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Complex Interrelations of Trait Vulnerabilities in Mothers and their Infants

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Despite the developmental and clinical relevance of this area of inquiry, no studies have examined the interrelations of trait vulnerabilities in the affective, behavioral, and interpersonal domains between mothers and their infants. Thus, this study examined the interrelations of three trait vulnerabilities (i.e., negative affective intensity, impulsivity, and insecure attachment) between mothers and their 12- to 23-month-old infants, focusing in particular on the unique and interactive influence of these maternal trait vulnerabilities on the expression of and precursors to these traits in their infants. Mother–infant dyads ($N = 101$) completed several laboratory procedures, and mothers reported on their own and their infants' expressions of the trait vulnerabilities of interest. Findings from this study provide preliminary evidence for intergenerational relations between these traits and suggest that it is the confluence of trait vulnerabilities in mothers that relates to the early expression of some of these traits in infants.

Growing research highlighting the intergenerational transmission of risk for maladaptation and psychopathology (Goodman & Gotlib, 1999; Hyoun, Capaldi, Pears, Kerr, & Owen, 2009; Loeber, Hipwell, Battista, Sembower, & Stouthamer-Loeber, 2009; Serbin & Karp, 2004) has led to increased interest in the intergenerational transmission of trait vulnerabilities, both in relation to psychopathology and with regard to typical development as well (Camras, Shuster, & Fraumeni, 2014; Kitamura et al., 2009; Meyer & Hautzinger, 2001; Wu et al., 2012). Research in this area provides evidence for the familial aggregation of trait vulnerabilities (Kitamura et al., 2009; Meyer & Hautzinger, 2001; Silverman et al., 1991), indicating that trait vulnerabilities in the affective, behavioral, and interpersonal domains both aggregate in families and aggregate separately from one another (Gunderson et al., 2011; White, Gunderson, Zanarini, & Hudson, 2003). Notably, although trait vulnerabilities are not inherently maladaptive (increasing the risk for psychopathology only in the context of other risk or vulnerability factors), the confluence and interaction of multiple trait vulnerabilities with one another (as well as relevant environmental stressors) is theorized to increase the risk for psychopathology (Siever & Davis, 1991; Wright et al., 2012). Moreover, a developmental psychopathology approach suggests that maladaptation is multiply determined by combinations of risk factors rooted in typical development that influence children toward probabilistic pathways (Sroufe, 1997).

Despite the clinical and developmental relevance of this area of inquiry, however, research on the familial aggregation of trait vulnerabilities has generally examined these traits among adult family members (e.g., adults and their parents or siblings; Gunderson et al., 2011; Meyer & Hautzinger, 2001; Silverman et al., 1991) or older children (Kitamura et al., 2009). No

studies have examined the complex interrelations of trait vulnerabilities in the affective, behavioral, and interpersonal domains between mothers and their infants.

Negative affective intensity

One prominent trait vulnerability that has received extensive attention both with regard to its role in vulnerability to psychopathology (Williams, 1989) and in research on maternal and infant emotional experiences (Goldsmith & Rothbart, 1999; Lorber & Slep, 2005; NICHD Early Child Care Research Network [ECCRN], 2004) is negative affective intensity. Defined as the tendency to experience negative emotions strongly (Weinfurt, Bryant, & Yarnold, 1994), negative affective intensity has been found to relate to numerous forms of psychopathology and maladaptive behaviors (including mood and anxiety disorders, borderline personality disorder, and alcohol use; Davis & Burns, 1999; Decker, Turk, Hess, & Murray, 2008; Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2010; Veilleux, Skinner, Reese, & Shave, 2014), as well as affective dysfunction in mother–child dyads (Dix, 1991; NICHD ECCRN, 2004).

In infants, high levels of anger and fear expressions, in general and in response to specific stimuli in the laboratory, indicate a propensity toward negative affective intensity that increases vulnerability for negative outcomes in the context of other trait vulnerabilities or environmental stressors (Eisenberg et al., 2001; He et al., 2010). Well-validated methodologies for assessing infant emotional expressions include laboratory procedures designed to elicit discrete emotions (e.g., the Laboratory Temperament Assessment Battery [Lab-TAB]; Goldsmith & Rothbart, 1999) and maternal report of infant emotions (Goldsmith, 1996). The temperament literature has a long history of using these emotional expressions to describe infants' tendencies to respond to the environment in various ways. Variations in infant temperament have been linked to both later personality traits and maladaptation and psychopathology in later childhood and adulthood (Evans & Rothbart, 2007; Garstein, Putnam, & Rothbart, 2012; Rothbart & Bates, 1998), with frustration/anger-proneness relating to later externalizing problems and fearfulness predicting social withdrawal and anxiety disorders (Garstein et al., 2012; Kagan, Snidman, Zentner, & Peterson, 1999). Of course, infant fear and anger expressions are not expected to uniformly predict risk, as negative expressivity in the context of a supportive environment may contribute to positive outcomes (Belsky & Pluess, 2009). Nonetheless, high levels of these expressions in infancy may be considered vulnerability factors in certain contexts.

Impulsivity

Another trait vulnerability of relevance to numerous forms of psychopathology is impulsivity. Defined here as the tendency to respond quickly and without forethought or consideration of the consequences of one's behaviors (Eysenck, 1993), trait impulsivity has been linked to mood, anxiety, substance use, and eating disorders in adulthood (Joseph, Dalgleish, Thrasher, & Yule, 1997; Peluso et al., 2007; Waxman, 2009; de Wit, 2009), various externalizing disorders in childhood (Neuhaus & Beauchaine, 2013), and borderline personality pathology in both childhood and adulthood (Bornovalova, Gratz, Delany-Brumsey, Paulson, & Lejuez, 2006; Gratz, Latzman, Tull, Reynolds, & Lejuez, 2011).

Although trait impulsivity *per se* is not generally studied in infancy, past research has examined both low inhibition and low levels of fear expressions in infants as indirect indicators of vulnerability to trait impulsivity (Burton et al., 2011; Kagan, 1997). With regard to the former, latency to reach for a novel object compared to a familiar object has been established as a paradigm for assessing inhibited approach in infants, with the reverse (speed to reach) reflecting lower inhibition and, putatively, greater vulnerability to later impulsivity (Putnam & Stifter, 2005; Rothbart, 1988). Second, this vulnerability may be expressed as low levels of fear expressions in infants, as low fear in situations involving novelty and uncertainty may indicate a general tendency toward disinhibition that increases the risk for impulsivity and externalizing problems in childhood (Kagan, 1997; Kimonis et al., 2006).

Insecure attachment

Within the interpersonal domain, one of the trait vulnerabilities that has received considerable attention in relation to adult psychopathology and has particular relevance to both the mother–infant relationship and social–emotional development is insecure attachment. Trait insecure attachment, which is characterized by a low threshold for caregiver proximity-seeking, intense reactions following separation from a caregiver, fear of caregiver loss, and intolerance of aloneness (Livesley, Jackson, & Schroeder, 1992), has been empirically linked to various forms of psychopathology in adulthood (including personality pathology, eating disorders, and mood and anxiety disorders; Goldner, Srikameswaran, Schroeder, Livesley, & Birmingham, 1999; Livesley et al., 1992; Pukrop et al., 2009) and is posited to have its developmental origins in insecure attachment relationships in infancy (Gunderson & Lyons-Ruth, 2008). Moreover, research has found evidence for the familial aggregation and heritability

of trait insecure attachment (Gunderson et al., 2011; Jang, Livesley, Vernon, & Jackson, 1996), as well as the intergenerational transmission of attachment to caregivers (van Ijzendoorn, 1995). For example, mothers' attachment to caregivers has been found to predict mother–infant attachment security (van Ijzendoorn, 1995), and maternal attachment insecurity (both to caregivers and in adult romantic relationships) has been found to predict caregiving behavior and the quality of mother–child interactions (Edelstein et al., 2004; Rholes, Simpson, & Blakely, 1995).

Adult attachment insecurity is theorized to have its origins in the mother–infant attachment relationship (Bowlby, 1973), consistent with prospective research linking infant attachment security (measured observationally using the Strange Situation; Ainsworth, Blehar, Waters, & Wall, 1978) to attachment security in adult romantic relationships (Roisman, Collins, Sroufe, & Egeland, 2005). Specifically, in infancy, insecure attachment is considered an interpersonal organizational construct reflecting a history of punitive or inconsistent parenting responses to the infants' attempted use of the caregiver for comfort and support. In the Strange Situation, infant–caregiver attachment quality is assessed through observation of infants' affective and behavioral responses to reunion with their caregivers following brief separations. Whereas infants in secure attachment relationships engage in positive interaction and/or proximity-seeking with their caregivers upon reunion, infants in insecure-resistant attachment relationships exhibit heightened negative affect (particularly anger) and those in insecure-avoidant attachment relationships engage in avoidant behaviors (e.g., looking away) upon reunion. The presence of insecure attachment in infancy has particular relevance for later development, increasing the risk for a variety of internalizing, externalizing, and social problems (Bosquet & Egeland, 2006; Fearon & Belsky, 2011).

Maternal psychopathology and parenting practices

Any study of the interrelations of these traits between mothers and their infants would be incomplete without a consideration of other factors that may account for these relations. Two factors that may be particularly important to consider in this regard are maternal psychopathology and parenting practices (which have been found to relate to both maternal and infant traits). With regard to the former, not only has each of these trait vulnerabilities been linked to numerous forms of psychopathology in adulthood (including mood and anxiety pathology), maternal mood and anxiety pathology have been found to relate to a number of vulnerabilities in infancy, including high levels of anger and fear expressions (Coplan, O'Neil, & Arbeau, 2005; Tikotzky, Chambers, Gaylor, & Manber, 2010),

insecure attachment (Coyl, Roggman, & Newland, 2002), and low inhibition (Galéra et al., 2011). Thus, the shared associations of maternal and infant traits with maternal mood and anxiety symptoms could explain the intergenerational relations between these traits.

Likewise, the presence of these traits in mothers has been found to relate to maternal authoritative and authoritarian parenting practices (Bifulco, Moran, Jacobs, & Bunn, 2009; Chen & Johnston, 2007; Coplan, Hastings, Lagacé-Séguin, & Moulton, 2002). Given that parenting plays a key role in infant social–emotional development and has been found to influence the expression of these traits in infants (with aspects of authoritative parenting relating to more moderate levels of infant emotional expressions, better self-regulation, and secure attachment, and aspects of authoritarian parenting relating to more extreme emotional expressions, weaker self-regulation, and insecure attachment; Belsky & Pasco-Fearon, 2008; Coplan, Reichel, & Rowan, 2009; Piotrowski, Lapierre, & Linebarger, 2013), the impact of maternal traits on both authoritative and authoritarian parenting could explain the relations between mother and infant expressions of these traits.

The current study

Despite the importance of this area of inquiry, no studies have examined the interrelations of these traits between mothers and their infants. Thus, the goal of this study was to examine the extent to which the presence and confluence of these trait vulnerabilities among mothers relate to the expression of and precursors to these traits in infants, above and beyond other relevant factors (i.e., maternal psychopathology and parenting practices). To this end, we assessed negative affective intensity, impulsivity, and insecure attachment in mothers and their 12- to 23-month-old infants, examining the complex interrelations of these traits (or vulnerability to these traits) between generations. In particular, given evidence of strong interrelations among these trait vulnerabilities in adults (Bornovalova et al., 2006), as well as the theorized importance of interactions between these traits to vulnerability to psychopathology, we examined both the unique and interactive influence of these maternal traits on the expression of and precursors to these traits in infants. We hypothesized significant positive relations between each of the maternal trait vulnerabilities and the corresponding trait in infants. We also hypothesized that the confluence of these traits in mothers would account for unique variance in the expression of these traits in infants, above and beyond that accounted for by the main effects of the maternal traits.

METHOD

Participants

Mother–infant dyads were recruited through advertisements posted in nursery schools, daycare facilities, hospitals, and churches, as well as on several Web sites. Mother–infant dyads were eligible for participation if the infant was 12–23 months and typically developing and the mother was fluent in English; there were no other exclusion criteria. Of the 149 mothers who contacted the laboratory and were screened for the study, two met exclusion criteria pertaining to infant typical development and 46 declined participation. Thus, data were collected from 101 mothers (M_{age} = 28.55 ± 5.28 years, *Range* = 18–42 years) and their infants (55 female; M_{age} = 16.46 ± 3.62 months, *Range* = 12–23 months). Mean annual income of the sample was between $36 K and $50 K. Mothers reported their own and their infants' racial/ethnic identities, respectively, as follows: 53 and 51% African American, and 44 and 43% European American. With regard to the mothers' education, 18% had completed high school or received a GED, 35% had attended some college or technical school, and 29% had graduated college. In terms of family composition, 41% of infants were an only child, 41% had one sibling, and 18% had 2 or more siblings. The majority of the infants' fathers (70%) lived in the home.

Procedures

All procedures were approved by the institution's Institutional Review Board. Advertisements instructed mothers to call the laboratory for further details about the study. Upon calling, mothers were informed that the purpose of the study was to examine the mother–infant relationship. Eligible participants who expressed an interest in participating met with research staff to obtain informed consent and schedule the laboratory visit. After providing written informed consent, mothers were given a questionnaire packet and informed that they could complete the questionnaires before the laboratory session or at the end of the laboratory session.

During the laboratory session, a lead experimenter (E1) guided mothers and infants through procedures. Except where noted, mothers were instructed to refrain from interaction unless infants became extremely distressed. First, infants participated in a reaching task designed to measure inhibited approach (Rothbart, 1988). Infants sat in a high chair facing a three-sided enclosure with three windows covered by curtains on a table.

Mothers sat to the side of the infant. From behind the enclosure, E1 presented the infant with stimuli through the curtains across three 30-s trials. "Low-intensity" toys (a cup with a spoon and a rattle) were presented in the first trial, with a "high-intensity" toy (musical mechanical butterfly) presented in the second and third trials.

Next, infants participated in four episodes from the Locomotor version of the Lab-TAB (Goldsmith & Rothbart, 1999), two of which elicited fear (unpredictable dog [UD]; spider [S]) and two of which elicited anger (gentle arm restraint [GAR]; toy behind barrier [TBB]). Episodes always occurred in the order in which they are described. In the UD episode, the infant sat in a high chair at the end of a table, and the mother sat in a chair to the side. In front of the infant was a black cardboard barrier with a curtain-covered opening. A mechanical dog that moved randomly and made noises was moved from the opening to the child and back on a rolling platform controlled by E1 behind the barrier. The dog was left in front of the child for 10 sec and then wheeled back to the front of the barrier for 5 sec. This was repeated twice for a total of three trials. In the GAR episode, the infant sat in a high chair at the end of a table, and the mother sat in a chair to the infant's left. E1, seated on the infant's right, put a perpetual motion toy on the table and showed the infant how to play with it. The mother was then cued to stand behind the infant and hold the infant's arms by her or his side for a maximum of 30 sec or until the infant expressed extreme distress. After the infant played for at least 30 sec and returned to a baseline state, the mother was cued to repeat the procedure.

In the S episode, the mother sat on a chair in the corner of the room with her infant on her lap. In the opposite corner was a large plush spider on top of a remote-controlled truck, which was hidden by a black shoe box. A secondary experimenter, hidden from view, controlled the spider remotely, moving it halfway toward the infant and mother (where it paused for 10 sec), then back to the corner (where it paused for 10 sec), then all the way to the feet of the mother and infant (where it paused for 10 sec), then back to the corner. In the TBB episode, the infant sat in a high chair at the end of a table and the mother sat to the infant's side. E1 brought out an attractive toy (a ball that lit up and played music), demonstrated how it worked, and placed it within the infant's reach. After the infant played for at least 30 sec, E1 took the toy and placed it behind a transparent Plexiglas barrier for 30 sec. E1 then returned the ball to within the infant's reach. This procedure was repeated two more times for a total of three trials.

Finally, after a brief break, mothers and infants participated in the Strange Situation, a standardized protocol for assessing infant attachment

involving various episodes characterized by interactions with an unfamiliar but friendly female stranger and brief separations and reunions between the infant and the mother (Ainsworth et al., 1978). Each episode lasted a maximum of 3 min or was curtailed if the infant expressed extreme distress.

Measures

Maternal negative affective intensity

Mothers completed the Affect Intensity Measure (AIM; Larsen, Diener, & Emmons, 1986), a 40-item measure of trait affective intensity and reactivity. Research suggests that the AIM is multidimensional, measuring both positive and negative affective intensity and emotional reactivity (Weinfurt et al., 1994). Given that the focus of this study is on negative affective intensity in particular, only the negative affect intensity subscale (10 items, $\alpha = 0.72$) was used here. Scores on this subscale range from 1 to 60, with a mean of 31.1 reported in a large nonclinical sample (Salsman & Linehan, 2012). Evidence for the convergent validity of this subscale has been provided (Gratz et al., 2010; Williams, 1989).

Maternal impulsivity

Mothers completed the UPPS Impulsive Behavior Scale (UPPS; Whiteside & Lynam, 2001), a self-report measure that assesses four distinct dimensions of impulsivity, including (lack of) perseverance, sensation seeking, negative urgency, and (lack of) premeditation (i.e., failure to reflect on the consequences of an act before engaging in that act). Of these dimensions, the Premeditation subscale is considered the primary factor of the UPPS, as it captures the most common conceptualization of impulsivity within the literature (Eysenck, 1993; Whiteside & Lynam, 2001). The validity of the Premeditation subscale has been established in relation to other personality traits (e.g., low deliberation/conscientiousness) and maladaptive behaviors (Lynam, Miller, Miller, Bornovalova, & Lejuez, 2011; Whiteside & Lynam, 2001). Scores on this subscale (11 items; $\alpha = 0.85$) range from 11 to 44, with means of 21–23 reported in large nonclinical samples (Cyders et al., 2007).

Maternal insecure attachment

Mothers completed the Experiences in Close Relationships Questionnaire (ECR; Brennan, Clark, & Shaver, 1998), a measure of adult

attachment security. The ECR assesses both avoidance and anxiety, with higher scores indicating greater attachment insecurity. This measure has demonstrated reliability and validity in both nonclinical and treatment-seeking populations (Brennan et al., 1998; Parker, Johnson, & Ketring, 2011). Although the ECR focuses on attachment security in romantic relationships, theory and research suggest that this has relevance for mother–infant attachment as well. Specifically, internal working models of the self and others developed through early experiences with caregivers are theorized to be relatively stable and to influence attachment behavior throughout life (Bowlby, 1973), including in adult romantic relationships (Hazan & Shaver, 1994). In support of this theory, studies have shown convergence between adult attachment measures (such as the ECR) and measures focused on attachment to caregivers in their relations to other relevant constructs, including caregiving behavior (Edelstein et al., 2004). Moreover, prospective research indicates a link between infant attachment security (assessed with the Strange Situation) and attachment security in adult romantic relationships (Roisman et al., 2005). Given the focus of this study on attachment insecurity in general, a total score was created as the mean across all 36 items ($\alpha = 0.93$). The mean item response in the original nonclinical validation sample was 3.25 (Brennan et al., 1998).

Maternal depression and anxiety symptoms

Mothers' mood symptoms were assessed using the 21-item Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995), a self-report measure that provides separate scores reflecting the severity of depression, anxiety, and stress symptoms. Evidence for the reliability and validity of this measure has been provided (Lovibond & Lovibond, 1995). The depression and anxiety subscales were included here to control for the influence of maternal psychopathology on the relations of interest (αs ≥ 0.82). Normal levels on the DASS range from 0 to 9 for depression and 0 to 7 for anxiety (Roemer, 2001).

Infant negative affective intensity

Measures of infant negative affective intensity included both maternal report and observation of infant anger and fear. Mothers completed the Toddler Behavior Assessment Questionnaire (TBAQ; Goldsmith, 1996), a 110-item questionnaire that assesses the frequency of specific child behaviors during the past month on a 1 (*never*) to 7 (*always*) scale. Evidence for the construct and discriminant validity of this measure for infants aged 12–36 months has been provided (Goldsmith, 1996; Watamura, Donzella,

Kertes, & Gunnar, 2004). This study used the Anger (10 items; $\alpha = 0.63$) and Fear (20 items; $\alpha = 0.73$) scales. Means of 3.96 and 3.89 were reported for the Anger and Fear scales, respectively, in the original validation studies for this measure (Goldsmith, 1996).

Infant negative affective intensity was also assessed observationally as the intensity of emotional responses to Lab-TAB episodes (with greater intensity of emotional expressions indicative of greater negative affective intensity). In each of the episodes, facial and bodily expressions of emotion and distress vocalizations were scored in 5- to 10-sec epochs across each of the various trials of stimulus exposure. Facial expressions were scored on a 0 (none) to 3 (strong expression in at least two regions of the face) scale according to the AFFEX coding system (Izard, Dougherty, & Humbree, 1983); bodily expressions (i.e., bodily fear, escape, struggle) were scored on a 0 (none) to 3 (extreme) scale; and distress vocalizations were scored on a 0 (none) to 5 (full intensity cry/scream) scale. Coders achieved and maintained reliability (ICCs = 0.79–0.98) with a master coder (the second author) throughout coding. Analyses of discrete behaviors suggested that the sample spanned the range of possible values for most codes. Data reduction followed the guidelines set forth in the Lab-TAB Locomotor Version 3.1 manual (Goldsmith & Rothbart, 1999), relying on correlations among behaviors and principle components analyses to determine final composites.

The overall Fear composite comprised a fear expression composite and distress vocalization composite from each of the fear-eliciting episodes (UD and S). The UD fear expression composite included standardized scores of average and maximum values of facial fear, bodily fear, and escape, as well as the speed (reversed latency) to the first fear expression. Fear expression in the S episode did not include the bodily fear variables due to low interrelations with the other variables. Standardized scores of the average, maximum, and speed of distress vocalizations were averaged to create distress vocalization composites for each episode. The fear expression and distress vocalization composites were interrelated across the two fear episodes (range = 0.25–0.59, average $r = .42$) and loaded on one principle component in the PCA (loadings = 0.68–0.82; % variance = 57.02); thus, they were averaged to create the final *Fear* composite.

A similar process of coding and data reduction occurred for the anger-eliciting episodes (GAR and TBB). For both episodes, the anger expression composite included the average and maximum values of facial anger and struggle. The speed to first anger expressions was not as strongly related to the other variables, so it was not included in the composite. The anger expression and distress vocalization composites were interrelated

across the two episodes (range = 0.28–0.70, average r = .45) and loaded on one principle component in the PCA (loadings = 0.71–0.81, % variance = 58.99). Thus, their average formed the overall *Anger* composite.

Infant indicators of vulnerability to trait impulsivity

The Inhibitory Control Scale of the TBAQ was used as one measure of low inhibition (one indirect indicator of vulnerability to trait impulsivity). Although the original scale contains 10 items, one item demonstrated a particularly low interitem correlation within this sample. When this item was removed, internal consistency for the remaining nine items was acceptable (α = 0.72). An example item is, "When asked to wait for something, how often did your child wait patiently?" This scale was reversed to provide a measure of *mother-reported low inhibition*.

Infant behavior in the reaching task yielded an observed measure of low inhibition. For the first high-intensity trial, latency in seconds from when the infant first looked at the toy to when the infant reached for the toy was computed. If the infant never reached for the toy, a score of the total length of the trial (approximately 30 sec) plus 1 was assigned. Latency scores ranged from 1 to 37 sec. The inverse of this score (with higher scores indicating greater speed to reach) provides a measure of *observed low inhibition*.

Low levels of fear expressions in fear-eliciting situations provide another indirect indicator of vulnerability to trait impulsivity. Specifically, in contrast to the use of the TBAQ Fear scale and Lab-TAB Fear composite as mother-reported and observed assessments of infant negative emotional intensity (with higher scores indicating greater levels of infant negative emotional intensity), low scores on these measures were used as indicators of a general tendency toward disinhibition that increases vulnerability to trait impulsivity.

Infant attachment

In the reunion episodes of the Strange Situation, trained coders scored infants for proximity seeking, contact maintenance, resistance, and avoidance. Infants received classifications of "secure," "insecure-avoidant," or "insecure-resistant" based on the profiles of these scores according to established guidelines (Ainsworth et al., 1978). Coding was conducted by a master coder (E. Kiel, who received training from and established reliability with Drs. Sroufe and Carlson at the University of Minnesota) and a research assistant under her supervision. Minimum inter-rater reliability (kappa = 0.80) on the classifications was established on cases unique from

this sample and then assessed throughout coding on 20% of cases (kappa = 0.83). All discrepancies were discussed and resolved. One Strange Situation was not recorded due to technical difficulties; of the others, 67 infants were classified as secure, 18 as insecure-avoidant, and 15 as insecure-resistant.

Parenting

The Child-Rearing Practices Report (Block, 1965) assesses parents' child-rearing attitudes and behaviors. Evidence for the reliability and validity of this measure has been provided (Block, 1965). Although originally developed as a Q-sort, the current study follows recent examples (Volbrecht & Goldsmith, 2010) by administering items to mothers in a Likert-style questionnaire format. This study used the authoritative and authoritarian dimensions validated by Kochanska, Kuczynski, and Radke-Yarrow (1989) with parents of young children. The authoritative dimension reflects parenting attitudes of valuing both open communication between parents and children and children's autonomy and accomplishments, as well as parenting behaviors such as the use of inductive rather than coercive discipline methods. It contains items from the rational guidance, encouragement of independence, and open expression of affect subscales (16 items; $\alpha = 0.67$). The authoritarian dimension reflects parenting attitudes of valuing unquestioned obedience from children and parenting behaviors like the use of physical punishment and criticism. It contains items from the authoritarian control, supervision of child, and control through anxiety induction subscales (13 items; $\alpha = 0.71$). Given the associations between parenting practices and both maternal and infant traits, these scales were examined as potential covariates.

Missing data

The attachment classification of one infant was missing due to technical difficulties recording the Strange Situation; thus, this infant was not included in analyses of infant attachment. In addition, one infant was missing data for the fear and anger composites of the Lab-TAB (due to being too distressed to begin the tasks) and, thus, was not included in analyses examining observed infant fear and anger expressions. Finally, two mothers were missing data for the AIM or UPPS (resulting in their exclusion from all primary analyses). Because analyses utilized available data from the 101 dyads, the sample size for primary analyses ranged from 98 to 99.

RESULTS

Preliminary analyses

Descriptive statistics and bivariate correlations among key variables are presented in Table 1. Prior to analyses, variables were examined for adherence to normality. Observed infant low inhibition was positively skewed and, thus, subjected to statistical transformation prior to analyses. To facilitate interpretation, nontransformed descriptive data are presented in Table 1; however, all analyses utilized the transformed values.

To identify potential covariates for the regression analyses, correlation analyses were conducted to examine associations between the dependent variables (i.e., infant traits) and both demographic characteristics (i.e., infant age and number of siblings, presence of the father in the home, and maternal age, education, and household income) and maternal parenting practices. Results revealed few significant associations between the demographic characteristics and infant traits. Specifically, infant age was significantly associated with both observed and mother-reported infant low inhibition (rs = .24 and .35, respectively, ps < .05), and household income was significantly associated with mother-reported low inhibition ($r = -.27$, $p < .01$); no other demographic characteristics were significantly related to infant traits (rs < |.18|, ps > .05). As for associations between maternal parenting practices and infant traits (Table 1), maternal authoritarian parenting was significantly associated with observed infant anger; no other associations between maternal parenting and infant traits were significant. Thus, identified covariates included infant age for analyses of observed infant low inhibition, infant age and income for analyses of mother-reported infant low inhibition, and maternal authoritarian parenting for analyses of observed infant anger. Notably, with one minor exception (see below), results did not change when the identified covariates were included in the models. Therefore, results of the regression analyses without covariates are presented first for all infants' traits, with any changes to these results when covariates were included in the models noted immediately thereafter.

Given our interest in examining the influence of these maternal trait vulnerabilities (versus maternal psychopathology) on the expression of and precursors to these traits in their infants, the associations between these traits in mothers and infants and maternal anxiety and depression symptoms were also examined (Table 1). Notably, although both anxiety and depression symptoms in mothers were significantly associated with maternal negative affective intensity and insecure attachment, there were few significant relations between these maternal symptoms and infant traits;

TABLE 1
Descriptive Statistics for and Bivariate Relations among Maternal and Infant Trait Vulnerabilities

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*Mean (SD)*
Intercorrelations														
1. Maternal affective intensity	–													31.32 (6.82)
2. Maternal insecure attachment	.59***	–												2.89 (1.01)
3. Maternal impulsivity	.14	.11	–											12.86 (2.54)
4. Reported infant anger	.39***	.23*	.18†	–										4.75 (1.05)
5. Observed infant anger	−.04	−.07	−.17†	.03	–									−0.00 (0.64)
6. Reported infant fear	.06	−.01	−.20*	.29**	−.11	–								3.62 (0.96)
7. Observed infant fear	−.26**	−.19†	−.22*	−.08	−.03	.11	–							−0.01 (0.61)
8. Reported infant low inhibition	.13	.15	−.07	.07	.19	−.07	.17†	–						4.22 (1.15)
9. Observed infant low inhibition	−.17†	−.08	−.13	−.03	.22*	.24*	−.06	.02	–					0.16 (0.20)
10. Authoritative parenting	−.05	−.10	.18†	−.06	.03	−.06	−.09	−.13	−.13	–				4.92 (0.47)

TABLE 1 *(Continued)*

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*Mean (SD)*
11. Authoritarian parenting	.08	.14	−.24*	.01	.19*	.18†	.10	.03	−.06	.01	–			3.68 (0.68)
12. Maternal depression	.43***	.58***	.17†	.20*	−.07	.06	−.14	.18	−.03	−.04	.15	–		5.07 (7.15)
13. Maternal anxiety	.36***	.48***	−.02	.17†	−.08	.04	−.14	.23*	−.05	−.09	.21*	.82***	–	5.56 (7.93)
Between-group differences														
Infant attachment	4.32*	1.63	2.49†	2.75†	0.03	0.28	1.11	1.21	1.29	0.59	0.11	0.33	0.47	

Note. Statistics under between-group differences reflect *F*-values of one-way ANOVAs for infant attachment classification (i.e., secure versus insecure-resistant versus insecure-avoidant). Post hoc Tukey's HSD tests revealed higher scores of maternal negative affective intensity for insecure-resistant versus secure relationships ($M_{diff} = 5.00$). $^{\dagger}p \leq .10$, $*p \leq .05$, $**p < .001$, $***p < .001$.

specifically, maternal depression symptoms were related to mother-reported infant anger and maternal anxiety was related to mother-reported infant low inhibition. Nonetheless, to ensure that any observed relations between mother and infant traits are not due solely to their shared associations with maternal psychopathology, we reran the primary analyses with maternal anxiety and depression symptoms as covariates.

Relations of maternal traits to expression of and precursors to traits in infants

Several significant bivariate relations were found between maternal and infant expressions of the traits of interest (Table 1). First, with regard to relations between the maternal trait vulnerabilities and the corresponding traits in infants, maternal negative affective intensity was significantly related to mother-reported infant anger, and maternal impulsivity was significantly related to both observed and mother-reported low levels of infant fear expressions (one indicator of infant vulnerability to later impulsivity). Moreover, both maternal negative affective intensity and maternal insecure attachment evidenced significant bivariate relations to one of the other infant trait vulnerabilities, with the former relating to low levels of observed infant fear expressions and the latter relating to one index of infant negative affective intensity (i.e., mother-reported infant anger).

Next, regression analyses were performed to examine the unique and interactive relations between maternal traits and infant traits. Specifically, to examine whether it is the confluence of these traits in mothers (versus any single maternal trait) that relates to the early expressions of these traits in infants, interactions among the maternal traits were investigated. Models progressed hierarchically, beginning with the main effects of maternal traits (and, when applicable, any relevant covariates), then the two-way interactions between the traits, and finally the three-way interaction among the traits. Maternal traits were centered at their means prior to creating interaction terms. Significant interactions were probed at the highest step in which a significant effect emerged (i.e., two-way interactions were not probed if subsumed by a significant three-way interaction) by recentering moderators at standard values (-1 *SD*, *M*, $+1$ *SD*) and, when the overall pattern suggested it, very high values ($+2$ *SD*; given that relations occurring at very high levels of these traits may be most clinically informative). Care was taken to ensure that probing only occurred at values observed within our sample to avoid extrapolation. Collinearity diagnostics suggest that both main effects and interaction terms for the primary study variables retained adequate unique variance to relate to

outcome variables (all tolerance scores >.34, all variance inflation factors <5).

Infant attachment

Infant attachment classification was analyzed through a multinomial logistic regression with secure attachment as the reference group (Table 2). In the main effects model (Step 1), no maternal traits related to the probability of infant avoidant versus secure attachment (Wald values < 1.87; *p*s > .17) or infant resistant versus secure attachment (Wald values < 3.17; *p*s > .07). Likewise, when the two-way interactions were added to the model in Step 2, no effects emerged as significant in relation to either infant attachment category (Wald values < 2.57; *p*s > .10). However, the final step (Step 3) yielded a significant three-way interaction among maternal negative affective intensity, impulsivity, and insecure attachment in relation to infant resistant attachment only (Table 2; for avoidant attachment, Wald = 3.05, $p = .081$). To probe this interaction, the maternal negative affective intensity × insecure attachment interaction was probed at various levels of maternal impulsivity (see Figure 1). The interaction was not significant at low ($b = -0.24$, $SE = 0.12$, Wald = 3.69, $p = .055$) or mean ($b = 0.15$, $SE = 0.08$, Wald = 3.62, $p = .057$) levels of impulsivity, but it was significant at high impulsivity ($b = 0.54$, $SE = 0.18$, Wald = 8.99, $p = .003$). Within high levels of impulsivity, the simple effect of maternal insecure attachment in relation to infant resistant attachment was probed at various levels of maternal negative affective intensity. A pattern emerged such that as maternal affective intensity increased, maternal insecure attachment shifted from having a negative relation to a positive relation to infant resistant attachment. Specifically, at +1 *SD* above the mean on maternal negative affective intensity, maternal insecure attachment related positively to infant resistant attachment ($b = 2.20$, $SE = 1.07$, Wald = 4.23, $p = .040$). Thus, when mothers reported high levels of both impulsivity and negative affective intensity (which was represented within our sample), mothers and infants shared a propensity toward insecure attachment.

Infant anger expressions

Hierarchical multiple regression models were run for both observed and mother-reported infant anger (two indices of infant negative affective intensity). Results of these analyses are presented in Table 3.

For observed infant anger, main effects of maternal traits did not contribute significantly to the regression model as a group, and no single

TABLE 2
Hierarchical Multinomial Logistic Regression of Maternal Traits Predicting Insecure-Resistant versus Secure Infant Attachment

	Step 1			*Step 2*			*Step 3*		
	−2 LL = 156.72 *$\chi^2_{(6)}$ = 11.33†*			*−2 LL = 150.13* *$\chi^2_{(12)}$ = 17.92* *Δ −2 $LL_{(6)}$ = 6.59*			*−2 LL = 136.65* *$\chi^2_{(14)}$ = 31.39*** *Δ −2 $LL_{(2)}$ = 13.48***		
Variable	*b (SE)*	*Wald*	*OR*	*b (SE)*	*Wald*	*OR*	*b (SE)*	*Wald*	*OR*
Affective intensity (AI)	0.10 (0.06)	2.87†	1.10	0.11 (0.06)	2.84†	1.11	0.12 (0.07)	2.91†	1.13
Impulsivity (IMP)	0.19 (0.10)	3.16†	1.20	0.21 (0.13)	2.77†	1.24	0.02 (0.17)	0.02	1.02
Insecure attachment (IA)	0.14 (0.35)	0.15	1.15	−0.04 (0.46)	0.01	0.96	−0.39 (0.53)	0.54	0.68
AI × IMP				0.00 (0.02)	0.01	1.00	−0.02 (0.03)	0.20	0.99
AI × IA				0.06 (0.05)	1.19	1.06	0.15 (0.08)	3.62†	1.16
IMP × IA				0.17 (0.16)	1.09	1.19	−0.43 (0.31)	1.94	0.65
AI × IMP × IA							0.15 (0.05)	8.56**	1.17

Note. This was a multinomial logistic regression in which insecure-avoidant and insecure-resistant groups were compared to the secure group. Only results from the comparison between insecure-resistant and secure groups are presented. OR = odds ratio. †$p < .10$, **$p < .01$.

TABLE 3
Regressions of Maternal Traits Predicting Infant Anger

	Observed anger						Mother-reported anger					
	Step 1		Step 2		Step 3		Step 1		Step 2		Step 3	
	$F_{(3,94)} = 1.06$ $R^2 = .03$		$F_{(6,91)} = 1.86\dagger$ $\Delta R^2 = 0.08\dagger$		$F_{(7,90)} = 1.61$ $\Delta R^2 = .00$		$F_{(3,95)} = 6.70***$ $R^2 = .18***$		$F_{(6,92)} = 3.62**$ $\Delta R^2 = .02$		$F_{(7,91)} = 3.34**$ $\Delta R^2 = .01$	
Variable	β	sr^2	β	sr^2	β	sr^2	β	sr^2	β	sr^2	β	sr^2
Affective intensity (AI)	−0.02	.000	−0.08	.003	−0.09	.005	0.32**	.065	0.28*	.050	0.25*	.036
Impulsivity (IMP)	−0.17	.029	−0.16	.023	−0.18	.024	0.12	.014	0.14	.016	0.07	.004
Insecure attachment (IA)	−0.02	.000	−0.03	.000	−0.05	.001	0.10	.006	0.13	.010	0.06	.002
AI × IMP			0.29*	.048	0.27†	.035			0.11	.007	0.05	.001
AI × IA			0.15	.016	0.17	.018			−0.03	.000	0.02	.000
IMP × IA			−0.21	.023	−0.28	.018			−0.16	.013	−0.35†	.027
AI × IMP × IA					0.11	.002					0.28	.014

Note. Significant interactions are probed in text. sr^2 = squared semi-partial correlation. $^{\dagger}p < .10$, $*p \leq .05$, $**p < .01$, $***p < .001$.

effect emerged as significant. Adding the two-way interactions improved the model, with the maternal negative affective intensity × impulsivity interaction emerging as significant. Given that the three-way interaction was not significant, probing occurred at the level of the two-way interaction. Results revealed that the relation between maternal negative affective intensity and observed infant anger shifted from negative to positive in direction as maternal impulsivity increased. Specifically, although none of the simple slopes were significant at standard values (−1 *SD*, *M*, +1 *SD*, +2 *SD*) of impulsivity (βs = −0.35, −0.08, 0.15, and 0.45 at low, *M*, high, and very high levels of impulsivity, respectively; *p*s > .05), the relation between maternal negative affective intensity and observed infant anger reached significance when maternal impulsivity reached a value of 2.95 *SD* above the mean (a value observed in our sample).

Comparable findings were obtained when maternal authoritarian parenting was included as a covariate, with the maternal affective intensity × impulsivity interaction remaining significant (β = 0.57, t = 2.16, p = .034). However, the relation between maternal negative affective intensity and observed infant anger failed to reach significance at any value of maternal impulsivity observed in our sample with authoritarian parenting included in the model. Thus, the relation between maternal negative affective intensity and infant negative affective intensity (in the form of observed anger) became stronger at increasingly higher levels of maternal impulsivity, although whether it reached significance depended on the exclusion of the covariate.

For mother-reported infant anger, the main effects of the maternal traits significantly improved the model, with maternal negative affective intensity emerging as significant (Table 3). Neither the two-way interactions nor the three-way interaction emerged as significant (at the level of the step or individual parameters). These results suggest that maternal negative affective intensity relates to mothers' perceptions of increased anger in their infants.

Infant fear expressions

Similar models were run for observed infant fear and mother-reported infant fear, with high levels of fear expressions (as evidenced by positive relations with maternal traits) considered an indicator of infant negative affective intensity and low levels of fear expressions (as evidenced by negative relations with maternal traits) considered an indirect indicator of vulnerability to trait impulsivity. Although none of the maternal traits (either alone or in interaction with one another) related positively to observed infant fear (Table 4), evidence was provided for the relevance of these

TABLE 4
Regressions of Maternal Traits Predicting Infant Fear

	Observed fear						*Mother-reported fear*					
	Step 1		*Step 2*		*Step 3*		*Step 1*		*Step 2*		*Step 3*	
	$F_{(3,94)} = 3.66$* $R^2 = .11$*		$F_{(6,91)} = 2.25$* $\Delta R^2 = .02$		$F_{(7,90)} = 2.27$* $\Delta R^2 = .02$		$F_{(3,95)} = 1.71$ $R^2 = .05$		$F_{(6,92)} = 1.80$ $\Delta R^2 = .05$		$F_{(7,91)} = 1.80$† $\Delta R^2 = .02$	
Variable	β	sr^2	β	sr^2	β	sr^2	β	sr^2	β	sr^2	β	sr^2
Affective intensity (AI)	−0.20	.026	−0.19	.022	−0.15	.012	0.12	.009	0.18	.020	0.22†	.027
Impulsivity (IMP)	−0.19*	.036	−0.23*	.049	−0.16	.018	−0.22*	.045	−0.24*	.050	−0.17	.020
Insecure attachment (IA)	−0.05	.002	0.01	.000	0.09	.004	−0.04	.001	−0.10	.006	−0.03	.000
AI × IMP			−0.02	.000	0.05	.001			−0.24†	.032	−0.17	.015
AI × IA			−0.17	.020	−0.23†	.032			0.04	.001	−0.02	.000
IMP × IA			0.14	.010	0.38†	.031			0.29*	.045	0.50*	.055
AI × IMP × IA					−0.35	.021					−0.31	.016

Note. Significant interactions are probed in text. sr^2 = squared semi-partial correlation. †$p < .10$, *$p \leq .05$.

traits to low levels of observed infant fear. Specifically, results revealed a significant main effect of maternal impulsivity, such that maternal impulsivity related negatively to observed infant fear. This was not qualified by two-way or three-way interactions. These results suggest that maternal impulsivity relates to low levels of observed infant fear (one indicator of infant vulnerability to later impulsivity).

A similar pattern of findings emerged for mother-reported infant fear, with maternal impulsivity evidencing a significant negative relation to infant fear as a main effect (Table 4). This was qualified by a two-way interaction between maternal impulsivity and insecure attachment. Given that the three-way interaction was not significant, probing occurred at the level of the two-way interaction. Although maternal impulsivity did not relate to mother-reported infant fear at high levels of maternal insecure attachment ($\beta = .03$, $t = 0.19$, $p = .850$), it evidenced a significant negative relation at mean ($\beta = -0.24$, $t = -2.26$, $p = .026$) and low ($\beta = -0.50$, $t = -2.86$, $p = .005$) levels of maternal insecure attachment. Thus, maternal impulsivity related to this particular indicator of infant vulnerability to later impulsivity when mothers reported low to moderate levels of insecure attachment.

Infant low inhibition

Observed infant low inhibition and mother-reported infant low inhibition were examined in hierarchical linear regression analyses similar to the preceding analyses (Table 5). For both observed and mother-reported infant low inhibition, neither the main effects of the maternal traits nor the two-way or three-way interactions among these traits significantly improved the models. Findings did not change when covariates were included in the models.

Relations between mother and infant traits controlling for maternal psychopathology

To ensure that the observed interrelations between mother and infant traits are not due solely to their shared associations with maternal psychopathology, we reran the primary analyses including maternal anxiety and depression symptoms as covariates. All findings reported above remained the same when maternal anxiety and depression symptoms were included in the models, with the exception of an additional two-way interaction emerging as significant in the model examining mother-reported infant fear expressions. Specifically, when maternal anxiety and depression symptoms were included in this model, both two-way interactions involving maternal impulsivity emerged as significant, including the maternal

TABLE 5
Regressions of Maternal Traits Predicting Infant Low Inhibition

	Observed low inhibition						*Mother-reported low inhibition*					
	Step 1		*Step 2*		*Step 3*		*Step 1*		*Step 2*		*Step 3*	
	$F_{(3,95)} = 1.38$ $R^2 = .04$		$F_{(6,92)} = 1.46$ $\Delta R^2 = .05$		$F_{(7,91)} = 1.36$ $\Delta R^2 = .01$		$F_{(3,95)} = 1.46$ $R^2 = .04$		$F_{(6,92)} = 1.11$ $\Delta R^2 = 0.02$		$F_{(7,91)} = 0.98$ $\Delta R^2 = .00$	
Variable	β	sr^2	β	sr^2	β	sr^2	β	sr^2	β	sr^2	β	sr^2
Affective intensity (AI)	−0.18	.020	−0.20	.023	−0.17	.017	0.04	.001	0.02	.000	0.04	.001
Impulsivity (IMP)	−0.11	.012	−0.12	.013	−0.08	.004	−0.10	.009	−0.11	.011	−0.09	.005
Insecure attachment (IA)	0.04	.001	0.01	.000	0.06	.002	0.17	.020	0.17	.016	0.20	.018
AI × IMP			0.15	.013	0.20	.018			0.14	.010	0.16	.012
AI × IA			0.13	.011	0.09	.005			0.06	.002	0.04	.001
IMP × IA			−0.01	.000	0.13	.004			−0.01	.000	0.07	.001
AI × IMP × IA					−0.21	.008					−0.11	.002

Note. sr^2 = squared semi-partial correlation.

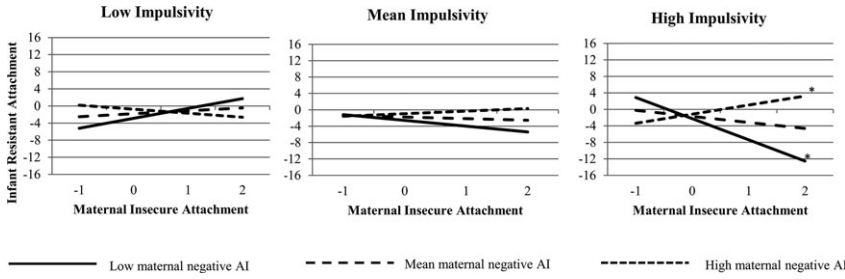

Figure 1 Three-way interaction among maternal traits (impulsivity, negative affective intensity [AI], and insecure attachment) in relation to probability of infant insecure-resistant attachment classification relative to secure attachment classification. The scale of the dependent variable is presented in log odds. Maternal insecure attachment related positively to infant insecure-resistant attachment when mothers reported high levels of impulsivity and negative affective intensity. *$p < .05$.

impulsivity × insecure attachment interaction described above (which revealed a significant negative relation between maternal impulsivity and mother-reported infant fear at low and mean levels of maternal insecure attachment; βs = −0.51 and −0.27, ts = −2.92 and −2.45, ps < .02, respectively) and an additional two-way interaction between maternal impulsivity and maternal negative affective intensity ($\beta = -0.27$, $t = -1.99$, $p = .049$). Probing this interaction revealed that maternal impulsivity did not relate to mother-reported infant fear at low levels of affective intensity ($\beta = -0.02$, $t = -0.10$, $p = .920$), but it did evidence a significant negative relation at mean ($\beta = -0.27$, $t = -2.45$, $p = .016$) and high ($\beta = -0.51$, $t = -3.13$, $p = .002$) maternal negative affective intensity. Thus, when variance associated with maternal psychopathology was removed, maternal impulsivity related to low levels of mother-reported infant fear when mothers reported either low insecure attachment or high negative affective intensity.

DISCUSSION

Although emerging research provides evidence for the familial aggregation of trait vulnerabilities (Kitamura et al., 2009; Meyer & Hautzinger, 2001), no studies have examined the extent to which the presence and confluence of multiple trait vulnerabilities among mothers relate to the expression of and precursors to these traits in infants. However, this line of research has important implications for understanding the intergenerational transmission

of both personality and risk for maladaptation. Thus, this study examined the interrelations of three trait vulnerabilities with relevance to both social–emotional development and risk for psychopathology (negative affective intensity, impulsivity, and insecure attachment) between mothers and their infants, focusing in particular on the unique and interactive influence of these maternal trait vulnerabilities on the expression of and precursors to these traits in their infants.

With regard to the unique relations between the maternal trait vulnerabilities and the corresponding trait in infants, results revealed significant main effects of both maternal negative affective intensity and impulsivity on the early expressions of and precursors to these traits in infants. Notably, although the relation between maternal negative affective intensity and infant negative affective intensity was limited to mother-reported levels of this trait in infants (suggesting that maternal negative affective intensity relates to mothers' perceptions of increased anger in their infants), the relation between maternal impulsivity and infant vulnerability to impulsivity was found for both observed and mother-reported low infant fear expressions. These findings suggest that the relation between maternal impulsivity and one indicator of infant vulnerability to later impulsivity (i.e., low levels of infant fear expressions) may be robust.

The interactive influence of maternal trait vulnerabilities on the early expression of these vulnerabilities in their infants was most evident for the mother–infant attachment relationship. Specifically, maternal insecure attachment was significantly related to a higher likelihood of infant insecure-resistant attachment when mothers also reported high levels of both negative affective intensity and impulsivity. Likewise, with regard to the relations between mother and infant negative affective intensity, maternal affective intensity was positively related to infant negative affective intensity (in the form of observed anger) when mothers also reported very high levels of impulsivity. These findings suggest that it is primarily in the context of the other trait vulnerabilities examined here that the presence of insecure attachment or negative affective intensity in mothers relates to the early expressions of and precursors to these traits in their infants.

The interactive influence of maternal traits on indicators of infant vulnerability to impulsivity was more complex. Specifically, maternal impulsivity was significantly related to low levels of mother-reported infant fear expressions when mothers also reported relatively low (versus high) levels of insecure attachment or (when the variance associated with maternal psychopathology was removed) high levels of negative affective intensity. These findings suggest that the relation between maternal impulsivity and mothers' perceptions of low fear in their infants is strongest for mothers

without heightened insecure attachment. Notably, when vulnerability to later impulsivity was assessed as low inhibition in infants (either observed or mother-reported), no significant relations with any of the maternal traits of interest (either alone or in combination with one another) were found. Of the three infant vulnerabilities examined here, vulnerability to impulsivity may well be the least developed and most difficult to assess during this developmental period, particularly when it is measured indirectly as low inhibition. It is possible that the impact of maternal trait vulnerabilities on offspring vulnerability to impulsivity may become stronger as children age (e.g., between 2 and 4 years of age), when acquiring skills in behavioral control emerges as a key developmental task (Eisenberg, Hofer, & Vaughan, 2007).

Although the results of this study add to the literature on the familial aggregation of trait vulnerabilities, several limitations warrant consideration. First, although we included both laboratory-based and mother-report measures of the early expressions of and/or precursors to two of these traits in infants, these measures were not significantly correlated with one another. Although the absence of significant correlations between mother-reported and observed infant vulnerabilities is consistent with past studies (Rothbart & Bates, 1998), future research is needed to examine the basis of these differences. In particular, research should examine the extent to which the lack of convergence between mother-reported and laboratory measures of infant traits is related to (a) actual differences in the early expression of these traits across contexts or method of assessment and/or (b) maternal characteristics and personality traits. Likewise, the extent to which findings of significant relations between maternal traits and mother-reported infant expressions of these traits are accounted for by shared method variance and/or reporter bias cannot be determined.

A related limitation pertains to the exclusive reliance on self-report measures of maternal traits and parenting behaviors, responses to which may be influenced by an individual's willingness and/or ability to report accurately on these phenomena. Future studies would benefit from the inclusion of objective behavioral and/or physiological measures of the maternal traits of interest here, as well as observations of parenting behavior. Future research should also incorporate biological and/or psychophysiological indices of infant negative emotional intensity. Moreover, given that we likely did not have access to the full range of infant behaviors in this one-session laboratory-based study, future research is needed to examine infant emotional and behavioral responses in other contexts.

Additionally, our relatively small sample size may have limited our statistical power and ability to detect interaction effects (particularly for the three-way interactions). In light of this modest power and the *a priori*

nature of our primary analyses, we did not apply an alpha correction in the present study, thus increasing our risk of Type I error as well. As such, it will be important for future research to replicate these findings in larger samples of mother–infant dyads. Likewise, although results provided support for significant interrelations of these traits between mothers and infants, much of the variance in the expression of these traits in infants remained unexplained and the effect sizes of the observed relations between mother and infant traits were modest. Future research is needed to examine other factors (e.g., maternal social support, paternal parenting, maltreatment) that may influence the expression of and precursors to these traits in infants. Furthermore, this study examined these trait vulnerabilities among women in the community. Although findings provided preliminary evidence for intergenerational relations between these traits within this nonclinical sample, future studies should examine these interrelations among mothers seeking treatment for emotion-related difficulties. Such studies have the potential to speak more directly to the implications of this line of research for understanding the intergenerational transmission of risk of psychopathology.

Finally, despite examining relations between seemingly similar traits and vulnerabilities in mothers and their infants, we do not wish to suggest that infant–caregiver attachment quality, infant negative emotional expressions, and indirect indicators of infant vulnerability to impulsivity are simple downward extensions of the relevant adult traits. Instead, these behaviors in infants are considered early representations of infant adaptation and success in relevant developmental tasks (Sroufe, 2013). Maternal traits may have both biologically and environmentally mediated effects on the early manifestation of these constructs in infants, and examining these relations was our primary aim. It was beyond the scope of the present study to examine all possible influences on infant adaptation or the complex developmental processes linking these infant constructs to later maladaptation or psychopathology. Nonetheless, the field of developmental psychopathology continues to require studies that provide avenues for future inquiry about risk rooted in typical development (Sroufe, 2013).

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