliably identify and interpret *discrete* infant emotions (e.g., disgust vs. dislike; see Camras & Shutter, 2010 for a review). Healthy adults, however, are generally able to assess the *valence* and *arousal level* of infant emotion with a high degree of accuracy (Dinehart et al., 2005; Messinger, Mattson, Mahoor, & Cohn, 2012; Spangler, Geserick, & von Wahlert, 2005), and it is the intersection of these dimensions that defines the infant’s emotional state (e.g., sad, furious, happy, elated). Sensitive parents reflect back the perceived¹ emotion to the infant in a manner that “marks” their understanding of the infant’s expressed emotional state, thereby validating the infant’s experience (Gergely & Watson, 1996) and leading to infant emotion regulation capacities (Oster, 2005).

Under normative conditions, specific infant characteristics tend to elicit a positive appraisal and associated caretaking response from adults. For example, the concept of *Kindchenschema* (baby schema), originally posited by Lorenz (1971), identifies infant physical characteristics (e.g., large eyes, rounded cheeks) as inherently evocative for adults, eliciting an approach response and compelling the provision of care for the immature infant (Glocker et al., 2009). Empirical work is in support of this phenomenon, finding that, compared with pictures of human adults, pictures of human infants activate the attentional system and capture the attention of adults (Brosch, Sander, & Scherer, 2007). In addition, in low-risk—that is, healthy with respect to (a) psychosocial functioning and (b) environmental risk exposure—groups of parents, positively attenuated physiological responses to infant pictures (e.g., increased zygomatic activation and low corrugator activity) have been demonstrated even with regard to pictures displaying negative emotion, suggesting a positive bias on the subcortical level in parental response to infant emotions (Spangler et al.,

2005). Further, healthy adults tend to demonstrate a “positive attribution bias” when evaluating infant emotions (Krippel, Ast-Scheitenberger, Bovenschen, & Spangler, 2010; Siddiqui, Eise-mann, & Häggelöf, 2000; Spangler, Emlinger, Meinhardt, & Hamm, 2001). That is, when presented with pictures of an infant demonstrating ambiguous emotional tone, they evaluate the emotions in a relatively positive light, describing a neutral emotional expression, for example, as *interest* as opposed to descriptions such as *sneaky* or *selfish* that have been observed in high risk samples (Hildyard & Wolfe, 2007).

Parents who tend to view a range of infant emotional expressions as predominantly negative are, therefore, demonstrating an important divergence from normative responses. This atypical response has been described as a “negative attribution bias,” and is associated with parent–child relationship disturbances (Butterfield, 1993; Hildyard & Wolfe, 2007). Parental misperception of positive and ambiguous infant emotions as negative precludes an attuned and sensitive parenting response; parents who reflect back a grossly inaccurate representation of the infant’s emotional signal interfere with the healthy development of emotion regulation (Schore, 2003). Gross misperceptions of infant emotion fall broadly into two dimensions: (a) misinterpreting the valence of the emotion (e.g., perceiving neutral emotions as negative), and (b) misinterpreting emotional arousal levels (e.g., describing a mildly upset infant as *furious*; Emde, Osofsky, & Butterfield, 1993).

The Infant Facial Expressions of Emotion from Looking at Pictures (IFEEL) test was designed to assess the valence and arousal level of adult attributions of infant emotions in an attempt to better understand the differential expression of these dimensions in groups of high-risk parents (Emde et al., 1993). When presented with still photos of infants demonstrating a range of emotions, parents are asked to name the expressed emotion. Using this and similar tests, psychosocial risk has been associated with these dimensions (Butterfield, 1993; Szajnberg, 1994; van Bakel et al., 2013). For instance, Hildyard and Wolfe (2007) found that mothers who were identified as neglectful in their parenting were more likely to label IFEEL photographs as representing *sadness* and *shame*, and less likely to describe infant emotions as *interested*, compared with nonneglecting mothers. In a similar study, Butterfield (1993) found that mothers at high risk for child maltreatment tended to describe infant photographs using extremely high arousal words such as *despairing* and *heartbroken* in contrast to normative descriptions such as *sad* and *upset* that were more commonly used by the standardization sample of relatively low risk mothers.

Because parental perception of infant emotion typically elicits a contingent physiological, emotional and behavioral response in the parent (Ammaniti & Gallese, 2014; Dix, 1991), errors along either dimension are likely to have negative consequences for parenting sensitivity, as results from the extant studies suggest. Furthermore, parents may misinterpret infant emotions based on many factors including: their state of mind in the moment (e.g., tired, anxious; Jansson-Fröjmark, Harvey, Norell-Clarke, & Linton, 2012; Mogg, Bradley, De Bono, & Painter, 1997), their own trait characteristics

¹ The term *perception* is operationalized in this paper as the parent’s accurate identification and interpretation of the infant’s expressed emotion. That is, the parent must notice that the infant is conveying an emotion and then interpret the valence and arousal level of the emotion with relative accuracy.

(e.g., anxious, angry; van Honk et al., 2001), lack of knowledge about normative infant development (e.g., describing an infant as intentionally *devious* or *seductive*; Butterfield, 1993), and negative experiences and expectations within interpersonal relationships based on prior relationship difficulties (e.g., intimate partner aggression; R. E. Bernstein, Tenedios, Laurent, Measelle, & Ablow, 2014; de Castro, 2007).

With regard to psychosocial parenting risk, no studies to date have examined the influence of mothers' own histories of child maltreatment and negative intimate partner experiences on their perceptions of infant emotions in relation to their actual parenting behaviors with their infants. Because of their inherently dysregulating effects, exposure to interpersonal conflict and aggression is likely to influence a mother's perception of emotion in others. Within the emotionally nuanced context of the parent–infant relationship, in particular, a propensity for negative attributions of emotion may interrupt the interpersonal “dance” that lays the foundation for the development of a healthy parent–child relationship and the infant's acquisition of emotional self-regulation (Schore, 1994).

Exposure to Interpersonal Aggression in Childhood and Adulthood: Influence on Attentional Bias, Perceptions of Infant Emotions, and Parenting Behaviors

Exposure to interpersonal aggression and conflict, especially when it is chronic and experienced across multiple relationships, may influence later expectations within subsequent interpersonal relationships (see Charuvastra & Cloitre, 2008, for a review). Early exposure to maltreatment, for instance, has been associated with the development of heightened attention to anger cues that detract from attention to positive, relationship-salient interpersonal cues (Pollak, Cicchetti, Hornung, & Reed, 2000), and may lead to continued expectations of, and exposure to, interpersonal discord for some individuals. For example, women who have experienced child maltreatment have a more difficult time forming trusting, intimate romantic relationships (Rumstein-McKean & Hunsley, 2001), and describe those relationships as less satisfying than women without a history of maltreatment (Testa, VanZile-Tamsen, & Livingston, 2005). Women with child maltreatment are also significantly more likely to experience partner violence during adulthood (Bensley, Van Eenwyk, & Wynkoop Simmons, 2003), resulting in more chronic and cumulative exposure to aggression over time.

Further, aggression experienced within close relationships, in particular, is thought to be uniquely damaging, relative to other kinds of potentially traumatic events (Cloitre et al., 2009; Kessler, Chiu, Demler, Merikangas, & Walters, 2005), due to its inherent break from established social norms. Individuals exposed to interpersonal aggression may also become hypervigilant to potential signs of anger and distress in others in an attempt to anticipate and avoid victimization (Forbes et al., 2014). Indeed, exposure to violence and psychosocial trauma has been associated with an attentional orientation and processing bias to threat cues (Briggs-Gowan et al., 2015; DePierro, D'Andrea, & Pole, 2013; Pollak, Cicchetti, Klorman, & Brumaghim, 1997; Swartz, Graham-Bermann, Mogg, Bradley, & Monk, 2011), as noted above. Although this tendency may be adaptive in promoting relative safety

and survival within conflictual and aggressive relationships, it is disruptive to adaptive functioning (e.g., memory, concentration) in nonviolent environments (Navalta, Polcari, Webster, Boghossian, & Teicher, 2006; van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005). It is, therefore, likely to interfere with the establishment of new, healthy relationships, where excessive reactivity to possible signs of distress may be misguided and lead to interpersonal discord.

Indeed, prior research has shown that attentional biases to anger and threat can begin during childhood in response to exposure to the atypical rearing practices associated with abusive parenting. For example, Pollak and colleagues (Pollak et al., 1997; Pollak, Klorman, Thatcher, & Cicchetti, 2001) used event-related potential (ERP) methodology and found an attentional bias to angry versus happy faces in maltreated children. Physically maltreated children identified angry faces more rapidly than their peers (Pollak et al., 2009) and demonstrated a more “liberal bias” in judging a facial expression as displaying anger (Pollak et al., 2000). In other words, children who have experienced maltreatment tend to err on the side of anger identification when evaluating facial expressions and to make these determinations rapidly. This body of research suggests that maltreated children devote more attentional resources to the detection of anger cues compared with their nonmaltreated peers and are also more likely to perceive ambiguous facial expressions as angry. As development unfolds, children exposed to physical maltreatment become adept at monitoring their environment for potential anger cues and, in cognitively preferencing the detection of anger, they exclude other contextually relevant and nonthreatening relationship-salient information (for a review see, Pollak, 2008). The experience of child maltreatment may, therefore, be one risk factor leading to harsh and insensitive parenting with one's own children.

In contrast to the body of literature documenting the attentional biases in individuals exposed to child maltreatment, however, less empirical attention has been devoted to understanding possible attentional biases in women exposed to intimate partner aggression. In work informing the current study, Lee and Lee (2014) found that female victims of *dating* violence demonstrated a prolonged attentional bias to angry faces and to dysphoric stimuli relative to happy stimuli. Similarly, in a study of chronic (e.g., at least 1 year total) exposure to violence, DiPierro and colleagues (DePierro et al., 2013) grouped adult female survivors of diverse forms of intimate partner violence (e.g., rape, child abuse, domestic violence) together, finding an attentional bias toward words representing trauma-specific cues. Finally, in a recent study using the IFEEL measure, R. E. Bernstein et al. (2014) found that adult experiences of interpersonal trauma were related to fewer endorsements of sad infant emotions; fewer perceptions of sadness, as well as more perceptions of infant anger, were in turn associated with infant disorganized attachment.

Thus, research on negative attributions and attentional biases to threat cues in samples experiencing child maltreatment and/or adult partner violence suggests that cognitive biases and attributions may constitute an important mechanism helping to explain associations between mothers' exposure to interpersonal aggression and parenting outcomes. Further, a number of existing studies suggest that current romantic experiences including partner violence may help account for the influence of maternal history of child maltreatment on parenting outcomes. Studies have indicated,

for instance, that intimate partner conflict may mediate the association between maternal childhood trauma and harsh parenting including the use of physical punishment (Miranda, de la Osa, Granero, & Ezpeleta, 2013; Renner & Slack, 2006). The same may be true for other types of parenting outcomes such as perceptions of infant emotions and parenting sensitivity.

Although most of the literature on trauma and perception of threat cues has focused on exposure to physical abuse specifically (usually in childhood), literature on partner violence indicates that psychological aggression is as frequent, if not more frequent, than physical abuse (e.g., B. A. Bailey & Daugherty, 2007). Furthermore, exposure to psychological aggression in adulthood appears to predict posttraumatic stress symptoms among mothers more robustly than physical violence (Huth-Bocks, Krause, Ahlfs-Dunn, Gallagher, & Scott, 2013), and studies have indicated that psychological aggression predicts depressive symptoms in women, even after controlling for exposure to other forms of violence (e.g., Yoshihama, Horrocks, & Kamano, 2009). It is possible that exposure to psychological aggression, in particular, is especially damaging among mothers of young children because elements of this form of aggression (i.e., intimidation, degradation, and coercion) interfere with the development of adequate maternal self-efficacy and other psychologically demanding tasks of early parenting (Ahlfs-Dunn & Huth-Bocks, 2012; Huth-Bocks et al., 2013), which are necessary for sensitive and accurate responding to infant emotional cues. Yet, it is surprising that research on the effects of psychological intimate partner violence on women is sparse, and no known studies have examined the role of this form of partner violence on possible attentional biases related to perceptions of infant emotions.

Study Aims and Hypotheses

Based on information processing theories of emotion, as well as existing research on attentional biases among individuals exposed to interpersonal aggression, the current study investigates the relation between maternal history of interpersonal conflict and aggression and the development of a negative attribution bias in mothers of 1-year-old infants. Overall, we expect that violence exposure would accumulate over time, from childhood to adulthood, leading to attribution biases about infant emotional states. Further, associations with subsequent, observer-rated parenting behaviors are examined. Using a sample of women exposed to high levels of childhood maltreatment and intimate partner aggression, the current study tests the following specific hypotheses:

Hypothesis 1: Maternal history of child maltreatment will be positively associated with exposure to intimate partner psychological aggression and with negative perceptions of adult romantic relationships.

Hypothesis 2: Maternal experiences of intimate partner aggression and negative relationship perceptions will be positively associated with more negative perceptions of infant emotion (e.g., a “negative attribution bias”).

Hypothesis 3: Perceptions of negative infant emotion will be negatively associated with concurrent and longitudinal assessments of sensitive parenting.

Method

Participants

Participants were 120 pregnant women recruited for a larger, longitudinal study investigating the role of psychosocial and environmental risk (e.g., trauma exposure, poverty) on women and their young children. Data were collected during the third trimester of pregnancy, at 3 months postpartum, and when children were 1 and 2 years of age. Data from the prenatal, 1-year, and 2-year data collection waves were used in the present study because these waves included pertinent relationship and parenting variables. In contrast, data from the 3-month interview focused on childbirth, the physical health of the mother and the infant post-partum, and infant temperament and were, therefore, not relevant to the present study. Participants were recruited through fliers posted at public locations and agencies serving low-income families. At the pregnancy interview, participants ranged in age from 18 to 42 years ($M = 26$, $SD = 5.7$ years). The majority of women were single and had never been married, and most identified themselves as African American or Caucasian. Although most reported some college education or a college degree, the sample overall was economically disadvantaged; the median family income was \$1,500/month, and most women were receiving one or more forms of public financial assistance (see Table 1 for more details about sample demographics).

Given the risky nature of this community sample, rates of participant exposure to interpersonal aggression and trauma were, overall, high. Exposure to childhood maltreatment ranged from 29% (sexual abuse, physical neglect) to 50% (emotional abuse), with 65% of participants reporting exposure to at least one form of childhood maltreatment that went beyond “minimal” levels. Like-

Table 1
Sample Demographics

| Variable | % |
|-----------------------------------------------------------------|---------|
| Race | |
| African American | 47 |
| European American | 36 |
| Biracial | 12 |
| Other | 5 |
| Marital status | |
| Single (never married) | 63 |
| Married | 28 |
| Separated | 4 |
| Divorced | 5 |
| Primiparous (i.e., no live birth before target infant in study) | 47.5 |
| Education | |
| High school diploma/GED or less | 20 |
| Some college or trade school | 44 |
| College degree | 36 |
| Employed | 45 |
| Financial assistance | |
| WIC | 73 |
| Food stamps | 52 |
| Medicaid, MICHild, Medicare | 76 |
| Public supplemental assistance | 17 |
| At or near poverty level | 74 |
| Median monthly income | \$1,500 |

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children; MICHild = Michigan child health care program.

wise, rates of exposure to *severe* psychological intimate partner aggression were high across the three time periods assessed in this study: 33% the year before pregnancy, 30% during pregnancy, and 32% the year following birth, with 50% of women experiencing *severe* psychological partner aggression at one or more of these time periods. Many women experienced both child maltreatment and severe psychological intimate partner violence (36%), with the remaining participants experiencing only child maltreatment (29%), only intimate partner violence (14%), or no violence above mild/minimal levels (21%).

Procedures

Pregnant women interested in participating in the study were initially screened by phone. Inclusion criteria were maternal age of 18 years or greater and English fluency. The study was approved by the university's institutional review board and informed consent was obtained from each participant. Financial compensation was provided for each wave of study participation in the form of gift cards. The majority of assessments were conducted in the family home by two or three research assistants who had received intensive training by the second author (Alissa C. Huth-Bocks). The lead interviewer administered the primary maternal assessments while the second interviewer assessed the child rearing quality of the home environment and the quality of the postnatal parent–infant interactions. A third interviewer was present to provide childcare for the nontarget children during the assessment when necessary. At each wave of data collection, all self-report questionnaires were read aloud to participants and were recorded by the lead interviewer in order to minimize random responding and protect against possible literacy difficulties.

Prenatal assessment. Pregnancy interviews were conducted in the third trimester, lasted approximately 2.5 to 3.0 hr and were administered in either the participant's home (81%) or at the research office (19%), based on participant preference. Demographic and interview data were collected and self-report questionnaires were administered (e.g., trauma history, intimate partner aggression exposure) in a standardized order.

Postnatal assessments. Mothers were recontacted approximately 2 weeks after the baby's due date to gather birth information and a brief phone interview was administered when infants were approximately 3 months of age. Postnatal assessments were conducted when infants were 1 and 2 years of age, lasted approximately 3.0 to 3.5 hr and were administered primarily in the participant's home (92% at both times). Demographic and self-report data were collected and maternal interviews and parenting protocols were conducted.

Participant retention. To maintain contact with individual families and reduce study attrition, participants were contacted every 3 months to update their own contact information as well as that of friends and relatives who would know their whereabouts if they could not be located. Study staff conducted home visits in person to update information if participants could not be reached by phone or mail. Participant retention rates were high: 99% at 3 months postpartum ($n = 119$), 95% at 1 year ($n = 114$) and 83% at 2 years ($n = 99$).

Measures

Childhood maltreatment. The *Childhood Trauma Questionnaire* (CTQ; D. Bernstein & Fink, 1998) is a 28-item self-report measure of adult history of childhood maltreatment and was administered during the pregnancy interview. The measure yields scores for five forms of childhood maltreatment: emotional, physical, and sexual abuse, and emotional and physical neglect. Each scale includes 5 items that are scored for frequency on a 5-point Likert scale (1 = *never true*, 3 = *sometimes true*, 5 = *very often true*). Scale scores range from 5 to 25; higher scores indicate greater severity of maltreatment. D. Bernstein and Fink (1998) reported satisfactory reliability coefficient α for each CTQ scale: emotional abuse = .89, physical abuse = .82, sexual abuse = .92, emotional neglect = .89, physical neglect = .66. Scores were stable over a 1 to 6-month period ranging from $r = .79$ for physical neglect to $r = .86$ for emotional abuse, and convergent validity with established trauma exposure measures was reported. In the current sample, coefficient alphas were .91 for emotional abuse, .90 for physical abuse, .96 for sexual abuse, .92 for emotional neglect, and .83 for physical neglect.

Romantic attachment. The *Experiences in Close Relationships—Revised* scale (ECR-R; Fraley, Waller, & Brennan, 2000) is a 36-item self-report measure of the attachment dimensions of anxiety (insecurity about partner responsiveness) and avoidance (inability to feel close and to depend on one's partner) in adult romantic relationships and was administered during the pregnancy interview. Each item is rated on a 1 to 7 Likert scale (1 = *disagree strongly*, 4 = *neutral/mixed*, 7 = *agree strongly*). Items are averaged for each dimension, with scores ranging from 1 to 9; higher scores on each subscale reflect greater levels of the construct. In the current study, only the anxiety subscale was included in the final analyses based on model fit of the broader relationship construct "perceptions of romantic relationships." Internal consistency of .90 or greater has been reported for each scale (Fairchild & Finney, 2006), and robust temporal stability and convergent validity with established measures of romantic relationship functioning have been reported (Sibley, Fischer, & Liu, 2005). Coefficient alpha in the current study was .93 for attachment anxiety.

Romantic relationship quality. The *Marital Relationship Scale* (Braiker & Kelley, 1979) is a 25-item self-report measure of the quality of romantic relationships and was administered during the pregnancy interview. Respondents consider the quality of their current, or most recent, romantic partner, not necessarily a marital partner. Subscales measure feelings of love toward their partner (10 items), ambivalence about the relationship (5 items), degree of conflict with the partner (5 items), and extent to which they worked to maintain the relationship (5 items). In the current study, only the conflict, ambivalence and love subscales were included in the final analyses; the maintenance subscale was not included because it had poor reliability. The items are rated on a 9-point Likert scale ranging from 1 (*not at all*) to 9 (*very much*) and are summed within each subscale. Higher scores indicate higher levels of the construct. Adequate reliability and validity have been previously established for the love, ambivalence, and conflict subscales (Belsky, Jaffee, Sligo, Woodward, & Silva, 2005; Bosch & Curran, 2011). Coefficient alphas were .93 (love), .76 (ambivalence), and .82 (conflict) in the current study.

Psychological intimate partner aggression. The *Conflict Tactics Scale-2* (CTS-2; Straus, Hamby, & Warren, 2003) is a 78-item questionnaire designed to assess multiple forms of intimate partner aggression and was administered at the pregnancy and 1 year interviews. Data reflecting aggression perpetrated against the woman that was experienced the year before pregnancy, during pregnancy and the year after pregnancy were collected. Items measuring psychological aggression included verbal and symbolic acts inflicted to cause fear or emotional pain (8 items at each time period). Response categories for each item included 0 (*never*), 1 (*once*), 2 (*twice*), 3 (*3–5 times*), 4 (*6–10 times*), 5 (*11–20 times*), 6 (*more than 20 times*), and 7 (*not during these time periods, but it happened before*). The CTS-2 was scored using a weighting system recommended by Straus and colleagues in which frequency values were recoded (1 = 1, 2 = 2, 3 = 4, 4 = 8, 5 = 15, 6 = 25, and 7 = 0) and then totaled at each time period. Higher scores indicate increased levels of exposure to partner aggression. Straus and colleagues (2003) reported good reliability for each subscale, and demonstrated convergent and discriminant validity. In the present study, coefficient alphas for the psychological violence subscale were: .78 for the year before pregnancy, .69 during pregnancy, and .79 for the year after birth.

Perceptions of infant emotion. The IFEEL task (Emde et al., 1993) was administered to mothers at the 1-year interview. This projective task consists of a set of 30 pictures of 1-year-old infants. Participants are asked to describe, in one word, the “strongest and clearest feeling that each baby is expressing.” Most of the pictures depict infants with ambiguous emotional expressions, described as “blends of emotions” by the authors, and a few of the pictures portray prototypical positive or negative emotions. Thus, the test is designed to elicit individual differences in perceptions of infant emotions. Using the standardized lexicon coding system, mothers’ responses are scored categorically; each response is classified as belonging to a specific emotion category: joy, sad, anger, surprise, content, passive, shame/guilt, disgust/dislike, distress, cautious/shy, interest, and fear. The number of responses for each category is then summed, with higher scores indicating more responses within that category. In the present study, data were coded by two independent raters; interrater agreement was 99% and disagreements were conferenced and consensus coded. Acceptable test-retest reliability in mothers of 3- to 12-month-old infants (Appelbaum, Butterfield, & Culp, 1993) and from the prenatal to the postnatal period (Siddiqui et al., 2000) has been documented. Studies confirming the validity of the test method have also been reported (Ridgeway, 1993). Answers falling into the shame/guilt and disgust/dislike categories are less prevalent within the extant published literature (Emde et al., 1993; Knežević & Jovančević, 2004; Szajnberg, Skrinjaric, Vidovic, & DeZan, 1994), and were very low frequency in the current sample (<9%). Sadness, although it is a negatively valenced emotion, has a potential infant signal value of eliciting parental care and is not typically perceived as threatening (Horley, Williams, Gonsalvez, & Gordon, 2004), and therefore, is less relevant to the current analysis. Thus, for the present study, a negative emotion composite variable was created by summing the anger, distress, and fear infant emotion scores.

Maternal sensitivity. Maternal sensitivity was assessed at both the 1-year and 2-year interviews with the *Maternal Behavior Q-Sort Mini* (MBQS-Mini; H. N. Bailey, Bisceglia, Roche, Jenkins, & Moran, 2009). The MBQS-Mini is a shortened, 25-item

q-sort procedure drawn from the original 90-item Maternal Behavior Q-Sort (MBQS; Pederson & Moran, 1995). Administration involves several hours of direct observation of mother–infant interactions by trained observers and the subsequent equal sorting of 25 statements that describe maternal sensitive and responsive parenting behavior into five groups ranging from *Very Much Unlike the Mother* to *Very Much Like the Mother*. Examples include “mother monitors baby’s activities during the visit” and “mother responds to baby’s distress and nondistress signals even when engaged in some other activity such as having a conversation with the visitor.” Observations of parenting behaviors during times of competing demands are carefully observed to capture individual differences in sensitivity, which are more likely to occur in high-versus low-demand situations. Strong interrater reliability and validity as evidenced by significant associations between sensitivity scores and infant attachment security and cognitive development have been previously reported (Tarabulsky et al., 2009).

In the present study, the protocol administration and scoring procedures developed by Pederson and Moran (1995) were adopted. Research assistants received extensive training before attending home visits. Subsequently, two to three research assistants attended each home visit in order to handle different research tasks with mothers and the target children, as well as provide childcare assistance if siblings were in the home. In general, home visits were difficult and chaotic, and assistants observed many different types of mother–infant interactions across the lengthy home visits. As such, a decision was made to have assistants complete the q-sorts through consensus method (i.e., as a group) after returning to the lab to maximize the accuracy and thoroughness of the assessment of maternal behavior. Each item was discussed and sorted together, while assistants shared their observations and notes from the visit. Following recommendations by Pederson and Moran, all research assistants also participated in weekly research meetings where the scoring associated with each home visit was reviewed by the study team including the principal investigator of the study (Alissa C. Huth-Bocks). As the manual outlines, final sensitivity scores were computed by correlating each participant’s final sort with a criterion sort for the “ideal” sensitive parent based on expert ratings; resulting correlation coefficients are used in analyses as the variable of interest, with higher scores reflecting greater maternal sensitivity.

Sample Attrition

Women were initially interviewed during pregnancy ($N = 120$). At this interview, 5 women refused to answer portions of the child maltreatment, intimate partner aggression or adult relationship questions. At the 1-year assessment ($n = 114$), 3 women could not be located, 2 withdrew from the study, and 1 moved out of the area. Of the 1-year study participants, 4 women did not complete the IFEEL or receive parenting assessments because the interview was conducted by phone, and an additional 4 women did not receive parenting assessments because the target child was either asleep or not home. At the 2-year assessment ($n = 99$), 11 women could not be located, 6 withdrew from the study, and 4 declined to participate due to scheduling conflicts. Of the 2-year study participants, 13 mothers did not receive parenting assessments due to data being collected via phone ($n = 4$) or because the target child was asleep or not home ($n = 9$).

Participants who completed assessments at the 1-year time point did not significantly differ from those lost to attrition at this time point on any study variables including: maternal age, family income, maternal race, marital status, education, history of child maltreatment, romantic attachment anxiety, marital relationship scale scores, or psychological aggression exposure. Likewise, participants who completed assessments at the 2-year time point did not significantly differ from those lost to attrition at 2 years on these same study variables.

Results

Missing Data

In the structural equation model, missing data were handled using full information maximum likelihood (FIML) estimation. The FIML approach maximizes power in the analysis by fitting the model to all of the nonmissing values for each observation (Widaman, 2006). In addition, the Mplus program used here employs test statistics in FIML that are robust to nonnormally distributed data (Allison, 2003; Muthén & Muthén, 2007).

Bivariate Correlations

Bivariate correlation analyses revealed significant associations in the expected directions among the manifest variables in the model (see Table 2). Notably, maternal history of child maltreatment exposure was not correlated with the IFEEL or sensitive parenting scores. In contrast, and as predicted, negative adult relationship perceptions and psychological aggression exposure from a partner were significantly associated with negative perceptions of infant emotions as measured by the IFEEL test. In addition, negative perceptions of romantic relationships and exposure

to psychological aggression were significantly correlated with less sensitive parenting at 2 years of infant age, but were not correlated with parenting sensitivity at 1 year of age.

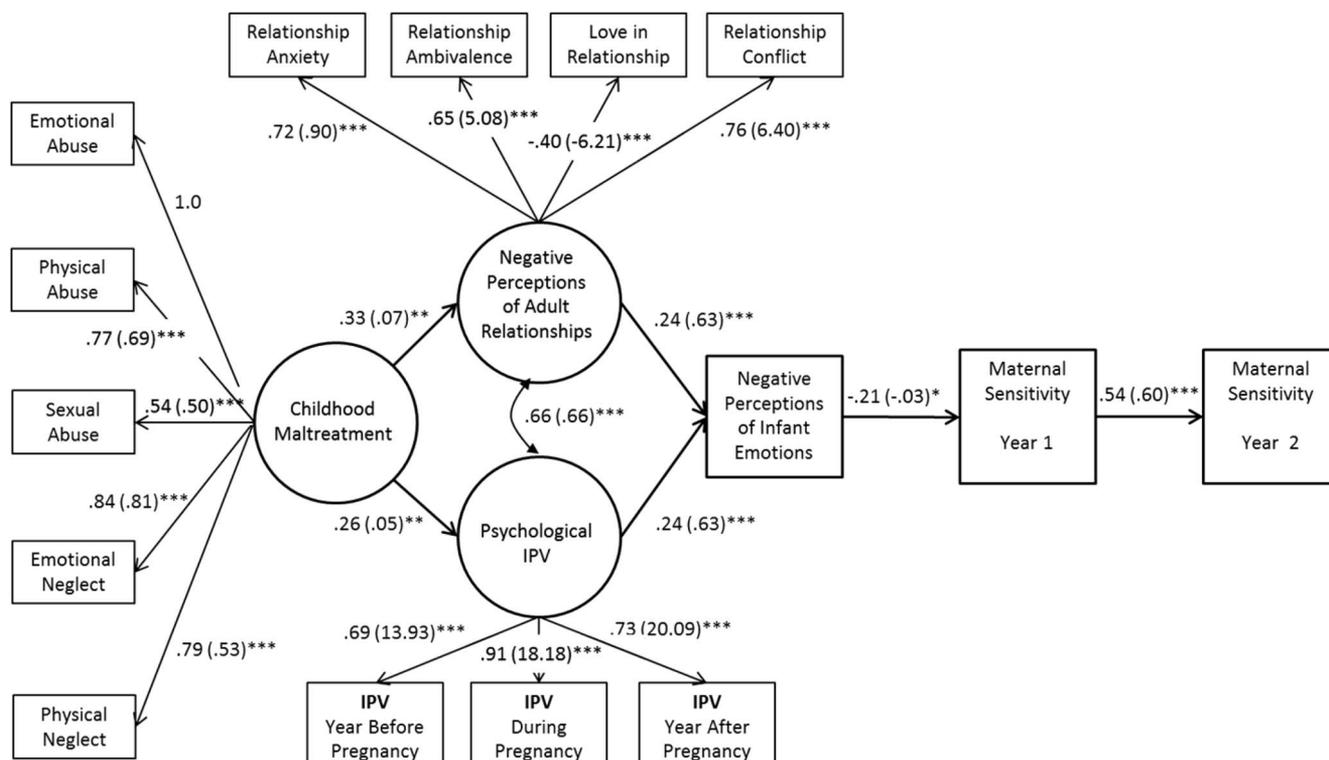
Structural Equation Model

Structural equation modeling was used to test study hypotheses. Constrained and unconstrained models were both estimated. The constrained model set the paths between intimate partner aggression and negative perceptions of adult romantic relationships onto negative perceptions of infant emotions to be equal. A chi-square difference test revealed that the constrained and unconstrained model fit was not significantly different ($\Delta\chi^2 = .20, df = 1, p = .65$). Because of the relatively small sample size in the current study, the constrained model was chosen and presented here because it was more parsimonious (see Figure 1). An analysis of fit indices indicated that the data fit the constrained model well: chi-square was significant ($\chi^2 = 120.80, df = 86, p < .01$), but root-mean-square error of approximation = .06, confidence interval [.03, .08], comparative fit index = .95, Tucker–Lewis index = .94, and standardized root-mean-square residual = .07. All significant paths were in the expected directions and supported the study hypotheses: Maternal history of child maltreatment was positively associated with exposure to intimate partner psychological aggression and with negative perceptions of adult romantic relationships (Hypothesis 1); maternal experiences of intimate partner aggression and negative relationship perceptions were positively associated with more negative perceptions of infant emotion (Hypothesis 2); and perceptions of negative infant emotion were negatively associated with concurrent assessment of sensitive parenting, which was, in turn, associated with longitudinal expression of parenting behaviors (Hypothesis 3).

Table 2
Bivariate Correlations (and Means and Standard Deviations) Among Variables in the Structural Equation Model

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|--------------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|-------|-------|-------|-------|--------|
| 1. Emotional abuse | — | .75** | .51** | .81** | .75** | -.21* | .11 | .15 | .39** | .25** | .20* | .15 | .12 | -.08 | .04 |
| 2. Physical abuse | | — | .41** | .63** | .58** | -.17 | .08 | .14 | .25** | .17 | .20* | .15 | -.02 | -.13 | -.09 |
| 3. Sexual abuse | | | — | .46** | .46** | -.04 | .08 | .04 | .22* | .03 | -.09 | .03 | .11 | -.08 | .00 |
| 4. Emotional neglect | | | | — | .70** | -.13 | .12 | .12 | .33** | .22* | .23 | .14 | .16 | -.14 | .07 |
| 5. Physical neglect | | | | | — | .01 | .17 | .19* | .29** | .15 | .13 | .13 | .05 | -.08 | .08 |
| 6. Love | | | | | | — | -.31** | -.25** | -.28** | -.21** | -.03 | -.06 | -.34 | .16 | .39** |
| 7. Ambivalence | | | | | | | — | .52** | .44** | .36** | .35** | .34** | .27** | -.23* | -.30** |
| 8. Conflict | | | | | | | | — | .53*** | .52** | .37** | .37** | .33** | -.05 | -.02 |
| 9. Attachment anxiety | | | | | | | | | — | .46** | .37** | .40** | .27** | -.07 | -.14 |
| 10. During pregnancy | | | | | | | | | | — | .63** | .66** | .38** | -.40 | -.28** |
| 11. Year before pregnancy | | | | | | | | | | | — | .53** | .21* | .00 | -.12 |
| 12. 1st year postpartum | | | | | | | | | | | | — | .24** | .05 | -.06 |
| 13. IFEEL negative emotion composite | | | | | | | | | | | | | — | -.21* | -.31** |
| 14. Parenting sensitivity—1 year | | | | | | | | | | | | | | — | .56** |
| 15. Parenting sensitivity—2 years | | | | | | | | | | | | | | | — |
| <i>M</i> | 10.13 | 8.24 | 7.34 | 10.18 | 7.25 | 72.45 | 14.25 | 22.73 | 2.79 | 12.12 | 15.33 | 18.63 | 6.03 | 0.41 | 0.36 |
| <i>SD</i> | 5.62 | 4.82 | 5.01 | 5.17 | 3.53 | 16.64 | 8.32 | 8.97 | 1.33 | 20.77 | 20.84 | 28.66 | 2.77 | 0.43 | 0.49 |

Note. IFEEL = Infant Facial Expressions of Emotion from Looking at Pictures.
* $p < .05$. ** $p < .01$. *** $p < .001$.



Coefficients: standardized (unstandardized)

Model Fit Indices:

$\chi^2 = 121$, $df=86$, ns; $RMSEA = .06$ (CI = .03-.08);

$CFI=.95$; $TLI=.94$; $SRMR=.07$

Figure 1. Structural equation model using full information maximum likelihood with standardized and (unstandardized) parameter estimates. IPV = intimate partner violence. * $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

This study examined how mothers' own relationship histories, including interpersonal aggression, influences their perceptions of infant emotions and subsequent parenting behaviors. This is an important question because prior studies have documented that mothers who have experienced interpersonal aggression such as child maltreatment and intimate partner violence are at risk for insensitive parenting behaviors with their own young children (Graham et al., 2012; Levendosky & Graham-Bermann, 2001; Levendosky et al., 2006). However, the mechanisms accounting for this association are not well understood. Information processing theories posit that cognitive processes, such as perceptions of others' emotions and interpretations of ambiguous stimuli, may represent one mechanistic pathway (e.g., Dykas, Ehrlich, & Cassidy, 2011). Thus, the current finding that mothers' heightened perceptions of negative infant emotions is associated with less sensitive parenting with their own infants adds to our understanding about how interpersonal conflict influences parenting; indeed, this is the first study to identify emotion perception as one mechanistic pathway accounting for this relationship.

The Accumulation of Interpersonal Aggression and the Negative Attribution Bias

In the current study, and consistent with prior work in this area (Desai, Arias, Thompson, & Basile, 2002; Huth-Bocks et al., 2013; Lang, Stein, Kennedy, & Foy, 2004), mothers' exposure to maltreatment in their own childhoods was associated with both psychological aggression within their adult romantic relationships and with negative perceptions of, and expectations within, romantic relationships. That is, women with child maltreatment experiences seem to expect intimate relationships to be conflictual, and they report having experienced aggression within them, demonstrating that relationship aggression often continues into adulthood (Lang, Rodgers, & Lebeck, 2006; Renner & Slack, 2006). Although it is possible for positive interpersonal experiences to allow for changes in negative relationship expectations (Lieberman, Padrón, Van Horn, & Harris, 2005), the cumulative effect of interpersonal relationship aggression and conflict may be particularly damaging for those individuals who do not experience reparative relationships, leading to disruptions in subsequent relationships. Furthermore, as negative interpersonal experiences accumulate, hyper-vigilance to subtle signs of negative emotion in others may also

increase, leading to a “negative attribution bias,” or selective attention to certain negative affective states in others (Briggs-Gowan et al., 2015; Butterfield, 1993; Hildyard & Wolfe, 2007; Pollak et al., 1997). For mothers specifically, negative attentional biases may increase the likelihood that they will exaggerate or distort perceived negative emotional states in their infants.

Indeed, as expected, our findings demonstrated that women with histories of interpersonal aggression and conflict were more likely to perceive infant fear, anger, and distress when exposed to the IFEEL picture task. These findings are consistent with information processing theories of emotion, as well as past research documenting associations between exposure to interpersonal aggression (usually physical aggression) in childhood and adulthood and attentional biases to environmental and interpersonal stimuli that are perceived as threatening in some way (Briggs-Gowan et al., 2015; DePierro et al., 2013; Lee & Lee, 2014; Pollak, 2008). Past research has suggested a dual role accounting for the influence of attentional threat bias on cognitive functioning that includes preferential attention toward threat cues (e.g., noticing possible signs of anger in another person) and difficulty in disengaging attention once the threat is identified (see, Cisler, Bacon, & Williams, 2009, for a review). The present study documents these associations among mothers regarding their perceptions of infant emotional states. Furthermore, in addition to the more oft-studied attentional bias toward perceptions of *anger*, this study identified a bias toward *fear* and *distress*, emotions which may feel “threatening” to trauma-exposed mothers who are in the position of being responsible for caring for the infant and responding to infant negative emotional states.

Further, for the first time, this study demonstrated associations between exposure to severe psychological aggression and conflict with romantic partners, specifically, and a negative attribution bias regarding infant emotional states. Past research has indeed suggested that psychological aggression from a romantic partner during the perinatal period may be especially damaging to the developing mother–infant relationship (Huth-Bocks et al., 2013). This is because psychological aggression, which includes degradation, shaming, and unfounded or contrived accusations of wrongdoing, depletes a woman’s sense of confidence and competence in herself and her abilities, including her abilities to provide care to a child (Ahlfs-Dunn & Huth-Bocks, 2012). The perinatal period is a time when the psychological tasks of parenting become acutely activated, as women prepare psychologically for the new relationship they will have with their baby, and the parenting they will be required to provide (Cohen & Slade, 2000). Severe psychological aggression from a partner may, therefore, undermine this central early parenting process by eroding a woman’s confidence in herself as a mother and her expectations of the relationship she is forming with her infant. In turn, a psychologically abused mother may show an attentional bias to certain infant emotions (in this case, anger, fear, and distress) that provoke a sense of threat, and possibly helplessness, within herself.

Negative Emotion Attributions and Early Parenting

It is important to note that mothers’ perceptions of infant emotions in this study were measured in response to ambiguous infant stimuli among children who were not their own. This is important because there is evidence for a differential emotional and neuro-

biological response in parents toward stimuli from their own infant compared with their response to unknown infant stimuli (see Swain, Lorberbaum, Kose, & Strathearn, 2007, for a review). For example, in a group of low-risk parents, Spangler et al. (2005) found that parents reported feeling more emotionally aroused when viewing pictures of their own infant compared with pictures of unknown infants. In addition, parents tended to report feeling less aroused themselves than they thought the infants in the pictures were feeling when they viewed pictures of infants (their own and unknown) expressing negative emotion (i.e., low contagion effects). The differential response to own versus other infant, combined with the attenuated feelings of arousal and the tendency to hold positive attribution biases in healthy (i.e., low risk) parents, may facilitate the motivation and capacity to provide sensitive care and attention to their own child.

In contrast, the expectation that relationships involve heightened negative and unpleasant emotions among women exposed to interpersonal aggression may potentiate emotional arousal in response to the perception of negative emotions, and this reaction is likely to be stronger in response to their own infant’s cues relative to the cues of other infants. These parents may experience increased contagion effects (i.e., be more emotionally “triggered”) in response to negative emotion in their own infants, leading to less sensitive parenting. Support for this hypothesis comes from a study of violence-exposed mothers with posttraumatic stress symptoms and healthy controls (Schechter et al., 2012), which demonstrated that exposed mothers reported greater feelings of subjective stress and showed greater activation of specific fear circuits in the brain during an fMRI procedure while watching toddlers (their own and others) being separated from their parents compared with healthy controls. Thus, given that findings in the present study were evident with respect to perceptions of unknown infants, we might expect an even stronger negative attribution bias toward their own children as they parent during the first several years of life.

The current study hypothesized that a negative attribution bias would influence parental sensitivity during parent–infant interactions. Our findings support this hypothesis and are consistent with prior work demonstrating an association of increased negative attributions of infant emotion and impaired parenting among high-risk mothers. For example, in a sample of women at risk for child neglect with their young (under 3 years) children, most of whom (71%) had experienced severe child maltreatment in their own histories, Hildyard and Wolfe (2007) found that mothers with substantiated cases of child neglect tended to use atypical and negative terms when describing infant emotions on the IFEEL task compared with nonneglecting mothers. Neglectful mothers tended to describe infant emotion as *sneaky* and *judging* and were less likely to describe ambiguous emotions as representing *interest*, a term used much more frequently by the nonneglecting comparison group. Rosenblum and colleagues (2006) reported associations between maternal expressions of anger toward their own infant during a semistructured parenting interview and elevated ratings of infant anger in response to ambiguous infant emotion on the IFEEL. Similarly, using longitudinal data, Huth-Bocks and colleagues (Huth-Bocks, Levendosky, Theran, & Bogat, 2004) found that exposure to intimate partner violence was associated with negative attributions of the child and of the parenting relationship during pregnancy (e.g., “[the baby] is beating me up from the inside like his dad does from the outside.”). These negative attri-

butions were, in turn, associated with insensitive parenting behaviors when infants were 1 year of age (Dayton, Levendosky, Davidson, & Bogat, 2010). Finally, Siddiqui and colleagues (2000) found that mothers who demonstrated impaired bonding with their infant prenatally, described infant emotional signals as more angry during a postnatal assessment using the IFEEL. Thus, the tendency to view infant emotions (and intentions) as particularly negative has been associated with nonoptimal parent–infant relationship factors across a small number of studies. Through the use of a longitudinal design that assessed relationship aggression and attributions of infant emotion on parenting outcomes in a single model, the current study extends these prior results and establishes perceptions of infant emotions as an important mechanism through which exposure to interpersonal aggression is associated with early parenting.

Limitations

There are methodological limitations that should be considered in interpreting the current findings. First, maternal history of child maltreatment was assessed retrospectively. Although this is the most common method of measuring child maltreatment, and has been shown to be a valid approach (Hardt & Rutter, 2004), findings should be interpreted with caution due to potential inaccuracies of the retrospective reports. In addition, measures of maternal reactions to pictures of their own infants were not included in this study. This represents an important methodological weakness given the evidence that parents respond differentially, and typically with greater intensity, when exposed to own- versus other-infant stimuli (Swain et al., 2007). The accumulated evidence for a greater reaction to own-infant stimuli suggests that the association of IFEEL responses to other-infant pictures and observed maternal parenting behaviors, which was identified in the current analyses, may represent a conservative estimate of the maternal negative attribution bias and associated parenting behaviors.

Relatedly, maternal parenting was measured using a single construct—sensitivity. Although the use of observer ratings of parenting sensitivity (vs. self-report ratings) was a strength of this study, it is possible that a more nuanced analysis of maternal parenting that included subcomponents of sensitivity such as attunement, marked affective mirroring, and so forth, may have identified particular elements of parenting behaviors that are specifically related to the perception of infant emotion. Future studies designed to isolate these distinct parenting elements will be useful in shedding light on the current findings. Additional variables that are likely to influence perceptions of infant emotions and early parenting were also not included in the current study. Symptoms of mental illness, for instance, have been shown to influence attentional biases to threat cues in adults (El Khoury-Malhame et al., 2011; Esterman et al., 2013). Furthermore, families with complex, often long-standing, exposure to interpersonal aggression, typically endure other psychosocial stressors and risks on a daily basis. Although findings from the current study are encouraging in terms of understanding one possible mechanism accounting for the association between interpersonal aggression and early parenting behaviors, future studies can begin to parse out the differential effects associated with various forms of environmental risk.

Conclusion

In conclusion, the current study adds to our understanding regarding the influence of interpersonal aggression exposure on the development of insensitive parenting by suggesting one mechanism accounting for this association. A mother's tendency to interpret infant emotions in a negative light was associated with her prior exposure to interpersonal aggression and conflict and with parenting sensitivity across the first 2 years of the infant's life. Thus, the development of a "negative attribution bias" in reaction to infant facial expressions was identified as one mechanism accounting for the association of relational aggression with less sensitive parenting. Findings suggest that maternal perceptions of infant emotion constitute one potential intervention target, especially for mothers who have been exposed to relationship aggression and may, therefore, view their children's emotions in a consistently negative light. Clinical interventions that help mothers to reframe their infant's emotional expressions more accurately may shift the mother–infant dyad onto a more healthy and adaptive developmental trajectory.

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Received September 23, 2014

Revision received November 6, 2015

Accepted November 9, 2015 ■