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Parental Sensitivity Predicted by Parent Personality and Infant Temperament

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ASSOCIATIONS BETWEEN PARENT PERSONALITY AND INFANT TEMPERAMENT AND THEIR EFFECTS ON PARENTAL SENSITIVITY

A Capstone Experience/Thesis Project

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By

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ABSTRACT

The determinants of parenting model (Belsky, 1984) suggests that there are intrinsic and extrinsic factors that contribute to parenting. Previous research has suggested that aspects of parent personality, such as neuroticism and extraversion, were predictive of parenting, but this research has provided conflicting results on the effect personality has on parenting. Furthermore, infant temperament has also found to be influential on parenting, but has also generated mixed results concerning how negative reactivity influences parenting. In regard to both variables, research on fathers is severely lacking. This study examined the direct effects of parent personality on parenting through the BIS/BAS model. Additionally, the direct effects of infant temperament on parenting were assessed. The interaction between these two factors was also examined as a predictor of sensitivity. Using a portion of a sample from an ongoing longitudinal study (n = 41), findings supported differential determinants of parenting for mothers and fathers, such that maternal sensitivity was influenced by infant temperament and paternal sensitivity was influenced by the interaction of parent personality and infant temperament.

Keywords: Parent Personality, Infant Temperament, Parental Sensitivity, Emotion Regulation, Determinants of Parenting

Dedicated to my always-encouraging parents. I love you both.

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PRESENTATIONS

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FIELDS OF STUDY

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INTRODUCTION

A sensitive parent in infancy is critical to the successful social and emotional development of a child (Braungart-Rieker, Hill, & Karrass, 2010; Rothbart & Bates, 2006). Parental sensitivity can be influenced by several factors, including the personality of the parent and the infant's temperament. For example, parent personality contributes to the development of a successful parent-child relationship (Kochanska, Friesenborg, Lange, & Martel, 2004), which includes factors of parental sensitivity. In addition, infant temperament can influence parenting styles as well as infant attachment (Rothbart & Bates, 2006). However, research on the associations between parent personality, infant temperament, and parental sensitivity are mixed, possibly due to variability in the measurement of the constructs. The present study accounted for these issues by using a different measure of personality and probing temperament subscales to find individual differences. In addition, research examining the role of parent personality and infant temperament as predictors of parental sensitivity in early infancy is lacking. Early infancy is a critical time-period to examine these associations, because early parent-child interactions are essential for positive long-term developmental outcomes, such as a secure parent-child attachment relationship (Rothbart & Bates, 2006). Typically, past research has focused on mother-infant interactions only. Therefore, the present study examined the associations and interactions between parent personality, infant temperament, and parental sensitivity using a sample of four-month old infants and both parents.

Determinants of Parenting

There are many ways to examine parenting, however, we chose to examine parenting through the determinants of parenting model (Belsky, 1984). This mode describes a triad of factors that contributes to parenting. These factors include parental characteristics and their psychological resources, individual characteristics of the child, and contextual sources of stress and support for the parent. Parenting is directly influenced by internal sources of the parent, internal sources of the child, and the outside environment. Belsky's (1984) model also assumes that the parents' developmental history, marital relationships, and work environment influence the way parents interact with their infant. When these factors are well balanced, the parent can provide optimal care to his or her infant.

According to the model, this balance directly influences positive child development. Based on the research supporting this model, there are three general conclusions that can be made: 1) parenting is determined by multiple factors, 2) not all factors are equally influential on parenting, and 3) there are indirect factors, such as parental developmental history, that impact the direct factors of parenting (Belsky, 1984).

As displayed in Figure 1, an adapted version of the determinants of parenting model (Belsky, 1984) was used as an overall conceptual model for the current study. Direct factors of parental sensitivity include parent personality and infant temperament. Consistent with Belsky's model, parent personality is influenced by environmental factors of the parent. Infant temperament and other facets of child development have a mutualistic relationship, such that one contributes to the other. These factors ultimately influence parenting.

Goodness of Fit

In addition, to the determinants of parenting model, the current study utilizes the goodness of fit theory (Thomas & Chess, 1977). This theory takes into consideration the goodness of fit between the parent and the child. Goodness of fit results when an organism is congruent with its environment (Chess & Thomas, 1999). According to the theory, goodness of fit can contribute to the most optimal developmental outcomes (Goldsmith et al., 1987). On the other hand, a lack of fit occurs when there is an incongruent match between an organism and its environment. An incongruent parent-infant pairing can lead to the parent misreading his or her infant's affect, over or under stimulating his or her infant, and poor developmental outcomes (Chess & Thomas, 1999; Crockenberg, 1981).

This theory can be applied to the examination of parent personality. When parent personality is congruent with infant temperament, positive outcomes can be expected. Manglesdorf, Gunnar, Kestenbaum, Lang, and Andreas (1990) found that infant temperament is related to maternal personality, such that when maternal personality was more congruent with the infant's temperament at 9-months, mother and infant displayed more secure attachment at 13-months. For example, when an extraverted parent is interacting with an outgoing infant, the infant is being stimulated in an appropriate way, resulting in goodness of fit (Manglesdorf et al., 1990). Conversely, a lack of fit would occur when this same parent is interacting with an easily upset infant. The intense interaction may over stimulate the infant, causing distress.

These conclusions emphasize the importance of a parent's ability to adjust his or her affect to meet the needs of his or her infant (Manglesdorf et al., 1990). As previous

research has shown, goodness of fit in regard to parent personality and infant temperament is beneficial to both the parent and child (Belsky, 1984; Mangelsdorf et al., 1990; Thomas & Chess, 1990).

Parental Sensitivity

Parental sensitivity is defined as a parent's awareness of the infant's state and how he or she adjusts the environment and his or her behavior to improve that state (Ainsworth, Bell, & Stayton, 1974). Previous research has shown that sensitive parents are more likely to have children who develop secure attachment (Bowlby, 1969; DeWolff & van Ijzendoorn, 1997), better compliance practices (van Berkel et al., 2015), and better relationship-building abilities (Kochanska et al., 2004). Thus, parental sensitivity is an important factor for successful development (Zeifman, 2003).

Parental sensitivity can be influenced by several factors, both intrinsic and extrinsic to the infant. Many predictors of sensitivity have been examined, such as parental stress, martial satisfaction, parental support systems, and infant temperament (Belsky, 1984). The research examining associations between parent personality and infant temperament in regard to sensitivity is limited. To our knowledge, very few studies have examined how parent personality and infant temperament interact to influence parenting (Clark, Kochanska, & Ready, 2000). Using a sample of 8-month old infants, Clark et al. (2000) found that infant negative emotionality significantly moderated the relationship between maternal extraversion and aspects of parenting, such that more extraverted mothers had a higher use of power assertion and were more responsive to their infant. A similar study by Kochanska et al. (2004) examined associations between parent personality and infant temperament and how they contributed to the emerging

parent-child relationship. Through these studies, we know that differences in personality directly and indirectly contribute to the relationship between the parent and child. This leaves a large area in the research that has yet to be conducted.

Parent personality and infant temperament are biologically based in genetics but can be heavily influenced by environmental factors such as social interactions and experiences (McCrae & Costa, 1994; Rothbart & Ahadi, 1994). Positive interactions between the parent and infant can encourage social shaping of temperament and the later formation of personality in the child. An outgoing parent may need to adjust his or her affect in order to be considerate of his or her infant's calmer temperament, whereas a shy, quiet parent may need to be more energetic in order to provide the infant with the proper level of stimulation. The ability of the parent to adjust his or her behavior can be examined through parental sensitivity.

Due to the increasing role of fathers in the home, it is important to study the father's role in his child's development. Previous research has shown that fathers generally perform more play activities than mothers, such as physical play and interacting with toys (Marsiglio, Amato, Day, & Lamb, 2000). Compared to fathers, mothers perform more care activities, like feeding, changing, and bathing (Lamb, 1977). Given that we know there are differences in parent-infant interactions, one could predict that there would be differences in sensitivity. Although there is little research pertaining to these differences, research has found no differences between levels of sensitivity between mother and fathers (Braungart-Rieker, Garwood, Powers, & Notaro, 1998). However, few studies have examined how individual differences in parents (e.g., parent personality) and infants (e.g., infant temperament) could differentially predict parental sensitivity in

mothers and fathers. Given the qualitative differences between how mothers and fathers interact with their infants, there may be different predictors of sensitivity for each parent. We aimed to define these potential differences through examining parent personality.

Parent Personality

Personality is defined as the way in which a person thinks, feels, and behaves (Kernberg, 2016), and research suggests that it has a biological basis but can also be influenced by environmental factors (Kernberg, 2016). There are several ways to measure personality, including the Big Five Inventory (BFI; John, Donahue & Kentle, 1991), the Behavioral Inhibition System/Behavioral Activation System (BIS/BAS; Carver & White, 1994), and the Neuroticism, Extraversion, Openness Personality Inventory (NEO-PI; Costa & McCrae, 1990). Measures like the BFI and NEO-PI assess descriptive components of personality, whereas the BIS/BAS provides an evaluative measure of the mechanistic aspect of personality (McCrae, Gaines, & Wellington, 2013). The BIS/BAS provides a more complete measure because it explains the neurological and physiological aspects of personality (Smits & Boeck, 2006).

Gray (1990) suggested that we are motivated by two systems, the behavioral inhibition system (BIS) and the behavioral activation system (BAS). The BIS is sensitive to signals of punishment, nonreward, and novelty (Gray, 1990) These signals lead to behaviors that inhibit movement toward goals (Gray, 1990). The BIS can lead to negative outcomes, such as anxiety, frustration, and sadness (Carver & White, 1994; Gray, 1990). The BAS is sensitive to signals of reward, nonpunishment, and escape from punishment (Carver & White, 1994). Unlike the BIS, it allows one to initiate movements toward goals and is responsible for positive feelings such as hope, elation, and happiness (Carver

& White, 1994; Gray, 1990). The BAS can be divided into three subcategories, which include drive (persistent pursuit of a desired goal), fun seeking (desire for new rewards and willingness to approach rewarding situations), and reward responsiveness (positive response in anticipation of reward) (Carver & White, 1994). In sum, the BIS is anxiety-driven, whereas the BAS is impulse-driven.

To our knowledge, there are no available studies examining parent personality, infant temperament, and parenting that include the BIS/BAS as a measure of personality. The most commonly used questionnaire is the BFI, which includes measures of agreeableness, conscientiousness, extraversion, neuroticism, and openness. Although the BIS/BAS differs from the BFI, there are some similarities that are worth noting. For example, the BIS is correlated with neuroticism (r = .68, p < .01) and is modestly, negatively correlated with extraversion (r = -0.30, p < 0.01; Smits & Boeck, 2006). Each of the BAS subscales are correlated with extraversion (BAS drive r = .43, p < .01; BAS fun seeking r = .69, p < .01; BAS reward responsiveness r = .36, p < .01; Smits & Boeck, 2006).

Even though components of the BIS/BAS and BFI are significantly correlated, the associations are not very strong. Therefore, the results from the Smits and Boeck (2006) study suggest that BIS/BAS is not measuring exactly the same personality constructs as the BFI. The BIS/BAS measures personality through questions about daily tasks, whereas the BFI measures personality through more global responses (Smits & Boeck, 2006). Measures similar to the BFI only assess broad domains of personality without considering the causal elements of personality (Smits & Bock, 2006). Smits and Boeck (2006) suggested the global descriptions of personality, as measured by the BFI, could be

explained by the specific, mechanistic attributes of personality, as measured by the BIS/BAS measure. Therefore, the current study will examine parent personality through the use of the BIS/BAS measure.

Previous research assessing parent personality and parenting using the BFI, NEO-PI, and other similar personality measures have noted fairly consistent results concerning neuroticism (or negative affect). Parents who score higher in neuroticism are generally more controlling (Clark et al., 2000) and more likely to negatively influence their children's affect (Belsky, Crnic & Woodsworth, 1995; Goldstein, Diener, & Mangelsdorf, 1996). They may also be less responsive (Fish & Stifter, 1993; Kochanska et al., 2004), less adaptive (Belsky et al., 1995), and less stimulating toward their infants (Clark et al., 2000).

Parent personality attributes related to extraversion (or positive affect), however, have yielded inconsistent findings. Some studies show that parents high in extraversion are more sensitive to their children due to their increased adaptability (Belsky et al., 1995), exhibit higher confidence in parenting (Hutteman et al., 2014), and have an increased likelihood of displaying an authoritative parenting style (high parental warmth/high parental control; Metsapelto & Pulkkinen, 2002). Other studies, however, suggest that these parents are more overbearing and force their own agendas on infants (Clark et al., 2000), and are more likely to hinder their child's development of autonomy (Metsapelto & Pulkkinen, 2002).

In sum, previous research has shown that parent personality is an important contributor to child development; however it is unclear how it may combine with infant temperament to predict parental sensitivity. Further research is needed to disentangle and

identify these associations. In addition, previous work examining parent personality has not examined it using the BIS/BAS. The current study aimed to provide clearer explanation concerning how specific personality types, measured with the BIS/BAS scale, lead to parenting behaviors during parent-infant interactions.

Infant Temperament

In infancy, temperament is defined as individual differences in reactivity and self-regulation that are biologically based (Bouchard & Loehlin, 2001; Rothbart, 2007; Rothbart & Ahadi, 1994; Rothbart & Bates, 2006). Over half of the temperamental make-up can be attributed to genetics (Bouchard & Loehlin, 2001). Temperament is moderately stable across time, but may fluctuate based on environmental factors, like parenting techniques, stability and structure in the home, and interactions with other individuals (Goldsmith et al., 1987; Rothbart & Bates, 2006). As temperament develops into personality, it becomes stable by adulthood (Costa & McCrae, 1994).

Temperament can be divided into three superfactors, which include negative reactivity, orienting, and surgency (Rothbart & Bates, 2006). Negative reactivity is similar to neuroticism and includes subscales of anger, falling reactivity/soothability (loading negatively), fear, and sadness (Gartstein & Rothbart, 2003). Orienting is similar to conscientiousness in adults and includes subscales of the ability to plan and inhibit inappropriate responses, attention control, and high perceptual sensitivity (Rothbart, 2007). It can be defined by duration of cuddliness, infant orienting, low intensity pleasure, and soothability (Putnam, Helbig, Gartstein, Rothbart & Leerkes, 2014). Surgency is similar to extraversion and is displayed through positive affect and behaviors. Its subscales include activity level, approach, high intensity pleasure,

perceptual sensitivity, smiling and laughter, and vocal reactivity (Putnam et al., 2014). Children higher in surgency may display both internalizing and externalizing problems (Oldehinkel, Hartman, de Winter, Veenstra, & Ormel, 2004). Infants high in surgency may display low levels of shyness, high levels of smiling and laughter, and may desire to be close to others (Rothbart, 2007; Rothbart & Ahadi, 1994; Rothbart & Bates, 2006).

The current study was only interested in the negative reactivity superfactor because of the inconsistencies in the literature regarding the factor. The negative reactivity superfactor and the anger and fear subscales were examined. Infants high in negative reactivity have a higher level of difficulty managing self-regulation into toddlerhood compared to toddlers with lower levels of negative reactivity (Kim & Kochanska, 2012). These infants also are at an increased risk to develop psychological disorders, such as Attention-Deficit/Hyperactivity Disorder, and other learning disorders as children (Sayal, Heron, Maugha, Rowe, & Ramchandani, 2013). Previous research, which focuses on mothers, has also suggested that infant negative reactivity has more of an effect on maternal sensitivity than the other superfactors during infancy (Kochanska et al., 2004; Oddi, Murdock, Vadnais, Bridgett, & Gartstein, 2013). Even though research suggests that moderate to high levels of surgency contribute more concurrent, positive parent-infant interaction, these interactions, however, do not contribute to the parent-infant relationship long-term to the same degree as negative reactivity (Kochanska et al., 2004; Kyrios & Prior, 1990).

By examining the anger and fear subscales of the superfactor, we were able to observe differences in the subscales and how they affected parental sensitivity. For example, previous research has indicated that infants higher in fear display very different

responses during stressful tasks than infants who score higher in anger (Clark et al., 2000; Kochanska et al., 2004). Fearful infants may receive more sensitive parenting due to the protective nature of the parent (Kochanska et al., 2004). Whereas infants higher in anger may have parents who are less responsive and adaptive to the infant's needs in order to promote self-regulation in the infant (Clark et al., 2000; Kochanska et al., 2004). Infants higher in fear are also more likely to develop internalizing problems compared to infants higher in anger who are more likely to develop externalizing problems (Oldehinkel et al., 2004).

We know that temperament can affect the parent-child relationship, however the research is mixed. For example, infants who are higher in overall negative reactivity may be more of a challenge to soothe and might cause the parent to heavily rely on the infant's self-soothing abilities. This can contribute to a higher level of parental stress, which could lead to lower parental sensitivity (Belsky, 1984; Oddi et al., 2013). Other research shows that children with higher levels of negative reactivity require more care and attention from the parent, increasing the levels of parental sensitivity (Belsky, 1997; Velderman, Bakermans-Kranenburg, Juffer, & van Ijzendoorn, 2006).

Discrepancies in the literature may be caused by previous research examining temperament using the negative reactivity subscale, which includes both anger and fear. Previous research has found that anger and fear reactivity during infancy might differentially affect development. For example, higher levels of anger in infancy are associated with higher levels of noncompliance in toddlerhood (Stifter, Spinrad, & Braungart-Rieker, 1999) and behavior problems in preschool (Brooker et al., 2014). Higher levels of fear in infancy are associated with the development of internalizing

problems (Razza, Martin, & Brooks-Gunn, 2012) and lower likelihood of developing positive peer relationships in preschool (Buss et al., 2013).

The relationship between negative reactivity and parental sensitivity needs to be examined further in order to determine whether additional factors and which aspects of negative reactivity might explain these mixed findings. Previous research looking at the differences between anger and fear suggests that sensitivity is an important factor when predicting fear, but not as strong a predictor for anger (Braungart-Rieker et al., 2010). By examining anger and fear separately in addition to the negative reactivity superfactor, we aimed to differentiate further how negative reactivity might impact parental sensitivity differentially.

When examining the relationship between parent personality and infant temperament, the BIS/BAS model examines approach and inhibition, which are constructs examined not only personality but also in temperament (Carver & White, 1994; Rothbart & Bates, 2006). In regard to approach, studies examining infant temperament found that higher levels of positive affectivity and lower levels of negative reactivity were linked to higher levels of approach (Rothbart, 1998; Rothbart, Derryberry, & Hershey, 2000). The inhibition system has been equated to fear and stress in adults (Gray, 1984) as well as infants (Buss et al., 2013). Similar to adults, children are sensitive to reward and punishment systems (Rothbart, Ahadi, & Hershey, 1994). The balance between these two opposing forces is maintained by the child's temperament, more specifically, the balance between the approach tendencies (positive affectivity, openness) and the inhibition tendencies (fear, distress to limitations; Rothbart & Bates, 2006).

Previous research examining the association between negative reactivity and the parent-child relationship has focused on mothers, and the research is mixed. Some research has found that higher infant negative reactivity is associated with higher maternal sensitivity (Belsky, 1997; Velderman et al., 2006), whereas others have found it to be associated with lower maternal sensitivity (Belsky, 1984; Oddi et al., 2013). The limited research examining negative reactivity and the father-infant relationship has found higher infant negative reactivity to be associated with less paternal sensitivity (Kochanska et al., 2004; Potapova, Gartstein & Bridgett, 2014). The current study aimed to contribute to this small body of literature pertaining to fathers, and to examine futher the extent to which negative reactivity is associated with maternal and paternal sensitivity.

The Current Study

Based on the results from previous literature, we aimed to answer the following research questions: 1) Using the BIS/BAS to assess personality, to what extent does parent personality impact parental sensitivity? 2) To what extent does infant temperament impact parental sensitivity? 3) To what extent do parent personality and infant temperament interact to affect parental sensitivity? 4) Do these effects differ for mothers and fathers?

Hypothesis 1. It was expected that parent personality would directly affect parent sensitivity, such that parents with a stronger BAS would score higher in sensitivity. It was predicted that these parents would be able to adapt better to their infant's needs. If their infant is upset, they would be able to better identify the cause of the distress and adapt their behavior to soothe the infant. Parents with a higher BIS would be less sensitive

toward their infant. They will not be able to make appropriate adjustments when their infant becomes upset and they would not be as effective at stimulating their infant's needs. This is consistent with previous research, suggesting that more extraverted parents are better at adapting and soothing than neurotic parents (Clark et al., 2000; Kochanska et al., 2004; Metsapelto & Pulkkinen, 2002).

Hypothesis 2. It was predicted that infant temperament would directly affect parental sensitivity such that infants higher in negative reactivity would have less sensitive parents and the opposite effect is predicted for infants lower in negative reactivity. Infants higher in negative reactivity would get upset easier in distressing situations and would be more difficult to soothe, causing the parent to be less sensitive. Infants lower in negative reactivity would not get upset as easily in distressing tasks and would be easier to soothe if they do become upset. It was also hypothesized that differences between the levels of anger and fear would evoke different responses from the parents, influencing their levels of sensitivity. The extent to which this occurs was exploratory, but we predicted that parents would be more sensitive to fearful infants than angry infants.

Hypothesis 3. When examining how parent personality and infant temperament interact, previous research suggested that parental neuroticism, which is highly correlated with BIS (Smits & Boeck, 2006), coupled with high infant negative emotionality consistently led to less sensitive parenting (Belsky, 1995; Clark et al., 2000; Kochanska et al., 2004). On the other hand, research on extraversion, which is highly correlated with BAS (Smits & Boeck, 2006), is mixed, with some studies finding extraverted parents to be less sensitive only if the infant is higher in negative emotionality (Clark et al., 2000;

Derryberry & Rothbart, 1997; Kochanska et al., 2004) and other research finding extraverted parents to be more sensitive despite the level of negative emotionality of the infant (Watson & Clark, 1997). It was hypothesized that when examining parent personality and infant temperament, temperament would moderate the association between personality and sensitivity such that parents with stronger BIS plus high levels of infant negative reactivity are expected to have lower levels of sensitivity. Parents with stronger BIS and infants who display lower levels of negative reactivity would have higher levels of sensitivity. For parents with stronger BAS, it was hypothesized that as infant negative reactivity increased, sensitivity would decrease. The level of negative reactivity in the infant would influence the relationship between parental personality and parental sensitivity.

Mothers versus fathers. Because little research has examined these associations in both mothers and fathers, these differences were examined from an exploratory standpoint. Mothers typically perform more care-related activities, whereas fathers are involved in more play-related activities (Lamb, 1977; Marsiglio et al., 2000). Braungart-Rieker and colleagues (1998) found that sensitivity between parents is similar, but because parent personality and infant temperament were included in the model, we hypothesized that there would be differences in the relationship between parental personality and sensitivity for mothers and fathers. For mothers, it was expected that a strong BIS would have a negative association with sensitivity. However, for fathers, given their playfulness with their children, it was anticipated that the BAS would play more of a role impacting sensitivity, such that fathers with a high BAS system would be more sensitive than fathers with a low BAS system. In regard to anger and fear, given the

different roles the parents play, we predicted that father sensitivity would be impacted more by anger and mother sensitivity would be influenced by fear more than anger.

METHOD

Participants

Participants included 41 (61.0% male infants) families, consisting of mother, father, and 4-month infant (+/-14 days) from a larger, ongoing longitudinal study. Participants were recruited through flyers posted in the community, expectant parent classes and fairs at the local hospital, and letters mailed through information found in birth announcements released in the local newspaper. Study inclusion criteria included: the infant was carried full term (at least 37 weeks), there were no major birth complications, parents were able to read and understand English, participants were not planning to move out of the area for six months, and mother, father, and infant were able to come into the laboratory together.

The majority of parents were European American (mothers: 90.2%; fathers: 95.1%; infants 90.2%). Families most frequently reported being middle-class (51.3% reported an income between $30,000 to $74,999), 9.8% of families reported an income less than $29,999, and 39% reported an income of $75,000 or more per year. Parent age ranged from 22 to 44 for mothers (M = 31.02, SD = 5.38) and from 22 to 49 for fathers (M = 32.66, SD = 6.18). The majority of parents reported being married, living together (92.7%); 4.9% reported being unmarried, living together; and 2.4% reported being single.

Levels of parent education varied widely with the majority of our sample having post-high school education: 7.3% of fathers attended but did not complete high school, 4.9% of fathers just completed high school, 2.4% of fathers completed trade school,

17.1% of mothers and 7.3% of fathers attended but did not complete college, 29.3% of mothers and 41.5% of fathers completed either an Associate's or Bachelor's Degree, and 53.6% of mothers and 36.6% of fathers reported having some postgraduate training or completed postgraduate training.

Procedure

A week before the scheduled laboratory visit, an information packet was mailed to the participants. This packet included parking information, a checklist covering how to prepare for the visit, and two packets of questionnaires, one for each parent to be completed before coming to the lab visit. This packet included the temperament questionnaire.

Once the family arrived at the lab, informed consent was obtained from the mother and father. Parents also provided consent for the infant. Optional video consent was obtained from parents, which allowed recordings from their visits to be used to educational purposes. The lead experimenter collected demographic information, including infant age, health information about the infant, parent age, income, marital status, and first-time parent status.

Parents were then randomly assigned to participate first or second with their infant in the Still-Face Paradigm (SFP: Tronick, Als, Adamson, Wise & Brazelton, 1978), a task composed of three face-to-face episodes in which the parent is seated across from their infant. In the first episode, the parent was instructed to interact and play with his/her infant. In the second episode, the parent was instructed to sit back with a blank face and not interact with his/her infant. The third episode was a reunion where the parent was allowed to interact with his/her infant again. While one parent was participating in

the task, the other parent completed a second packet of questionnaires, which included our personality measure. The entire visit lasted about two hours and families were compensated $20 for participating.

Measures

Parent Personality. The BIS/BAS (Carver & White, 1994) was used to measure parent personality. This questionnaire has 24 items where the participant was asked to answer on a 4-point Likert scale with 1 meaning "very true for me," and 4 meaning "very false for me." Parents completed the questionnaires separately. The measure includes seven BIS items (e.g. "Criticism or scolding hurts me quite a bit"); four BAS drive items (e.g. "I go out of my way to get things I want"); four BAS fun seeking items (e.g. "I often act on the spur of the moment"); five BAS reward responsiveness items (e.g. "When good things happen to me, it affects me strongly"); and four filler items (e.g. "How I dress is important to me").

Responses within each subscale (BIS, BAS drive, fun seeking, and reward responsiveness) were averaged to create the subscale scores. In the present study, Cronbach α for the BIS subscale was .72 for mothers and .78 for fathers. For the BAS subscales, Cronbach αs were .78 for mothers and .76 for fathers for the BAS drive, .57 for mothers and .65 for fathers for BAS fun seeking, and .50 for mothers and .71 for fathers for BAS reward responsiveness.

Infant Temperament. Infant temperament was measured using the Infant Behavior Questionnaire – Revised (IBQ-R; Gartstein & Rothbart, 2003), which contains 191 items. Parents completed the questionnaire separately and were asked to think about how many times his or her infant behaved or reacted in a certain way in the past week.

Item responses were on a 7-point Likert format, ranging from "never" to "always" with an additional "non-applicable" choice option. The IBQ-R measures three superfactors of temperament (negative reactivity, surgency, and orienting). The current study examined the following four subscales which comprise the negative reactivity superfactor: anger/distress to limitations (n=16 items; e.g., "When the baby wanted something, how often did s/he become upset when s/he could not get what s/he wanted?), falling reactivity/soothability (n=13 items; e.g., "When frustrated with something, how often did your baby calm down within five minutes?"), fear (n=16 items; e.g., "When your baby was approached by an unfamiliar person when you and s/he were out, how often did the baby show distress?), and sadness items (n=14 items; e.g., "When tired, how often was your baby likely to cry?") . Items were averaged to create these subscales. In addition to the overall negative reactivity superfactor, the anger and fear subscales were examined separately.

Crohnbach αs for the negative reactivity superfactor were .67 for mothers and .74 for fathers. For mothers, αs for anger and fear subscales were .75 and .92, respectively. For mothers, αs for anger and fear subscales were .74 and .85, respectively. Item scores for the four subscales (anger, falling reactivity/soothability, fear, and sadness) were averaged across the subscales to create the negative reactivity superfactor. Higher scores represented higher levels of infant negative reactivity, whereas low scores represented low infant negative reactivity.

Parental Sensitivity. Sensitivity and intrusiveness were coded during the SFP using an established, observational scale developed by Braungart-Rieker and colleagues (Braungart-Rieker et al., 2001). A team of trained, reliable coders and a "gold standard"

coder trained until reaching interclass correlations (ICCs) of ≥ .80. Coders independently rated sensitivity and intrusiveness during 10-second intervals of the play and reunion episodes of the SFP on a 5-point, Likert-type scale. Coders did not code the same infant with both parents.

Sensitivity is defined as a parent's appropriate responsiveness to his or her infant's state (Ainsworth, Belehar, Waters, & Wall, 1978). High levels of sensitivity are reflected when the parent follows the infant's signals, appropriately stimulates the infant, and is able to soothe the infant if he/she becomes upset (Ainsworth et al., 1978). Low parental sensitivity was characterized by the parent being unable to soothe the infant, forcing his/her own agenda, and over-stimulating the infant (Ainsworth et al., 1978). The scale was as follows: 5 (*high sensitivity*; parent's behavior could not be improved), 4 (*mostly sensitivity;* consistently sensitive but improvement is possible), 3 (*some sensitivity*; mixture of sensitivity/insensitivity), 2 (*low sensitivity*; very few sensitive behaviors), and 1 (*no sensitivity*).

Intrusiveness is defined as the parent displaying aggressiveness toward his or her infant (Braungart-Rieker et al., 2001). Intrusiveness was determined by the infant's response to the interaction between infant and parent. Examples of intrusiveness include the parent overwhelming the baby, parent is too rough with baby, and parent misses "slow-down" signals from the baby (Ainsworth et al., 1978). The 5-point scale was as follows: 5 (*no intrusiveness*), 4 (*ambiguous intrusiveness*; potentially intrusive acts), 3 (*some intrusiveness*; one or two brief/mild examples of intrusiveness), 2 (*mostly intrusive*; extended or intense examples of intrusiveness but not for entire length of episode), and 1 (*extremely intrusive*).

Sensitivity and intrusiveness scores were averaged across play and play resume. Reliability was assessed by the gold standard coder randomly coding 34% of mother videos and 40% of father videos. Averaged ICCs for sensitivity were .81 for mothers and .88 for fathers. Averaged ICCs for intrusiveness were .87 for mothers and .85 for fathers. Sensitivity and intrusiveness are highly correlated, which is consistent with previous studies (Braungart-Rieker et al., 2001; Lickenbrock & Braungart-Rieker, 2015). For mothers, the correlation between sensitivity and intrusiveness for both play episodes ranged from.70 to .84 ($p < .01$) and for fathers, Pearson's r ranged from .57 to .70 ($p < .01$). Therefore, we averaged sensitivity and intrusiveness to create an overall score, from here on referred to as parental sensitivity. Separate scores were created for mothers and fathers. High scores equal high sensitivity/low intrusiveness.

Missing Data

Out of the overall sample (n=41), one mother and two fathers had missing data due to not fully completing the Still-Face Paradigm Task. The mother who did not complete the task did so because the infant became too upset and the data were unusable. For one of the fathers, a similar situation occurred. The other missing father chose not to participate in the task. This resulted in an overall sample of 39.

RESULTS

First, descriptive statistics were run for each of the variables. In addition, tests for the inclusion of any covariates among demographic variables were run. Next, correlations were run among the variables of interest (parent personality, infant temperament, and parental sensitivity) within parent and between parents. Finally, hierarchical multiple regression models were run to test the hypotheses.

Preliminary Analyses

Descriptive statistics. Table 1 shows the descriptive statistics for study variables. The data are fairly normally distributed with a slight positive skew for mother and father BAS Reward Responsiveness scores and infant Negative Reactivity scores. There was also a slight negative skew for father Sensitivity.

Correlations. Within parent correlations are reported in Table 2 (mothers) and Table 3 (fathers). For mothers, the BAS subscales (Drive, Fun Seeking, and Reward Responsiveness) were positively correlated with one another, ranging from $r = 0.51$ to $r = 0.72$. In addition, the mother-report of infant temperament variables (Negative Reactivity, Anger, and Fear) were positively correlated with one another ranging from $r = .37$ to $r = .86$. However, the Anger and Negative Reactivity correlation is stronger than the other infant temperament correlations. In addition, infant Negative Reactivity and Anger had a slight positive correlation with maternal Sensitivity.

The correlations for fathers, revealed slightly different results in comparison to the mother correlations. For fathers, the BAS Drive was positively correlated with BAS

Fun Seeking and BAS Reward Responsiveness. BAS Fun Seeking trended ($p <$ .10) toward a significant correlation with BAS Reward Responsiveness. BAS Drive had a slight, negative correlation with Sensitivity. Further, BAS Reward Responsiveness trended toward a significant negative correlation with Sensitivity. Similar to mothers, Anger and Fear were significantly correlated with Negative Reactivity, however, Anger more so than Fear.

Between-parent correlations comparing mother and father data are presented in Table 4. Correlations revealed a moderate, positive association between mother and father reports of Negative Reactivity. The remaining correlations were non-significant.

Inclusion of covariates. Correlations, *t*-tests, and one-way ANOVAS examined potential covariates between the variables of interest and the demographic variables including Infant Gender, Parity, Parent Age, Parent Education, Family Income, Infant Ethnicity, Cohabitation Status, and Parent Order of the Still-Face Paradigm. Analyses were conducted for all parent personality variables, infant Negative Reactivity, infant Anger, and infant Fear. Of the 96 tests, seven were found to be significant, which is roughly the amount expected that would be due to chance (0.08). However, due to theoretical reasons and previous studies that have found that the parent who went first during the Still-Face Paradigm tended to be more sensitive (Braungart-Rieker et al., 2014), subsequent analyses controlled for Parent Order in the Still-Face Paradigm.

Hierarchical Multiple Regression Results

Subsequent analyses used hierarchical multiple regression models to test the hypotheses. The first step was to include main effects of the two predictor variables (i.e., infant temperament and parent personality) controlling for Parent Order with Parental

Sensitivity as the outcome (Hypothesis 1 and 2). The second step also included the two-way interactions (i.e., Parent Personality X Infant Temperament) with Parental Sensitivity as the outcome variables (Hypothesis 3). Separate models were run for mothers and fathers. Models were run in three sets (Infant Negative Reactivity, Anger, and Fear). Parent personality variables (BIS, BAS Drive, BAS Fun Seeking, BAS Reward Responsiveness) were included in separate models.

Mother model results: Negative reactivity models. Table 5 reports the hierarchical multiple regression results for the models examining the extent to which parent personality and infant negative reactivity predict maternal sensitivity. Step 1 of each model tested Hypothesis 1 (direct effects of parent personality) and 2 (direct effects of infant temperament), which examined main effects of parent personality and negative reactivity. The overall model for Step 1 that included the main effects of BIS and Infant Negative Reactivity (controlling for Parent Order) was significant, $F(3, 36) = 2.92$, $p < .05$. The model revealed a significant main effect of Infant Negative Reactivity, $\beta = 0.17$ (0.07), $t = 2.41$, $p < .05$. The overall model for Step 2, which also included the interaction between BIS and Infant Negative Reactivity, trended toward significance, $F(4, 35) = 2.35$, $p = .07$. However, the BIS X Negative Reactivity interaction was nonsignificant.

Next, the overall model for Step 1 that included the main effects of BAS Drive and Infant Negative Reactivity (controlling for Parent Order) was significant, $F(3, 36) = 3.43$, $p < .05$. The model revealed a significant main effect of Infant Negative Reactivity, $\beta = 0.17$ (0.07), $t = 2.42$, $p < .05$. The overall model for Step 2, which also included the interaction between BAS Drive X Infant Negative Reactivity, was significant, $F(4, 35) =$

2.70, $p < .05$. However, the BAS Drive X Infant Negative Reactivity interaction was nonsignificant.

The overall model for Step 1 that included the main effects of BAS Fun Seeking and Infant Negative Reactivity (controlling for Parent Order) was significant, $F(3, 36) = 3.20$, $p < .05$. The model revealed a significant main effect of Infant Negative Reactivity, $\beta = 0.17$ (0.07), $t = 2.48$, $p < .05$. The overall model for Step 2, which also included the interaction between BAS Fun Seeking X Infant Negative Reactivity, was significant, $F(4, 35) = 2.90$, $p < .05$. However, the BAS Fun Seeking X Infant Negative Reactivity was nonsignificant.

The overall model for Step 1 that included the main effects of BAS Reward Responsiveness and Infant Negative Reactivity (controlling for Parent Order) was significant, $F(3, 36) = 3.17$, $p < .05$. The model revealed a significant main effect of Infant Negative Reactivity, $\beta = 0.16$ (0.07), $t = 2.27$, $p < .05$). The overall model for Step 2, which also included the interaction between BAS Reward Responsiveness X Infant Negative Reactivity, was significant, $F(4, 35) = 2.40$, $p = .07$). However, the BAS Reward Responsiveness X Infant Negative Reactivity interaction was nonsignificant.

In summary, there were significant main effects for infant negative reactivity on maternal sensitivity, such that as infant negative reactivity increased, maternal sensitivity also increased. Maternal personality was not a significant predictor of maternal sensitivity. In addition, Step 2 models revealed no significant interactions between infant negative reactivity and maternal personality in predicting maternal sensitivity.

Father model results: Negative reactivity models. Table 6 reports the hierarchical multiple regression results for the models examining the extent to which

parent personality and infant negative reactivity predict paternal sensitivity. Step 1 of each model tested Hypothesis 1 (direct effects of parent personality) and 2 (direct effects of infant temperament), which examined main effects of parent personality and negative reactivity. The overall model for Step 1 that included the main effects for BIS and Infant Negative Reactivity (controlling for Parent Order) was nonsignificant, $F(3, 36) = 0.31$, ns. The overall model for Step 2, which also included the interaction between BIS X Infant Negative Reactivity, was nonsignificant, $F(4, 36) = 0.42$, ns.

The overall model for Step 1 that included the main effects for BAS Drive and Infant Negative Reactivity (controlling for Parent Order) was nonsignificant, $F(3, 36) = 2.01$, $p = .13$. The overall model for Step 2, which also included the interaction between BAS Drive X Infant Negative Reactivity was also nonsignificant, $F(4, 35) = 1.49$, $p = .23$.

The overall model for Step 1 that included the main effects for BAS Fun Seeking and Infant Negative Reactivity (controlling for Parent Order) was nonsignificant, $F(3, 36) = 1.38$, $p = .26$. The overall model for Step 2, which also included the interaction between BAS Fun Seeking X Infant Negative Reactivity was significant, $F(4, 35) = 4.46$, $p < .01$. The model revealed a significant interaction between BAS Fun Seeking X Infant Negative Reactivity, $\beta = -0.58$ (0.17), $t = -3.52$, $p < .01$).

Follow-up tests were used to examine simple slopes one standard deviation above and below the mean (Aiken & West, 1991). As seen in Figure 2, the simple slopes test revealed that for infants high in negative reactivity, as father BAS fun seeking increase, sensitivity decreased ($\beta = -0.56$, $t = -3.95$, $p < 0.01$). However, the simple slopes test that examined infants low in negative reactivity was nonsignificant.

The overall model for Step 1 that included the main effects for BAS Reward Responsiveness and Infant Negative Reactivity (controlling for Parent Order) was nonsignificant, $F(3, 36) = 1.86$, $p = .15$. The overall model for Step 2 that also included the interaction between BAS Reward Responsiveness X Infant Negative Reactivity was nonsignificant, $F(4, 35) = 1.37$, $p = .27$.

In summary, there were no significant main effects of infant negative reactivity or paternal personality on paternal sensitivity. However, one Step 2 model revealed a significant Infant Negative Reactivity X BAS Fun Seeking interaction. For infants high in negative reactivity, as paternal Fun Seeking increased, sensitivity decreased.

Mother model results: Infant anger. Table 7 reports the hierarchical multiple regression results for the models examining the extent to which parent personality and infant anger predict paternal sensitivity. Step 1 of each model tested Hypothesis 1 (direct effects of parent personality) and 2 (direct effects of infant anger), which examined main effects of parent personality and anger. The overall model for Step 1 that included the main effects for BIS and Infant Anger (controlling for Parent Order) was significant, $F(3, 36) = 3.17$ $p < .05$. The model revealed a significant main effect of Infant Anger, $\beta = 0.15$ (0.06), $t = 2.55$, $p < .05$. The overall model for Step 2 that also included the interaction between BIS X and Infant Anger was significant, $F(4, 35) = 2.79$, $p < .05$. However, the BIS X Infant Anger interaction was nonsignificant.

The overall model for Step 1 that included the main effects for BAS Drive and Infant Anger (controlling for Parent Order) was significant, $F(3, 36) = 3.64$, $p < .05$. The model revealed a significant main effect of Infant Anger, $\beta = 0.15$ (0.06), $t = 2.53$, $p < .05$. The overall model for Step 2 that also included the interaction between BAS Drive X

Infant Anger was significant, $F(4, 35) = 2.66$, $p < .05$. However, the BAS Drive X Infant Anger interaction was nonsignificant.

The overall model for Step 1 that included the main effects for BAS Fun Seeking and Infant Anger (controlling for Parent Order) was significant $F(3, 36) = 3.31$, $p < .05$. The model revealed a significant main effect of Infant Anger, $\beta = 0.15$ (0.06), $t = 2.53$, $p < .05$. The overall model for Step 2 that also included the interaction between BAS Fun Seeking X Infant Anger trended toward significance $F(4, 35) = 2.42$, $p = .07$. However, the BAS Fun Seeking X Infant Anger interaction was nonsignificant.

The overall model for Step 1 that included the main effects of BAS Reward Responsiveness and Infant Anger (controlling for Parent Order) was significant, $F(3, 36) = 3.38$, $p < .05$. The model revealed a significant main effect of Infant Anger, $\beta = 0.15$ (0.06), $t = 2.39$, $p < .05$). The overall model for Step 2 that also included the interaction between BAS Reward Responsiveness X Infant Anger was significant, $F(4, 35) = 3.19$, $p < .05$). However, the BAS Reward Responsiveness X Infant Anger interaction was nonsignificant. In summary, there was a main effect of infant anger on maternal sensitivity, such that as infant anger increased, maternal sensitivity also increased. There were no significant main effects of maternal personality on sensitivity. Step 2 models revealed no significant interactions.

Father model results: Infant anger. Table 8 reports the hierarchical multiple regression results for the models examining the extent to which parent personality and infant Anger predict paternal sensitivity. Step 1 of each model tested Hypothesis 1 (direct effects of parent personality) and 2 (direct effects of infant Anger), which examined main effects of parent personality and Anger. The overall model for Step 1 that included the

main effects of BIS and Infant Anger was nonsignificant, $F(3, 36) = 0.48$, ns. The overall model for Step 2 that also included the interaction between BIS X Infant Anger was nonsignificant, $F(4, 35) = 0.53$, ns.

The overall model for Step 1 that included the main effects of BAS Drive and Infant Anger (controlling for Parent Order) was nonsignificant, $F(3, 36) = 1.90$, $p = .15$. The overall model for Step 2 that also included the interaction between BAS Drive X Infant Anger was nonsignificant, $F(4, 35) = 1.49$, $p = .23$.

The overall model for Step 1 that included the main effects of BAS Fun Seeking and Infant Anger (controlling for Parent Order) was nonsignificant, $F(3, 36) = 1.60$, $p = .21$. The overall model for Step 2 that also included the interaction between BAS Fun Seeking X Infant Anger was significant, $F(4, 35) = 4.36$, $p < .01$. The model revealed a significant BAS Fun Seeking X Infant Anger interaction, $\beta = -0.56$ (0.17), $t = -3.36$, $p < 0.01$.

Similar to the previous significant interaction, follow-up tests were used to examine simple slopes one standard deviation above and below the mean (Aiken & West, 1991). As seen in Figure 3, the simple slopes test revealed that for infants high in anger, as father BAS fun seeking increased, sensitivity decreased ($\beta = -0.74$, $t = -3.93$, $p < 0.01$). However for infants low in anger, the effect was nonsignificant.

The overall model for Step 1 that included the main effects of BAS Reward Responsiveness and Infant Anger (controlling for Parent Order) was nonsignificant, $F(3, 36) = 1.96$, $p = .14$. The overall model for Step 2 that also included the interaction between BAS Reward Responsiveness and Infant Anger was nonsignificant, $F(4, 35) = 1.49$, $p = .24$.

In summary, there were no significant main effects of infant anger or paternal personality on paternal sensitivity. Step 2 models revealed a significant interaction between infant anger and BAS fun seeking in predicting paternal sensitivity. For infants high in anger, as paternal fun seeking increases, sensitivity decreases.

Mother model results: Infant fear. Table 9 reports the hierarchical multiple regression results for the models examining the extent to which parent personality and infant fear predict paternal sensitivity. Step 1 of each model tested Hypothesis 1 (direct effects of parent personality) and 2 (direct effects of infant fear), which examined main effects of parent personality and fear. The overall model for Step 1that included main effects of BIS and Infant Fear (controlling for Parent Order) was nonsignificant, $F(3, 36) = 1.17$, $p = .33$. The overall model for Step 2 that also included the BIS X Infant Fear interaction was nonsignificant, $F(4, 35) = 1.22$, $p = .32$.

The overall model for Step 1 that included main effects of BAS Drive and Infant Fear (controlling for Parent Order) was nonsignificant, $F(3, 36) = 1.65$, $p = .20$. The overall model for Step 2 that also included the interaction between BAS Drive X Infant Fear was nonsignificant, $F(4, 35) = 2.21$, $p = .09$.

The overall model for Step 1 that included main effects of BAS Fun Seeking and Infant Fear (controlling for Parent Order) was nonsignificant, $F(3, 36) = 1.49$, $p = .24$. The overall model for Step 2 that also included the interaction between BAS Fun Seeking and Infant Fear trended toward significance, $F(4, 35) = 2.29$, $p = .08$. The model revealed a significant BAS Fun Seeking X Infant Fear interaction, $\beta = 0.12$ (0.06), $t = 2.07$, $p < 0.05$.

Follow-up tests were used to examine simple slopes one standard deviation above and below the mean (Aiken & West, 1991). As seen in Figure 4, the simple slopes test revealed that for infants low in fear, as mother BAS Fun Seeking increased, sensitivity decreased ($\beta = 0.20$, $t = 2.79$, $p < 0.01$). For infants high in infant fear, this relationship was nonsignificant.

In summary, there were no significant main effects of infant fear or maternal personality in predicting maternal sensitivity. Step 2 models revealed an interaction between infant fear and BAS fun seeking that trended toward significance. For infants high in fear, as maternal fun seeking increases, sensitivity decreases. There were no other interactions for these models.

Father model results: Infant fear. Table 10 displays results for the multiple regression models examining infant fear and parent personality as predictors of sensitivity. Across all of the models, Infant Fear and paternal Personality (BIS, BAS Drive, Fun Seeking, and Reward Responsiveness) there were no significant main effects or interactions.

Results Summary

For mothers, Step 1 for each model involving the main effects of parent personality and infant temperament (controlling for Parent Order) revealed that there was a main effect of Negative Reactivity with all personality variables. Although all of the Step 2 models, examining the interactions, were significant, but there were no significant Infant Temperament (negative reactivity, anger, fear) X Parent Personality interactions. Similarly, Step 1 of the Anger models revealed significant main effects for all personality models, however, there were no interactions. For Infant Fear, there were no main effects

across all models. However, there was a significant Infant Fear X BAS Fun Seeking interaction.

For fathers, there were no main effects of Infant Negative Reactivity. However, there was a significant interaction between Negative Reactivity and BAS Fun Seeking. There were similar effects for the Anger models, such that there were no main effects, but a significant Negative Reactivity X BAS Fun Seeking interaction. Fear models for fathers yielded no main effects or interactions.

DISCUSSION

This study examined the extent to which parent personality and infant temperament predicted parental sensitivity with both mothers and fathers through the determinants of parenting perspective (Belsky, 1985), adding to the literature in several ways. First, the BIS/BAS model was used, which describes and examines the mechanisms of personality and temperament through a neurological perspective (Carver & White, 1994). By using this model, theoretical comparisons via goodness of fit between approach/inhibition systems in parents and infants can be examined. In addition, the combined influences of parent personality and infant temperament on parental sensitivity were examined.

Second, we acknowledged and accounted for the mixed research on the negative reactivity temperament superfactor by examining two specific components of the superfactor, anger and fear. This allowed us to examine the relative contributions of two specific categories relative to the overall superfactor. By including analyses for anger and fear independently, we aimed to separate how these two aspects of negative reactivity may influence parental sensitivity.

The addition of fathers also contributed to the small body of literature in which fathers are studied. Fathers play an ever-increasing role in the family, causing a need for their impacts to be studied. Fathers do not differ in levels of sensitivity compared to mothers (Braungart-Rieker et al., 1998), but these differences between parents had not

been examined adding parent personality and infant temperament into the model. This model needed to be expanded upon to identify these differences.

Effects of Parent Personality

The influence of parent personality on parental sensitivity is well documented. High levels of neuroticism contribute to negative parenting practices, such that these parents are more controlling (Clark et al., 2000), less adaptive (Belsky et al., 1995), and less responsive (Fish & Stifter, 1993). Results with extraversion, on the other hand, have provided inconsistent results. Some studies suggest that extraversion contributes to positive parenting outcomes. For example, parents who are higher in extraversion are more adaptive (Belsky et al., 1995) and have higher levels of parenting confidence, which may influence how they interact with their infants (Hutteman et al., 2014). Other studies have suggested that higher levels of extraversion contribute to negative parenting outcomes, such that these parents are more overbearing (Clark et al., 2000), and they may hinder the development of autonomy (Metsapelto & Pulkkinen, 2002).

In the present study, the first hypothesis addressed the direct effects of parent personality on parental sensitivity. It was predicted that higher levels of BIS would lead to less sensitive parenting and higher levels of BAS would lead to more sensitive parenting. Results revealed that BIS was not a significant predictor of sensitivity for either mothers or fathers. This finding is contrary to previous research that found neuroticism, a correlate of the BIS (Smits & Boeck, 2006), consistently predicted parenting (Belsky et al., 1995; Clark et al., 2000; Fish & Stifter, 1993). The present study also did not find significant main effects for the BAS subscales (drive, fun seeking, and reward responsiveness) in predicting parental sensitivity. This finding was counter to

hypothesis 1, which predicted that higher levels of BAS would predict higher levels of sensitivity.

Taken together, the results from the current study suggest that the effects of personality from a BIS/BAS framework capture different aspects of personality than what has previously been found with the associations between neuroticism, extraversion, and parenting. Neuroticism consists of several components such as self-doubt, emotional lability, and worry (Scheier, Carver, & Bridges, 1994). Inhibition is just a small portion of this larger personality construct. On the other hand, the approach system is much larger than extraversion. Components of extraversion, including sociability, impulsivity, elatedness (Plomin, 1976), are also components of approach. However, extraversion does not completely encompass approach behaviors (Smits & Boeck, 2006). In other words, the BIS may not be capturing enough of the neuroticism construct, and BAS may be capturing information that is too broad to accurately predict parenting. Future research should aim to replicate these findings using the BIS/BAS model and another model of personality, such as the BFI (John et al., 1991).

Effects of Infant Temperament

Although many studies have evaluated how negative reactivity impacts parenting, the results have been inconsistent. Some studies suggest that infants high in negative reactivity receive more sensitive parenting because they require more attention and the parent may react protectively (Belsky, 1997; Velderman et al., 2006). Conversely, other studies have suggested that these infants receive less sensitive parenting because they are more difficult to soothe and contribute to a higher level of parenting stress (Belsky, 1984; Oddi et al., 2013). We predicted that these differences might be caused by the differences

between the anger and fear subscales. Infants who are high in anger may be more likely to receive less sensitive parenting because the parent may be promoting self-regulation and self-soothing techniques such as thumb-sucking and the infant distracting him or herself from what is upsetting him or her (Clark et al., 2000). Infants who are high in fear may receive more sensitive parenting due to the protective nature of parents (Kochanska et al., 2004). These differences are inconsistent in the literature and need to be further explored to identify how the differential aspects of negative reactivity contribute to parenting. Overall, we found different effects for mothers and fathers.

Mothers. The overall main effects of negative reactivity on parenting were similar to the main effects of anger, such that infants higher in negative reactivity and anger received more sensitive parenting from their mothers. This suggests that mothers may be able to better soothe infants high in negative reactivity or anger, which increases their level of maternal sensitivity. Even though this result is the opposite of what was predicted from our hypotheses regarding both negative reactivity and anger, it can still be concluded that maternal sensitivity is influenced more by the infant than by intrinsic factors of the mother. This finding is supportive of research that suggests that negative reactivity increased sensitive parenting (Clark et al., 2000; Kochanska et al., 2004).

Although the main effects of negative reactivity and anger on parental sensitivity provided similar results to one another, the results involving infant fear provided different results. Fear does not typically develop in infants until 6- to 8-months old (Rothbart & Bates, 2006). Taking that into consideration, it was surprising that there was an Infant Fear X BAS Fun Seeking interaction, such that for infants low in fear, as maternal fun seeking increased, sensitivity decreased. It is possible that if the infant is interacting with

a mother who is high in fun seeking, she may be ignoring the infant's fear signals. This creates a poor goodness of fit between the infant and mother. In addition, the overall model trended toward significance, so this finding should be interpreted with caution. It is possible that as fear develops further this effect may become more pronounced. Future research should aim to examine these constructs at later time points in infancy to determine whether this result is consistent through development.

Fathers. The effects of infant temperament (negative reactivity, anger, and fear) on parenting for fathers were quite different than what was found for mothers. For example, there were no direct effects of infant temperament (negative reactivity, anger, and fear) on paternal sensitivity. This suggests that paternal sensitivity is not dependent directly on infant temperament.

For fathers, there was a significant negative reactivity X BAS fun seeking interaction and a significant infant anger X BAS fun seeking interaction, such that for infants high in negative reactivity or anger, as paternal fun seeking increased, sensitivity decreased. However, for infants low in negative reactivity or anger, paternal fun seeking did not have an effect on the level of sensitivity. In other words, negative reactivity or anger moderated the relationship between BAS Fun Seeking and Sensitivity. This suggests that sensitivity in fathers is contingent on the congruency between the infant's temperament and father's fun seeking personality. An infant high in negative reactivity may be more likely to become upset if he or she becomes over stimulated. This creates a poor goodness of fit between the infant and father (Mangelsdorf et al., 1990). To become more sensitive to their infants, fathers should attempt to match their affective state to the infant to avoid overstimulating and overwhelming the infant (Mangelsdorf et al., 1990).

The almost identical results from the overall negative reactivity and anger models further suggest that anger is the driving force behind infant negative reactivity.

In addition, it is possible, that an additional factor might be driving the association between infant temperament and paternal sensitivity. For example, the level of father involvement may be influential on his parenting (Van Horn, Bellis, & Snyder, 2001). Fathers who are less involved may not have enough exposure to their infant's emotional displays to have practice in determining emotions. This lack of knowledge could have influenced their reports of their infants' temperament. This is especially true in early infancy. Mothers are more involved than fathers during this time (Lamb, 1977). When fathers are involved, they typically engage in more play activities with the infant, whereas the mother typically engages in more care activities (Lamb, 1977; Marsiglio et al., 2000). Future research should also examine the role of parental involvement as a determinant of parenting with parental personality and infant temperament.

Mothers versus Fathers. There was also a positive correlation between maternal and paternal reports of negative reactivity, which supports consistency between parents when reporting about the same infant. However, the fact that this correlation is not stronger, supports that mothers and fathers respond differently to their infant. Mothers and fathers may perceive emotions in infants differently from one another. Typically, mothers are better at identifying anger in their children than fathers (Fivush, Brotman, Buckner, & Goodman, 2000). This difference could also be infant-driven, such that infants respond differently to their mothers than to their fathers.

All of the significant interactions included BAS Fun Seeking. Of the three BAS subscales, fun seeking is the most similar to extraversion with a correlation of $r = .69$,

whereas the correlation between extraversion and drive is $r = .43$ and $r = .36$ for reward responsiveness (Smits & Boeck, 2006). This supports previous research that higher levels of extraversion predict less sensitive parenting (Belsky et al., 1995; Hutteman et al., 2014; Metsapelto & Pulkkinen, 2002). This also suggests that there may be a lack of fit between these parents and their infants. These parents may be overstimulating their infant during play or they may not be responding to the infant's needs (Manglesdorf et al., 1990).

Limitations and Future Directions

This study has several limitations related to the sample and methodology that need to be noted. First, the small sample size limits the power to test more complex models. Therefore, these findings need to be interpreted with caution. The data from the current study is a portion of data from an ongoing study. As the sample size increases, we may see more pronounced results.

Second, the sample is not very diverse, given the majority of our sample is European American and well educated. Future research needs to replicate these findings with a more diverse sample to determine if there are different determinants of parenting across a variety of socioeconomic statuses (SES) and minority groups. Previous research has suggests infants from low SES homes are more irritable and their parents may be less responsive (Hoff, Laursen, & Tardif, 2002).

Third, the current study only examined infant temperament through the use of parent-report. The correlation between mother and father report of parenting was significant, but small. Even though this is consistent with previous work that has found a modest correlation between mothers and fathers (Stifter, Willoughby, Towe-Goodman, &

the Family Life Project Key Investigators, 2008), this suggests that there is variability between parent reports. Future research should also utilize multiple methods of examining infant temperament. For example, using an observational method in a laboratory setting allows for avoidance of parent bias and more control over what is being reported by researchers.

Additionally, the Cronbach's alpha levels for the BAS drive subscales for mothers (α = .57) and fathers (α = .65) as well as the BAS fun seeking for mothers (α = .50) were low in comparison to the other subscales. The low alphas indicate that these subscales might not be the best indicator of personality in parents. Therefore, the findings that include these subscales should be interpreted with caution and should be replicated in a different sample. This sample is currently part of an ongoing study, and it is expected that as the sample size increases, these values will increase to an acceptable level. However, the Cronbach alphas published in the original BIS/BAS scale (Carver & White, 1994) ranged from .66 to .76 with the lowest of these being BAS Drive (α = .73) and BAS Fun Seeking (α = .66). These values were obtained with a much larger sample size (n=732; Carver & White, 1994) compared to the current study (n=41). It is possible that these specific subscales that make up the larger BIS/BAS questionnaire might not be the most valid indicator of personality.

Last, the current study only examined the associations between parent personality, infant temperament, and parental sensitivity at one time-point, when infants were 4-months of age. Future research needs to examine these effects across time. By looking at these effects longitudinally, researchers will be able to see how these findings may change over time. In addition to the child changing over time, parenting may also change

as the child develops (Belsky, 1984). For example, as infants age, crying behavior typically decreases (Bell & Ainsworth, 1972). This may increase parental sensitivity.

Implications and Conclusions

The findings from the current study can be used in the development of parenting interventions. Parents who are higher in particular personality characteristics can be taught to be more sensitive to their infant through controlling their interactions. Previous research has suggested that parent mimic interactions and facial expressions displayed by their infants (Field et al., 1988). In addition, mothers and fathers need to receive different types of interventions given that they have different determinants of parenting.

Results from the current study demonstrated that there are different predictors of parenting for mothers versus fathers. For mothers, the infant's temperament (specifically, negative reactivity) was predictive of sensitivity such that infants high in negative reactivity received more sensitive parenting. For fathers, there were no direct effects of paternal personality or infant temperament, however, the fathers' level of fun seeking interacted with negative reactivity to predict sensitivity, such that for infants high in negative reactivity, as father fun seeking increased, sensitivity decreased. A similar effect was found for anger for fathers high in fun seeking. Using the determinants of parenting model (Belsky, 1984) and the findings from the current study, future research should differentiate further the complex processes that underlie parenting in mothers and fathers.

REFERENCES

Ainsworth, M. S., Belehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. New York, NY, USA: Lawrence Erlbaum.

Ainsworth, M. S., Bell, S. M., & Stayton, D. F. (1974). Infant-mother attachment and social development: 'Socialisation' as a product of reciprocal responsiveness to signals. In P. M. M. Richards (Ed.), *The integration of a child into a social world* (pp. 99-135). New York, NY, USA: Cambridge Press.

Bell, S. M. & Ainsworth, M. S. (1972). Infant crying and maternal responsiveness. *Child Development, 43,* 1171-1190. doi.org/10.2307/1127506

Belsky, J. (1984). The determinants of parenting: A process model. *Child development*, 83-96. doi.org/10.2307/1129836

Belsky, J. (1997). Theory testing, effect-size evaluation, and differential susceptibility to rearing influence: The case of mothering and attachment. *Child Development. 68,* 598-600. doi.org/10.1111/j.1467-8624.1997.tb04221.x

Belsky, J., Crnic, K., & Woodsworth, S. (1995). Personality and parenting: Exploring the mediating role of transient mood and daily hassles. *Journal of Personality, 63(5),* 905-929. doi.org/10.1111/j.1467-6494.1995.tb00320.x

Bouchard, T. J. & Loehlin, J. C. (2001). Genes, evolution, and personality. *Behavior Genetics, 31,* 243-273. doi.org/10.1023/A:1012294324713

Bowlby, J. (1969). *Attachment and loss*. *Attachment, 1*. New York, New York: Basic Books.

Braungart-Rieker, J. M., Garwood, M. M., Powers, B. P., & Notaro, P. C. (1998). Infant affect and affect regulation during the still-face paradigm with mothers and fathers: The role of infant characteristics and parental sensitivity. *Developmental Psychology, 34,* 1428-1437. doi.org/10.1037/0012-1649.34.6.1428

Braungart-Rieker, J. M., Zentail, S., Lickenbrock, D. M., Ekas, N. V., Oshio, T., & Planalp, E. (2014). Attachment in the making: Mother and father sensitivity and infants' responses during the Still-Face Paradigm. *Journal of Experimental Child Psychology, 125,* 63-84. doi.org/10.1016/j.jecp.2014.02.007

Braungart-Rieker, J., Hill-Soderlund, A. L., & Karrass, J. (2010). Fear and anger reactivity trajectories from 4 to 16 months: The roles of temperament, regulation, and maternal sensitivity. *Developmental Psychology, 46,* 791-804. doi.org/10.1037/a0019673

Brooker, R. J., Buss, K. A., Lemery-Chalfant, K., Aksan, N., Davidson, R. K., Goldsmith, H. H. (2014). Profiles of observed infant anger predict preschool behavior problems: Moderation by life stress. *Developmental Psychology*. doi.org/10.1037/a0037693

Buss, K. A., Davis, E. L., Kiel, E. J., Brooker, R. J., Beekman, C., & Early, M. C. (2013). Dysregulated Fear Predicts Social Wariness and Social Anxiety Symptoms during Kindergarten. *Journal of Clinical Child and Adolescent Psychology: The Official Journal for the Society of Clinical Child and Adolescent Psychology, American*

Psychological Association, Division 53, *42*(5), 603–616. doi.org/10.1080/15374416.2013.769170

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activations, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*, 319-333. doi.org/10.1037/0022-3514.67.2.319

Chess, S. & Thomas, A. (1999). *Goodness of fit: Clinical applications from infancy through adult life.* Philadelphia, PA, USA: Brunner/Mazel

Clark, L. A., Kochanska, G., & Ready, R. (2000). Mothers' personality and its interaction with child temperament as predictors of parenting behavior. *Personality and Social Psychology, 79(2),* 274-285. http://dx.doi.org/10.1037/0022-3514.79.2.274

Costa, P. T. & McCrae, R. R. (1990). Personality disorders and the five-factor model of personality. *Journal of Personality Disorders, 4,* 362-371. doi.org/10.1521/pedi.19 90.4.4.36

Costa, P. T., McCrae, R. R. (1994). *Set like plaster? Evidence for the stability of adult personality.* Washington, DC. American Psychological Association.

Crockenberg, S. B. (1981). Infant irritability, mother responsiveness, and social support influences on the security of infant-mother attachment. *Child Development, 52,* 857-865. doi.org/10.2307/1129087

De Wolff, M. S. & van Ijzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis of parental antecedents of infant attachment. *Child Development, 68,* 571-591. doi.org/10.1111/j.1467-8624.1997.tb04218.x

Field, T., Healy, B., Goldstein, S., Perry, S., Bendell, D., Schanberg, S., Zimmerman, E. A., & Kuhn, C. (1988). Infants of depressed mothers show "depressed" behavior even with nondepressed adults. *Child Development, 59,* 1569-1579. doi.org/10.2307/1130671

Fish, M., Stifter, C. A. (1993). Mother parity as a main and moderating influence on early mother-infant interaction. *Journal of Applied Developmental Psychology, 14,* 557-572. doi.org/10.1016/0193-3973(93)90007-I

Fivush, R., Brotman, M. A., Buckner, J. P., & Goodman, S. H. (2000). Gender differences in parent-child emotion narratives. *Sex Roles, 42,* 233-253. doi.org/ 10.1023/A:1007091207068

Gartstein, M. A. & Rothbart, M. K. (2003). Studying infant temperament via the revised infant behavior questionnaire. *Infant Behavior & Development, 26,* 64-86. doi.org/10.101 6/S0163-6383(02)00169-8

Goldsmith, H. H., Buss, A. H., Plomin, R., Rothbart, M. K., Thomas, A., Chess, S., Hinde, R. A., McCall, R. B. (1987). Roundtable: What is temperament? Four approaches. *Child Development, 58,* 505-529. doi.org/10.2307/1130527Goldstein, L. H., Diener, M. L., Mangelsdorf, S. C. (1996). Maternal characteristics and social support across the transition to motherhood: Associations with maternal behavior. *Journal of Family Psychology, 10,* 60-71. http://doi.org/10.1037/0893-3200.10.1.60

Gray, J. A. (1990). Brain systems that mediate both emotion and cognition. *Cognition & Emotion, 4*(3), 269-288. doi.org/10.1080/02699939008410799

Hoff, E., Laursen, B., & Tardif, T. (2002). Socioeconomic status and parenting. *Handbook of parenting Volume 2: Biology and ecology of parenting*, *8*(2), 231-52.

Hutteman, R., Hennecke, M., Orth, U., Reitz, A., & Specht, J. (2014). Developmental tasks as a framework to study personality development in adulthood and old age. *European Journal of Personality, 28,* 267-278. doi.org10.1002/per.1959

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). The big five inventory—versions 4a and 54. Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.

Kernberg, O. F. (2016) What is personality? *Journal of Personality Disorders, 30,* 145-156. doi.org/10.1521/pedi.2106.30.2.145

Kim, S. & Kochanska, G. (2012). Child temperament moderates effects of parent-child mutuality on self-regulation: A relationship-based path for emotionally negative infants. *Child Development, 83,* 1275-1289. doi.org/10.1111/j.1467-8624.2012.01778.x

Kochanska, G., Friesenbrog, A. E., Lange, L. A., & Martel, M. M. (2004). Parents' personality and infants' temperament as contributors to their emerging relationship. *Journal of Personality and Social Psychology, 86,* 744-759. doi.org/10.1037/0022-3514.86.5.744

Kyrios, M. & Prior, M. (1990). Temperament, stress and family factors in behavioral adjustment of 3-5-year old children. *International Journal of Behavioral Development, 13,* 67-93. doi.org/10.1177/016502549001300105

Lamb, M. E. (1977). Father-infant and mother-infant interaction in the first year of life. *Child Development, 48,* 167-181. doi.org/10.2307/1128896

Lickenbrock, D. M., Braungart-Rieker, J. M. (2015). Examining antecedents of infant attachment security with mothers and fathers: An ecological systems perspective. *Infant Behavior and Development, 39,* 173-187.doi.org/10.1016/j.infbeh.2015.03.003

Mangelsdorf, S., Gunnar, M., Kestenbaum, R., Lang, S., & Andreas, D. (1990). Infant proneness-to-distress temperament, maternal personality, and mother-infant attachment: Associations and goodness of fit. *Child Development, 61,* 820-831. doi.org10.1111/j.1467-8624.1990.tb02824.x

Marsiglio, W., Amato, P., Day, R. D., & Lamb, M. E. (2000). Scholarship on fatherhood in the 1990s and beyond. *Journal of Marriage and Family, 62,* 1173-1191. doi.org/10.1111/k.1741-3737.2000.01173.x

McCrae, R. R., Gaines, J. F., & Wellington, M. A. (2012). The five factor model in fact and fiction. In I. B. Weiner (Ed), *Handbook of psychology. 2nd ed.* (pp.65-91). New Jersey. John Wiley and Sons Inc.

Metsapelto, R. & Pulkkinen, L. (2002). Personality traits and parenting: Neuroticism, extraversion, and openness to experience as discriminative factors. *European Journal of Personality, 17,* 59-78. doi.org/10.1002/per.468.

Oddi, K. B., Murdock, K. W., Vadnais, S., Bridgett, D. J., & Gartstein, M. A. (2013). Maternal and infant temperament characteristics as contributors to parenting stress in the first year postpartum. *Infant and Child Development, 22,* 553-579. doi.org/10.1002/icd.1813

Oldehinkel, A. J., Hartman, C. A., de Winter, A. F., Veenstra, R., & Ormel, J. (2004). Temperament profiles associated with internalizing and externalizing problems in preadolescence. *Development and Psychopathology, 16,* 421-440. doi.org/10.1017/S0954579404044591

Plomin, R. (1976). Extraversion: Sociability and impulsivity. *Journal of Personality Assessment, 40,* 24-30. doi.org/10.1207/s15327752jpa4001_6

Potapova, N. V., Gartstein, M. A., & Bridgett, D. J. (2014). Paternal influences on infant temperament: Effects of father internalizing problems, parenting-related stress, and temperament. *Infant Behavior and Development, 37*(1), 105-110. doi.org/10.1016/j.infbeh.2013.12.014

Putnam, S. P., Helbig, A. L., Gartstein, M. A., Rothbart, M. K., & Leerkes, E. (2014). Development and assessment of short and very short forms of the infant behavior questionnaire-revised. *Journal of Personality Assessment, 96,* 445-458. doi.org/10.1080/00223891.2013.841171

Razza, R. A., Martin, A., & Brooks-Gunn, J. (2012). The implications of early attentional regulation for school success among low-income children. *Journal of Applied Developmental Psychology, 33,* 311-319. doi.org/10.1016/j.appdev.2012.07.005

Rothbart, M. K. (2007). Temperament, development, and personality. *Current Directions in Psychological Science, 16,* 207, 212. doi.org/10.111/j.1467-8721.2007.00505.x

Rothbart, M. K. & Ahadi, S. A. (1994). Temperament and the development of personality *Journal of Abnormal Psychology, 103,* 55-66. doi.org/10.1037/0021-843X.103.1.55

Rothbart, M. K. & Bates, J. E. (2006). Temperament. In N. Eisenberg (Ed.), *Handbook of Child Psychology* (pp.99-166). New York, New York: Wiley.

Rothbart, M. K., Ahadi, S. A., Hershey, K. L. (1994). Temperament and social behavior in childhood. *Merrill-Palmer Quarterly,* 21-39. Retrieved from http://www.jstor.org/stable/23087906

Rothbart, M. K., Derryberry, D., & Hershey, K. (2000). Stability of temperament in childhood: Laboratory infant assessment to parent report at seven years. *Temperament and personality development across the life span,* (pp. 85-199). New York, NY: Routledge.

Sayal, K., Heron, J., Maughan, B., Rowe, R., & Ramchandani, P. (2013) Infant temperament and childhood psychiatric disorder: longitudinal study. *Child: Care, Health and Development, 40,* 292-297. doi.org/10.1111/cch.12054

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67,* 1063-1978. doi.org/10.1037/0022-3514.67.6.1063

Smits, D. J., & Boeck, P. D. (2006). From BIS/BAS to the big five. *European journal of personality*, *20*(4), 255-270. doi.org/10.1002/per.583

Stifter, C. A., Spinrad, T., Braungart-Rieker, J. (1999). Toward a developmental model of child compliance: the role of emotion regulation in infancy. *Child Development, 70,* 21-32. doi.org/10.1111/1467-8624.00003

Stifter, C. A., Willoughby, M. T., Towe-Goodman, N., & the Family Life Project Key Investigators (2008). Agree or agree to disagree? Assessing the convergance

between parents and observers on infant temperament. *Infant Child Development, 17,* 407-426. doi.org/10.1002/icd.584

Thomas, A., & Chess, S. (1977). *Temperament and development*. Philadelphia, PA, USA: Brunner/Mazel.

Tronick, E., Als, H., Adamson, L., Wise, S., & Brazelton, T. B. (1978). The infant's response to entrapment between contradictory messages in face-to-face interaction. *Journal of the American Academy of Child Psychiatry, 17,* 1-13. doi.org/10.1016/S0002-7138(09)62273-1

van Berkel, S. R., Groeneveld, M. G., Mesman, J., Endendijk, J. J., Hallers-Haalboom, E. T., van der Pol, L. D., Bakersmans-Kranenburg, M. J. (2015). Parental sensitivity toward toddlers and infant siblings predicting toddler sharing and compliance. *Journal of Child Family Studies, 24.* 2270-2279. doi.org/10.1007/s10826-014-0029-y

Van Horn, M. L., Bellis, J. M., & Snyder, S. W. (2001) Family resource scale-revised: Psychometrics and validation of a measure of family resources in a sample of low-income families. *Journal of Psychoeducational Assessment, 19,* 54-68. doi.org/10.1177/073428290101900104

Velderman, M. K., Bakermans-Kranenburg, M. J., Juffer, F., & van Ijzendoorn, M. H. (2006). Effects of attachment-based interventions on maternal sensitivity and infant attachment: Differential susceptibility of highly reactive infants. *Journal of Family Psychology, 20,* 266-274. doi.org/10.1037/0893-3200.20.2.266

Watson, D., & Clark, L. A. (1997). Extraversion and its positive emotional core. In R. Hogan, J. Johnson, S. Briggs (Eds.), *Handbook of Personality Psychology*. (pp. 767-793). San Diego, CA, US: Academic Press.

Zeifman, D. M. (2003). Predicting adult responses to infant distress: Adult characteristics associated with perceptions, emotional reactions, and timing of intervention. *Infant Mental Health Journal, 24*, 597-612. doi.org/10.1002/imhj.1007

Table 1

Descriptive Statistics for Study Variables

Variable	*N*	*M (SD)*	Skewness	Kurtosis
Mother				
BIS	41	1.72 (0.44)	0.44	-0.99
BAS Drive	41	2.07 (0.60)	0.49	0.41
BAS Fun Seeking	41	2.14 (0.49)	0.30	-0.25
BAS Reward Responsivene	41	1.31 (0.28)	1.14	0.95
Negative Reactivity	41	3.50 (0.76)	0.68	0.27
Anger	41	3.47 (0.87)	0.63	1.89
Fear	41	2.71 (1.56)	1.57	1.94
Sensitivity	40	4.36 (0.36)	-0.36	-0.27
Father				
BIS	41	2.40 (0.54)	0.02	-1.05
BAS Drive	41	2.31 (0.62)	0.40	0.62
BAS Fun Seeking	41	2.05 (0.54)	0.14	-0.43
BAS Reward Responsivene	41	1.54 (0.41)	1.27	2.89
Negative Reactivity	41	3.30 (0.56)	0.56	0.46
Anger	41	3.39 (0.71)	0.15	-0.62
Fear	41	2.24 (0.88)	2.16	7.37
Sensitivity	39	4.31 (0.38)	-0.61	0.16

Table 2

Within Parent Correlations - Mothers

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. BIS	1.00							
2. BAS Drive	-0.21	1.00						
3. BAS Fun Seeking	0.04	0.51**	1.00					
4. BAS Reward Responsiveness	-0.06	0.56**	0.72**	1.00				
5. Infant Negative Reactivity	0.10	-0.06	-0.02	-0.16	1.00			
6. Infant Anger	0.11	-0.08	-0.11	-0.21	0.68**	1.00		
7. Infant Fear	0.09	-0.07	-0.08	-0.08	0.86**	0.37*	1.00	
8. Maternal Sensitivity	0.07	-0.22	0.04	-0.20	0.34*	0.36*	0.13	1.00

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

Table 3

Within Parent Correlations - Fathers

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. BIS	1.00							
2. BAS Drive	-0.15	1.00						
3. BAS Fun Seeking	-0.03	0.41**	1.00					
4. BAS Reward Responsiveness	0.22	0.37*	0.27†	1.00				
5. Infant Negative Reactivity	0.14	-0.08	-0.03	-0.03	1.00			
6. Infant Anger	0.06	0.12	0.03	0.03	0.82**	1.00		
7. Infant Fear	0.19	-0.26	-0.15	-0.15	0.77**	0.47**	1.00	
8. Paternal Sensitivity	0.02	-0.35*	-0.30	-0.31†	-0.13	-0.18	-0.05	1.00

Note: $^{\dagger}p < .10$, * $p < .05$, ** $p < .01$

Table 4

Between Parent Correlations

Variable	1.	2.	3.	4.
1. Maternal Sensitivity	1.00			
2. Paternal Sensitivity	-0.07	1.00		
3. Neg. Reactivity (Maternal Rating)	0.34*	0.02	1.00	
4. Neg. Reactivity (Paternal Rating)	0.18	-0.13	0.43**	1.00

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

Table 5

Maternal Sensitivity Predicted by Infant Negative Reactivity and Parent Personality

	B	*SE* (*B*)	*β*	*df*	*F*	R^2
BIS						
I.				3	2.92*	0.13
Parent Order	-0.21†	0.11	-0.29			
Negative Reactivity	0.17*	0.07	0.36			
BIS	0.09	0.13	0.11			
II.				4	2.35†	0.12
Parent Order	-0.23*	0.16	-0.33			
Negative Reactivity	0.16*	0.71	-0.34			
BIS	0.10	0.13	0.12			
Negative Reactivity X BIS	-0.17	0.20	-0.13			
BAS Drive						
I.				3	3.43*	0.16
Parent Order	-0.19†	0.11	-0.26			
Negative Reactivity	0.17*	0.07	0.37			
BAS Drive	-0.13	0.09	-0.21			
II.				4	2.70*	0.15
Parent Order	-0.20†	0.11	-0.28			
Negative Reactivity	0.17*	0.07	0.37			
BAS Drive	-0.13	0.09	-0.21			
Negative Reactivity X BAS Drive	0.09	0.16	0.12			
BAS Fun Seeking						
I.				3	3.20*	0.15
Parent Order	-0.20†	0.11	-0.29			
Negative Reactivity	0.17*	0.07	0.37			
BAS Fun Seeking	-0.12	0.11	-0.17			
II.				4	2.90*	0.16
Parent Order	-0.20†	0.11	-0.28			
Negative Reactivity	0.20**	0.07	0.43			
BAS Fun Seeking	-0.15	0.11	-0.21			
Negative Reactivity X BAS Fun Seeking	0.19	0.14	0.21			
BAS Reward Responsiveness						
I.				3	3.17*	0.14
Parent Order	-0.19†	0.11	-0.27			
Negative Reactivity	0.16*	0.07	0.34			
BAS Reward	-0.20	0.19	-0.16			
II.				4	2.40†	0.13
Parent Order	-0.20†	0.11	-0.28			
Negative Reactivity	0.17*	0.07	0.36			
BAS Reward	-0.21	0.19	-0.17			
Negative Reactivity X BAS Reward	0.14	0.27	0.08			

Note: †$p < .10$, * $p < .05$, ** $p <. 01$

Table 6

Paternal Sensitivity Predicted by Infant Negative Reactivity and Parent Personality

	B	*SE* (*B*)	*β*	*df*	*F*	R^2
BIS						
I.				3	0.31	0.03
Parent Order	0.07	0.14	0.09			
Neg. Reactivity	-0.10	0.11	-0.14			
BIS	0.004	0.13	0.01			
II.				4	0.42	0.05
Parent Order	0.08	0.14	0.10			
Negative Reactivity	-0.11	0.11	-0.16			
BIS	-0.02	0.13	-0.03			
Neg. Reactivity X BIS	0.20	0.23	0.15			
BAS Drive						
I.				3	2.01	0.14
Parent Order	-0.01	0.12	-0.01			
Negative Reactivity	-0.10	0.10	-0.15			
BAS Drive	-0.22*	0.10	-0.36			
II.				4	1.49	0.15
Parent Order	-0.002	0.13	-0.002			
Negative Reactivity	-0.11	0.11	-0.16			
BAS Drive	-0.22*	0.10	-0.35			
Neg. Reactivity X BAS Drive	-0.04	0.15	-0.05			
BAS Fun Seeking						
I.				3	1.38	0.10
Parent Order	0.04	0.12	0.05			
Negative Reactivity	-0.08	0.11	-0.11			
BAS Fun Seeking	-0.20	0.12	-0.28			
II.				4	4.46**	0.34
Parent Order	0.02	0.11	0.03			
Negative Reactivity	-0.21*	0.10	-0.32			
BAS Fun Seeking	-0.23*	0.10	-0.33			
Neg. Reactivity X BAS Fun Seeking	-0.58**	0.17	-0.53			
BAS Reward Responsiveness						
I.				3	1.86	0.13
Parent Order	0.11	0.12	0.14			
Negative Reactivity	-0.10	0.11	-0.15			
BAS Reward	-0.31*	0.14	-0.33			
II.				4	1.37	0.14
Parent Order	0.11	0.12	0.14			
Negative Reactivity	-0.10	0.11	-0.14			
BAS Reward	-0.31*	0.15	-0.34			
Neg. Reactivity X BAS Reward	0.50	0.23	0.03			

Note: $^{\dagger}p < .10$, * $p < .05$, ** $p <. 01$.

Table 7

Maternal Sensitivity Predicted by Infant Anger and Parent Personality

	B	*SE* (*B*)	*β*	*df*	*F*	R^2
BIS						
I.				3	3.17*	0.21
Parent Order	-0.21†	0.11	-0.30			
Anger	0.15*	0.06	0.38			
BIS	0.08	0.12	0.10			
II.				4	2.79*	0.24
Parent Order	-0.28†	0.11	-0.31			
Anger	0.14*	0.06	0.34			
BIS	0.07	0.12	0.09			
Anger X BIS	0.17	0.14	0.19			
BAS Drive						
I.				3	3.64*	0.23
Parent Order	-0.19†	0.11	-0.27			
Anger	0.15*	0.06	0.37			
BAS Drive	-0.11	0.09	-0.18			
II.				4	2.66*	0.23
Parent Order	-0.19†	0.11	-0.27			
Anger	0.15*	0.07	0.37			
BAS Drive	-0.11	0.09	-0.18			
Anger X BAS Drive	-0.003	0.12	-0.004			
BAS Fun Seeking						
I.				3	3.31*	0.22
Parent Order	-0.20†	0.11	-0.29			
Anger	0.15*	0.06	0.38			
BAS Fun Seeking	-0.09	0.11	-0.13			
II.				4	2.42†	0.22
Parent Order	-0.20†	0.11	-0.29			
Anger	0.15*	0.06	0.38			
BAS Fun Seeking	-0.09	0.11	-0.13			
Anger X BAS Fun Seeking	-0.02	0.12	-0.02			
BAS Reward Responsiveness						
I.				3	3.38*	0.22
Parent Order	-0.20†	0.11	-0.28			
Anger	0.15*	0.06	0.36			
BAS Reward	-0.18	0.19	-0.14			
II.				4	3.19*	0.27
Parent Order	-0.18†	0.10	-0.25			
Anger	0.14*	0.06	0.36			
BAS Reward	-0.17	0.19	-0.13			
Anger X BAS Reward	0.34	0.23	0.22			

Note: †$p < .10$. * $p < .05$.

Table 8

Paternal Sensitivity Predicted by Infant Anger and Parent Personality

	B	*SE* (*B*)	*β*	*df*	*F*	R^2
BIS						
I.				3	0.48	0.04
Parent Order	0.07	0.14	0.09			
Anger	-0.10	0.09	-0.18			
BIS	-0.002	0.12	-0.002			
II.				4	0.53	0.06
Parent Order	0.06	0.14	0.08			
Anger	-0.09	0.09	-0.17			
BIS	-0.02	0.13	-0.03			
Anger X BIS	0.13	0.16	0.14			
BAS Drive						
I.				3	1.90	0.14
Parent Order	-0.01	0.12	-0.01			
Anger	-0.07	0.08	-0.13			
BAS Drive	-0.21*	0.10	-0.33			
II.				4	1.49	0.15
Parent Order	-0.02	0.13	-0.03			
Anger	-0.08	0.09	-0.14			
BAS Drive	-0.27*	0.11	-0.36			
Anger X BAS Drive	0.09	0.15	0.10			
BAS Fun Seeking						
I.				3	1.60	0.12
Parent Order	0.03	0.12	0.04			
Anger	-0.09	0.08	-0.16			
BAS Fun Seeking	-0.20	0.11	-0.29			
II.				4	4.36**	0.33
Parent Order	0.21	0.11	0.03			
Anger	-0.06	0.08	-0.10			
BAS Fun Seeking	-0.34**	0.11	-0.48			
Anger X BAS Fun Seeking	-0.56**	0.17	-0.51			
BAS Reward Responsiveness						
I.				3	1.96	0.14
Parent Order	0.10	0.12	0.13			
Anger	-0.09	0.08	-0.17			
BAS Reward	-0.30*	0.14	-0.32			
II.				4	1.45	0.14
Parent Order	0.10	0.12	0.13			
Anger	-0.09	0.08	-0.17			
BAS Reward	-0.31†	0.15	-0.34			
Anger X BAS Reward	0.06	0.23	0.04			

Note: †$p < .10$, * $p < .05$, **$p <. 01$

Table 9

Maternal Sensitivity Predicted by Infant Fear and Parent Personality

	B	*SE* (*B*)	*β*	*df*	*F*	R^2
BIS						
I.				3	1.17	0.09
Parent Order	-0.20	0.12	-0.28			
Fear	0.04	0.04	0.16			
BIS	0.09	0.13	0.11			
II.				4	1.22	0.12
Parent Order	-0.21†	0.12	-0.30			
Fear	0.03	0.04	0.14			
BIS	0.13	0.14	0.17			
Fear X BIS	0.10	0.08	0.19			
BAS Drive						
I.				3	1.65	0.12
Parent Order	-0.18	0.11	-0.25			
Fear	0.04	0.04	0.16			
BAS Drive	-0.12	0.09	-0.21			
II.				4	2.21†	0.20
Parent Order	-0.17	0.11	-0.23			
Fear	0.06	0.04	0.28			
BAS Drive	-0.10	0.09	-0.16			
Fear X BAS Drive	0.11†	0.06	0.31			
BAS Fun Seeking						
I.				3	1.49	0.11
Parent Order	-0.20†	0.12	-0.28			
Fear	0.04	0.04	0.19			
BAS Fun Seeking	-0.13	0.12	-0.18			
II.				4	2.29†	0.21
Parent Order	-0.20†	0.11	-0.28			
Fear	0.06†	0.04	0.28			
BAS Fun Seeking	-0.18	0.11	-0.25			
Fear X BAS Fun Seeking	0.12*	0.06	0.33			
BAS Reward Responsiveness						
I.				3	1.62	0.12
Parent Order	-0.19	0.11	-0.26			
Fear	0.04	0.04	0.15			
BAS Reward	-0.26	0.20	-0.20			
II.				4	1.86	0.18
Parent Order	-0.18	0.11	-0.25			
Fear	0.05	0.04	0.24			
BAS Reward	-0.22	0.20	-0.18			
Fear X BAS Reward	0.15	0.09	0.25			

Note: †$p < .10$, * $p < .05$.

Table 10

Paternal Sensitivity Predicted by Infant Fear and Parent Personality

	B	*SE* (*B*)	*β*	*df*	*F*	R^2
BIS						
I.				3	0.09	0.01
Parent Order	0.06	0.14	0.08			
Fear	0.02	0.07	0.04			
BIS	-0.01	0.13	-0.01			
II.				4	0.21	0.02
Parent Order	0.05	0.14	0.06			
Fear	0.02	0.07	0.05			
BIS	-0.001	0.13	-0.002			
Fear X BIS	-0.13	0.17	-0.13			
BAS Drive						
I.				3	1.67	0.12
Parent Order	-0.01	0.13	-0.01			
Fear	-0.02	0.07	-0.04			
BAS Drive	-0.22*	0.10	-0.36			
II.				4	1.25	0.13
Parent Order	-0.01	0.13	-0.01			
Fear	-0.03	0.08	-0.06			
BAS Drive	-0.22*	0.11	-0.35			
Fear X BAS Drive	-0.03	0.09	-0.06			
BAS Fun Seeking						
I.				3	1.20	0.09
Parent Order	0.03	0.13	0.04			
Fear	-0.003	0.07	-0.01			
BAS Fun Seeking	-0.21†	0.11	-0.29			
II.				4	1.36	0.13
Parent Order	0.02	0.12	0.03			
Fear	-0.07	0.08	-0.15			
BAS Fun Seeking	-0.20†	0.11	-0.29			
Fear X BAS Fun Seeking	-0.14	0.11	-0.26			
BAS Reward Responsiveness						
I.				3	1.52	0.11
Parent Order	0.10	0.13	0.13			
Fear	-0.01	0.07	-0.03			
BAS Reward	-0.31*	0.15	-0.33			
II.				4	1.15	0.12
Parent Order	0.10	0.13	0.13			
Fear	-0.03	0.09	-0.07			
BAS Reward	-0.30†	0.15	-0.33			
Fear X BAS Reward	-0.08	0.19	-0.08			

Note: †$p < .10$, * $p < .05$.

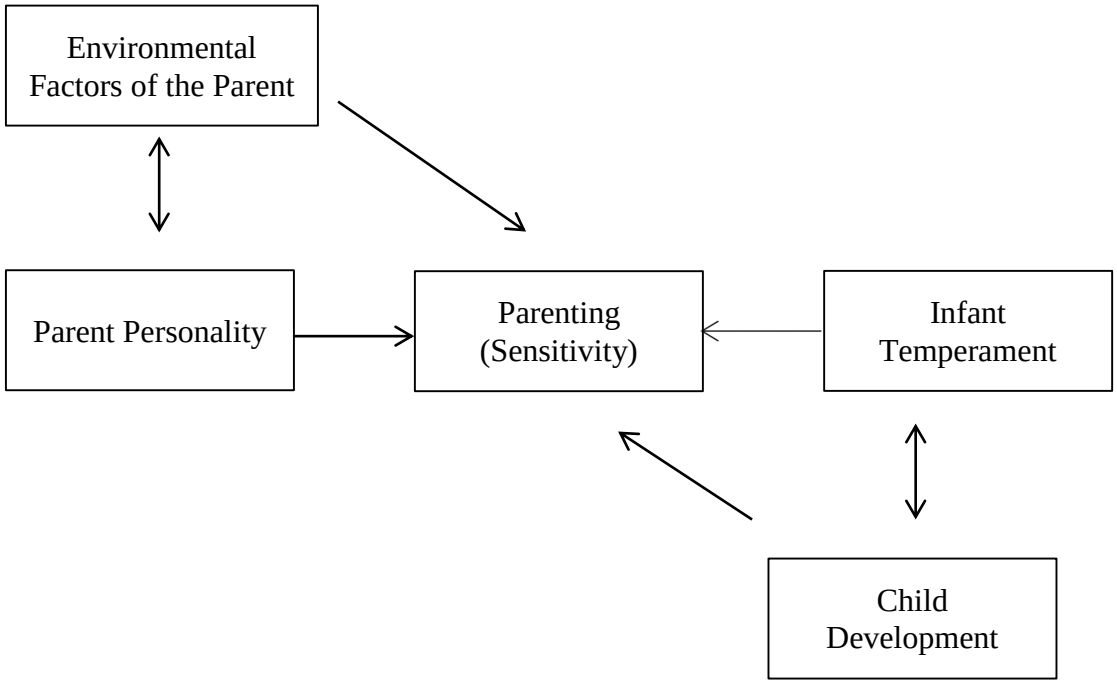

Figure 1. Adapted Determinants of Parenting Model (Belsky, 1984).

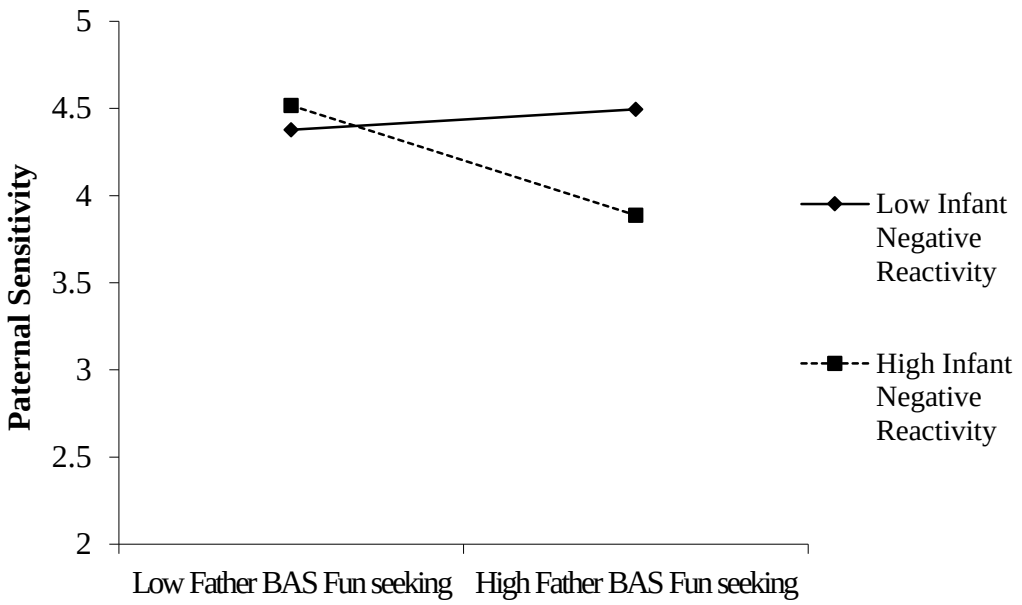

Figure 2. Graph of infant negative reactivity by paternal BAS Fun seeking interaction.

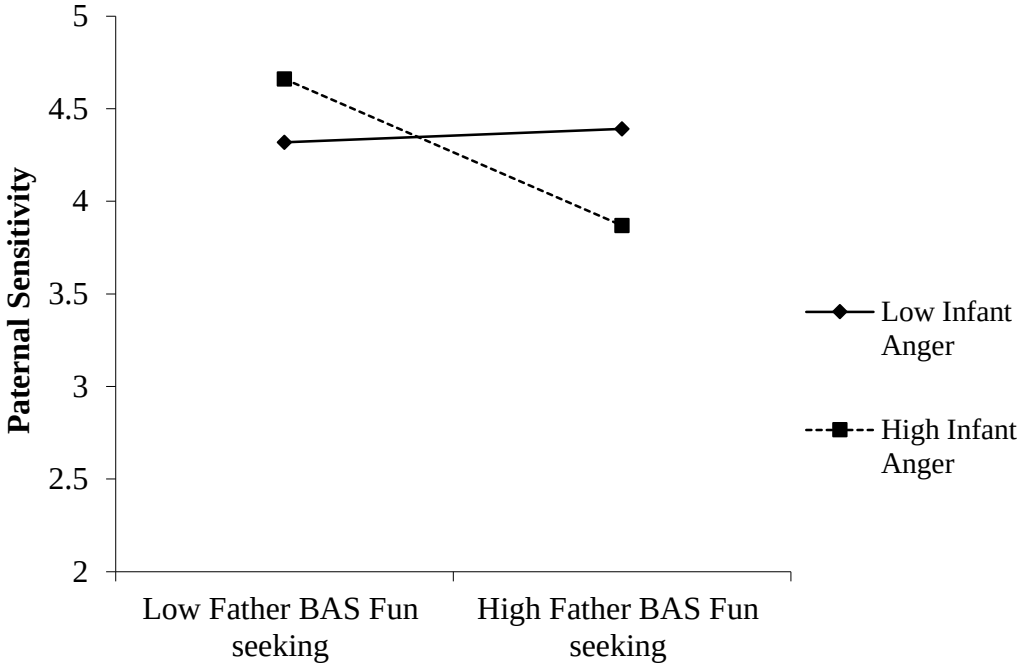

Figure 3. Graph of infant anger by paternal personality interaction.

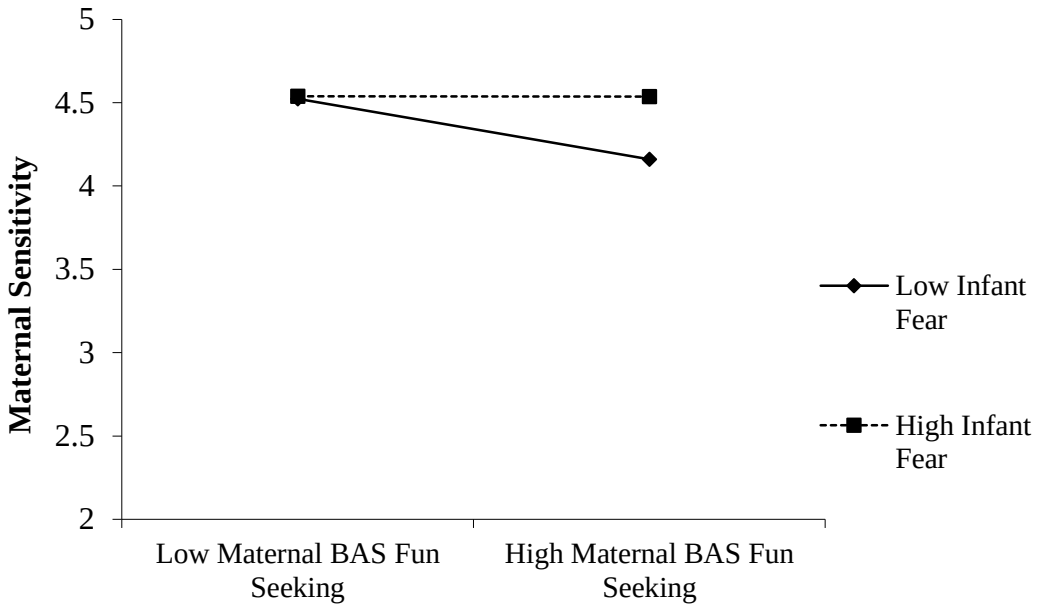

Figure 4. Graph of infant fear by maternal BAS fun seeking