INFANT EMOTIONALITY MODERATES RELATIONS BETWEEN MATERNAL PARENTING IN EARLY CHILDHOOD AND CHILDREN'S REACTIVITY AND EFFORTFUL CONTROL AT 54 MONTHS: DIFFERENTIAL SUSCEPTIBILITY OR GENE-ENVIRONMENT DUAL RISK VULNERABILITY?

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INFANT EMOTIONALITY MODERATES RELATIONS BETWEEN MATERNAL PARENTING IN EARLY CHILDHOOD AND CHILDREN'S REACTIVITY AND EFFORTFUL CONTROL AT 54 MONTHS: DIFFERENTIAL SUSCEPTIBILITY OR GENE-ENVIRONMENT DUAL RISK VULNERABILITY?

The current study utilizes data from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (Research Triangle Institute, 2002) to explore the moderating effect of infant emotionality (i.e., emotional intensity and negative mood) on maternal emotional support (i.e., responsivity and rejection) during early childhood predicting childhood levels of reactivity and effortful control. A primary aim of the current investigation was to determine if moderated effects were better accounted for by one of two explanatory models: gene-environment dual risk vulnerability or differential susceptibility. Predicting later levels of childhood reactivity, infants with high levels of emotional intensity were more vulnerable to maternal rejection than infants with low levels of emotional intensity. Predicting later levels of childhood reactivity and effortful control, infants with high levels of negative mood were more vulnerable to maternal rejection than infants with low levels of negative mood. The above findings are in support of gene-environment dual risk vulnerability. Findings are discussed in light of other results in support of differential susceptibility, as well as limitations to the current study and areas of future research.

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Chapter One: Introduction

The emotional variations of an individual are among the defining characteristics of young people and old people alike. The human species shares a common set of emotional characteristics, but these variations are expressed differently from person to person. For some children, the expression of anger is a common feature of their personality, whereas other children seldom exhibit this emotion. Likewise, the extent to which a child is able to control emotional reactions may markedly set apart one peer from another.

The emotional variations above account for a range of socioemotional outcomes during childhood. Emotional characteristics from as early as infancy are related to both prosocial and antisocial traits during childhood (Rothbart, Ahadi, & Hershey, 1994). Negative emotional reactivity is related to externalizing behavior problems during early childhood (Sanson, Hemphill, & Smart, 2004) and difficulties with self-regulation are related to problematic socioemotional and academic functioning during childhood and adolescence (Eisenberg, Hofer, & Vaughan, 2007; Sanson et al., 2004). In the early years, and beyond, healthy functioning in socioemotional and academic domains can set either a probabilistic trajectory of future success, or conversely, a less than desirable base from which to develop healthfully.

Emotional characteristics are believed to be a part of children's temperamental makeup—or characteristics attributable to genetic inheritance—but importantly, also affected by the environment. That is, emotional characteristics such as reactivity and effortful control during early childhood are the result of interactions between our biological makeup, in this case infant emotionality, and especially, environmental experiences such as parenting (Rothbart & Bates, 2006). The current study will explore these relations by examining the interactions between infant emotionality such as emotional intensity and negative mood, and dimensions of maternal

emotional support such as responsivity and rejection, together predicting later emotional reactivity and effortful control.

Present from birth, constitutionally based temperamental components consist of emotional reactivity and self-regulation (Rothbart & Derryberry, 1981). Both *reactivity* and *self-regulation* are "umbrella terms," under which fall a variety of emotional characteristics aggregated within each domain (Rothbart & Bates, 2006). Reactivity is defined as individual differences in arousal and emotionality (Rothbart, 2004) as a result of changes in the internal and external environments (Rothbart & Bates, 2006). Accordingly, reactivity includes aspects of negative affectivity (Rothbart & Bates, 2006) such as anger or frustration (Rothbart, Ahadi, Hershey, & Fisher, 2001). Self-regulation involves the processes that attenuate emotional reactivity, such as effortful control (Rothbart, 2004). In particular, effortful control consists of attention focusing strategies and the ability to planfully inhibit inappropriate responses (Rothbart et al., 2001).

Numerous studies support main effect or direct linkage relations between constitutionally based emotional characteristics and later socioemotional adjustment; however, these models may provide a better template for future vulnerability than explicating direct, inexorable outcomes (Rothbart & Bates, 2006). That is, when such direct or main effects relations between temperamental characteristics and later outcomes are reported it is often the case that these relations occur when extreme levels of early emotional characteristics predict later extremes (Sanson, Hemphill, & Smart, 2002). Such is the case when a highly reactive child engages in aggressive behavior years later (Bates, Maslin, & Frankel, 1985). That is to say, temperament researchers do not assert the inevitability of early temperamental emotional characteristics alone

predicting future socioemotional outcomes; rather, environmental factors are also to be considered (Bates, 1989).

An important environmental factor interacting with temperament is parenting (Gallagher, 2002; Rothbart & Bates, 1998, 2006; Thomas, Chess, Birch, Hertzig, & Korn, 1963). Not surprisingly, main effect or direct linkage relations between parenting and socioemotional outcomes are widespread (Denham, 1998; Sroufe, 1995). One such parental factor that is the focus of this study is maternal emotional support. Both maternal and paternal influences are believed to be important factors of child development, yet given the disproportional number of mothers who act as primary caregivers to infants and young children, the scope of this investigation focuses exclusively on the mother-child relationship. Maternal emotional support is an important parental emotional resource, which among the many conceptualizations of this dimension includes both positive and negative aspects of parenting such as responsivity and rejection, respectively. Maternal responsivity includes aspects of sensitivity, supportive presences, and a lack of intrusiveness, whereas maternal rejection encompasses negativity and hostility toward the child (Grolnick & Gurland, 2002). A salient characteristic of maternal emotional support is the timely availability provided to the infant's developing emotional system (Sroufe, 1995). Responding sensitively to the infant's needs and in a manner that is not intrusive functions to soothe and shape what is a highly raw and poorly regulated emotional system. These maternal behaviors act as a supportive presence throughout the dyadic mother-child interactions, whereby the infant can learn to regulate herself/himself without external regulation. Alternatively, maternal negative regard toward the infant does not help to maintain or restore the child to a homeostatic state. Rejecting an infant's needs by responding with hostility may exacerbate what is already a volatile emotional system, making it ever more difficult for the

infant to self-soothe and/or function with healthful emotional independence during the early years.

One dimension of maternal emotional support includes positive aspects of parenting such as responsivity, which is favorably related to child outcomes. During infancy, high maternal responsivity is related to secure infant attachment to its caregiver (Ainsworth, Blehar, Waters, & Wall, 1978). During early childhood, high maternal responsivity is generally related to positive outcomes (Grolnick & Gurland, 2002) such as higher self-esteem (Coopersmith, 1967), prosocial skills (Sroufe, 1985), less problematic behavior, and healthier peer relationships (Baumrind, 1972). In contrast, another dimension of maternal emotional support includes negative aspects of parenting such as rejection and hostility which are unfavorably related to child outcomes. Rejection and hostility are related to childhood aggression (Shaw, Gilliom, Ingoldsby, & Nagin, 2003), and extreme cases of negative parenting—child maltreatment—is related to many socioemotional problems throughout the early years and beyond (Egeland & Sroufe, 1981). Yet with exception to child maltreatment, the relations between parenting and child outcomes are modest at times and subject to multiple interpretations (Gallagher, 2002). Researchers have therefore sought to adopt more convincing strategies—both theoretically and methodologically—for explaining the relations between temperamentally based infant emotionality, parenting, and later socioemotional outcomes (Rothbart & Bates, 2006).

Direct, main effect relations linking constitutionally based emotional characteristics and parental factors to socioemotional outcomes alone are not sufficient in accounting for developmental outcomes. More suitably, complex developmental processes must be taken into consideration given that child characteristics are believed to be important reciprocal factors in eliciting parental behaviors (Bell, 1968). Bioecological systems theory (Bronfenbrenner &

Morris, 1998) supports this idea, outlining a model that includes proximal processes, such as parenting, interacting with biological characteristics of the child, such as infant emotionality. Therefore, taking into consideration the interaction between parenting and infant emotionality is a more robust model from which to draw complex developmental inferences than more simplified main effects between infant emotionality and later childhood outcomes, and parenting and later childhood outcomes alone (Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007; Crockenberg & Leerkes, 2003; Rothbart & Bates, 2006; Sanson et al., 2002). Indeed, the field of developmental science has moved beyond the outdated thinking that main-effects-models of parenting or temperament provide the clearest interpretation of human development (Gallagher, 2002).

Belsky et al. (2007) discuss two influential models that offer greater breadth to explaining developmental outcomes than research highlighting main effects between either parenting or temperament and later outcomes: gene-environment dual risk vulnerability and differentially susceptibility. The premises of each theory are comparable in that not all emotional systems function or are affected similarly. Moreover, the disparity between varying emotional systems cannot be fully understood without taking into consideration differences in contextual circumstances—thus, interactive effects between infant emotionality and parenting. Each of these theories propose that having a better understanding of the gene-environment fit can provide not only a more complex understanding of the specific domains associated with each theory, but a more sophisticated way to design effective interventions (Dodge, 2004).

For the sake of driving research and designing effective early intervention and prevention programs, it is important to understand the manner in which interactions occur and their relatedness to diverse outcomes. Knowing that infants with negative emotionality may be at

greater risk for problematic socioemotional outcomes is necessary in order to put interventions in place to buffer against unfavorable developmental trajectories. The characteristics of both types of interactions—gene-environment dual risk vulnerability and differential susceptibility—converge in that parenting affects children's development differently; however, the two explanations diverge when hypothesizing about the quality of outcomes associated with the domains of parenting-by-temperament interactions.

Gene-Environment Dual Risk Vulnerability

Gene-environment dual risk vulnerability focuses on the additive effects of a negative biological predisposition—such as infant emotional intensity and negative mood—and negative environmental characteristics—such as low maternal responsivity or high maternal rejection—together heightening the risk for problematic outcomes (Belsky et al., 2007). This hypothesis proposes that children with high infant emotional intensity and negative mood who experience high maternal responsivity and low maternal rejection will have worse outcomes at 54 months than children with low infant emotionality and negative mood who experience high maternal responsivity and low maternal rejection.

In the first and perhaps most convincing argument for gene-environment dual risk vulnerability linking gene-environment interactions with behavior, Caspi and Moffitt (2006) discuss their findings of antisocial behavior in men followed from early childhood. In this sample, the highest levels of conduct disorder, antisocial personality, and violent crime were predicted by both early experiences of child maltreatment and a gene expressing low levels of monoamine oxidase A (MAOA) compared to children with a genotype that expressed high MAOA activity.

In younger samples, parenting-by-temperament interactions predicting externalizing behaviors are becoming more abundant. For instance, Belsky, Hsieh, and Crnic (1998) reported that higher levels of fearfulness and distress during infancy predicted childhood externalizing problems at age 3 among children who received higher levels of maternal negative affect and intrusiveness. Rubin, Burgess, Dwyer, and Hastings (2003) reported that low levels of self-regulation at 2 years of age predicted externalizing problems 2 years later more so for toddlers who received a higher degree of maternal intrusiveness and hostility. Deater-Deckard and Dodge (1997) reported that infants with negative reactivity had the highest levels of externalizing behaviors at age five when exposed to the highest levels of harsh discipline during early childhood. In children of divorce, Lengua, Wolchik, Sandler, and West (2000) reported that child ratings of maternal rejection predicted externalizing behaviors among those children with low positive emotionality. In another study linking parenting-by-temperament interactions to externalizing problems, Morris et al. (2002) reported that both high levels of anger and frustration and low levels of effortful control predicted externalizing behavior in first grade among those children who rated their mothers as displaying higher levels of hostility.

An increasing number of studies have identified parenting-by-temperament interactions that support dual risk vulnerability; however, specific associations between infant emotional intensity or negative mood interacting with maternal responsivity or rejection predicting reactivity or effortful control (in a manner that also supports dual risk vulnerability) are not as abundant. Three studies have been found to be most similar to the proposed study. Morrell and Murray (2003) reported that infants with high levels of crying and back arching at 4 months continued to display these same characteristics 5 months later when experiencing coercive and rejecting maternal behaviors. In a study with an outcome similar to reactivity, low positive

parenting predicted high levels of anger and aggressive behavior at 24 months among infants who were highly distressed and resistant in frustrating situations at 18 months (Calkins, 2002). In a study with an outcome similar to effortful control, negative emotionality as a toddler was predictive of poor self-regulation two years later among children whose mothers employed high negative control and low warmth (Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002). Findings that are not well represented in the literature on dual risk vulnerability are those that have identified specific relations between disaggregated measures of infant emotionality (notably, distinguishing between emotional intensity and negative mood) interacting with specific maternal behaviors such as responsivity and rejection, predicting later levels of childhood reactivity and effortful control prior to kindergarten.

Gene-environment dual risk vulnerability hypotheses for the current study. High levels of reactivity and low levels of effortful control are associated with negative childhood outcomes. According to the gene-environment dual risk vulnerability concept, negative outcomes during early childhood are predicted by concurrent levels of negative infant characteristics (high emotional intensity or high negative mood) and negative maternal characteristics (low responsivity or high rejection)—hence, dual risk. Therefore, according to this view children are said to be most vulnerable when two negative predictors occur simultaneously. If dual risk vulnerability explains the parenting-by-infant emotionality interactions, the highest levels of reactivity at 54 months would occur in children who have high emotional intensity during infancy and receive low maternal responsivity. This pattern would remain consistent for each of the parenting-by-infant emotionality interactions predicting reactivity and effortful control. That is, according to this theory, high emotional intensity is believed to be a risk factor, whereas low infant emotionality is believed to be a protective factor. Likewise, low maternal responsivity is

believed to be a risk factor and high maternal responsivity is believed to be a protective factor. Dual risk vulnerability proposes that two risk factors are predictive of the worst outcomes (i.e., high emotional responsivity or low effortful control).

Differential Susceptibility

Belsky et al. (2007) argued that the gene-environment dual risk vulnerability hypothesis may be telling the wrong story within certain domains and/or outcomes. Rather than interactions being accounted for by dual risk vulnerability, Belsky proposed the differential susceptibility hypothesis. He proposes that infant characteristics such as emotional intensity are not necessarily a negative characteristic, but indicative of the infant having a highly sensitive nervous system that is malleable—or, susceptible—to both negative *and* positive rearing conditions. That is, according to the differential susceptibility hypothesis, an infant with high levels of negative mood is likely to develop more favorably than an infant with low levels of negative mood if they are exposed to positive rearing conditions; for example, high levels of maternal responsivity. On the other hand, an infant with high levels of negative mood is likely to develop less favorably than an infant with low levels of negative mood if they are exposed to poor parenting such as a lack of maternal responsivity. So infants who are more sensitive are affected more than infants who are less sensitive by both negative and positive parenting influences.

Differential susceptibility has been proposed by Belsky (1997, 2005) as an evolutionary explanation to account for the above associations, suggesting that children with characteristics such as high emotional intensity or negative mood are easily aroused because they have highly sensitive nervous systems. Variations in sensitivity may be adaptive to humans because it increases the likelihood that some children in each family will do well irrespective of the environmental conditions. Being sensitive to environmental conditions is an adaptive trait,

predictive of organismic success if environmental conditions are positive whereas being less sensitive is adaptive when the environment is negative.

Although Belsky's differential susceptibility hypothesis is relatively new, early support for this concept was reported in the attachment literature. Crockenberg (1981) reported that maternal social support predicted secure infant attachment among only infants with high irritability. More recently, Stright, Gallagher, and Kelley (2008) reported that infants with difficult temperaments exposed to lower levels of maternal emotional and autonomy support had lower levels of academic and social functioning, consistent with the proposition of dual risk vulnerability; however, highly emotional infants exposed to higher levels of emotional and autonomy support had higher levels of academic and social functioning than less emotional infants receiving the same high quality parenting.

Using the same data set as Stright et al. (2008), Bradley and Corwyn's (2008) results also support the differential susceptibility hypothesis. They found that infants with difficult temperaments who experienced high maternal sensitivity across early childhood had less externalizing behavior at first grade than infants with easy temperaments who experienced high maternal sensitivity. In another study related to externalizing behaviors, Denham et al. (2000) reported that the effects of parental supportive presence and limit setting during middle childhood were most beneficial among children scoring the highest on disobedient and aggressive behavior and anger at an earlier age.

Experimental studies also support the differential susceptibility hypothesis. Highly negative, preterm infants whose mothers were assigned to receive a comprehensive intervention—consisting of home visitation, educational day care, and parental support during group meetings—experienced the greatest reductions in externalizing and internalizing problems

and a dramatic decrease in the occurrence of scores less than or equal to 75 on a measure of intelligence (Blair, 2002). In another experimental study, Klein Velderman, Bakermans-Kranenburg, Juffer, and Van IJzendoorn (2006) reported that a maternal sensitivity intervention was more effective for children with high levels of reactivity.

Two of the more intriguing studies supporting differential susceptibility illustrate what Belsky and his colleagues (2007) refer to as parenting-by-temperament interactions that are "for better *and* for worse." First, Kochanska, Aksan, and Joy (2007) found that fathers' power-assertive discipline predicted the lowest levels of rule-compatible conduct at 38 months among fearful children. On the other hand, fearful children who had a positive mother-child relationship predicted the highest rule-compatible conduct at 38 months. Second, Feldman, Greenbaum, and Yirmiya (1999) reported that high negative emotionality during infancy predicted noncompliance at age 2 when maternal sensitivity was low; however when maternal sensitivity was higher among mother-infant dyads, infants with higher levels of negative emotionality had the highest self control at age 2. Similar to the literature on dual risk vulnerability, findings that are not well represented in the literature on differential susceptibility are those that have identified specific relations between disaggregated measures of infant emotionality (notably, distinguishing between emotional intensity and negative mood) interacting with specific maternal behaviors such as responsivity and rejection, predicting later levels of childhood reactivity and effortful control prior to kindergarten.

Differential susceptibility hypotheses for the current study. Differential susceptibility differs in relation to dual risk vulnerability in that whereas dual risk vulnerability predicts that the lowest levels of reactivity at 54 months would be predicted by low intensity infants who receive high maternal responsivity this is not the predicted result according to the differential

susceptibility hypothesis. The differential susceptibility hypothesis proposes that children with sensitive nervous systems differ in their susceptibility to both negative and positive rearing experiences, thereby suggesting that the lowest levels of reactivity at 54 months is predicted by high infant intensity and high maternal responsivity. According to this view, children with sensitive nervous systems are not only more sensitive to environmental stimuli but as stated above they may also be more easily affected by both negative and positive aspects of the environment. Dual risk vulnerability suggests that negative temperament will always be a risk factor for the child; however, according to the differential susceptibility hypothesis an infant with a sensitive nervous system is actually a desirable trait for a child being reared in an environment with either high maternal responsivity or low maternal rejection.

Whereas supporters of dual risk vulnerability view high emotional intensity as a risk factor, proponents of differential susceptibility view this emotional characteristic healthfully when parenting is also beneficial—such as high maternal responsivity. The dual risk vulnerability view never concedes that a sensitive nervous system, or high emotional intensity, is beneficial to the child; rather, it is always looked at as a risk factor. At the same time, according to dual risk vulnerability a child with low emotional intensity is believed to be a protective factor because this child may be less likely to elicit negative parenting; yet, according to differential susceptibility a child with low emotional intensity does not have a sensitive nervous system and therefore may be at a disadvantage to a child with a sensitive nervous system under circumstances where the child is exposed to beneficial rearing influences such as high maternal responsivity. It may be the case, however, that differential susceptibility only accounts for interactions in specific domains or for specific outcomes (Belsky, 2005; Belsky et al., 2007;

Kochanska et al., 2007). Given this uncertainty, it is important to differentiate between dual risk vulnerability and differential susceptibility with respect to various domains and outcomes.

Theoretically, differential susceptibility purports that certain childhood characteristics, such as having a sensitive nervous system, are related to beneficial outcomes when parenting is of high quality. However, in addition to a theoretical argument for differential susceptibility, Belsky et al. (2007) proposed a five-step test of differential susceptibility which distinguishes this type of interaction from other types of interactions, namely dual risk vulnerability.

The first step for determining differential susceptibility is a statistically significant finding for a cross-over interaction (i.e., regression lines that cross). The second step is to determine the independence of the susceptibility variable (i.e., infant emotionality) to the predictor variable (i.e., maternal emotional support). That is, infant emotionality and maternal emotional support cannot be significantly correlated. The third step involves testing the relation between the susceptibility factor and the predicted outcome (i.e., childhood reactivity and effortful control). Again, these two factors cannot be significantly correlated. The fourth step requires an inspection of the plotted interaction. The plotted interaction must illustrate Belsky and colleagues' (2007) "for better *and* for worse" phenomenon. That is, the susceptibility factor must clearly predict both the worst outcome when exposed to the least desirable environment (i.e., low maternal responsivity or high maternal rejection) and the best outcome when exposed to the most desirable environment (i.e., high maternal responsivity or low maternal rejection). Conversely, plotted interactions that support dual risk vulnerability will only illustrate the risk factor (e.g., high emotional intensity) being associated with the worst outcome when exposed to the least desirable environment. Finally, the fifth step tests the uniqueness of the result if the finding is not replicated when different moderating variables and outcomes are entered into the

model. If any of the above criteria are not satisfied, differential susceptibility has not been determined.

The Current Study

The current study used data from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD, 2001; Research Triangle Institute, 2002). The study explored parenting-by-temperament interactions predicting reactivity and effortful control at 54 months. More precisely, interactions were explored for infant emotional intensity and negative mood at 6 months and maternal responsivity and rejection at 6, 15, 24, 36, and 54 months, predicting reactivity and effortful control at 54 months. In addition, the exploration of parenting-by-temperament interactions sheds light onto the early mechanisms of emotional development. That is, are emotional intensity and/or negative mood indicators of a sensitive nervous systems that predict the worst outcomes when poor parenting is experienced and the best outcomes when good parenting is experienced (i.e., differential susceptibility), or are emotional intensity and negative mood best conceived as risk factors that can be reduced by good parenting (i.e., dual risk vulnerability)?

Variables used in this study have been analyzed in the past. Most recently, Booth-LaForce & Oxford (2008) used the same data set and ratings of infant negative mood, maternal sensitivity to nondistress and intrusiveness at 6 months, supportive presence and hostility at 54 months, and inhibitory control at 54 months. However, this study was exploring varying patterns of social withdrawal, as opposed to parenting-by-temperament interactions for reactivity and effortful control.

The current data set has, however, been used in the past to illustrate parenting-by-child interactions; yet, these studies differ with respect to each of the specific infant and maternal

predictors and the childhood outcomes. For instance, Stright et al. (2008) tested the moderating effect of an overall score of infant temperament at 6 months on an overall score of parenting styles (including emotional and autonomy support) from 6, 15, 24, 36, and 54 months, predicting social and academic competencies at first grade. In a related study, Bradley and Corwyn (2008) investigated the relations between an overall score of infant temperament at 6 months interacting with maternal sensitivity, harshness, and productive activity at 6, 15, 24, 36, and 54 months, predicting externalizing behaviors at first grade. Belsky (2005) has also used this data set in a similar manner, using the same measure of infant negative mood at 6 months and maternal sensitivity at 6, 15, 24, and 36 months to predict maternal ratings of problem behavior and emotional adjustment at 36 months.

The current study differs in two important ways. First, the current study includes two scores of infant emotionality, so as to gain a better understanding of the specific dimensions of temperament that interact with specific dimensions of parenting—relations that are needed to advance the field's understanding of parenting-by-temperament interactions (Rothbart & Bates, 2006). Therefore temperament is disaggregated from an overall score of infant "difficulty" to understanding the specific relations among infant emotional intensity and negative mood interacting with maternal emotional characteristics—responsivity and rejection. A second important distinction from the above studies is the use of different outcomes. Belsky (2005) included outcomes of problem behavior and emotional adjustment at 36 months, whereas the current study includes outcomes at 54 months. Stright et al. (2008) also used different outcomes, reporting on findings the first of its kind linking parenting-by-temperament interactions to academic competence and teacher-child relationships. Similarly, Bradley and Corwyn (2008) reported relations among the first of its kind, linking parenting-by-temperament interactions to

externalizing problems. The current study will also attempt to report the first findings of its kind linking interactive effects between multiple dimensions of infant temperament and specific maternal behaviors with later outcomes that are closely related to temperament—childhood reactivity and effortful control.

Study Hypotheses

Of great interest to the current study is to identify the moderating effects of infant emotional intensity and negative mood on maternal responsivity and rejection predicting reactivity and effortful control at 54 months. These relations are tested to provide support to one of two explanatory models regarding parenting-by temperament interactions: gene-environment dual risk vulnerability or differential susceptibility.

If gene-environment dual risk vulnerability accounts for the parenting-by-infant emotionality interactions proposed in this study, the most problematic childhood outcomes (high reactivity or low effortful control) will be predicted by high infant emotionality (either emotional intensity or negative mood) and low maternal responsivity (or high maternal rejection) to a greater extent than low infant emotionality and low maternal responsivity (or high maternal rejection), high infant emotionality and high maternal responsivity (or low maternal rejection), and low infant emotionality and high maternal responsivity (or low maternal rejection).

If differential susceptibility accounts for the parenting-by-infant emotionality interactions proposed in this study, the most problematic childhood outcomes (high reactivity or low effortful control) will be predicted by high infant emotionality (either emotional intensity or negative mood) and low maternal responsivity (or high maternal rejection) and the best childhood outcomes will be predicted by high emotional intensity (or high negative mood) and high maternal responsivity (or low maternal rejection), more so than either combination of low infant

emotionality and low maternal responsivity (or high maternal rejection) or low infant emotionality and high maternal responsivity (or low maternal rejection).

Chapter Two: Method

Participants

Participants included children and their families from an already existing data set, the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (Research Triangle Institute, 2002). The study began in 1991 when the children were born and is still continuing. This dissertation focused on the preschool years, from birth to 54 months. The original sample was designed to include geographically-, economically-, and ethnically-diverse families. Recruitment of participants took place throughout 24 hospitals near the 10 data collection sites (Charlottesville, VA; Irvine, CA; Lawrence, KS; Little Rock, AR; Madison, WI; Morganton, NC; Philadelphia, PA; Pittsburgh, PA; Seattle, WA; and Wellesley, MA).

All women who had given birth within selected 24-hour intervals were screened within 48 hours after birth and asked if they were willing to be contacted again. During the sampling period, 5,416 of the 8,986 (60%) mothers both agreed to be contacted in two weeks and met eligibility requirements (at least 18-years of age, English-speaking, healthy baby, single birth, not released for adoption, lived within one hour of research site, and lived in a neighborhood that was not unsafe). Of the above sample, 3,015 (56%) were randomly selected based on prescribed conditions. These conditions included and allowed for at least 10% representation of mothers without partners, mothers without a high school diploma, and ethnic minority mothers. Families were not selected if the infant had been cared for in the hospital for more than a week, the family intended to move within three years, or if the families could not be reached after three attempts. Meeting the above conditions, 1,526 eligible mothers agreed to an interview and 1,364 mothers

completed a home interview when the child was one month old. These 1,364 individuals became the study participants (see NICHD Early Child Care Research Network, 2001).

At 1 month, there were 705 (52%) male and 659 (48%) female children. Among the 1,364 original participants, mothers identified their children as either non-Hispanic White/European American (76%), non-Hispanic Black/African American (13%), Hispanic (6%), or Asian, Native American, or other ethnicities (5%). At the initial one month interview, 24% of the sample was classified as living in poverty using an income-to needs ratio less than 1 (M = 2.76, SD = 2.66, range = .00 to 25.08), and mothers' mean years of education was 14.2 years (SD = 2.5, range = 7 to 21).

At 54 months of age, 1,083 (79%) of the original children and their families remained active participants. Of these participants, outcome data were available from 803 (74%) of the children's caregivers. For this subsample, there were 389 (48%) male and 414 (52%) female children, with ethnic-minority children accounting for 20% of the sample: 80% were non-Hispanic and White/European-American, 10% were non-Hispanic and Black/African-American, 6% were Hispanic, and 4% had other ethnicities. Compared to the original sample, distribution of ethnicity was affected by subject attrition, χ^2 (4, N = 1,364) = 22.43, $p < .001$, $\varphi = .13$. This indicates that for the subsample that included data from the study child's caregiver, ethnic-minority families were less likely to remain in the sample at 54 months. Of the participants at 54-months with outcome data, 11.6% of the sample had an income-to-needs ratio less than 1 (M = 3.59, SD = 3.17, range = .1 to 56.96), and mothers' mean years of education when her child was 54 months of age was 14.6 years (SD= 2.45, range = 7 to 21). Independent-sample t tests were calculated to determine the extent to which maternal education and familial income-to-needs were affected by subject attrition. Children whose caregivers completed the 54-month measure

had mothers with higher average years of education ($M = 14.65$, $SD = 2.45$), t (1361) = 7.442, $p < .01$, $d = .40$ and belonged to families with higher income-to-needs ($M = 3.11$, $SD = 2.74$), t (1272) = 5.63, $p < .01$, $d = .32$ compared to the original sample. This indicates that among data returned by the study child's caregiver, mothers with fewer years of education and families with lower income-to-needs at 54 months were less likely to remain in the study, yet the effect sizes for each were within the range of medium (Cohen, 1988).

Measures

To eliminate the effects of shared method variance, measures were used from the data set from three unique sources: (1) maternal ratings of infant emotional intensity and negative mood, (2) direct observations of maternal responsivity and rejection during a mother-child interaction task, and (3) non-maternal caregiver ratings of child reactivity and effortful control at 54 months. Therefore, in order to utilize outcome data from a third unique source, this study is limited to children in care at 54 months. Infant emotional intensity and negative mood were assessed at six months, maternal responsivity and rejection were assessed at 6, 15, 24, 36, and 54 months, and the outcome variables—non-maternal caregiver ratings of child reactivity and effortful control—were assessed at 54 months.

Infant emotionality. At six months, mothers reported on the study child's emotional intensity and negative mood by completing items from an adaptation of the Infant Temperament Questionnaire (ITQ; Carey & McDevitt, 1978). The ITQ is an adaptation of the temperament research interview developed by Thomas et al.(1963). Mothers completed 20 items from two of the original nine subscales from the ITQ with response levels of 1 (*Almost never*), 2 (*Rarely*), 3 (*Usually does not*), 4 (*Usually does*), 5 (*Frequently*), and 6 (*Almost always*). Research on parenting-by-temperament interactions will benefit by defining more precisely the characteristics

of infant emotionality, and at the same time coming to a better understanding of the specific features of infant emotionality—such as emotional intensity and negative mood—that are interacting with the environment (Rothbart & Bates, 2006)—such as maternal responsivity and rejection. For the purposes of this study, infant emotionality is operationalized as consisting of both emotional intensity and negative mood. Two subscales that were used in this study to more precisely operationalize infant emotionality included ten items assessing emotional intensity (e.g., "My baby reacts strongly to foods, whether positively [smacks lips, laughs, squeals] or negatively [cries]") and ten items assessing negative mood (e.g., "My baby is fussy [frowns, cries] on waking up or going to sleep") (see Appendix A). Appropriate items were reflected for each subscale, and subscale scores were created by computing the mean of the nonmissing items, with higher scores indicative of higher levels of emotional intensity and negative mood, respectively. Internal consistency (Cronbach's alpha) for emotional intensity and negative mood was .52 and .61, respectively. Low internal consistency can be expected when assessing events or behaviors that collectively may not be experienced by all individuals (Strickland, 1999). This can be demonstrated by evaluating sample items from the subscales including, "My baby reacts strongly to strangers; laughing or crying," (emotional intensity subscale) and "My baby is fussy or moody throughout a cold or intestinal virus" (negative mood subscale). It can be argued that even though such items are related to infant emotional intensity and negative mood, respectively, not all infants will have had the above experiences by the age of 6 months, accounting for low interrelatedness among items. Since factor analysis is statistically related to internal consistency, test-retest reliability can be utilized as an appropriate reliability index (Cortina, 1993; Strickland, 1999). Test-retest reliability over a 2-week period for the ITQ was reported as .84 (Carey & McDevitt, 1978). The two scales were correlated at .09. Additionally, given parents' proximity

and exposure to a variety of infant behaviors and reactions to environmental stimuli, evidence exists for the use of caretaker ratings of infant emotionality (Rothbart & Bates, 1998; 2006).

Parenting. At 6, 15, 24, 36, and 54 months, maternal responsivity and rejection were assessed using videotapes of semi-structured mother-child interaction tasks. At 6 and 15 months, the interaction task took place in the children's home, whereas at 24, 36, and 54 months the interaction task took place in a laboratory. The 6-month interaction task had two parts. First, mothers were instructed to play with their infants for 7 minutes, choosing any toy available in the home, or to play with no toy at all. The second part lasted 8 minutes, while mothers played with their children using a standard set of toys. At 15, 24, and 36 months, mothers were asked to show their children three age-appropriate toys in separate containers for 15 minutes (Vandell, 1979). At 54 months, the 15-minute dyadic interaction task included the following three activities: a) using an Etch-A-Sketch to complete a maze that had been superimposed on the screen, b) using wooden blocks to build identical cube towers, and c) playing together with a set of 6 hand puppets. All videotapes were coded in a central location by trained coders who were unaware of all other data related to the study child or the family of the study child.

Maternal responsivity and rejection represent positive and negative aspects of emotional support, respectively, an important condition for detecting both specific relations between different dimensions of emotional support and infant emotionality and detecting differential susceptibility. The first composite score, maternal responsivity, included sensitivity to nondistress at 6 and 15 months, sensitivity to distress at 24 months and a reflected intrusiveness rating at 6, 15, and 24 months, and a supportive presence rating at 36 and 54 months. (That is, the maternal responsivity composite included two ratings at 6, 15, and 24 months and one rating at 36 and 54 months.) Sensitivity to nondistress/distress and intrusiveness were both coded 1 to 4

with 1 representing the lowest levels of sensitivity to nondistress/distress and intrusiveness and 4 representing the highest levels, and supportive presence was coded 1 to 7 with 1 representing the lowest level of supportive presence and 7 representing the highest level. Interobserver reliability was computed using repeated measures analysis of variance (Winer, 1971). Each of the reliability estimates above exceeded Winer's .60 cutoff, ranging from .69 to .87.

The second composite score, maternal rejection, included a negative regard rating at 6, 15, and 24 months, and a maternal hostility rating at 36 and 54 months. (Similar to the maternal responsivity composite above, one rating was used at 6, 15, and 24 months and one rating at 36 and 54 months.) Maternal negative regard was coded 1 to 4 with 1 representing the lowest levels of negative regard and 4 representing the highest levels, and maternal hostility was coded 1 to 7 with 1 representing the lowest level of hostility and 7 representing the highest level. Reliability estimates (Winer, 1971) ranged from .62 to .82.

Previous research using the above data have reported the stability of maternal sensitivity (NICHD ECCRN, 2002) and more generally, parenting styles during early childhood (Stright et al., 2008). These findings support the recommended use of composite scores over a developmental period to assess the relations between developmental sequela and stable environmental factors (Moffitt, Caspi, & Rutter, 2006). Using a procedure that has been utilized frequently with these data (e.g., Bradley & Corwyn, 2005, 2007; Brooks-Gunn, Han, & Waldfogel, 2002; & NICHD ECCRN, 2001), two cross-age composites were computed to capture the average levels of maternal responsivity and rejection from six to 54 months. The two maternal composites were created by separately computing the mean of nonmissing observations from 6, 15, 24, 36, and 54 months. Cross-age composites were computed by standardizing parenting scores from each time point, followed by computing the mean of these standard scores.

That is, maternal responsivity scores from 6, 15, and 24 months and supportive presence scores from 36 and 54 months were standardized at each time point, and the mean of the five standard scores was computed to create a total maternal responsivity composite. To create a total maternal rejection composite, the maternal negative regard scores from 6, 15, and 24 months and the hostility scores from 36 and 54 months were standardized at each time point, and the mean of the five standard scores was computed.

Child reactivity and effortful control. At 54 months, the study children's day care providers reported on children's reactivity and effortful control using the Children's Behavior Questionnaire (CBQ; Rothbart et al., 2001). Caregivers completed 28 items from three of the original five subscales from the caregiver version of the CBQ with response levels of 1 (*Extremely untrue*), 2 (*Quite untrue*), 3 (*Slightly untrue*), 4 (*Neither true nor false*), 5 (*Slightly true*), 6 (*Quite true*), and 7 (*Extremely true*). These three subscales were used to create two overall scores. The first of two overall scores, reactivity, was measured using ten items from the anger/frustration subscale (e.g., "This child easily gets irritated when s/he has trouble with some task [e.g., building, drawing]") (Cronbach's alpha = .86). The second overall score, effortful control, was measured using 10 items from the inhibitory control subscale (e.g., "This child can easily stop an activity when s/he is told 'no'"; Cronbach's alpha = .80), and 8 items from the attention focusing subscale (e.g., "This child when building or putting something together, becomes very involved in what s/he is doing, and works for long periods"; Cronbach's alpha = .85) (see Appendix B). Appropriate items were reflected for each subscale, and subscale scores were created by computing the mean of the nonmissing items, with higher scores representing higher levels of reactivity and effortful control, respectively. Previous research conducting factor analysis supports the existence of anger/frustration being representative of reactivity and both

inhibitory control and attention focusing being representative of effortful control (Rothbart et al., 2001).

Analyses

Following the methodological guidelines of Baron and Kenny (1986), hierarchical regression analysis will be used to test for the moderating effect of infant negative mood and emotional intensity on the relations between parenting and later childhood reactivity and effortful control at 54 months. For each of the regression equations, the centered infant emotion variables and parenting variables will be entered in the first step of the hierarchical regression analysis, followed in step two by the product of the centered infant emotion variables and parenting variables. Significant interactions are present when the change in R^2 is statistically significant ($p < .05$). Statistically significant interactions will be interpreted by plotting conditional regression lines for children at the mean, 1 *SD* above the mean, and 1 *SD* below the mean (Aiken & West, 1991) using R (R Development Core Team, 2008).

Chapter Three: Results

Means, standard deviations, and Pearson bivariate correlations for all of the variables used in the analysis are reported in Table 1. Infant emotional intensity was not directly related to childhood reactivity; however, infant emotional intensity and effortful control were significantly correlated, r = -.08. Infant negative mood was not directly related to either reactivity or effortful control. Maternal responsivity scores from six to 54 months were moderately correlated to one another (r = .27 to .48). Additionally, maternal rejection scores from six to 54 months were moderately correlated to one another (r = .19 to .36). The cross-age composite for maternal responsivity was negatively correlated to childhood reactivity (r = -.13) and positively correlated to childhood effortful control (r = .25). The cross-age composite for maternal rejection was positively correlated to reactivity (r = .10) and negatively correlated to childhood effortful control (r = -.13). Cross-age composites of maternal responsivity and rejection were negatively correlated, r (1306) = -.63.

Given the high correlation between the two cross-age composites for maternal responsivity and rejection, each maternal parenting score was entered into separate regression equations to avoid unstable regression estimates. That is, when high correlations among predictor variables are identified, it is appropriate to either combine the two scores or drop one of the scores from the analysis; however, neither option provides an explanation of the unique contribution of both positive and negative aspects of maternal emotional support: responsivity and rejection. Therefore, the four regression equations will include two models predicting reactivity at 54 months (with maternal responsivity and maternal rejection in separate models), and two models predicting effortful control at 54 months (with maternal responsivity and maternal rejection in separate models).

Predictor variables were centered to reduce the occurrence of multicollinearity; as well, to interpret interactions for parenting by infant emotionality relations, infant emotionality was plotted at the mean, 1 *SD* above the mean, and 1 *SD* below the mean for both reactivity and effortful control (Aiken & West, 1991). Furthermore, each significant parenting by infant emotionality interaction was evaluated to distinguish between differential susceptibility and dual risk vulnerability (Belsky et al., 2007), following the steps outlined above.

Infant Emotionality and Maternal Responsivity Predicting Childhood Reactivity

In the first of four simultaneous regression models, predictor variables included infant emotional intensity, infant negative mood, maternal responsivity, and interaction terms for infant emotional intensity and maternal responsivity, and infant negative mood and maternal responsivity (see Table 2). The first step was significant F (3, 773) = 4.875, p = .002, adjusted R^2 = .02, with maternal responsivity negatively predicting childhood reactivity (β = -.12, p = .001). That is, mothers who were observed to be more responsive throughout early childhood had children who were rated as having lower levels of reactivity at 54 month. The second step was significant, F (5, 771) = 3.612, p = .003, ΔR^2 = .002, and the interaction between infant negative mood and maternal responsivity predicting childhood reactivity approached significance (β = -.07, p = .069). This relation, albeit nonsignificant, is illustrated in Figure 1. In support of dual risk vulnerability, it appears as though there was a greater relation between maternal responsivity and childhood reactivity for infants with high negative mood (1 SD above the mean; β = 3.45) than for infants with either average (β = 3.29) or low negative mood (1 SD below the mean; β = 3.14).

Infant Emotionality and Maternal Rejection Predicting Childhood Reactivity

In the second of four simultaneous regression models, predictor variables included infant emotional intensity, infant negative mood, maternal rejection, and interaction terms for infant emotional intensity and maternal rejection, and infant negative mood and maternal rejection (see Table 3). The first step was significant F (3, 773) = 3.394, p = .018, adjusted R^2 = .009, with maternal rejection positively predicting childhood reactivity (β = .09, p = .01). That is, mothers who were observed to be more rejecting throughout early childhood had children who were rated as having higher levels of reactivity at 54 months. The second step was significant, F (5, 771) = 3.979, p = .001, ΔR^2 = .01, and the two parenting by infant emotionality interactions are noteworthy. The first interaction between infant emotional intensity and maternal rejection predicting childhood reactivity was significant (β = .08, p = .028). As illustrated in Figure 2, there was a greater relation between maternal rejection across infancy and early childhood and children's reactivity at 54 months for infants with high emotional intensity (β = 3.88) than for infants with either average (β = 3.67) or low emotional intensity (β = 3.45). Following the steps set forth by Belsky et al. (2007), this interaction does not support differential susceptibility. Although statistical moderation is present (step 1) and infant emotional intensity is not correlated to maternal rejection (step 2; p = .11) or childhood reactivity (step 3; p = .26), the graphical representation of the interaction does not clearly illustrate differential susceptibility (step 4). Therefore, this interaction is more representative of dual risk vulnerability.

The second interaction between infant negative mood and maternal rejection predicting childhood reactivity was significant (β = .07, p = .044). As illustrated in Figure 3, there was a greater relation between maternal rejection across infancy and early childhood and children's reactivity at 54 months for infants with high negative mood (β = 3.88) than for infants with either average (β = 3.69) or low negative mood (β = 3.50). Following the same criteria above (Belsky

et al., 2007), this interaction is not representative of differential susceptibility; both a significant correlation between infant negative mood and maternal rejection (step 2; $p = .016$) and a graphical display that does not clearly illustrate differential susceptibility suggest that this interaction is more representative of dual risk vulnerability.

Infant Emotionality and Maternal Responsivity Predicting Childhood Effortful Control

In the third of four simultaneous regression models, predictor variables included infant emotional intensity, infant negative mood, maternal responsivity, and interaction terms for infant emotional intensity and maternal responsivity, and infant negative mood and maternal responsivity (see Table 4). The first step was significant F (3, 791) = 19.305, $p < .001$, adjusted $R^2 = .07$, with maternal responsivity positively predicting childhood effortful control ($\beta = .25$, $p < .001$). That is, mothers who were observed to be more responsive throughout early childhood had children who were rated as having higher levels of effortful control at 54 months. The second step was significant, F (5, 789) = 10.279, $p < .001$, $\Delta R^2 = .00$; however, neither interaction term was statistically significant.

Infant Emotionality and Maternal Rejection Predicting Childhood Effortful Control

In the fourth and final simultaneous regression model, predictor variables included infant emotional intensity, infant negative mood, maternal rejection, and interaction terms for infant emotional intensity and maternal rejection, and infant negative mood and maternal rejection (see Table 5). The first step was significant F (3, 791) = 6.922, $p < .001$, adjusted $R^2 = .02$, with infant emotional intensity negatively predicting childhood effortful control ($\beta = -.08$, $p = .033$). That is, infants who were rated to have higher levels of emotional intensity were also rated to have lower levels of effortful control at 54 months. In addition, maternal rejection negatively predicted childhood effortful control ($\beta = -.13$, $p < .001$). Mothers who were observed to be more rejecting

throughout early childhood had children who were rated as having lower levels of effortful control at 54 months. The second step was significant, F (5, 789) = 5.414, $p < .001$, $\Delta R^2 = .005$, and the interaction between infant negative mood and maternal rejection predicting childhood effortful control was significant (β = -.09, $p = .014$). As illustrated in Figure 4, there was a greater relation between maternal rejection across infancy and early childhood and children's effortful control at 54 months for infants with high negative mood (β = 4.88) than for infants with either average (β = 4.71) or low negative mood (β = 4.55). Following the same criteria above (Belsky et al., 2007), this interaction is not representative of differential susceptibility; both a significant correlation between infant negative mood and maternal rejection (step 2; $p = .016$) and a graphical display that does not clearly illustrate differential susceptibility suggest that this interaction is more representative of dual risk vulnerability.

Chapter Four: Discussion

The results of the study both support and uniquely contribute to the literature on infant emotionality, maternal emotional support, and childhood emotional outcomes in three important ways. First, the results support the view that direct, main effects, linking infant temperament or parenting alone to later childhood outcomes only tell part of the story when accounting for the complex relations among infant characteristics, parenting, and childhood outcomes (Gallagher, 2002). Except for a small negative association of infant emotional intensity predicting effortful control, infant emotionality characteristics were not direct predictors of early childhood emotionality. This may be accounted for by several factors. Whereas larger effects were found between observations of parenting and childhood outcomes than infant emotionality—assessed by a maternal questionnaire—and later outcomes, parental observations may have less measurement error and thus be associated with more robust associations. It is also possible that the low internal consistency related to the infant emotionality measures obscured the magnitude of the effects.

Maternal responsivity and rejection, however, were direct predictors of childhood emotionality. Maternal responsivity negatively predicted childhood reactivity and positively predicted effortful control, whereas maternal rejection positively predicted reactivity and negatively predicted effortful control. Yet, a more dynamic account for the interaction between infant characteristics and parenting remains an important consideration (Bronfenbrenner & Morris, 1998).

Secondly, this study uniquely contributes to the developmental sciences by further identifying unique relations for infant emotionality interacting with maternal emotional support, predicting childhood emotional outcomes—reactivity and effortful control. With respect to

developmental outcomes childhood reactivity and effortful control, infant emotional intensity and negative mood interacted with maternal rejection to predict childhood reactivity and effortful control. Although the adjusted R^2 for the significant interactions appear small, it has been suggested that such effects can actually be quite meaningful (Rosenthal, 1990). Yet it is important to highlight the direct main effects of maternal responsivity and rejection predicting both reactivity and effortful control at 54 months explained more of the variance within each respective model than any of the significant interactions. This sheds light on the importance of both main and interactional effects when explaining the above relations, but as stated above, the infant emotionality measures may have otherwise obscured the findings.

Infant Emotional Intensity Moderates Relations Between Maternal Rejection and Reactivity

Three of the four interactions involving maternal rejection were significant. The first involves infant emotional intensity and maternal rejection interacting to predict childhood reactivity. In predicting childhood reactivity, infants with high levels of emotional intensity (1 SD above the mean) were the most vulnerable to maternal rejection. Infants with low emotional intensity (1 SD below the mean), on the other hand, were the least vulnerable to maternal rejection. This may be expected in that infants with low emotional intensity continue to experience relatively lower levels of anger and frustration during early childhood in spite of receiving high levels of maternal rejection. It is possible, however, that infants with low levels of emotional intensity are vulnerable to maternal rejection and they just do not exhibit high levels of anger or frustration during early childhood.

Infant Negative Mood Moderates Relations Between Maternal Rejection and Reactivity

The infant negative mood and maternal rejection interaction predicting childhood reactivity demonstrates similar findings. Again, infants with high levels of negative mood were

more vulnerable to maternal rejection than infants with low levels of negative mood. In both of the above interactions, infants with high emotional intensity or negative mood were more vulnerable to maternal rejection in predicting childhood outcomes of anger and frustration, or, reactivity; however, it is possible that infants with low levels of negative mood are vulnerable to maternal rejection, but again, they just do not display high levels of anger or frustration during early childhood. Theoretically, maternal rejection should affect all children negatively; however, with respect to childhood reactivity it is possible that children's biology affects the extent to which parenting—or more broadly, the environment—is influential. Given that maternal rejection predicts different developmental outcomes depending on the child's characteristics, it seems plausible that children with low levels of emotional intensity and negative mood are affected in other domains of socioemotional adjustment. To investigate this, both of the above interactions (emotional intensity and negative mood separately interacting with maternal rejection) were tested to predict levels of negative affect at 54 months using the sadness subscale from the Children's Behavior Questionnaire (Rothbart et al., 2001). However, these interactions were not significant, perhaps due to a large number of caregiver missing responses corresponding to the sadness subscale. It may be important to follow up with the children and adolescents who as infants were rated as having low levels of emotional intensity and negative mood and who also received high levels of maternal rejection throughout childhood in domains of negative affect such as depression or anxiety.

Infant Negative Mood Moderates Relations Between Maternal Rejection and Effortful Control

The third significant interaction involves infant negative mood interacting with maternal rejection predicting effortful control at 54 months. Children with high levels of negative mood during infancy were more vulnerable to maternal rejection than children with low levels of

negative mood during infancy. Predicting childhood effortful control, maternal rejection was associated with lower levels of effortful control for both high-negative mood and low-negative mood infants, but more so for children who were rated to have high levels of negative mood as infants. That is, in contrast to the two findings above, maternal rejection appears to be associated with lower levels of effortful control for both high-negative mood and low-negative mood infants, rather than for infants with high levels of negative mood, alone. The difference between this finding and the above two interactions associated with childhood reactivity may be attributed, in part, to maternal rejection exerting a stronger negative influence on regulatory mechanisms associated with effortful control than arousal mechanisms associated with reactivity.

Taken together, the three findings above suggest that parenting does not affect all children in the same manner. Similar relations between infant negative emotionality interacting with negative aspects of parenting to predict externalizing behaviors have been identified in the past (see for example, Deater-Deckard & Dodge, 1997; Morris et al., 2002), yet null interactive findings between parenting and child negativity have also been reported (Lengua et al., 2000). Lengua and colleagues hypothesized that the use of a general measure for negative emotionality (rather than measures for distinct qualities of negative emotionality) had potentially obscured the interaction of parenting with specific aspects of negative emotionality.

Among the four possible interactions between emotional intensity and negative mood interacting with maternal rejection to predict childhood reactivity and effortful control, the only interaction that was not significant was emotional intensity and rejection interacting to predict effortful control. Following the general pattern of the above three interactions, it might have been expected that lower levels of effortful control are predicted by high-emotional intensity infants who are more vulnerable to maternal rejection. This null finding may be an indication that

maternal rejection is negatively related to effortful control for infants with both high and low levels of emotional intensity. Moreover, childhood effortful control was significantly predicted by the main effects of both infant emotional intensity and maternal rejection, yet these relations were not accounted for by moderated relations. Higher levels of infant intensity and higher levels of maternal rejection were separately predictive of lower levels of childhood effortful control. Stated differently, infant emotional intensity is related to childhood effortful control irrespective of maternal influence, and maternal rejection is related to childhood effortful control irrespective of infant emotionality.

Maternal Responsivity Predicts Childhood Reactivity and Effortful Control

As for infant emotional intensity and negative mood interacting with maternal responsivity to predict either childhood reactivity or effortful control, none of the four interactions were statistically significant. Yet direct main effects illustrate that maternal responsivity is beneficially related to lower levels of childhood reactivity and higher levels of effortful control, irrespective of infant emotionality. One possible exception is demonstrated in one interaction that approached significance. In predicting childhood reactivity, it appeared as though infants with high levels of negative mood and who experienced the lowest levels of maternal responsivity had higher levels of childhood reactivity at 54 months than children who were rated as having low levels of negative mood as infants. This finding is similar to the three significant interactions above which demonstrate that infants with high negative emotionality may be more vulnerable to negative rearing conditions—in this case, low levels of maternal responsivity.

Gene-Environment Dual Risk Vulnerability or Differential Susceptibility?

Finally, this study uniquely contributes to the developmental sciences by further articulating the domains and outcomes that are associated with parenting-by-temperament interactions being

accounted for by one of two explanatory variables: gene-environment dual risk vulnerability or differential susceptibility (Belsky et al., 2007). This study provides evidence for the dual risk vulnerability hypothesis with respect to infant emotional intensity and negative mood moderating the relations between maternal rejection and either reactivity or effortful control. That is, Belsky and colleagues' differential susceptibility, or, "for better *and* for worse" hypothesis was not identified for the relations among the above variables—maternal emotionality-by-infant emotionality interactions predicting reactivity and effortful control. It is important to note, however, that according to Belsky and others (Belsky, 2005; Belsky et al., 2007; Kochanska et al., 2007), differential susceptibility may only account for interactions in specific domains or for specific outcomes. That is, Belsky and his colleagues do not argue for the veracity of one theory over the other accounting for all parenting-by-temperament interactions; rather, that one explanatory model provides a more appropriate account for the specific domains and outcomes associated with each respective finding. In this case, it appears as though the specific domains of infant emotional intensity and negative mood in concert with environmental factors of maternal responsivity and rejection are more closely associated—for the worse—with childhood reactivity and effortful control, than for the better.

According to the differential susceptibility hypothesis, having a sensitive nervous system is not only detrimentally related to negative rearing environments but also beneficially related to positive rearing conditions. Infant emotional intensity and negative mood may be susceptible to positive rearing environments with respect to outcomes not assessed in the current study; however, given that infant emotional intensity and negative mood do not moderate the relations between maternal emotionality and the current outcomes, differential susceptibility is an inappropriate explanatory model. If differential susceptibility had been an adequate explanatory

model, infants with high levels of emotional intensity or negative mood would have lower levels of reactivity or higher levels of effortful control when exposed to positive rearing environments. Instead it appears as though the current investigation reveals domains and outcomes that are more closely associated with dual risk vulnerability.

Interestingly, the speculation that differential susceptibility may be domain specific is evident in that differential susceptibility has been observed in two different studies utilizing the same sample (Bradley & Corwyn, 2008; Stright et al., 2008). However in both studies, infant temperament was aggregated into overall scores, making it difficult to isolate specific infant characteristics that may or may not be differentially susceptible to rearing environments. In one of the studies parenting was also aggregated into an overall score making it difficult to determine the role of varying contexts; infants scoring high on overall temperament were differentially susceptible to varying parenting styles in the context of school adjustment (e.g., academic competence, social skills) (Stright et al., 2008).

It is plausible that for children with high levels of emotionality some outcomes are more susceptible to both positive and negative rearing environments. The case of negative emotionality and a rejecting rearing environment is more intuitive, but in the case of positive rearing environments a child with high levels of emotionality as an infant may be socialized to put their emotionality to good use by focusing one's intense emotions toward succeeding in school; however, the core features of this child's emotional reactivity may be less modifiable. Therefore, the manner in which emotions are channeled may be differentially susceptible but the emotions themselves may not be. This is an area of the developmental sciences that would benefit from further research.

Strengths

There are several methodological strengths to this study. Given the longitudinal nature of the data—infant emotionality assessed at six months, maternal emotional support at six, 15, 24, 36, and 54 months, and childhood reactivity and effortful control assessed at 54 months—statistical inferences can operate from a true predictive model, as opposed to the contemporaneous use of data. Reliable observations of parenting were obtained at five different points in time; additionally, rather than using an aggregate score of maternal emotional support, separate scores for responsivity and rejection were utilized. Infant emotionality was also disaggregated into two scores. Together, these methods allowed for a more rich analysis by investigating a more precise manner in which different dimensions of parenting interact with particular aspects of infant emotionality.

A particular strength of this study is that the results are not better accounted for by shared method variance which is associated with data coming from the same source. In this study, the predictor variables (observations of parenting), the moderating variables (maternal ratings of infant emotionality), and the outcome variables (nonmaternal ratings of childhood reactivity and effortful control) were assessed from three independent sources. This strength, which is not always present in the social sciences, may also account for the seemingly small effect sizes discussed above. Theoretically, data that are collected from a single source may inflate the relations among variables. Alternatively, the low effect sizes may otherwise be accounted for by characteristics of the child's day care or the nonmaternal caregiver's attitudes filling out the questionnaire.

Limitations

Given the selection criteria set forth at the beginning of the Study of Early Child Care, this study is generalizable to middle class Caucasian-Americas. Eligibility requirements included

only English-speaking mothers not living in unsafe neighborhoods, thus potentially excluding minority representation and mothers of low socioeconomic status, respectively. Attrition analyses revealed that of the remaining participants at 54 months, ethnic minority families, children of mothers with fewer years of education, and families with lower income-to-needs were less likely to remain in the sample. More research is needed on ethnic minority or lower income families. Furthermore, these findings need to be replicated to account for the relations between paternal responsivity and rejection interacting with infant emotionality.

Limitations to the study measures of infant emotionality are also to be considered. First, measures of infant emotionality were used for only one time point at six months. Data were collected when infants were one-month old, yet there was a high number of missing responses at this time point and not again after six months. Given that temperamental characteristics such as infant emotionality are the product of biological differences and socialization, it would be most ideal to assess infant emotionality at an earlier time point before the infant has been exposed to parental socialization, thereby reducing environmental artifacts that were not measured at an earlier time point. Even though parental report of infant emotionality has been shown to be an acceptable data source (Rothbart & Bates, 1998, 2006), observations of infant emotionality, over time, would allow for interactions to be investigated longitudinally. Previous longitudinal research has demonstrated the relative stability of maternal reported infant temperament throughout early childhood (Pedlow, Sanson, Prior, Oberklaid, 1993), yet assessing for repeated interactions throughout early childhood, rather than looking at the interaction between parenting and infant emotionality at only one time point, is an area of research that has currently not been reported (Stright et al., 2008). Observations of infant emotionality would also eliminate the possible confound that maternal report is biased by her personality characteristics. That is, there

were small negative correlations between maternal responsivity and infant emotionality and small positive correlations between maternal rejection and infant emotionality. Finally, the measures for infant emotional intensity and negative mood had low internal consistency, and therefore, the findings should at the least be interpreted with caution given that biased estimates can increase the likelihood of spurious results. However, the low internal consistency may otherwise be accounted for by the situational nature of many emotional intensity and negative mood items.

As for the maternal emotional support observations, the composite score representing maternal responsivity was not consistent. At six and 15 months, the composite consisted of sensitivity to nondistress and a reflected score of intrusiveness. Sensitivity to distress—as opposed to nondistress—was not used at six and 15 months due to a lack of opportunity to observe the infant while being distressed. Maternal sensitivity to distress was observed in only 31 and 21 percent of the population at six and 15 months, respectively. At 24 months, the maternal responsivity composite consisted of sensitivity to distress—because sensitivity to nondistress was not observed—and a reflected score of intrusiveness. At 36 and 54 months, maternal responsivity consisted of a single rating of supportive presence.

The composite for maternal rejection was similar in that the composite score representing maternal rejection was not consistent. From 6 through 24 months, maternal observations of negative regard toward the child were used. These scores were no longer assessed at 36 months; therefore, maternal observations of hostility were used at 36 and 54 months. Although different observations of parenting were used to create the maternal responsivity and rejection composites, each of the scores are related, both conceptually and theoretically, and the differences within each are more a factor of terminology than substance (Grolnick & Gurland, 2002).

Furthermore, given that maternal observations of both responsivity and rejection were aggregated into respective composite scores, a multilevel model was not conducted. Investigating the hierarchical nature of the data—that is, multiple maternal observations nested within each child—would have allowed for the analysis of changes in parenting associated with childhood emotionality. Changes in parenting during early childhood, however, have been investigated with the same sample and parenting was shown to remain relatively stable (NICHD ECCRN, 2002; Stright et al., 2008).

Finally, inferences may be limited in that both children and mothers share genotypic characteristics. That is, infants with high levels of emotional intensity and negative mood may have inherited these phenotypes from their mothers, and maternal rejection could be a further expression of an earlier proclivity towards negative emotionality. However, the maternal rejection composite was not significantly related to infant emotional intensity, and the correlation between the rejection composite and infant negative mood was very small.

Future Directions

The current study has contributed to the current understanding of maternal emotional support-by-infant emotionality interactions, as well as providing further support to the idea that differential susceptibility and dual risk vulnerability account for interactions that predict different outcomes; however, research on differential susceptibility is still relatively new (Belsky et al., 2007). To further our theoretical and empirical understanding of the differences between dual risk vulnerability and differential susceptibility, future studies might include measures of positive emotionality as the outcome. If negative infant emotionality is more vulnerable to maternal rejection and yet, influenced less by a positive rearing condition such as maternal responsivity when predicting developmental outcomes reactivity and effortful control, perhaps the same

models but predicting different emotional outcomes—such as positive affect—would demonstrate differential susceptibility. This study was a step in the right direction in assessing different types of infant emotionality and parenting, but to better understand dual risk vulnerability and differential susceptibility, more work is needed to better understand the specific domains and developmental outcomes that are associated with dual risk vulnerability and differential susceptibility.

Another interesting research agenda might consider the investigation of temperament-by-temperament interactions (Rothbart & Bates, 2006; Sanson et al., 2002). For example, it may be the case that specific dimensions of temperament are more highly predictive of developmental outcomes in the presence or absence of another temperamental characteristic. In the case of the current study, there may be a stronger relation between infant negative mood and childhood effortful control for infants with high levels of emotional intensity.

Conclusions

The findings from this study are unique in that interactions between maternal rejection and infant emotionality predicting childhood reactivity and effortful control have been identified. In support of gene-environment dual risk vulnerability, these findings provide further evidence with respect to the specific child characteristics, environmental factors, and related outcomes associated with each respective model—in particular, gene-environment dual risk vulnerability. Given that differential susceptibility has been identified in this sample but with different variables, this study may provide evidence for a domain specific model of differential susceptibility.

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Table 1

Descriptive Statistics and Pearson Correlations for All Variables Used in the Analysis

Measure	*n*	*M*	*SD*	1	2	3	4	5	6	7
1. Infant emotional intensity (6m)	1279	3.60	.65	-						
2. Infant negative mood (6m)	1279	2.88	.66	.09**	-					
3. Maternal responsivity (6m)	1272	3.18	.69	-.06*	-.12**	-				
4. Maternal responsivity (15m)	1240	3.30	.63	-.07*	-.08**	.37**	-			
5. Maternal responsivity (24m)	1172	3.27	.64	-.07*	-.12**	.28**	.37**	-		
6. Maternal responsivity (36m)	1161	5.28	1.32	-.01	-.14**	.34**	.35**	.40**	-	
7. Maternal responsivity (54m)	1040	5.16	1.30	-.01	-.16**	.30**	.27**	.37**	.48**	-
8. Maternal responsivity composite (6-54m)	1306	-.02	.73	-.06*	-.18**	.69*	.70**	.71**	.74**	.71**
9. Maternal rejection (6m)	1272	1.09	.33	.06*	.08**	-.38**	-.20**	-.21**	-.26**	-.22**
10. Maternal rejection (15m)	1240	1.05	.28	.04	.01	-.12**	-.36**	-.28**	-.19**	-.16**
11. Maternal rejection (24m)	1172	1.25	.57	.04	.05	-.16**	-.27**	-.62**	-.30**	-.29**
12. Maternal rejection (36m)	1161	1.38	.81	.02	.06*	-.27**	-.25**	-.36**	-.55**	-.35**
13. Maternal rejection (54m)	1040	1.43	.89	.00	.04	-.23**	-.23**	-.36**	-.34**	-.61**
14. Maternal rejection composite (6-54m)	1306	-.48	.71	.05	.07*	-.36**	-.40**	-.56**	-.51**	-.51**

Measure	*n*	*M*	*SD*	1	2	3	4	5	6	7
15. Reactivity (54m)	785	3.49	1.12	.04	.06	-.04	-.03	-.14**	-.13**	-.11**
16. Effortful control (54)	803	4.96	.96	-.08*	-.05	.14**	.16**	.18**	.22**	.19**

Note. *$p < .05$; **$p < .01$.

Table 1 (continued)

Descriptive Statistics and Pearson Correlations for All Variables Used in the Analysis

Measure	8	9	10	11	12	13	14	15
1. Infant emotional intensity (6m)								
2. Infant negative mood (6m)								
3. Maternal responsivity (6m)								
4. Maternal responsivity (15m)								
5. Maternal responsivity (24m)								
6. Maternal responsivity (36m)								
7. Maternal responsivity (54m)								
8. Maternal responsivity composite (6-54m)	-							
9. Maternal rejection (6m)	-.36**	-						

Measure	8	9	10	11	12	13	14	15
10. Maternal rejection (15m)	-.32**	.22**	-					
11. Maternal rejection (24m)	-.48**	.20**	.26**	-				
12. Maternal rejection (36m)	-.51**	.32**	.21**	.36**	-			
13. Maternal rejection (54m)	-.51**	.21**	.19**	.31**	.36**	-		
14. Maternal rejection composite (6-54m)	-.63**	.65**	.63**	.67**	.71**	.65**	-	
15. Reactivity (54m)	-.13**	.06	-.03	.11**	.08*	.13**	.10**	-
16. Effortful control (54)	.25**	-.08*	-.01	-.14**	-.13**	-.13**	-.13**	-.54**

Note. *$p < .05$; **$p < .01$.

Table 2

Regression Analysis Summary for Infant Emotional Intensity, Infant Negative Mood, Maternal Responsivity, and the Interactions Between Emotional Intensity and Responsivity and Negative Mood and Responsivity Predicting Reactivity at 54 Months (N = 777)

Reactivity	*B*	*SE B*	β	Adjusted R^2	Δ R^2
Step 1				.015*	
Infant emotional intensity	.05	.06	.03		
Infant negative mood	.07	.06	.04		
Maternal responsivity	-.21	.06	-.12*		
Step 2				.017	.002
Infant emotional intensity X Maternal responsivity	-.02	.10	-.01		
Infant negative mood X Maternal responsivity	-.17	.09	-.07†		

Note. †p = .07. *p < .01.

Table 3

Regression Analysis Summary for Infant Emotional Intensity, Infant Negative Mood, Maternal Rejection, and the Interactions Between Emotional Intensity and Rejection and Negative Mood and Rejection Predicting Reactivity at 54 Months (N = 777)

Reactivity	*B*	*SE B*	β	Adjusted R^2	Δ R^2
Step 1				.009*	
Infant emotional intensity	.06	.06	.03		
Infant negative mood	.09	.06	.05		
Maternal rejection	.17	.06	.09*		
Step 2				.019**	.01**
Infant emotional intensity X Maternal rejection	.23	.11	.08*		
Infant negative mood X Maternal rejection	.18	.09	.07*		

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

Table 4

Regression Analysis Summary for Infant Emotional Intensity, Infant Negative Mood, Maternal Responsivity, and the Interactions Between Emotional Intensity and Responsivity and Negative Mood and Responsivity Predicting Effortful Control at 54 Months (N = 795)

Effortful control	*B*	*SE B*	β	Adjusted R^2	Δ R^2
Step 1				.065*	
Infant emotional intensity	-.09	.05	-.06		
Infant negative mood	-.01	.05	-.01		
Maternal responsivity	.36	.05	.25*		
Step 2				.065	.000
Infant emotional intensity X Maternal responsivity	-.02	.08	-.01		
Infant negative mood X Maternal responsivity	.11	.08	.05		

Note. *$p < .001$.

Table 5

Regression Analysis Summary for Infant Emotional Intensity, Infant Negative Mood, Maternal Rejection, and the Interactions Between Emotional Intensity and Rejection and Negative Mood and Rejection Predicting Effortful Control at 54 Months (N = 795)

Effortful control	*B*	*SE B*	β	Adjusted R^2	Δ R^2
Step 1				.022**	
Infant emotional intensity	-.11	.05	-.08*		
Infant negative mood	-.05	.05	-.04		
Maternal rejection	-.20	.05	-.13**		
Step 2				.027*	.005*
Infant emotional intensity X Maternal rejection	-.02	.09	-.01		
Infant negative mood X Maternal rejection	-.19	.08	-.09*		

Note. *$p < .05$. **$p < .001$.

Figure 1

Maternal responsivity by infant negative mood interaction predicting childhood reactivity at 54 months. Infant negative mood (z) is plotted at the mean, 1 SD above, and 1 SD below the mean.

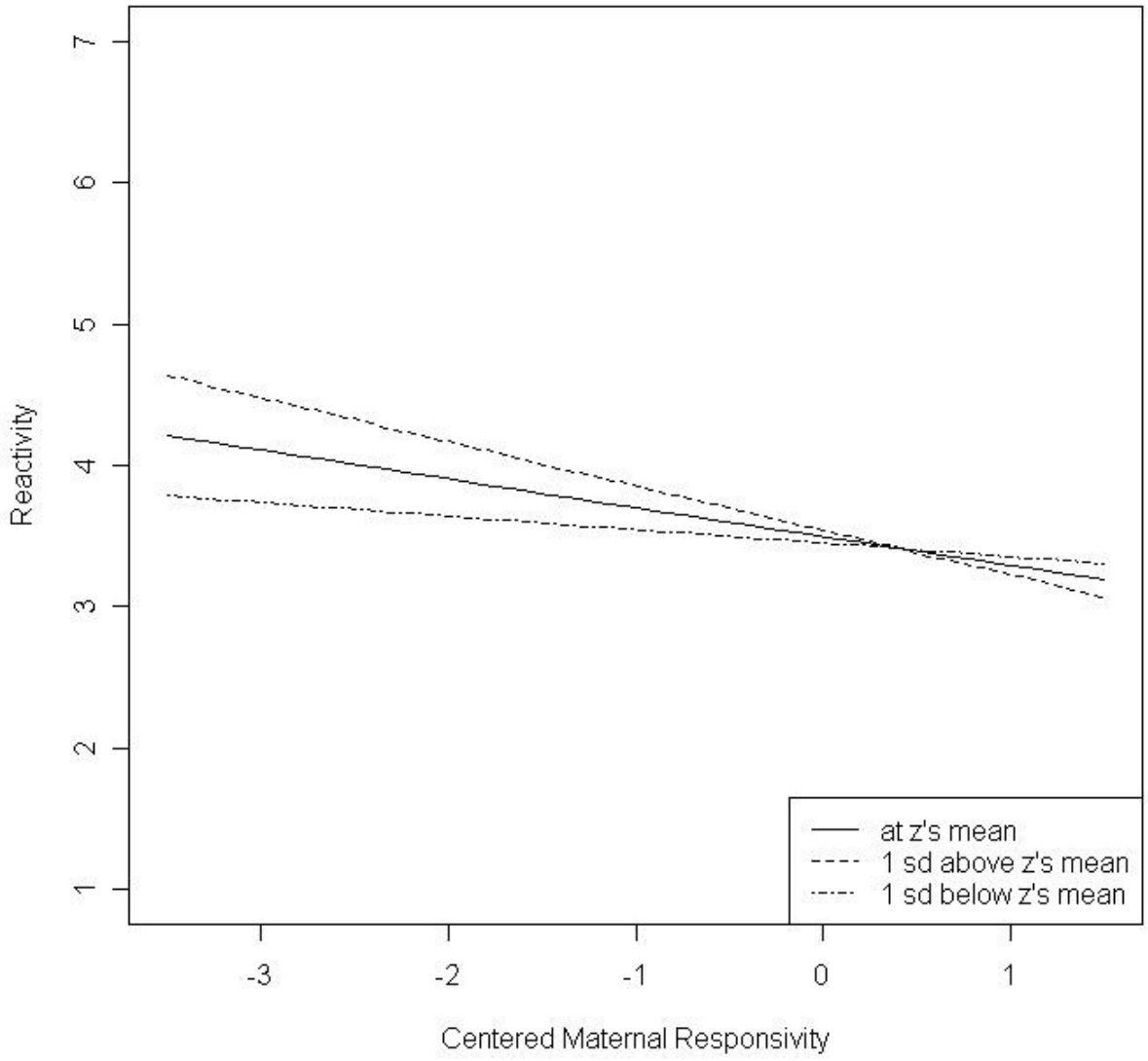


Figure 2

Maternal rejection by infant emotional intensity interaction predicting childhood reactivity at 54 months. Infant emotional intensity (z) is plotted at the mean, 1 SD above, and 1 SD below the mean.

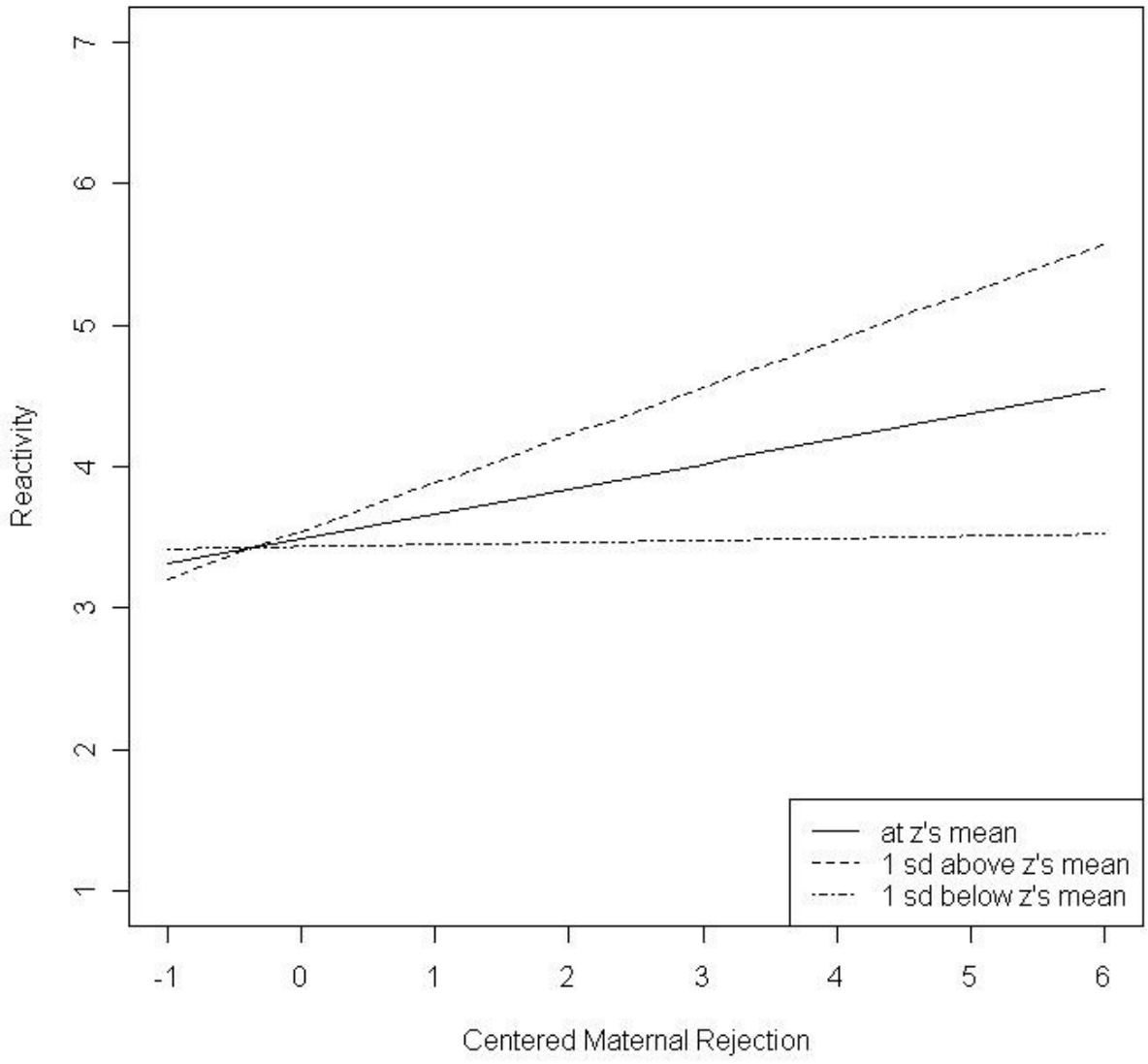


Figure 3

Maternal rejection by infant negative mood interaction predicting childhood reactivity at 54 months. Infant negative mood (z) is plotted at the mean, 1 SD above, and 1 SD below the mean.

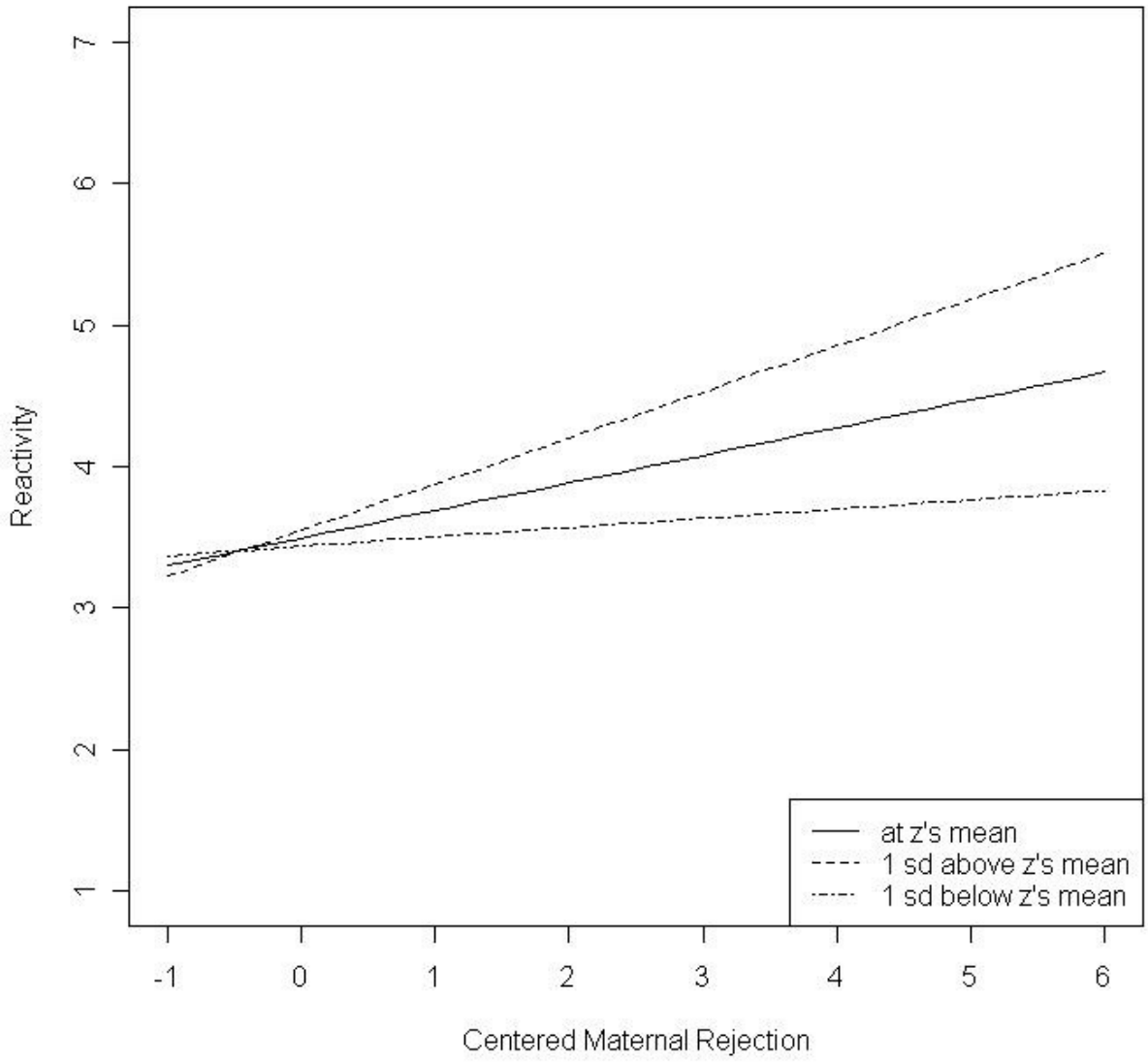
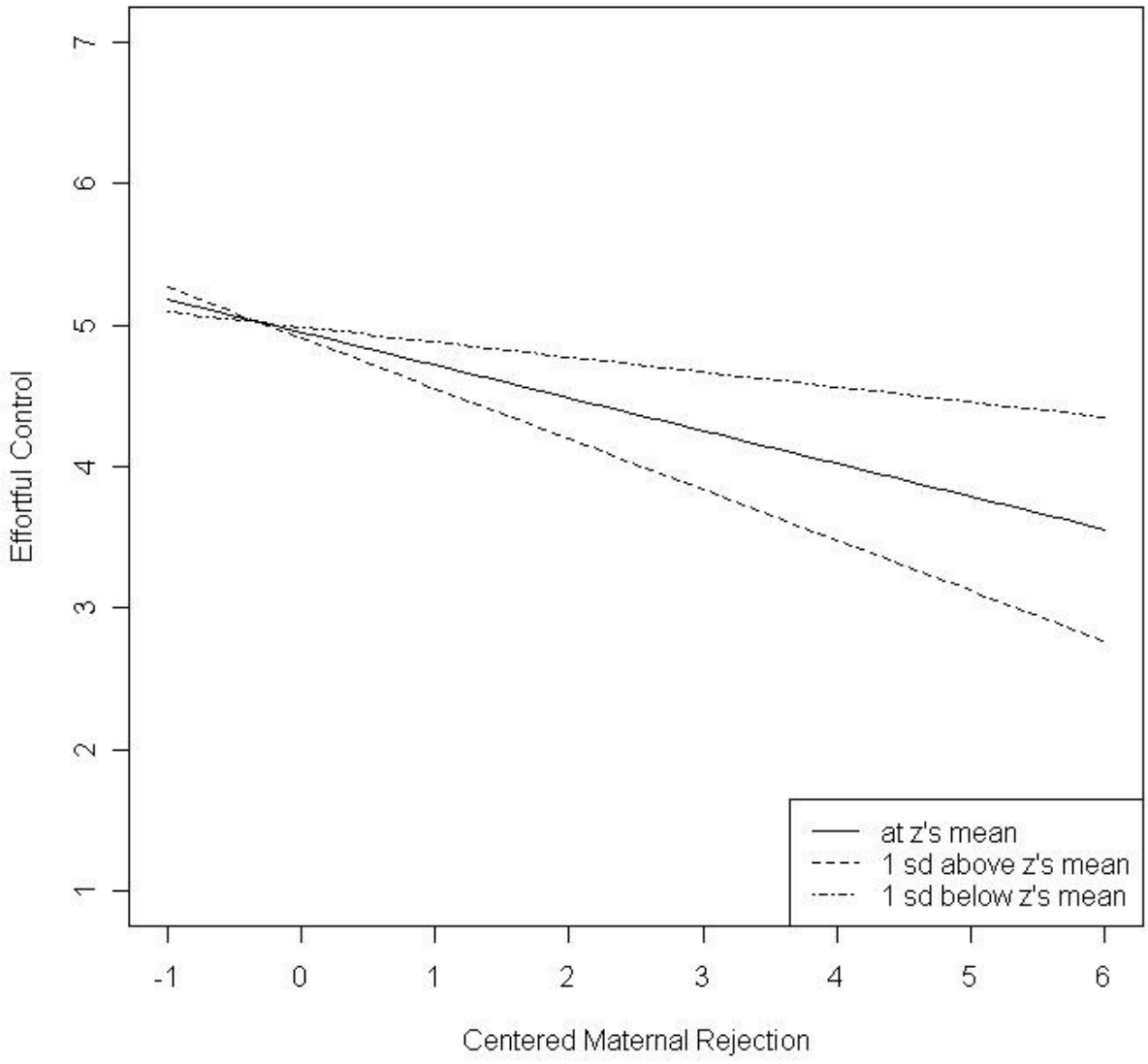


Figure 4

Maternal rejection by infant negative mood interaction predicting childhood effortful control at 54 months. Infant negative mood (z) is plotted at the mean, 1 SD above, and 1 SD below the mean.



Appendix A

Infant Temperament Questionnaire

Emotional Intensity

1. My baby takes feedings quietly with mild expression of likes and dislikes. (R)
2. My baby vigorously resists additional food or milk when full (spits out, clamps mouth closed, bats at spoon, etc.)
3. My baby reacts mildly (just blinks or startles briefly) to bright light such as flash bulbs or letting sunlight in by pulling up shade. (R)
4. My baby reacts strongly to foods, whether positively (smacks lips, laughs, squeals) or negatively (cries).
5. My baby greets a new toy with a loud voice and much expression of feeling (whether positive or negative).
6. My baby displays much feeling (vigorous laugh or cry) during diapering or dressing.
7. My baby reacts strongly to strangers; laughing or crying.
8. My baby reacts mildly (quiet smiles or no response) to meeting familiar people. (R)
9. My baby plays quietly and calmly (little vocalization or other noises) with toys. (R)
10. My baby is calm in the bath. Like or dislike is mildly expressed (smiles/frowns). (R)

Negative Mood

1. My baby is fussy (frowns, cries) on waking up or going to sleep.
2. My baby makes happy sounds (coos, smiles, laughs) when being diapered or dressed. (R)
3. My baby is pleasant (smiles, laughs) when first arriving in unfamiliar places (friend's house, store). (R)
4. My baby is pleasant (coos, smiles, etc.) during procedures like hair brushing or face washing. (R)
5. My baby cries when left to play alone.
6. My baby is content (smiles, coos) during interruptions of milk or solid feeding. (R)
7. My baby cries for less than one minute when given an injection. (R)
8. My baby is fussy or moody throughout a cold or an intestinal virus.
9. My baby remains pleasant or calm with minor injuries (bumps, pinches). (R)
10. My baby is fussy or cries during the physical examination by the doctor.

(R) Denotes reverse scored.

Appendix B

Children's Behavior Questionnaire

Reactivity

Anger/Frustration

1. Rarely gets irritated when s/he makes a mistake. (R)
2. Has temper tantrums when s/he doesn't get what s/he wants.
3. Gets quite frustrated when prevented from doing something s/he wants to do.
4. Gets angry when s/he can't find something s/he wants to play with.
5. Rarely gets upset when told s/he has to pick up toys. (R)
6. Becomes easily frustrated when tired.
7. Rarely protests when another child takes his/her toy away. (R)
8. Easily gets irritated when s/he has trouble with some task (e.g., building, drawing).
9. Gets angry when called in from play before s/he is ready to quit.
10. Gets mad when provoked by other kids.

Effortful Control

Inhibitory Control

1. Can lower his/her voice when asked to do so.
2. Has a hard time following instructions. (R)
3. Can wait before entering into new activities is s/he is asked to.
4. Has difficulty waiting in line for something. (R)
5. Has trouble sitting still when s/he is told to. (R)
6. Is able to resist laughing or smiling when it isn't appropriate.
7. Is good at following instructions.
8. Approaches equipment s/he has been told could be dangerous slowly and cautiously.
9. Can easily stop an activity when s/he is told "no."
10. Is usually able to resist temptation when told s/he is not supposed to do something.

Attention Focusing

1. When practicing an activity, has a hard time keeping her/his mind on it. (R)
2. Will move from one task to another without completing any of them. (R)
3. When drawing or coloring in a book, shows strong concentration.
4. When building or putting something together, becomes very involved in what s/he is doing, and works for long periods.
5. Has difficulty leaving a project s/he has begun.
6. Is easily distracted when listening to a story. (R)
7. Sometimes becomes absorbed in a picture book and looks at it for a long time.
8. Has a hard time concentrating on an activity when there are distracting noises. (R)

(R) Denotes reverse scored.

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Research Consultant
Contracted by the SGC Consulting Group, Inc. (Chicago, IL) as an external consultant in the areas of youth development, organizational communication, occupational self-efficacy, and the psychological underpinnings of dysfunctional workplace behaviors (e.g., Bipolar Disorder, OCD, aberrant personality characteristics)

2003 – 2004

Residential Counselor
Niequist Center
Family & Youth Services Bureau of Porter Co. – Valparaiso, IN

- This is a residential treatment facility for adolescents with psychiatric and behavioral challenges.
- Responsibilities include the implementation of treatment plans, daily therapeutic and psycho-educational group therapy, crisis intervention, behavior modification, and medication management.

2003 – 2004

Therapist (*Internship*)
The Learning Place
Family & Youth Services Bureau of Porter Co. – Valparaiso, IN

- This is a county-funded alternative academic setting for middle and high school students with academic, behavioral, social, and emotional aberrations.
- Responsibilities include daily therapeutic and psycho-educational group therapy, weekly and biweekly individual counseling, development and implementation of student treatment plans, & teacher and school administration consultation.

Site Supervisors: Lisa Brychell-Jordan, & Anne Bass, M.S.W.
Faculty Supervisor: Stanley L. Hughes, Ph.D.

2003

Primary Counselor
Early-Identification/Early-Intervention Day Treatment
Family & Youth Services Bureau of Porter Co. – Valparaiso, IN

- Responsibilities include developing and facilitating daily therapeutic activities for at-risk children entering middle school; identification and intervention of family-, school-, and peer-related concerns.

Clinical Supervisor: Heidi Badgly, M.S.W., LCSW

2001 – 2003

Child Advocate
The Caring Place, Inc. – Valparaiso, IN

- This is a shelter for victims of domestic abuse.

- Responsibilities include daily support and educational group meetings for families and children; liaison between families and schools; crisis calls.

RESEARCH

2006 — Research Assistant
Department of Counseling and Educational Psychology
Human Development Area
Indiana University – Bloomington
Faculty Supervisor: Anne Dopkins Stright, Ph.D.

2001 – 2002 — Unpaid Research Assistant
Department of Psychology
Valparaiso University – Valparaiso, IN
Faculty Supervisor: Stanley L. Hughes, Ph.D.

PUBLICATIONS

Manzeske, D. P., & Stright, A. D. (in press). Parenting styles and emotion regulation: The role of behavioral and psychological control during young adulthood. *Journal of Adult Development*.

MANUSCRIPTS

Perdue, N. H., **Manzeske, D. P.**, & Estell, D. B. (2008). *Early predictors of school engagement: Exploring the role of peer relationships.* Revise and resubmit.

Manzeske, D. P., & Stright, A. D. (2009). *Infant Emotionality Moderates the Relations Between Maternal Parenting in Early Childhood and Children's Reactivity and Effortful Control at 54 Months.* Manuscript in preparation.

Perdue, N. H., & **Manzeske, D. P.** (2007). *The psychometric properties of proposed subscales from alternate versions of the Social Skills Rating System.* Manuscript in preparation.

PRESENTATIONS

Manzeske, D. P. (2009, May). *Infant emotionality moderates relations between parenting and children's reactivity and effortful control.* Poster presented at the Association for Psychological Science Annual Conference, San Francisco, CA.

Manzeske, D. P., Perdue, N. H., & Estell, D. B. (2008, August). *School engagement as a developmental process: Exploring the peer context*. Poster presented at the American Psychological Association Annual Conference, Division 7, Chicago, IL.

Perdue, N. H., & **Manzeske, D. P.** (2008, May). *A comparison of alternate factor structures of the Social Skills Rating System*. Poster presented at the Association for Psychological Science Annual Conference, Chicago, IL.

Manzeske, D. P., & Stright, A. D. (2008, May). *Maternal parenting styles, emerging adults' emotional characteristics, and romantic relationships*. Poster presented at the Society for Research on Adolescence Biennial Meeting, Chicago, IL.

Manzeske, D. P., & Stright, A. D. (2008, May). *Attachment theory, emerging adults' emotional characteristics, and close interpersonal relationships*. Poster presented at the Society for Research on Adolescence Biennial Meeting, Chicago, IL.

Manzeske, D. P., Perdue, N. H., & Oxnard, R. C. (2008, January). *Predicting school commitment at grade five with contemporaneous and longitudinal data from grade three: Exploring the role of students' relationships with peers and teachers*. Poster presented at the Hawaii International Conference on Education Annual Conference, Honolulu, HI.

Oxnard, R. C., Perdue, N. H., & **Manzeske, D. P.** (2008, January). *The use of curriculum-based measurement to minimize the occurrence of false positive diagnoses of readings disorders among students previously diagnosed with Attention-Deficit/Hyperactivity Disorder*. Poster presented at the Hawaii International Conference on Education Annual Conference, Honolulu, HI.

Perdue, N. H., & **Manzeske, D. P.** (2007, May). *The use of longitudinal data to revise the Social Skills Rating System*. Poster presented at the Association for Psychological Science Annual Conference, Washington, DC.

Manzeske, D. P. (2004). *The developmental sequela of child maltreatment.* Poster presented at the annual Valparaiso University Symposium for Graduate Scholarship, Valparaiso, IN.

TEACHING EXPERIENCE

2004 – 2008	Associate Instructor Department of Counseling and Educational Psychology Indiana University – Bloomington
2005	Adjunct Faculty Department of Special Education Roosevelt University – Chicago, IL
2005	Adjunct Faculty Department of Counseling and Human Services Roosevelt University – Schaumburg, IL

2003 – 2004 Teaching Assistant
Department of Psychology
Valparaiso University – Valparaiso, IN

COURSES TAUGHT

Undergraduate
Laboratory in Experimental Psychology (TA)
Educational Psychology
Laboratory for Educational Psychology
Adolescent Development
Life Span Development
Child Development: Prenatal to Three

Graduate
Adolescent Development
Human Development
Human Appraisal (Psychological Testing & Measurement)

3 May 2007 Guest Lecturer: PSY661 Affect Regulation and Affective Disorders

Valparaiso University – Dept. of Psychology (*Graduate Program*)
Faculty: Stanley L. Hughes, Ph.D.

SERVICE

2008 Ad Hoc Reviewer
Journal of Adolescent Research
Editor, Jeffrey Arnett

2007 – 2008 Committee Member
Department of Counseling and Educational Psychology
New Faculty Search Committee
Human Development Area

HONORS & AWARDS

2008 American Psychological Association Student Travel Award
Science Directorate

2008 Department of Counseling and Educational Psychology Research Fellowship
Indiana University – Bloomington

2008 Trentham Travel Award
Department of Counseling and Educational Psychology

2006 Myrtle M. Scott Award for Outstanding Student of Human Development
Indiana University – Bloomington

2004 Graduation with Highest Distinction
Valparaiso University – Valparaiso, IN

2004 Outstanding Research and Scholarship
Valparaiso University – Valparaiso, IN

PROFESSIONAL AFFILIATIONS

Association for Psychological Science

Society for Research in Child Development