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Exploration of the Interaction of Maternal Experience of
Trauma and Infant Temperament on Maternal Parenting

A Dissertation

Presented in

Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

By

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August, 2019

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Biography

The author was born in Champagne, Illinois on September 21, 1981. She received her Bachelor of Arts degree from the University of Notre Dame in 2003, and her Masters in Counseling Psychology from the University of California, Santa Barbara in 2008. In 2012, she began her doctoral work in the Clinical Child Psychology Program at DePaul University.

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Abstract

Among women over age 18, 1 in 3 have experienced intimate partner violence, including physical aggression and stalking, and nearly 1 in 5 have experienced some type of sexual violence during childhood, adolescence, or adulthood (Black et al., 2011). Given the high rates of trauma experiences in women of childbearing age, especially in low-income populations (Gillepsie et al, 2009), it is critical to examine the effect these experiences have on women's parenting, especially during infancy, a sensitive period for many important domains of child development (Bornstein, 2002). Previous research has demonstrated experiencing victimization can affect maternal caregiving (Trickett, Noll, Putnam, 2011). However, findings vary depending on the type and timing of the trauma assessed, the parenting outcomes evaluated, and other methodological factors. Moreover, the contribution of infant characteristics to the parenting of trauma-exposed women has been only rarely examined in previous research. The purpose of the current study is to assess whether infant temperament interacts with maternal experience of trauma to contribute to mothers' emotional availability. A community sample of 72 mother–infant dyads who participated in a cross-sectional study exploring the effects of maternal trauma and intimate partner violence (IPV) on relational, behavioral, and physiological infant outcomes, was used for the current study. Self-reports on the Childhood Trauma Questionnaire (Bernstein & Finke, 1998), the Life Stressor Checklist Revised (Wolfe, Kimerling, Brown, Chrestman, & Levin, 1996), and the Conflict Tactics Scale (Straus, Hamby, Boney-McCoy, & Sugarman, 1996) were used to compute an index of lifetime cumulative maternal victimization. Maternal reports on the Infant Behavior Questionnaire (Gartstein & Rothbart, 2003) yielded infant Negativity, Surgency, and Regulation scores. Mothers emotional availability during free play with their infants was coded using the Emotional Availability Scales

(Biringen, 2008). Regressions were used to evaluate whether infant temperament moderates the effect of maternal victimization on maternal emotional availability, including her sensitivity, structuring, intrusiveness, and hostility during mother-infant interactions. An examination of main effects showed expected results for sensitivity and structuring, with higher levels of trauma being linked to lower levels of sensitivity and structuring. In addition, higher levels of infant surgency were linked to higher levels of maternal hostility. Moderation analyses revealed a significant interaction for maternal cumulative trauma and infant temperamental negativity on the degree of maternal non-intrusiveness, where for infants with highest negative affect, higher maternal trauma was associated with increased intrusiveness, and for infants with lowest negative affect, more maternal trauma was associated with decreased intrusiveness. The current study contributes to the literature in several ways. First, it shows not all elements of parenting are similarly affected by exposure to trauma. Second, it demonstrates the role infant temperament plays in affecting mother-infant relationships, and highlights the importance of taking an integrated perspective when viewing the relationship between trauma and parenting. Findings could be used to identify dyads at higher risk of relationship dysfunction, as well as provide information on elements to add to existing interventions, such as strategies for regulating infant distress.

Parenting is an important occupation, which plays a critical role in both society and the life of the individual. While parenting is a job with no end date, its importance is felt from the moment of conception and is particularly relevant during the first phase of life – infancy. This period of parenting is critical; both because the infant depends on the parent for their survival, but also because infants are uniquely affected by their surroundings and experienced events (Bornstein, 2002).

While there are numerous factors that affect parenting, one primary element is individual caregiver characteristics (Belsky, 1984), such as personality and psychological functioning. Given that the expression of personality traits and psychological capacity can vary over time in response to experiences and stressors, it is important for researchers to investigate and understand which experiences and characteristics are most likely to impact parenting capacity.

Experiences of interpersonal violence are unfortunately common for many women during childhood and/or adulthood (Black et al., 2011; Cloitre et al., 2009; Follette, Polusny, Bechtle, & Naugle, 1996) and can exert strong influence on women's caregiving capacities. Research in this area has found women who have experienced interpersonal violence during childhood and/or adulthood report less parental efficacy, display less warmth, and more harsh and intrusive parenting. However, the effects of victimization are nuanced, with some studies documenting significant parenting challenges and others showing that the parenting outcomes of violence-exposed women are heterogeneous, such that many women maintain adequate levels of sensitivity, warmth, and responsiveness (Bennett, Sullivan, & Lewis, 2006; DiLillo & Damashek, 2003; Sexton, Davis, Menke, Raggio, & Muzik, 2017; Wilson, Rack, Shi, and Norris, 2008).

One element that may contribute to these varied outcomes is the child's contribution to the relationship. In addition to maternal personality and experiences, child factors, such as their

early temperamental characteristics, are conceptualized as a second key domain of influence in Belsky's influential parenting model (Belsky, 1984). Research specifically focused on infant temperament has demonstrated widespread effects on parenting, from parental sensitivity and playfulness, to chosen methods of discipline (Bates, Schermerhorn, & Petersen, 2012). Infant negativity often relates to less parental warmth and increased negative parenting, whereas, easy temperament is associated with increased warmth and responsiveness. Notably, children's temperamental characteristics may not influence all women's parenting in the same fashion; women who have been victimized in the past have been found to have more negative and rigid expectations of their infant during pregnancy, which may make infant distress more difficult to tolerate or perceived as re-traumatizing (Huth-Bocks, Theran, Levendosky, and Bogat, 2004; Huth-Bocks, Theran, Levendosky, and Bogat, 2011).

Given the importance of parenting, especially in infancy, it is essential to continue to expand research on the effects of maternal trauma on parenting, so that potential negative effects can be addressed through effective interventions. The purpose of the current study is to obtain a better understanding of the effect of maternal experience of trauma on parenting, by examining whether infant temperament moderates the effects of maternal experiences of interpersonal trauma on mothers' emotional availability, a key caregiving domain.

Trauma

Belsky (1984) suggests the maternal psychological system is the most important and proximal area of influence on parenting. He hypothesizes that interpersonal experiences during development shape women's personality, which in turn determines their ability to engage in positive, effective parenting. While there are numerous factors highlighted by research as affecting maternal personality and thereby parenting, given the high rates of lifetime traumatic

exposures for women of childbearing age, one of the most important to examine is maternal experience of interpersonal trauma. Among women over age 18 in the United States, 1 in 3 have experienced intimate partner violence, including physical aggression and stalking, and 1 in 5 have experienced sexual violence during childhood, adolescence, or adulthood (Black et al., 2011). Notably, victimization rates are higher for women in the United States than those of women living in most other developed nations (SAMHSA, 2014). Low-income populations also have high rates, with 33% of women reporting physical intimate partner violence, and 17.3% reporting physical abuse during childhood (Gillepsie et al., 2009).

Research has demonstrated experiencing interpersonal trauma can negatively affect maternal caregiving. However, findings vary depending on the type and severity of trauma assessed, the specific parenting outcome evaluated, the timing of evaluations and other methodological differences between studies (DiLillo & Damashek, 2003; Lang, Garstein, Rodgers, and Lebeck, 2010; Trickett, Noll, & Putnam, 2011; Wilson, Rack, Shi, and Norris, 2008).

Childhood sexual abuse (CSA) is an example of a type of interpersonal trauma that has been extensively researched to learn more about the effects this experience has on later maternal parenting. Findings are mixed, with some studies documenting survivors of CSA experience significant problems in the maternal role (Trickett et al., 2011) and others finding survivors have only minimal problems in the maternal role, or the problems experienced are dependent on other interpersonal or environmental factors (Alexander, Teti, Anderson, 2000; DiLillo & Damashek, 2003; Sexton et al., 2017).

Zvara and colleagues (2015) tried to shed light on these disparate findings and proposed that significant family of origin variables (e.g., income, additional trauma experienced), which

were inconsistently taken into account in early research in this area, may have a confounding effect. To address this problem, they compared adult victims of childhood sexual trauma to a control group matched on family of origin variables and found that the CSA group demonstrated poor functioning in multiple domains of parenting, including observed sensitivity and harsh intrusiveness. However, there were no group differences in self-reported parenting efficacy. They also did not find moderating effects for potential current protective factors (higher income, higher education, or adult social support) (Zvara, Mills-Koonce, Carmody, Cox, & Family Life Project Key Investigators, 2015). These findings could indicate that only some domains of parenting are effected by trauma, or given parental efficacy was measured through maternal self-report and the other domains through observation, the difference in findings could be related to differences in maternal perception versus maternal behavior.

Additional research studies have broadened the scope of the CSA research and explored the effects of multiple types of childhood maltreatment (CM) on later parenting. Ehrensaft and colleagues (2015) compared parenting in mothers who had experienced sexual or physical abuse during childhood with a control group. They found experience of sexual abuse during childhood predicted lower reported availability, higher perceived ineffectiveness, and lower levels of satisfaction. In contrast, experience of childhood physical abuse only predicted higher perceived ineffectiveness. Women who had experienced both types of abuse reported lower overall availability and higher levels of harsh discipline (Ehrensaft, Knous-Westfall, Cohen, & Chen, 2015). In contrast, Lang, Garstein, Rodgers, and Lebeck (2010) found that women who reported experiencing emotional abuse reported more dysfunctional interactions with their infant. Those with a history of physical maltreatment reported less dysfunctional parent-child interactions, but they also reported having more difficult infants. It is important to note the cell sizes in this study

were particularly small (around 10 individuals in each maltreatment group) and all data was collected through parent report (Lang et al., 2010). Sexton, Davis, Menke, Raggio, and Muzik (2017), further sought to clarify effects of CM based on type experienced. They examined the effects of childhood maltreatment in a non-clinical group of mothers and their 6-month-old infants, 72% of whom had experienced CM. They found no differences in observed hostile, controlling, or positive parenting related to severity or type of childhood maltreatment experienced. Although results are inconsistent, taken together findings suggest there may be a connection between various types of childhood maltreatment and parenting, and it may vary by type of maltreatment experienced.

In addition to examining varying effects based on type of childhood maltreatment mothers experienced, research has also evaluated how experience of maltreatment differentially impacts maternal parenting during various stages of infant development. Moehler, Biringen, and Poustka (2007) examined emotional availability among mother-infant dyads when infants were 5 months old. Women who reported severe physical and/or sexual childhood abuse were paired with a control group matched on infant gender, birthweight, number of children, maternal education, and marital status. Emotional availability was coded during a 10-minute lab play session using the Emotional Availability Scales, 3rd Edition (Biringen, 1998). Mothers in the childhood maltreatment group showed more intrusiveness than the control group. Their scores on, sensitivity, structuring, and nonhostility were also lower than the control group, but differences were not statistically significant. However, in a continuation of this study conducted when the infants were 12 months, authors report that differences in all domains became statistically significant by that time (Fuchs, Mohler, Resch & Kaess, 2015). That is, scores based on a 20-minute laboratory free play session at 12 months of age showed mothers who had

experienced CM had significantly lower scores on maternal sensitivity, nonintrusiveness, structuring, and nonhostility, compared to the control group (Fuchs et al., 2015). Because the control group demonstrated an increase in their EA scores from the 5 month to the 12 month assessment, the authors hypothesize that changes in infant locomotion and autonomy over the first year of life may lead to increased parenting challenges, which women in the CM group may have been unable to meet or even seen as threatening (Fuchs et al., 2015).

In another study examining similar constructs among mothers and their 18-month old toddlers, authors found that mothers reporting a history of CM demonstrated less sensitivity and less optimal structuring during play (Driscoll & Easterbrooks, 2007). However, Bailey and colleagues (2012) explored the connection between history of CM and emotional availability with mothers and their preschool age children (4-6) and did not find associations between maternal history of physical or sexual childhood abuse and observed emotional availability, though they did find a connection between other forms of CM (emotional maltreatment, neglect, and witnessing violence) and higher levels of maternal hostility (Bailey, DeOliveira, Wolfe, Evans, & Hartwick, 2012).

In sum, there is some evidence that the experience of childhood maltreatment can negatively impact numerous facets of maternal emotional availability including sensitivity, structuring, intrusiveness, and hostility; however, these findings are not consistent across all studies, as there seems to be variation depending on type of childhood maltreatment experienced and other psychosocial factors at the time one becomes a mother. This is consistent with findings of a recent meta-analysis conducted by Vaillancourt and colleagues (2017) who reviewed 14 studies, 10 of which found a direct or indirect connection between CM and parenting. However, authors noted conclusions were limited due to heterogeneity of studies, and

speculated moderating or mediating factors at work may explain some of the diversity in findings.

Experience of maltreatment during childhood is not the only type of interpersonal trauma exposure linked to alterations in maternal parenting. Adulthood experience of interpersonal trauma, particularly intimate partner violence (IPV), has also been associated with parenting problems. Research by Kita, Haruna, Matsuzaki, and Kamibeppu (2016) found a relationship between IPV experienced during pregnancy and compromised mother-infant bonding at 1 month of age. Two groups of researchers examined factors increasing the likelihood of mothers neglecting their infants and both found that experiences of IPV significantly contributes to the occurrence of infant neglect (Bartlett, Raskinb, Kotake, Nearing, & Easterbrooks, 2014; Nicklas & Mackenzie, 2013). In addition, Levendosky, Leahy, Bogat, Davidson, and von Eye (2006) looked at the effect of experiencing IPV at two time points (prior to/during pregnancy and when infant was one year of age) on observed maternal parenting when the infant was one. They found no direct relationship between past experience of IPV and current parenting; however, current experience of IPV was related to decreased sensitivity and warmth, as well as increased hostility and disengagement. Gustafsson and Cox (2012) also conducted a longitudinal study over the first two years of the child's life and found that higher levels of IPV exposure when infants were 6 months of age were linked to higher levels of depression symptoms when infants were 15 months of age, and thereby increased observed intrusive parenting behaviors when children were 24 months old. Research conducted in families of school age children (7-12) found maternal warmth was inversely related to mother's experience of IPV, specifically physical or psychological abuse, over and above other potential contributors such as maternal depressive symptoms (Levendosky and Graham-Bermann, 2000).

However, not all research has found such clear-cut impairments in parenting for mothers experiencing IPV: some studies have reported no significant associations, while others report positive effects of IPV on parenting among specific groups of women. Sullivan and colleagues (2001) reported that a recent history of IPV (physical abuse, emotional abuse, and injury experienced) was not associated with women's self-reported parenting stress or use of harsh discipline among mothers of children ages 7 to 11 (Sullivan, Nguyen, Allen, Bybee, & Juras, 2001). On the other hand, Levendosky, Huth-Bocks, Shapiro, and Semel (2003) found that only mothers who experienced IPV and were also dealing with psychological distress reported lower parenting effectiveness and attachment with their preschool children, but mothers without depressive symptoms had positive parenting outcomes. Similarly, a study by Casanueva and colleagues (2008) examined the effects of exposure to IPV on the parenting skills of mothers of children under the age of 10, in families who had been referred to the child welfare system. They found no difference between the overall observed parenting skills of women currently experiencing IPV and those with no history of IPV experience, but surprisingly, women who experienced IPV previously but were not currently experiencing it, demonstrated significantly better parenting skills. While the authors acknowledge these findings are not generalizable to all mothers who have experienced IPV, they suggest that their findings indicate exposure to IPV does not necessarily result in impairments in maternal parenting (Casanueva, Martin, Runyan, Barth, & Bradley, 2008).

In summary, although the literature relating IPV and parenting shows significant heterogeneity, there is substantial evidence that suggests IPV predicts less maternal warmth and sensitivity, and increased intrusiveness, especially among women who also experience other stressors. This is in line with the results of a recent meta-analysis where authors found a small

but significant connection between IPV and positive parenting with higher levels of IPV being linked with less positive parenting. They also found a small, yet significant, connection between IPV and increased physical aggression (Chiesa et al., 2018).

While research has often looked at adult versus childhood experiences of trauma separately, or used one as a control when examining the other, research has shown they tend to co-occur and should be examined as a whole. Desai and colleagues (2002), using a nationally representative sample, found that women who experienced interpersonal violence in childhood were at increased risk for adulthood victimization. Similar research conducted in the UK indicates risk for victimization in adulthood increases based on the amount of abuse experienced in childhood (Coid, Petrukevitch, Feder, Chung, Richardson, & Morey, 2001). In addition to childhood and adulthood victimization frequently co-occurring, additional research has demonstrated worse outcomes on numerous dimensions for women with more experiences of trauma throughout their lifespan. Banyard and colleagues (2003) found experiences of complex trauma, or the cumulative level of trauma experiences across the lifespan, was related to more depressive symptoms, as well as worse parenting outcomes, such as more reports of child neglect, decreased parenting satisfaction, and a history of involvement with child protective services (Banyard, Williams, & Siegel, 2003). Similarly, Levendosky and Graham-Bermann (2001) found maternal history of childhood trauma significantly contributed to the effect of IPV exposure on maternal parenting, via impairments on maternal psychological functioning, among mothers of children ages 7 to 11 years.

At least two mechanisms have been proposed to mediate the effects of maternal interpersonal trauma on parenting during infancy: maternal psychological functioning and their perceptions of the infant behavior. Research provides a plethora of evidence demonstrating

depressed mothers often display more negative caregiving characteristics such as intrusiveness, anger, and irritation (Field, 1995; Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Even in cases where mothers do not meet diagnostic criteria for depression, there is evidence caregiver distress can also negatively affect parenting, as distressed parents are more removed from their infants and thereby do not become as familiar with their needs (Bornstein, 2002). In regards to maternal perceptions of the infant, Dayton, Huth-Bocks, and Busuito (2016) found that mothers with a history of child abuse and IPV demonstrated less sensitivity with their young children, as a result of the measured tendency of these mothers to perceive ambiguous infant facial expressions as negative. Further lending credence to the idea that maternal representations and interpretations of infant behavior may play a role in the connection between experience of maternal trauma and parenting behaviors. Waters, Hagan, Rivera, and Lieberman (2015) conducted a study of predominately low-income Latina women with a history of IPV exposure and found that when these women were enrolled in child-parent psychotherapy, it was the change in child-rearing attitudes that resulted in increased sensitivity, not improvements in their posttraumatic stress symptoms.

As stated at the beginning of this section, there is a large body of research demonstrating interpersonal trauma can negatively affect maternal caregiving. However, even in the relatively small group of studies highlighted, specific findings vary. Researchers have looked at numerous variables to help explain these varied findings, such as the timing/type of interpersonal trauma (childhood, adulthood, or cumulative or physical vs. sexual). While research has also identified multiple maternal factors that may shape the parenting outcomes of victimization survivors, infant characteristics have generally been overlooked. Infant factors are theorized to be a key domain of influence for the parent child-relationship (Belsky, 1984). The following section

reviews the effects of temperament on maternal parenting, as victimized women may be particularly sensitive to infant temperamental difficulties.

Infant Temperament

Parenting is an interactive process that is continually shaped by the behavior of both members of the mother-infant dyad. Parents often mention that parenting an infant becomes more fun around 3 months of age, when infants start smiling. Infant smiling, cooing, and eye gaze are all early examples of ways infant behavior can affect parenting. When a parent behavior is rewarded with a smile, the parent is often more likely to engage in that behavior in the future. As one expands their view from analyzing single infant behaviors, the bigger picture emerges, in which infant temperament as a whole affects parenting. Temperament is generally defined as the biological basis for individual differences in patterns of self-regulation and reactivity to internal and external stimuli. Temperament has been found to be relatively stable; however, there is substantial evidence that it is not static but is shaped over time by environmental experiences (Rothbart & Bates, 2006; Bates et al., 2012).

There are numerous theoretical and measurement approaches in the temperament literature. One of the earliest is found in the work of Thomas, Chess, and colleagues (1963), pioneers in the field of temperament research. Thomas and Chess' work was inspired by observations of their own children and their clinical observations. Contrary to expectations, some children with healthy, positive parents would demonstrate profound impairment, while others experiencing social stress and disrupted parenting were adapting and succeeding. This sparked the hypothesis that there may be innate characteristics of the child, which were driving their responses to external stimuli (Putnam, Sanson, & Rothbart, 2002). Thomas and Chess conceptualize temperament as consisting of *how* behavior is expressed in response to some type

of external stimulus (Goldsmith et al., 1987). They note two infants may have the same ability for a task but that they may differ in how they perform in terms of persistence, mood expressed, and level of distractibility, among other things (Goldsmith et al., 1987). Their initial work measured temperament using a set of nine categories gathered from parent interviews (Thomas et al., 1963), but more recent research has found infant temperamental variability can be accounted for by a smaller number of dimensions (Rothbart & Mauro, 1990), including Fear, Irritability, Positive Affect, Activity Level, and Attentional Persistence.

A second major tradition in temperament research is the psychobiological approach pioneered by Rothbart (Rothbart & Derryberry, 1981). The psychobiological approach builds on the work of Thomas and Chess and integrates context to examine the *why* of behavior, seeking to include the motivation behind behavior into the construct of temperament. Some of the specific dimensions used to measure temperament in this theoretical tradition, such as distress to limitations, attention shifting, activity level, and soothability, were based on the work done by Thomas and colleagues. These dimensions have been found to be relatively stable and valid in measuring individual differences in infant temperament (Garstein & Rothbart, 2003).

While different theoretical traditions originally identified slightly different dimensions of temperament, over time factor analytic studies have identified three consistently emerging factors (Rothbart & Bates, 2006). Studies using the Child Behavior Questionnaire (Ahadi, Rothbart, & Ye, 1993) with children between 3 to 8 years of age, identified the broad factors of: Negative Affectivity, Surgency, and Effortful control (Rothbart, Ahadi, Hershey, & Fisher, 2001). Similar dimensions have been found with infant samples. For example, Garstein and Rothbart (2003) performed factor analysis on a large dataset of 360 3-to-12-month old infants using the Infant Behavior Questionnaire-Revised (Garstein and Rothbart, 2003) and found three

similar dimensions: Negative Affectivity, Surgency, and Regulation. It should be noted that different measures often have scales with different names, but measure similar constructs (Rothbart & Bates, 2006). Research on these three dimensions has found links to numerous child outcomes, from alterations in parent-child relationships, to later functioning with peers including level of empathy and aggressive behavior (Rothbart, Ahadi, & Evans, 2003; Rothbart, Ahadi, & Hershey, 1994). Research generally supports a plausible link between infant temperament and maternal parenting, for both positive and negative infant temperament traits.

Evidence for the connection between positive infant temperament and maternal sensitivity has been found cross-sectionally, but not longitudinally. Specifically, Kochanska and colleagues (2004) reported cross-sectional correlations between 7-month-old infants' observed positive affect and observer ratings of maternal responsiveness, attunement, and warmth during interactions among 102 caregiver-infant dyads, but did not find longitudinal associations (Kochanska et al., 2004). A separate longitudinal study that followed caregiver-infant dyads from 3-to-20 months of age unexpectedly found that lower levels of infant surgency at 3 months (closely related to positive affect) predicted higher initial levels of sensitivity and increased caregiving involvement over time (Planalp, Braungert-Reiker, Lickenbrock, & Zentall, 2013).

On the other hand, longitudinal associations have been found between infant positive emotionality and decreased later maternal negative parenting practices. Bridgett and colleagues (2013) obtained mother reports of infant positive emotionality at four, six, eight, ten, and 12 months of age, and assessed maternal parenting when infants were 18 months of age using self-report measures. Results demonstrated that even after accounting for a variety of maternal characteristics, higher initial levels and steeper increasing trajectories of infant positive

emotionality predicted fewer reported negative parenting practices at 18 months (Bridgett, Laake, Garstein, & Dorn, 2013).

In regards to infant temperamental regulation, findings are similarly mixed: one longitudinal study documents it predicts maternal support, while another study found significant cross-sectional associations between self-regulation and maternal responsiveness that were not significant when examined longitudinally. Kennedy, Rubin, Hastings, and Maisel (2004) examined positive temperament traits of 2-year-olds and found that children who exhibited signs of increased physiological regulation had mothers who were more supportive two years later, even after controlling for initial levels of maternal support. On the other hand, Popp and colleagues (2008) found a concurrent connection between toddler self-regulation (scored via a composite of observation and maternal report) and observed maternal responsiveness at two time points (18 and 30 months of age), but there was no predictive relationship between earlier levels of self-regulation and later maternal responsiveness, once they controlled for initial levels of caregiving (Popp, Spinrad, & Smith, 2008). Another longitudinal study suggests infant regulation predicts negative aspects of parenting. Bridgett and colleagues (2009) discovered that the most important predictor of reported negative parenting at 18-months was a steeper decrease in reported infant regulatory control from 4 to 12 months, with a trend-level effect for initial ratings of regulatory control (Bridgett et al., 2009).

Negative elements of infant temperament have received more examination in the literature. Cross-sectional studies provide support for correlations between negative temperamental characteristics and decreased maternal sensitivity and increased intrusiveness, with some exceptions. Specifically, Mills-Koonce et al. (2007) documented a relationship between ratings of 6-month-old infant's negative affect across several stressful contexts and

decreased observed maternal sensitivity. Similarly, Fields-Olivieri and colleagues (2017) found an association between 18-month-olds rated higher in negative affectivity and lower observed maternal sensitivity (Fields-Olivieri, Cole, & Maggi, 2017). Calkins and colleagues (2004) found that 6-month-old infants classified as easily frustrated during laboratory tasks had mothers who demonstrated significantly higher levels of intrusiveness across a variety of mother-infant interactions; however, in contrast to the other findings reviewed, there was no relationship between infant temperamental frustration and observed maternal sensitivity in this study. With older children, Ciciola, Crnic, & West (2013) reported that difficult child temperament (propensity toward anger) had a negative relationship with maternal sensitivity at 3 years of age, but only during free play situations, not challenge situations.

A meta-analytic review of 62 studies conducted to clarify the pattern of influence between infant negative emotionality and parenting over the first few years of life found a small but significant association between parent rated negative emotionality and less supportive (responsive, sensitive, involved) parenting (Paulussen-Hoogeboom, Stams, Hermanns, & Peetsma, 2007). Interestingly, the relationship was relatively strong in studies with primarily lower SES samples, ethnic diversity (less than 75% Caucasian), and when infant temperament was assessed through parent report. The relationship was reversed, however, in studies with families of higher SES, which showed higher levels of negative emotionality being linked to more supportive parenting (Paulussen-Hoogeboom et al., 2007).

Longitudinal studies examining negative infant temperament and parenting over time demonstrate mixed findings and only preliminary evidence for negative temperament as a predictor of maternal negative parenting. In a study with 47 mother-toddler dyads, assessed at 12 months and then again at 24 months of age, toddler distress reactivity (an aspect of negative

emotionality) at 12 months predicted a decline in supportive parenting from 12 to 24 months (Scaramella, Sohr-Preston, Mirabile, Robinson, & Callahan, 2008). However, another longitudinal study with 120 caregiver-infant pairs assessed at 3, 5, 7, 12, 14, and 20 months reported no association between infant negative emotionality or regulation over time and caregiving sensitivity and involvement (Planalp et al., 2013). In sum, evidence from the cross-sectional data generally points toward a concurrent connection between elements of infant negative emotionality (e.g., anger, frustration) and less effective parenting, while evidence from longitudinal studies is inconclusive.

Taken in conjunction, the research on the association between infant temperament and parenting suggests: 1) strong evidence for cross-sectional associations between infant negativity and lower maternal positive parenting, with one meta-analysis supporting a larger effect among low SES dyads (Paulussen-Hoogeboom et al., 2007); 2) some evidence for correlational associations between infant regulation and maternal sensitivity, with support from one study (Popp et al., 2008); 3) some evidence for cross-sectional associations between infant positivity and maternal sensitivity, as one study suggests more positivity is associated with sensitivity (Kochanska et al., 2004); 4) no evidence of a longitudinal association between positive temperament and positive parenting, with one study finding no relationship (Kochanska et al., 2004) and one study finding a relationship that was opposite from expectations (i.e., less positive temperament predicted increases in maternal involvement) (Planalp et al., 2013); 5) some evidence for longitudinal associations between infant positivity or regulation and maternal negative parenting, with one study supporting this association (Bridgett et al., 2013); and 6) mixed evidence of longitudinal associations between negative infant temperament or regulation and maternal sensitivity, support, or involvement, with one study finding this effect (Scaramella

et al., 2008) and one study finding no effect for each of the temperamental dimensions (Planalp et al., 2013).

The mixed findings found in the longitudinal studies may be due, at least in part, to the complex and transactional nature of the relationship between the different aspects of temperament and parenting (Bates et al., 2012; Kiff, Lengua, & Zalewski, 2011; Rothbart & Bates, 2006). For example, in one study negative emotionality at 12 months predicted less supportive parenting at 24 months, but harsh parenting responses to toddler non-compliance at 12 months predicted increases in toddler negativity at 24 months (Scaramella et al., 2008). Mixed findings may also be explained by sample characteristics, with effects being more pronounced for certain groups of women. For example, while the overall effect of negative infant temperament on parenting may be small, for a subset of mothers who are already at risk, due to factors such as low income, maternal stress, or mental health concerns, the addition of an infant with high negative emotionality may lead to less sensitive parenting (Mertesacker, Bade, HaverKock, & Pauli-Pott, 2004; Paulussen-Hoogeboom et al., 2007).

Empirical evidence has shown child temperament interacts with caregiver factors, such as mental health, to determine parenting outcomes. Pauli-Pott, and colleagues (2000) conducted a cross-sectional study examining the connection between infant temperament, both positive and negative emotionality (observed and reported), maternal mental health, and observed maternal sensitivity with 101 mothers and their 4-month-olds. Authors found no direct connection between maternal depression or infant negative emotionality and maternal sensitivity. However, they did find a significant interactive effect, where higher levels of depressive symptoms and higher levels of infant negative emotionality (both observed and reported) were linked to lower maternal sensitivity (Pauli-Pott, Mertesacker, Bade, Bauer, & Beckmann, 2000). There was no

direct connection or interaction found for positive infant emotionality. These results were extended in a separate longitudinal study with a smaller sample size; authors reported that observed infant negative emotionality predicted a decrease in maternal sensitivity over time, but only for mothers who were either high in depressive/anxiety symptoms or who had low levels of social support. Again there was no direct or interactive effects found for positive infant emotionality (Mertesacker et al., 2004).

Given these significant associations with multiple domains of parenting and interactions with maternal factors that shape parenting behaviors, temperament is a strong candidate to moderate the effects of maternal trauma exposure on key parenting domains, such as maternal emotional availability.

Emotional Availability

As the earlier review of the literature illustrated, there are numerous domains of parenting that are relevant to child development and many ways to measure parenting have been used in research studies. Self-report measures are useful for trying to assess how a caregiver perceives their parenting or relationship with their child. Alternatively, observational measures are more appropriate when research seeks to describe more concrete elements of the dyadic relationship, such as the affective quality of the dyad (Bailey et al., 2012; Cox & Harter, 2003). Multiple observational studies have identified distinct positive and negative dimensions of parenting that help encapsulate key aspects of the parent-child relationship, including sensitivity, hostility, and intrusiveness. In a review exploring parenting from infancy through adolescence, Cox & Harter (2003) concluded by pointing to sensitivity, warmth, and nonintrusiveness as being key elements of parenting for determining positive development. In addition, because both maternal and child contributions determine parent-child interactions, it is helpful to use a measure that incorporates

the dyadic nature of parent-child interactions, which is often missed by scales that rely on a discrete count of behaviors that are independent of interactional context. For these reasons, maternal emotional availability has emerged as a key construct used in parenting research.

Emotional availability (EA) is defined in the current study as a dyadic construct encompassing emotional openness, warmth, mutual understanding, and parent-child communication. It is a bidirectional construct, as it assesses both signals sent between the dyad and the reception/reflection of those signals (Biringen, 2000; Biringen & Robinson, 1991; Easterbrooks & Biringen, 2000; Biringen, 2004). This construct was influenced by attachment theory and early writings on emotional availability in the clinical literature (Biringen, 2000; Biringen & Robinson, 1991) and places emphasis on the emotional communication in the relationship, which is viewed as important for promoting children's emotional expression and sense of self. Attachment theory proposes that interaction with a caring, responsive, and emotionally open caregiver allows infants to build securely attached relationships and build essential social emotional competencies (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby 1969/1982; Bretherton, 1992; Easterbrooks & Biringen, 2000). Ainsworth, a primary figure in attachment theory, introduced the concept of sensitivity, which encompasses both warmth and attunement (Ainsworth et al., 1978). That is, a sensitive mother does not only demonstrate positive affect and warm tone, she must also be adept at reading and responding to her infant's signals (Ainsworth et al., 1978; Biringen, 2000; Bretherton, 1992). EA builds on the concept of sensitivity to include other domains that characterize optimal parent-child interactions, such as how well mothers scaffold interactions to build their child's skills, whether they can do so in a way that allows the child to still lead the interactions, and while controlling their own negative emotions (Easterbrooks & Biringen, 2000).

Facets of emotional availability are linked to numerous important developmental outcomes, including secure attachment, emotional regulation, expressive language and social competence. Several studies have documented connections between emotional availability and attachment using observational measures, including the Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978) and the Attachment Q-set (Waters & Deane, 1985). Ziv and colleagues (2000) used the Strange Situation when infants were 12-months-old to examine the connection between attachment and emotional availability in a large community sample of 667 dyads in Israel. Results indicated that secure attachment was associated with more positive scores on the sensitivity and structuring scales of the EAS (Ziv, Aviezer, Gini, Sagi, & Koren-Karie, 2000). Similarly, Swanson, Beckwith, and Howard (2000) focused solely on the intrusiveness scale and found higher levels of intrusiveness were linked to disorganized and insecure avoidant attachment in the Strange Situation among 51 drug-exposed infants (Swanson et al., 2000). In addition, EA sensitivity was also associated with later attachment security at age 3 (using the Attachment Q-set) in a sample of 104 children, who had been placed in substitute care as infants (Altenhofen, Clyman, Little, Baker, & Biringen, 2013).

Several studies have examined the relationship between EA and maternal representations of attachment assessed in adulthood. Oyen, Landy, and Hillburn-Cobb (2000) reported sensitivity as it varied by mother's attachment classification on the Adult Attachment Interview (AAI; George, Kaplan, Main, 1985). They found autonomous/secure mothers, those who are able to discuss and reflect on attachment experiences in a clear and organized way, were more sensitive than mothers with insecure (anxious or preoccupied) AAI scores. This finding was congruent with work done by Biringen and colleagues (2000) who also used the AAI and found mothers with autonomous representations demonstrating higher levels of emotional availability.

Additional work by Biringen and colleagues (2000) using a different measure of adult attachment, the Parent Attachment Interview, found maternal sensitivity and structuring measured across multiple time points from 18 months to 3.5 years of age predicted maternal representations of themselves as a mother when children were age 3.5 (Biringen, Matheny, Bretherton, Renouf, & Sherman, 2000).

Associations between emotional availability and measures of child socio-emotional development are also robust, with longitudinal links between EA scores and a variety of indices of child outcomes, including empathy, internalizing and externalizing problems, and child self-regulation. Little and Carter (2005) reported that maternal hostility was negatively related to infants' ability to regulate themselves during a challenging task. In a longitudinal study, Moreno, Klute & Robinson (2008) reported maternal emotional availability measured when children were 15 months predicted child empathy at 2 years of age in a large (661 dyads) community sample. Biringen and colleagues (2005) found associations between pre-kindergarten maternal EA scores and child aggressiveness in Kindergarten. More specifically, when measuring EA in a play context, sensitivity and structuring predicted less child aggression in Kindergarten, while maternal hostility in a reunion context predicted more child aggression. In addition, higher structuring, nonintrusiveness, and nonhostility, predicted lower levels of internalizing and externalizing symptoms in Kindergarten (Biringen, Skillern, Mone, & Pianta, 2005). In a cross-sectional study, Easterbrooks and colleagues (2012) found similar associations among 43 low-income 7-year-old children and their mothers. Maternal levels of sensitivity, nonhostility, and nonintrusiveness were associated with lower child mental health symptoms as reported by the child and their teacher. Children whose mothers were less sensitive demonstrated more overall behavior problems, as rated by their teacher, and more self-reported

depressive symptoms. Increased levels of maternal hostility were also linked to increased self-reported depressive symptoms (Easterbrooks, Bureau, & Lyons-Ruth, 2012).

Given the strong connection between emotional availability as measured by the EAS and significant child outcomes, it is not surprising that researchers are examining this construct in at-risk mother-child dyads, including those with economic and mental health challenges. Little and Carter (2005) examined emotional availability in a group of 45 low-income, primarily single mothers, most of whom were ethnic minorities. Emotional availability was measured during both challenge and non-challenge contexts when infants were 12-months old. Mothers had lower scores on the three maternal scales measured (sensitivity, structuring/intrusiveness, and hostility) than those typically found in other samples rated using the EAS, with 19% of the sample demonstrating low levels of sensitivity, 26% with high levels of intrusiveness, and 38% showing some hostility (Little & Carter, 2005).

Low SES and contextual stress often are comorbid with victimization, an additional construct that can impair maternal emotional availability. As reported in previous sections, mothers exposed to trauma demonstrated lower levels of maternal nonintrusiveness when infants were 5 months and 12 months, as compared to women who were not exposed to trauma, as well as lower sensitivity, less structuring, and more hostility when their infants were 12 months or 18 months (Driscoll & Easterbrooks, 2007; Fuchs et al., 2015; Moehler et al., 2007). However, one study did not find the expected results with mothers who had experienced childhood sexual or physical abuse but did find a significant relationship when accounting for other forms of maltreatment, such as emotional abuse, neglect, and witnessing family violence (Bailey et al., 2012). Based on their finding the authors recommend assessing multiple forms of interpersonal trauma, when examining the relationship between history of trauma and parenting. This advice

is congruent with findings from other trauma researchers who have shown that higher levels of cumulative trauma for women lead to increased traumatic stress and other mental health symptoms, parenting stress, reports of perpetrating neglect and abuse with their own children (Banyard et al., 2003; Follette et al., 1996).

The studies highlighted in this section point to the importance of assessing emotional availability due to its relationship with numerous important child outcomes. In addition, they show that emotional availability can be detrimentally affected by a variety of maternal risk factors, such as low-income and mental health concerns. Connecting these findings with the studies from the previous sections, indicates mixed evidence for predicted deficits in emotional availability based on trauma exposure, but highlights the potential for examining infant temperament as a moderator to explain mixed findings. Clearly, more research is needed to better understand what factors shape maternal EA.

Rationale

Women experience high rates of interpersonal violence both in childhood and later in life, especially when they are also economically disadvantaged (Gillepsie et al, 2009), and young children are disproportionately represented in households where women experience intimate partner violence (Fantuzzo et al., 1991). Accordingly, the effects of maternal history of child maltreatment and intimate partner violence have been examined in multiple studies, and although findings generally suggest victims of interpersonal violence have more parenting difficulties, some findings are mixed, and a specific pattern of deficits is still not well delineated. In addition, Lang et al. (2010) highlight the need for more research with community samples of women who have experienced trauma, as much previous research has been done with women recruited from clinical populations. Finally, child factors have frequently been overlooked as

important contributors in this research, even though theoretical models suggest both maternal characteristics and child behaviors shape maternal parenting, and significant interactions between maternal distress (e.g., depression) and child temperament have been reported to predict parenting outcomes.

The current study will evaluate the effect of maternal exposure to trauma across the lifespan on maternal emotional availability when infants are about 1 year of age. To extend previous work, the current study will include infant temperament as a moderator of the effects of maternal trauma, given the extensive literature demonstrating a relationship between different aspects of infant temperament and parenting. In addition, maternal and child factors that have been previously associated with alterations in maternal parenting (i.e., maternal mental health symptoms (Pauli-Pott et al., 2000), maternal education (Paulussen-Hoogeboom et al., 2007), and infant sex (Bornstein et al., 2008) will be used as covariates in statistical analyses, to enhance methodological rigor.

Research Question and Statement of Hypotheses

Research Question I. Is there a direct relationship between maternal experience of interpersonal trauma and maternal emotional availability?

Hypothesis I. There will be a significant relationship between maternal experience of trauma and maternal sensitivity and structuring, such that, mothers who experience higher levels of interpersonal trauma will demonstrate decreased sensitivity and structuring.

Hypothesis II. There will be a significant relationship between maternal experience of trauma and maternal intrusiveness and hostility, such that, mothers who experience

higher levels of interpersonal trauma will demonstrate increased intrusiveness and hostility.

Research Question II. Is there a direct relationship between infant temperament and maternal emotional availability?

Hypothesis III. There will be a significant relationship between infant negative temperament and maternal sensitivity, such that, for infants with higher rated negative emotionality, mothers will demonstrate decreased sensitivity.

Hypothesis IV. There will be a significant relationship between infant regulation and maternal sensitivity, such that, for infants with higher rated regulation, mothers will demonstrate increased sensitivity.

Hypothesis V. There will be a significant relationship between infant positivity (surgency) and regulation and maternal intrusiveness and hostility, such that higher positivity and regulation will be associated with less intrusiveness and hostility.

Research Question III. Does infant temperament moderate the relationship between maternal experience of trauma and maternal emotional availability?

Hypothesis VI. Temperament will moderate the relationship between trauma and maternal sensitivity. Among infants with higher negative affect, maternal trauma will be associated with less sensitivity, but among infants with low negative affect, trauma will not be associated with low sensitivity.

Methods

Participants

A community sample of 102 mother–infant dyads participated in a cross-sectional study exploring the effects of maternal trauma and intimate partner violence (IPV) on relational,

behavioral, and physiological infant outcomes. Dyads were recruited from community centers and neighborhood facilities in a large Midwestern City using flyers and brochures directed toward women with an infant who may or may not have experienced prenatal IPV. Brochures and flyers, in both English and Spanish, were distributed at social service agencies, such as Women Infant Child (WIC) centers, as well as other local businesses including laundromats, public libraries, public parks, daycare centers, and doctors' offices. Mothers were eligible to participate if they were over 18 years old, had no history of schizophrenia, had full custody of their infants, and had a healthy infant (i.e., no birth defects, serious medical conditions, or serious developmental delays that would make interview completion too burdensome, including Down's Syndrome, or cerebral palsy) age 11-to-14-months-old.

A subset of 72 mother-infant dyads who had audio and video data suitable for coding was used in the current study. Reasons data was unusable varied, but included no audio material, missing video files, and a couple cases deemed uncodable due to either camera angle or significant alteration in protocol, which could have altered maternal behavior. There was no significant difference in demographic variables between those included in the current study and those excluded due to uncodable videos. Maternal average age was around 30 years old and women were predominantly from ethnic minority backgrounds. Forty four percent of women had completed some college or a trade school/AA degree. Infant ages ranged from 10-14 months, with an average of 12 months of age. Complete demographic information for the 72 dyads used in the current study is listed in Tables 1 and 2.

Table 1
Maternal Demographic Characteristics of the Sample (N = 72)

Variable	N	%
Age (years) ^a	29.72 ± 6.76	
18-21	9	12.5
22-25	14	19.4

26-29	15	20.9
30-34	18	25.0
35 +	16	22.2
Ethnicity		
Caucasian	10	13.9
African American	25	34.7
Hispanic/Latino	28	38.9
Biracial/Other	7	9.7
Native American	1	1.4
Asian/Pacific Islander	1	1.4
Education (years) ^a	14.74 ± 2.57	
GED or Below	19	26.4
Some College	18	25.0
Trade School/ AA Degree	14	19.5
BA/BS	11	15.3
Some Graduate School	2	2.8
Graduate Degree	8	11.1

a. Mean ± SD.

Table 2

Infant Demographic Characteristics of the Sample (N = 72)

Variable	N	%
Age (months) ^a	11.96± 0.92	
10	1	1.4
11	24	33.3
12	27	37.5
13	16	22.2
14	4	5.6
Gender		
Male	33	45.8
Female	39	54.2

a. Mean ± SD.

Procedures

Interested participants who contacted the project, either by phone or email, were scheduled to complete a brief phone screening with trained undergraduate research assistants to determine eligibility. To ensure an adequate number of women with IPV exposure, potential

participants were read a list of 11 actions their partner may have done during an argument (i.e. threatened to hit or throw something at you, threw or smashed or hit or kicked something, hit or tried to hit you with something, threatened you with a knife or gun, etc.) and asked to respond “Yes” at the end of the list if their partner had done any of those things. During the screening call, women also received a description of the study protocol. If eligible and interested in participating, mothers and their infants were scheduled to complete one in-person visit at DePaul University when their infants were 11-to-14-months-old.

During the in-person assessment, which lasted between two and a half to three hours, mothers were given information regarding the study by a graduate student or faculty interviewer and completed an informed consent form approved by the DePaul University Institutional Review Board. After consent was attained, a brief questionnaire was completed, assessing current infant health and mood. Infants provided seven saliva samples using oral swabs throughout the assessment. These samples were used to evaluate specific genetic polymorphisms and cortisol levels, but these were not used in the current study. After completion of the first saliva sample, mother and infant were taken to a small playroom, which was furnished with age-appropriate materials and toys. The study protocol was changed shortly after the study began to increase infant interest in the “novel” toys during the free play situation. Meaning a small subset of mothers and infants completed initial consent procedures, the short questionnaire, and the first saliva samples in the same room as the free play situation, instead of moving to a novel room for the free play.

Mothers were instructed to engage in a 5-minute free-play task and play with their infants "as you would at home," while the interviewers observed from behind a one-way mirror. Interactions were video and audio recorded using a microphone and two remotely controlled wall

mounted cameras with tilt, pan, and zoom capabilities, so videos could be coded at a later time. Immediately after the 5 minutes of free play, the interviewers came back in to the room and the rest of the study procedures were conducted, including additional interactive tasks (e.g., Strange Situation Task), collecting the remaining infant saliva samples, and having mothers complete a series of paper-based self-report measures on demographics, maternal lifetime and pregnancy exposure to trauma and violence, infant temperament, and maternal current mental health status. Participants were given the option to fill out the questionnaires on their own or complete the questions with assistance of the interviewer (e.g., read aloud), while another research assistant was nearby playing with the infant. The large majority of mothers opted to complete the measures on their own. Participants were told that they could skip questions they felt uncomfortable answering and could discontinue participation at any point.

After completion of the questionnaires, interviewers briefly reviewed the materials to assess for completeness, as well as to address issues of potential child maltreatment, current physical or sexual IPV exposure, and/or suicidal/homicidal ideation. If participant responses to key questionnaire questions indicated risk, interviewers completed a more in-depth verbal assessment. In cases of suspected child maltreatment by the participant, their partner, or another adult in a caregiving role, a Child Protective Services report was completed. Information about services for IPV victims and/or mental health services were provided if the interviewer believed these resources could be helpful for the participant. Women who expressed high levels of distress or vocalized a desire for mental health services were also referred to specific agencies in their communities. Upon completion of the interview, participants received financial remuneration and a small toy for their infants.

Measures

Demographics. Participants were asked age of infant, infant gender, whether participant had custody of the participating infant, how many people lived in their household, current relationship with the father of the infant, whether they have lived with their infant continuously for the past year, their occupation, their highest level of education completed, their total monthly family income, if they are currently residing in a shelter for battered women, if they have ever stayed in a shelter for battered women, and if they have ever stayed in a homeless shelter. Information about infant age, gender, and maternal level of education was used as covariates in the current study.

The Emotional Availability Scales, Fourth Edition. (EA scales, Biringen, 2008). The EA scales assess six different dyadic qualities, four on the caregiver side and two on the infant side. For caregivers, the scale measures Sensitivity, Structuring, Nonintrusiveness, and Nonhostility. On the child side, it assesses Responsiveness and Involvement. Sensitivity denotes positive affect, warmth, responsiveness, creativity, and conflict negotiation. Structuring refers to the parent's ability to scaffold interactions so as to build infant skill and extend interactions. Nonintrusiveness is the way caregivers are able to interact with their infant without intruding on their autonomy or taking the lead of the interaction from the child. Nonhostility refers to parent's ability to regulate their negative emotional states and interact with their child without traces of impatience or antagonism (Easterbrooks & Biringen, 2000). Each scale is given a global score from 1 (nonoptimal) to 7 (optimal). The global scores for the caregiver scales were used as the dependent variable in the regression analyses. In the coding manual, the author notes that for scores of 5.5 and above in each category indicate adequate to optimal parenting.

Reliability and validity data for the EA scales has been collected from parents, caregivers, and children of different genders, ages, and cultural backgrounds (Biringen, Derscheid, Vliegen, Closson, & Easterbrooks, 2014). Short-term test-retest reliability (1-week) has been demonstrated in multiple studies, with intraclass correlations ranging from 0.79 - 0.92 depending on the scale. Inter-rater reliability correlations range from .76 - .96 (Bornstein, Gini, Putnick, Haynes, Painter, & Suwalsky, 2006; Bornstein, Gini, Suwalsky, Putnick, & Hayes, 2006). Acceptable cross-cultural validity has also been found for minority populations in the United States, as well as mothers in countries outside the United States (Bornstein et al., 2008; Howes & Obregon, 2009; Ziv, Aviezer, Gini, Sagi, & Koren-Karie, 2000).

Coders in this study were two graduate students trained using the online training curriculum, created by the EA scales originator, Dr. Zeynep Biringen. After completion of the training curriculum, coders participated in a consultation call to ensure comprehension of material before coding a set of seven standard reliability videos. Agreement $\geq 80\%$ with Dr. Biringen on every scale score, for all standard reliability videos, was used as mastery criteria. Internal consistency between the two coders was established using a set of 15 initial free-play videos from this project, and 6 additional videos were coded to address drift. Inter-rater reliability was assessed using IntraClass Correlations (ICC). The ICC for average measures was above .8 for Sensitivity (.93), Structuring (.94), and Nonintrusiveness (.89). Reliability was lower for Hostility (.60); this was likely because the majority of participants were rated between 5 and 7 instead of across the full 7-point range, unlike the rest of the scales.

Conflict Tactics Scale. (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996). This 39-item questionnaire assesses whether the participant experienced physical, psychological, or sexual IPV victimization during a designated time period. Sample items include “My partner

insulted or swore at me” and “My partner slammed me against a wall.” This scale was administered two times to each participant, once asking about experiences of IPV during their pregnancy and the second time reporting their IPV experiences since the birth of the infant. For the first administration of the CTS2, participants also noted whether they experienced the listed relationship behavior prior to their pregnancy with this child. Participants were asked to indicate the frequency of these experiences by selecting one of the following options: Once (= 1), Twice (= 2), 3-5 Times (= 3), 6-10 Times (= 4), 11-20 Times (= 5), More than 20 Times (= 6), Not During Pregnancy but Before (= 7), or Never (= 0). The second administration of the CTS2 used the same items but participants were asked to rate frequency since birth with the following options: Once Since my Baby’s Birth (= 1), Twice Since my Baby’s Birth (= 2), 3-5 Times Since my Baby’s Birth (= 3), 6-10 Times Since my Baby’s Birth (= 4), 11-20 Times Since my Baby’s Birth (= 5), More Than 20 times Since my Baby’s Birth (= 6), or My partner has not done this to me since my baby’s birth (= 0). The CTS2 has strong internal consistency for each category of abuse: $\alpha = .86$ for physical assault, $\alpha = .86$ for psychological aggression, $\alpha = .95$ for injury, and $\alpha = .87$ for sexual coercion (Straus et al., 1996). In the current study, the overall internal consistency for the measure was $\alpha = .87$ for prenatal ratings and $\alpha = .82$ for postnatal ratings. Test-retest scores for the CTS2 scales have also been shown to be strong in the majority of categories except sexual coercion: $r = .76$ for physical assault, $r = .69$ for psychological aggression, $r = .70$ for injury, and $r = .30$ sexual coercion (Vega & O’Leary, 2007). The CTS2 has also been tested and shown to have high cross-cultural reliability and validity (Straus, 2004). This measure has been used frequently for research on IPV, often as an indicator of involvement in a violent relationship (Overbeek, de Schipper, Lamers-Winkelmann, & Schuengel, 2013; Stein, Kennedy, & Twamley, 2002). Although the original timeframe was written by the authors as

“within the last year,” the time period for the CTS2 has been successfully modified to meet the needs of specific studies, including during pregnancy (Jones, Ji, Beck, & Beck, 2002; Straus, Hamby, Boney-McCoy, & Sugarman, 1996).

In the current study, totals from the physical assault, psychological aggression, and sexual coercion subscales were used to create a dichotomous variable indicating whether the participant had experienced IPV during the designated time frame. Total physical, psychological, and sexual scores were obtained by adding up frequency scores for each item within a subscale. Severity scores used were created by the authors for the physical and sexual scales based on severity of harm, while the severity score for the psychological abuse subscale is based on correlation to increased harm. In this study, anyone meeting minimal severity for physical or sexual abuse, or severe psychological abuse was given a score of 1. A separate dichotomous score was tallied for postnatal IPV and prenatal IPV. The injury subscale was not included in determining the dichotomous IPV score to avoid double-counting of IPV events that led to injury.

Childhood Trauma Questionnaire. (CTQ; Bernstein and Fink, 1998; Bernstein, et. al., 2003). The CTQ-SF is a 28-item retrospective self-report measure of childhood abuse and neglect. The CTQ-SF assesses the frequency of traumatic life events prior to the age of 18. Sample items include, “I didn’t have enough to eat,” “I got hit so hard by someone in my family that I had to see a doctor or go to the hospital,” and “My family was a source of strength and support (reverse coded).” Participants are asked to respond on a 5-point Likert scale of Never True (= 1), Rarely True (= 2), Sometimes True (= 3), Often True (= 4), and Very Often True (= 5). Items yield Physical Abuse, Sexual Abuse, Emotional Abuse, Emotional Neglect, and Physical Neglect scales, as well as a 3-item minimization scale to detect false-negative trauma

experiences. The CTQ has been validated with both general and clinical populations, varying in gender, ethnicity, and socioeconomic status (Bernstein & Fink, 1998), including pregnant women (Lang, Rodgers, & Lebeck, 2006). Satisfactory internal consistency, ranging from 0.79 – 0.94, has been reported for the factors (Bernstein et al., 1994). The CTQ has shown stability across assessments, with good test-retest reliability over a 2- to 6-month period (ICC = 0.88). The CTQ is highly correlated with other self-report and semi-structured interviews assessing childhood maltreatment including the Childhood Trauma Interview and the Evaluation of Lifetime Stressors, suggesting high convergent and discriminant validity (Bernstein et al., 1994).

In the current study internal consistency for the majority of scales ranged from 0.82 - 0.94. However, the physical neglect scale was not used due to low internal consistency, dichotomous scores were identical regardless of inclusion. Scores on the abuse and neglect scales were used to create a dichotomous score indicating whether the participant had experienced any form of abuse or neglect during childhood. Participants were marked as having experienced abuse or neglect during childhood if their score met the “Low to Moderate” criteria set for any of the measured scales (Bernstein and Fink, 1998).

Life Stressor Checklist Revised. (LSC-R; Wolfe, Kimerling, Brown, Chrestman, & Levin, 1996). This 30-item questionnaire asks about specific traumatic events that people may or may not have experienced during their life, including physical or sexual assault, natural disasters, death of a loved one, accidents, and other potentially traumatic events. The published version of this checklist has follow-up questions for each event including: age at time of trauma, whether participant believed that someone could be killed or seriously harmed due to the trauma, if they experienced feelings of intense helplessness, fear, or horror at the time of the trauma, and if the trauma has affected their life in the past year. For the purpose of this study, the additional

follow-up question “Did this happen during your pregnancy (with baby you brought in today)?” with a “yes” or “no” option was included after each traumatic event.

The LSC-R has been tested and found to have good construct validity (Humphreys et al., 2011). Test-retest reliability was found to be relatively high with absolute agreement between administrations of the survey between 84 - 89% (McHugo et al., 2005). The internal consistency in the current study was acceptable ($\alpha = 0.77$). This survey has been used successfully with participants in different populations (Humphreys et al., 2011) and age groups (Lieberman, Van Horn, Ippen, 2005) including to test additional traumatic life events in women who have experienced IPV (Schumacher et al., 2010).

In the current study, we tallied up five questions that asked about interpersonal violence experiences that were not captured by the CTS2 and CTQ, including “have you ever been robbed, mugged, or physically attacked (not sexually) by someone you did not know?” and “Have you ever been bothered or harassed by sexual remarks, jokes, or demands for sexual favors by someone at work or school (for example, a coworker, a boss, a customer, another student, a teacher)?” The total score for these five questions was then converted to a dichotomous variable indicating whether the participant had experienced any of these events in their lifetime.

Infant Behavior Questionnaire. (IBQ-R; Gartstein & Rothbart, 2003). The IBQ-R asks parents to rate 91 Likert scale items about their infant’s behavior over the past one to two weeks. The questionnaire asks the parent to report frequency of infant behaviors, such as “How often did your baby laugh aloud in play?” or “How often did your baby move quickly toward new objects?” Likert responses range from Never (= 1), Very Rarely (= 2), Less Than Half the Time (= 3), About Half the Time (= 4), More Than Half the Time (= 5), Almost Always (= 6), Always

(= 7), or Does Not Apply (= X). Responses can then be categorized into six subscales: activity level, distress to limitations, latency to approach novel situations (fear), duration of orienting, smiling and laughter, and soothability. These scales can be aggregated into three domains of temperament: surgency/extraversion, negative affectivity, and orienting/regulation (Gartstein & Rothbart, 2003); these domain scores were used in the current study. Internal consistency for the scales in the current study ranged from 0.70 - .80 for the 91 question version. Twenty three participants completed the extended version of the IBQ before protocol was shifted to use the 91 question version to reduce participant burden. For those participants their domain scores were calculated based on the full range of items for each domain in the extended version of the scale. The IBQ-R has been used with infants of varied ages ranging from 3-14 months (Gartstein & Rothbart, 2003; Planalp et al., 2013). This scale has been found to have good construct validity through good concordance with observer ratings of temperament, as well as, adequate internal consistency (Gartstein & Rothbart, 2003; Parade & Leerkes, 2008).

Center for Epidemiological Studies Depression Scale. (CES-D; Radloff, 1977). The CES-D is a 20-item questionnaire designed to measure the frequency of depressive symptoms during the past week, including depressed mood, feelings of guilt, feelings of helplessness and hopelessness, psychomotor retardation, decreased appetite, and trouble sleeping. Sample questions are “I thought my life had been a failure” and “I felt depressed.” Participants select their rating from the following options: “Rarely or none of the time (less than 1 day)” (= 0), “Some or a little of the time (1–2 days)” (= 1), “Occasionally or a moderate amount of time (3–4 days)” (= 2), or “Most or all the time (5–7 days)” (= 3). Some items in the scale are worded positively to discourage participants from selecting the same answer for all questions and are reverse scored before summing items into a total score. This scale has high internal consistency

($\alpha = .85$ for the general population and $\alpha = .90$ for clinical samples; Radloff, 1977). Internal consistency in the current study was slightly lower, but acceptable, at 0.70. Test-retest reliability of this measure is expected to be weaker due to the scale's focus on current symptomology by asking specifically about the past week. Depending on time between testing the test-retest correlation ranges from .51 - .67 (Radloff, 1977). Validity is supported by strong correlations, ranging from .69 to .75, with other clinical measures of depression (Radloff, 1977). This measure has been used in other IPV research to assess depression levels (Lang, Stein, Kennedy, & Foy, 2004). A total score is calculated by summing all item ratings, with higher scores indicating more depressive symptoms, and the possible range of scores being 0-60. A score of 16 represents clinically significant depressive symptoms. In the current study the total score was used as a covariate in analyses.

Post Traumatic Stress Disorder Checklist – Civilian Version. (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1994). The PCL-C is a 17-item self-report questionnaire assessing current posttraumatic stress symptoms, aligned with DSM-IV criteria (American Psychiatric Association, 2000). Participants rate each item on a 5-point Likert scale, ranging from “Not at all” (= 1) to “Extremely” (= 5), based on their experiences over the past month. Example of items include “Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?,” “Avoiding activities or situations because they remind you of a stressful experience from the past?,” and “Feeling emotionally numb or being unable to have loving feelings for those close to you?” Scores were summed and range from 0 - 68, higher scores indicating more severe symptomology. This total score was used as a covariate in the regression analyses.

The PCL-C has demonstrated strong psychometric properties in both general and clinical populations, including excellent internal consistency, $\alpha = .94$, and moderate test-retest reliability 2 weeks following the original assessment, $r = .66$. Internal consistency was also high in the current study, $\alpha = .87$. In addition, the PCL-C has been shown to have strong convergent and discriminant validity (Conybeare, Behar, Solomon, Newman, & Borkovec, 2012; Ruggiero, Del Ben, Scotti, & Rabalialis, 2003).

Data Analysis Plan

A cumulative lifetime trauma variable was created using the four dichotomous scores created for childhood maltreatment (CTQ), pregnancy IPV (CTS-2), postpartum IPV (CTS-2), and additional lifetime interpersonal trauma events (LSC). Scores on the cumulative lifetime trauma variable ranged from 0, which indicates the participant did not report experiencing a stressful experience on any of the measures, to 4, which indicates the participant endorsed all four types of interpersonal trauma.

Data was examined to ensure all necessary assumptions were met prior to conducting the primary analyses. A visual representation of the data was created to assess for normality and identify outliers. Skewness and kurtosis were used to verify normality (Field, 2009). Scatterplots were created to visually assess linearity and heteroscedasticity (Field, 2009), and multicollinearity was evaluated using the Variance Inflation Factor (VIF) and Tolerance in the linear regressions (Field, 2009). A hierarchical regression was run to assess the main effects of cumulative trauma and infant temperament on maternal emotional availability. Maternal and child factors previously associated with alterations in maternal parenting (i.e., maternal mental health symptoms [Pauli-Pott et al., 2000], maternal education, [Paulussen-Hoogeboom et al., 2007], and infant sex [Bornstein et al., 2008]) were used as covariates in the statistical analyses.

The covariates were entered in Step 1 of the regression equation, followed by the three temperament variables in Step 2. Cumulative Trauma was then added in Step 3 of the regression. Significant effects were evaluated using $\alpha = .05$.

To determine whether a significant interaction between maternal cumulative lifetime trauma exposure and infant temperament predicted each of the four dimensions of maternal emotional availability, the SPSS PROCESS macro (Hayes, 2017) was used. Moderation models to predict sensitivity, structuring, intrusiveness, and hostility were run for each of the three measured dimensions of infant temperament, surgency, negative affect (negativity), and regulation.

To reduce Type I error, a Bonferroni correction was used to assess significance, where α is divided by the number of comparisons (Field, 2009). Accordingly, the interaction effects were evaluated using the Bonferroni corrected significance level for three comparisons (one for each temperament dimension), $p < .0167$. An a priori power analysis was conducted using G*Power Software. G*Power revealed that 71 participants are needed for excellent power to detect a medium effect size $f^2 = 0.40$, with $\alpha = .0167$, using one predictor (or effect) of interest and up to 5 additional predictors (Faul, Erdfelder, Lang, & Buchner, 2005). Justification for expectation of medium effect size, comes from findings of Wilson, Rack, Shi, and Norris (2008), who conducted a meta-analysis of 33 studies comparing the parenting of parents who had a history of child maltreatment and those who did not, and found differences between groups were medium in size (d ranging from .46 to .62).

Results

Missing Data and Regression Assumptions

Item level missingness was rare (<1% of all data points) in the full dataset and addressed by replacing missing items with the sample mean for that item (Roth, Switzer, & Switzer, 1999). There was no missing data on the Emotional Availability Scales for the 72 dyads in the current study. One value in the Hostility scale was identified as an outlier (>3 SD) and was not utilized in analyses. Skewness and Kurtosis values, scatterplots, and the VIFs suggest the data are appropriate for the statistical analyses conducted.

Descriptive Statistics and Correlations

Complete means and standard deviations for all demographic variables were reported in the previous section in Tables 1 and 2. Means and standard deviations for the remaining variables are listed below in Table 3 along with correlations. The average score for the EA scales ranged from 4.72 for Structuring to 6.16 for Hostility. All of the participants endorsed experiencing interpersonal trauma in at least one domain and 34.7% endorsed experience of interpersonal trauma in all four domains assessed (childhood maltreatment, additional lifetime trauma, IPV during pregnancy, and IPV postpartum).

Correlations indicated moderate to strong positive associations between women's cumulative lifetime trauma exposure and total postnatal PTSD and depression scores ($r = .49$, and $.43$, respectively). In addition, cumulative lifetime trauma was significantly negatively correlated with maternal Sensitivity ($-.36$) and Structuring ($-.40$). Per expectations, all four Emotional Availability scales were positively associated with each other, with correlations ranging from $.86$ to $.44$. Correlations for all study variables are listed in Table 3.

Table 3

Bivariate Correlations and Descriptives among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Sensitivity	--											
2. Structuring	.86**	--										
3. Nonintrusiveness	.58**	.44**	--									
4. Nonhostility	.60**	.53**	.62**	--								
5. Cumulative Trauma	-.31**	-.37**	-.07	-.23	--							
6. Surgency	-.08	.00	-.15	-.16	-.12	--						
7. Negativity	-.18	-.17	-.14	-.12	.11	-.12	--					
8. Regulation	.08	.11	.06	.25*	-.05	.23	-.26*	--				
9. Infant Gender	.00	-.08	.18	.23*	-.03	.20	.11	.24*	--			
10. Maternal Education	.44**	.40**	.28*	.44**	-.01	-.01	.04	.20	.19	--		
11. PTSD total	-.21	-.27*	-.06	-.31*	.47**	.01	.11	-.16	-.20	-.13	--	
12. Depression total	-.29*	-.27*	-.05	-.18	.34**	.00	.16	-.10	.00	-.15	.56**	--
<i>n</i>	72	72	72	72	72	72	72	72	72	72	72	72
Mean	5.40	4.72	5.28	6.16	2.57	5.50	3.91	4.99	--	--	14.74	10.83
SD	1.07	1.24	1.12	.70	1.09	.56	.78	.60	--	--	10.83	8.23

Note: ** $p < .01$, * $p < .05$.

Hypothesis Testing

Research Question I. Is there a direct relationship between maternal experience of interpersonal trauma and maternal emotional availability?

Hypothesis I. There will be a significant relationship between maternal experience of trauma and maternal sensitivity and structuring, such that, mothers who experience higher levels of interpersonal trauma will demonstrate decreased sensitivity and structuring.

Hypothesis II. There will be a significant relationship between maternal experience of trauma and maternal intrusiveness and hostility, such that, mothers who experience higher levels of interpersonal trauma will demonstrate increased intrusiveness and hostility.

Cumulative trauma demonstrated main effects above and beyond both the control variables and temperament variables on Sensitivity ($\Delta R^2 = .07$; $\Delta F(1, 63) = 6.40$, $p = .01$), and Structuring (R^2 change = .08; $\Delta F(1, 63) = 8.16$, $p = .01$), such that higher levels of cumulative

trauma were associated with decreased levels sensitivity and structuring. Cumulative trauma did not demonstrate a significant main effect for Nonintrusiveness (R^2 change = .01; $\Delta F(1, 63) = .73, p = .40$) or Nonhostility (R^2 change = .03; $\Delta F(1, 63) = 2.86, p = .10$). Results for hierarchical regressions can be found in Table 4.

Research Question II. Is there a direct relationship between infant temperament and maternal emotional availability?

Hypothesis III. There will be a significant relationship between infant negative temperament and maternal sensitivity, such that, for infants with higher rated negative emotionality, mothers will demonstrate decreased sensitivity.

Hypothesis IV. There will be a significant relationship between infant regulation and maternal sensitivity, such that, for infants with higher rated regulation, mothers will demonstrate increased sensitivity.

Hypothesis V. There will be a significant relationship between infant positivity (surgency) and regulation and maternal intrusiveness and hostility, such that higher positivity and regulation will be associated with less intrusiveness and hostility.

Negative emotionality was not a predictor of maternal sensitivity, nor was surgency or regulation ($\Delta R^2 = .04$; $\Delta F(3, 64) = 1.05, p = .38$). In addition, the inclusion of negative emotionality, surgency, and regulation did not significantly increase the predictive value for structuring ($\Delta R^2 = .02$; $\Delta F(3, 64) = .51, p = .68$), nonintrusiveness ($\Delta R^2 = .07$; $\Delta F(3, 64) = 1.83, p = .15$), or nonhostility ($\Delta R^2 = .07$; $\Delta F(3, 64) = 2.21, p = .10$) above and beyond that explained by the covariates. Results for hierarchical regressions can be found in Table 4.

Table 4

Main Effects of Trauma and Infant Temperament on Emotional Availability

	Emotional Availability Scale											
	Sensitivity			Structuring			Nonintrusiveness			Nonhostility		
	ΔR^2	ΔF	p	ΔR^2	ΔF	p	ΔR^2	ΔF	p	ΔR^2	ΔF	p
Step 1: Covariates	.26	5.73	.00	.26	5.77	.00	.09	1.73	.15	.27	6.15	.00
Step 2: Temperament	.04	1.05	.38	.02	.51	.68	.07	1.83	.15	.07	2.21	.10
Step 3: Cumulative Trauma	.07	6.40	.01	.08	8.16	.01	.01	.73	.40	.03	2.86	.10
Total R^2	.36			.36			.18			.37		
n	72			72			72			72		

Research Question III. Does infant temperament moderate the relationship between maternal experience of trauma and maternal emotional availability?

Hypothesis VI. Temperament will moderate the relationship between trauma and maternal sensitivity. Among infants with higher negative affect, maternal trauma will be associated with less sensitivity, but among infants with low negative affect, trauma will not be associated with low sensitivity.

Moderation analyses show the maternal cumulative lifetime trauma by infant temperament interaction effects were not a significant predictor of maternal sensitivity (Surgency: $b = -.17$, $SE = .19$, $p \geq .38$, 95%CI = [(-.56) - .22]; Negativity: $b = -.12$, $SE = .13$, $p = .36$, 95% CI = [(-.37) - .14]; Regulation: $b = .10$, $SE = .17$, $p = .57$, 95% CI = [(-.25) - .44]).

Moderation analyses show the interaction effects of maternal cumulative lifetime trauma by infant temperament were not significant predictors of maternal structuring (Surgency: $b = .12$, $SE = .22$, $p = .59$, 95% CI = [(-.32) - .56]; Negativity: $b = -.11$, $SE = .15$, $p = .46$, 95% CI = [(-.40) - .18]; Regulation: $b = .11$, $SE = .20$, $p = .58$, 95% CI = [(-.28) - .50]). Moderation analyses also did not reveal a significant interaction for maternal cumulative trauma and any of the infant temperament scores on maternal hostility (Surgency: $b = -.19$, $SE = .12$, $p = .13$, 95% CI = [(-

.44) - .16]; Negativity: $b = -.16$, $SE = .08$, $p = .06$, 95% CI = [(-.33) - .006]; Regulation: $b = -.01$, $SE = .11$, $p = .90$, 95% CI = [(-.24) - .21]).

Moderation analyses did not reveal a significant interaction for maternal cumulative lifetime trauma and infant temperament on maternal nonintrusiveness for Surgency ($b = -.18$, $SE = .23$, $p = .43$, 95% CI = [(-.64) - .27]) or Regulation ($b = .14$, $SE = .21$, $p = .51$, 95% CI = [(-.28) - .55]). However, moderation analyses revealed a significant interaction for maternal cumulative interpersonal trauma and infant temperamental negativity on the degree of maternal nonintrusiveness ($b = -.61$, $SE = .13$, $p = .00$, 95% CI = [(-.88) - (-.34)]). The effect of maternal cumulative interpersonal trauma was probed at three different levels of infant negativity: mean (average), 1 SD above (high), and 1SD below (low) the mean. For a graph, see Figure 1.

Findings indicate a positive association between maternal cumulative interpersonal trauma and maternal nonintrusiveness at low levels of temperamental negativity (Low: Trauma effect = .48, $p = .01$, 95% CI = [.14 - .83]), a nonsignificant association for infants with mid-levels of reported negativity (Average: Trauma effect = .01, $p = .93$ 95% CI = [(-.23) - .25]), and a negative association for infants with high levels of reported negativity (High: Trauma effect = -.46, $p = .00$, 95% CI = [(-.75) - (-.17)]). The Johnson-Neyman procedure revealed that the association between maternal cumulative interpersonal trauma and maternal non-intrusiveness is positive for infants below the 32nd percentile in negativity, this association is not significant for infants between the 32nd and 72nd percentile, and is negative (with more trauma predicting more intrusiveness) for infants above the 72nd percentile in negativity.

Table 5

Interaction of Temperament and Trauma Predicting Emotional Availability

	Emotional Availability Scale											
	Sensitivity			Structuring			Nonintrusiveness			Nonhostility		
	b ^a	SE	p	b ^a	SE	p	b ^a	SE	p	b ^a	SE	p
Surgency	-.17	.19	.38	.12	.22	.59	-.18	.23	.43	-.19	.12	.13
Negativity	-.12	.13	.36	-.11	.15	.46	-.61	.13	.00	-.16	.08	.06
Regulation	.10	.17	.57	.11	.20	.58	.14	.21	.51	-.01	.11	.90

^a This is the unstandardized (raw) coefficient

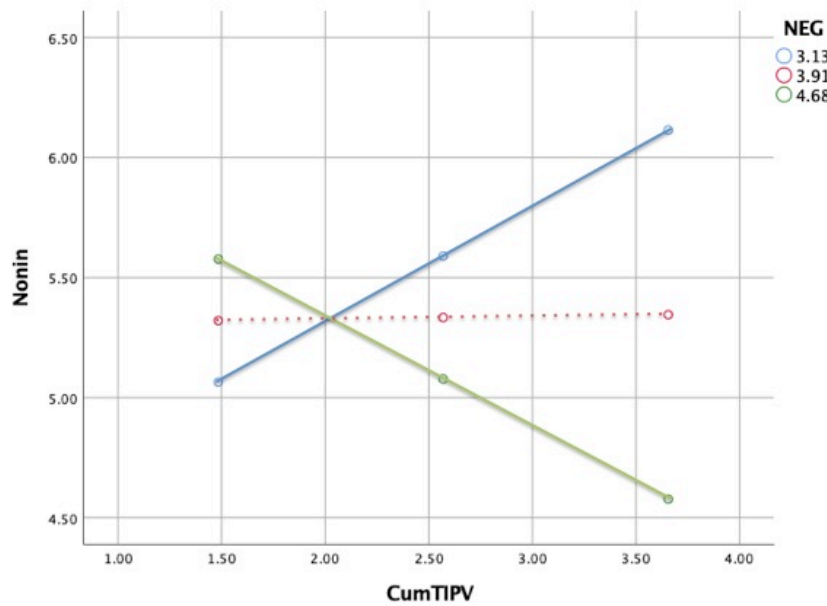


Figure 1. Moderation of Temperament on the Relationship Between Trauma and Emotional Availability

Discussion

The current study examined the interactive effects of infant temperament and maternal history of interpersonal trauma on various facets of maternal emotional availability. Given the high rates of interpersonal trauma experienced by women both in childhood and young adulthood, it is critical to examine whether and how these experiences shape maternal parenting, and the factors that can ameliorate their potential detrimental effects (Black et al., 2011; Cloitre et al., 2009; Follette et al., 1996). Previous research has examined the link between trauma experience and maternal parenting in a variety of ways; however, the examinations were often

focused on maternal variables and did not account for the infant's contribution to the dyadic nature of parent-child relationships. To extend previous work, the current study evaluated the main and interactive effects of maternal experience of interpersonal trauma and infant temperament on multiple domains of emotional availability, a key element of healthy parent-child relationships.

Our findings replicate previous research that suggests interpersonal trauma significantly influences maternal parenting. Examination of main effects showed cumulative trauma was directly connected to both sensitivity and structuring, after controlling for demographic and mental health factors that are often associated with parenting quality. That is, mothers with higher levels of trauma showed lower levels of sensitivity and structuring, over and above the effect of maternal education, and current PTSD and depressive symptoms. This finding is consistent with multiple studies that independently examined the effects of childhood maltreatment, childhood interpersonal trauma experiences, and IPV on parenting. Specifically, a history of interpersonal trauma in childhood and childhood maltreatment both are associated with lower levels of sensitivity and less optimal structuring (Driscoll & Easterbrooks, 2007; Fuchs et al., 2015), while IPV is inversely related to maternal warmth (an element of sensitivity in the EA coding), over and above other potential contributors such as maternal depressive symptoms (Levendosky & Grahmann-Bermann, 2000). While these studies have provided valuable information about the effects of trauma at different points in the lifespan, the current study highlights the importance of accounting for multiple instances of trauma, given that we see a linear relationship demonstrating that for every additional trauma experience, we see a .29 reduction in sensitivity and a .38 reduction in structuring.

On the other hand, cumulative interpersonal trauma was not associated with maternal nonintrusiveness and nonhostility. Previous research support for this association is mixed. Similar to our study, Sexton and colleagues (2017) found no connection between maternal experience of childhood maltreatment and mothers' observed hostile or controlling parenting with their 6-month-old infants among a community based sample of post partum women (Sexton et al., 2017). Also consistent with our findings, Sullivan et al. (2001) found no relationship between recent experience of IPV and self and child reports of harsh parenting among a sample of mother's who experienced intimate partner violence and their elementary school age children. On the other hand, Fuchs and colleagues (2015) reported higher levels of intrusiveness and hostility among women with a history of child maltreatment using the EA scales (Fuchs et al., 2015). One possible reason for the difference in findings, is that mother's in Fuch's and colleagues (2015) study were selected based on endorsement of severe physical or sexual abuse during childhood, whereas, the current study examined cumulative trauma, but included mothers who endorsed less severe forms of interpersonal trauma. It could be that mothers in Fuch's study were therefore more similar to a clinical population than the community based sample used in the current study.

Associations between infant temperament variables (surgency, negative emotionality, and regulation) and the four emotional availability domains were not significant in all bivariate correlations and regression analyses. These null findings are not exceptionally surprising given there is significant variability across the temperament/parenting literature. However, there is strong evidence of cross-sectional associations between infant negativity and decreased maternal sensitivity, based on both cross-sectional and longitudinal findings (Fields-Olivieri et al., 2017; Mills-Koonce et al., 2007; Scaramella et al., 2008), so the lack of association for that specific

pairing in our sample was unexpected. There are a couple potential reasons for the differing findings between these studies and the current one. The first is that several of the studies (Fields-Olivieri et al., 2017; Scaramella et al., 2008) examined negativity later in toddlerhood (18-24 months), when the increase in language and mobility could alter the caregiver-child dynamic, thereby changing the association between negativity and sensitive parenting. Second, Mills-Koonce and colleagues (2007) used observed negative infant affect as opposed to self-reported infant temperament, which could have led to an alteration in the association. Nonetheless, this lack of association is not unprecedented: Calkins and colleagues (2004) found no relationship between observed infant temperamental frustration and observed maternal sensitivity in their cross-sectional study of 162 infants, and Planalp and colleagues (2013) reported no association between infant negative emotionality over time (assessed at 3, 5, and 7 months) and caregiving sensitivity at 7 months among 120 caregiver-infant pairs.

This is the first study to evaluate whether temperament moderates the effects of interpersonal trauma on maternal emotional availability. Results show infant negativity moderated the relationship between maternal cumulative lifetime interpersonal trauma and maternal nonintrusiveness. Maternal cumulative lifetime trauma was associated with increases in intrusiveness among infants with high levels of temperamental negativity, such that women with high levels of trauma who reported high infant negativity were the most intrusive. This result is in line with previous findings, such as that of Calkins, Hungerford, and Dedmon (2004) who found a significant relationship between infant frustration and maternal intrusiveness. The authors of that study hypothesized that mothers of more easily frustrated infants could be more intrusive because they were working hard to avoid their infant becoming upset, however, in doing so did not allow the infant to lead interactions. Examination of our results shows that

dyads with “high” levels of maternal interpersonal trauma (+1 SD, a score of about 3.5) and “high” infant temperamental negativity (+1 SD, a score of about 4.5) had an estimated maternal nonintrusiveness score of about 4.5. In the emotional availability coding manual, a score of 4.5 is described as an example of “benign intrusiveness,” meaning that mothers are likely trying to be good play partners but are not attending to child cues and are not letting the child lead the interaction enough. It may be that mothers with the highest levels of trauma, who could have the most difficulty managing a distressed infant, use benign intrusiveness as an active strategy to prevent infant fussiness and keep arousal low. This hypothesis that women who have experienced high levels of trauma may be more easily distressed by infant fussiness, is also consistent with the work of Huth-Bocks, Theron, Levendosky, and Bogat (2011), who showed that women who have been victimized in the past may be more susceptible to infants’ negative affect, because infants’ distress may be more difficult to tolerate or perceived as re-traumatizing (Huth-Bocks et al., 2011).

Maternal cumulative lifetime trauma did not have a significant effect on maternal nonintrusiveness for those who reported average levels of infant negativity, but unexpectedly, the relationship between maternal cumulative lifetime trauma and nonintrusiveness was positive for those who reported low levels of infant negativity. That is, dyads with “high” levels of maternal interpersonal cumulative trauma (+1 SD, a score of about 3.5) and “low” levels of infant negative temperament (-1 SD, a score of about 3.1) were the least intrusive. While this finding may initially seem counterintuitive, it is similar to findings from Pauli-Pott and colleagues (2000), who found mothers who described themselves as depressed and perceived their infant as exhibiting more negative emotionality demonstrated low levels of sensitivity, whereas mothers

who described themselves as depressed and saw their infant as low in negative emotionality, demonstrated relatively high sensitivity.

There are several potential explanations for this unusual finding. One is that some mothers who have experienced interpersonal trauma respond to it by choosing to funnel their energies into being a highly engaged parent, and those in situations that are not too overwhelming (like having a very difficult infant) are most likely to demonstrate these parenting strengths. Secco, Letourneau, and Collins (2016) conducted a series of qualitative interviews with mothers who had left violent relationships and they spoke about having a sense of awakened maternal identity that pushed them to invest and prioritize their relationship with their infants and focus on providing the best possible mothering. Levendosky, Huth-Bocks, Shapiro, and Semel (2003) adopted a similar perspective on their finding with mothers exposed to IPV that only mothers who were dealing with psychological distress reported lower parenting effectiveness and attachment, while mothers without depressive symptoms had positive parenting outcomes.

Alternatively, this finding could be a result of the bidirectional nature of the relationship between infant temperament and parenting, such that infant behaviors elicit specific parent behaviors, which will or will not reinforce the temperamental trait expression (Bates et al., 2012). Research examining transactional associations between infant temperament and parenting has found that positive infant traits, such as smiling and laughing, resulted in less negative parenting practices over time (Bridgett et al., 2013). In this case, it could be that having less fussy infants allowed the mothers to have a more relaxed approach to interactions, given that the infants needed less consolation. Specific to the context of interpersonal victimization, Huth-Bocks et al. (2011) hypothesize that more positive or adaptable infant behavior could function as

a protective factor for mother-infant dyads, and found more adaptable infant behavior predicted changes from nonbalanced (or non-secure) working models of the infant prenatally to secure attachment at 1 year of age. These hypothesis need to be tested in larger, longitudinal studies, to understand the potential protective effect of infant temperament on emotional availability among women with interpersonal trauma experiences.

The effect of maternal interpersonal trauma on sensitivity, structuring, and nonhostility was not moderated by infant temperamental surgency, negativity, or regulation. Because this is the first study to evaluate those interactions, there is not a previous body of work to compare it to. Mixed findings from the infant temperament literature made it so that these analyses were exploratory, but influential parenting theories (Belsky, 1984) suggest both infant and maternal characteristics influence parenting behaviors. The null findings may be a result of some of the limitations of our study (see below). Specific to nonhostility, the null findings are likely related to the small range of scores in the current study, most of which fall into what would be considered the normal range of maternal behavior. This is consistent with a study completed by Driscoll and Easterbrooks (2007) where authors removed nonhostility from their analyses due to limited range (Driscoll & Easterbrooks, 2007). This is also consistent with findings by Biringen and colleagues (2005), who noted in previous research that maternal hostility is difficult to detect in non-stressful contexts (Biringen et al., 2005).

Implications.

The current study adds to the literature in several ways. First, it replicates previous findings of the deleterious effects of maternal interpersonal trauma on maternal sensitivity and structuring, two important components of optimal parenting that predict healthy socioemotional development throughout childhood (Ehrensaft, 2015; Fuchs et al., 2015; Levendosky &

Grahamm-Berman, 2000). It also serves as an initial examination of infant temperament as a moderator of the relationship between maternal experience of interpersonal trauma and emotional availability. Findings suggest accounting for infant temperamental characteristics is key to understand the relationship between maternal lifetime victimization and emotional availability; future research needs to integrate infant characteristics into empirical evaluation of the strengths and difficulties in parenting that women with histories of interpersonal violence possess.

Second, the study offers an examination of a community sample of women who have experienced interpersonal trauma, as much of the previous research focused on women recruited from clinical populations. Researchers have touted the importance of including more community samples for examination (Lang, Garstein, Rodgers, and Lebeck, 2010) because the use of a community sample allows for greater generalizability of the findings. Our study extends the research conducted with specific populations, such as women living in domestic violence shelters or parents who have been involved in the child welfare system, and suggests parenting difficulties demonstrate a dose-response relationship with interpersonal trauma experiences among non-referred and non-treatment seeking women.

A final implication from the current study is that findings could be used to identify dyads at higher risk of relationship dysfunction, as well as provide information on important elements to add to existing interventions, such as strategies for coping with and regulating infant distress. For example, our finding of the negative effects of pervasive interpersonal victimization suggests there is value in providing information on the importance of warm, responsive parenting for mothers who have experienced multiple instances of trauma across their lifetime. In addition, our finding that infant negativity amplifies the detrimental influence of maternal interpersonal

trauma experiences suggests the utility of specific support strategies. For example, providing information about ways to calmly engage the infant in play and the importance of following the child's lead may be most helpful for women who experienced trauma and are concerned their infant is difficult to manage. There has been a recent push to increase trauma awareness in medical settings, such as prenatal and pediatric care (Ko et al., 2008; Raja, Hasnain, Hoersch, Gove-Yin, & Rajagopalan, 2015), and the current study highlights the value of obstetricians and pediatricians screening for maternal trauma history and infant temperament and providing recommendations and support around parenting as needed.

Limitations.

While this study has several strengths, which allow it to contribute to the existing literature, there are also several limitations, which must be acknowledged.

An important limitation is that the free play segment used to code maternal emotional availability is only 5 minutes in length. While there is precedent for this in previous research (Easterbrooks, Biesecker, & Lyons-Ruth, 2000), Dr. Biringen (2005), the developer of the EAS has emphasized the importance of obtaining at least a 20 minute sample to use for EA coding to account for social desirability effects, particularly in a clinic/lab based observation setting. This could help explain why we only detected significant interaction effects for nonintrusiveness, a scale that may be less likely to be influenced by social desirability as compared to the other three scales, given that sensitivity, structuring, and nonhostility are more commonly identified elements of "good" parenting and thereby more susceptible to social desirability effects.

A second limitation is the use of mother reported infant temperament data, as opposed to observational ratings. This is particularly relevant to the current study, as research has shown that maternal factors, such as childhood experiences and mental health symptoms, can alter maternal ratings of temperament (Leerkes, & Crockenberg, 2003). However, other studies have

found congruence between observed and reported measures of infant temperament, in mother with mental health concerns (Pauli-Pott, Mertesacker, Bade, Bauer, & Beckmann, 2000). It is important to note that, even if maternal reports of temperament may not always map on to observational measures, it could be argued that maternal ratings are uniquely valuable, especially in regards to parenting, as how mothers see their infant is likely to directly correspond to how they parent their child. In addition, temperament rating scales may be most accessible to use in public health initiatives or pediatric settings because they are significantly cheaper and easier to integrate into existing mother-health provider contacts than observational measures, which are relatively infrequently used outside of research.

Future Directions.

The literature on the effects of maternal lifetime trauma exposure on parenting is both vast and complex. The current research points at the importance of examining differing types of trauma across different points in the lifespan and integrating infant temperament into statistical models that explain individual differences in maternal emotional availability. To address some of the noted limitations, future research is needed to replicate findings with a larger sample size that allows enough power to detect small effect sizes. A larger sample size would also permit exploration of additional moderators and mediators (e.g., maternal mental health) and evaluating profiles of interpersonal trauma exposure that take into account aspects like timing, type, and cumulative exposure (e.g., latent class analysis or cluster analysis). Our cumulative interpersonal trauma exposure variable is an important first step to better characterize the experiences of women exposed to multiple types of interpersonal victimization, but identifying differences in parenting as they relate to specific trajectories of traumatic experiences would allow for increased specificity of intervention strategies.

In regards to methodology, future research in this area should evaluate emotional availability through longer observations (at least 20 minutes) to reduce the potential social desirability effects, and include a range from pleasant (e.g., free play) to challenging or stressful tasks (e.g., separations), as previous studies suggest some parenting behaviors are more likely to be demonstrated in more challenging contexts (Biringen et al., 2005). It will also be important to use longitudinal designs to evaluate bidirectional associations between parenting and infant temperament; our findings, in conjunction to previous longitudinal research, support potential evocative effects for infant temperament, but maternal parenting behaviors also likely influence the infant's behavior (Bates, Schermerhorn, & Petersen, 2012).

Last, it is important to include fathers and/or women's partners in future iterations of this research. Previous research has found that presence of social support was a protective factor against the negative impact of trauma experience on parenting (Banyard et al., 2003). Future research would benefit from examining social support, and more specifically partner support as a protective factor for women who have experienced interpersonal trauma. In addition to examining the role partners play in maternal caregiving, there has also been recent examination of the quality of paternal parenting, beyond simple measures of involvement. Fields-Olivieri and colleagues (2017) examined paternal parenting and found both similar and varied patterns when compared to mothers in the same study. For example, they found that father's supportive parenting was directly related to their child's positive emotion expression (Fields-Olivieri et al., 2017). Similarly, Planalp and colleagues also examined quality of parental caregiver and found differences in patterns of change in paternal versus maternal sensitivity over the course of the child's first year of life (Planalp et al., 2013). Future research should continue to examine factors affecting paternal caregiving, including trauma and infant temperament.

Despite limitations and need for additional work in the future, the current study contributes meaningfully to our understanding of emotional availability among mothers of infants. Findings lend support to previous work, which has found maternal experience of trauma to be related to less sensitive parenting. In addition, structuring has not been as well studied, but the current study replicates previous findings that it is affected by maternal experience of interpersonal trauma. The findings also highlight the importance of accounting for infant temperament in future work as an important contributor to women's parenting, and one that may exacerbate difficulties or protect against problems in the parent-child relationship among women with histories of interpersonal victimization.

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