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Parents' Differential Susceptibility to the Effects of Marital Quality on Sensitivity Across the First Year

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Abstract

The current investigation examined the differential susceptibility of parents to the effects of marital quality on changes in parenting. We predicted that parents who were high on the personality constructs Negative Affect and Constraint would be more susceptible to the effects of marital quality on their level of sensitivity. Sensitivity was assessed at 3.5 and 13 months for both mothers and fathers during a triadic interaction. Consistent with the differential susceptibility theory, results suggested that when mothers were high on Negative Affect and when fathers were high on Constraint, their marital quality was associated with changes in sensitivity. This investigation suggests that personality factors may create "vulnerabilities" in parents that make them differentially susceptible to the effects of the family environment on parenting

Keywords

Parent-child relations; Differential susceptibility; Personality; Marital relations; Family dynamics

1. Introduction

Parental sensitivity is often considered one of the most important aspects of quality caregiving. Early parental sensitivity has been linked to a number of positive child outcomes including: attachment security (de Wolff & van IJzendoorn, 1997), enhanced cognitive development (Lemelin, Tarabulsy, & Provost, 2006), and higher levels of school readiness (NICHD Early Child Care Research Network, 1999). In light of its established significance for child development, the precursors and correlates of parental sensitivity are of great interest to researchers.

Family systems researchers are particularly interested in how families develop and change over time (Cox & Paley, 2003; Darling & Steinberg, 1993). During the transition to parenthood, parents must learn how to behave toward their new baby and toward each other in new ways (Cox, 1985). This learning process implies that parenting may not be stable—particularly during the first year of life—as parents are adjusting to their new family system. Research has confirmed that parenting is less stable during infancy than when children are older (Holden & Miller, 1999). Thus, parenting patterns may become established toward the end of infancy, and these patterns may remain stable across childhood. Examining the predictors of increases or decreases in parenting quality during this transition may help identify families at risk for developing and/or maintaining insensitive parenting patterns across childhood.

In addition to understanding changes in parenting across time, the study of parenting in multiple contexts is also valuable for understanding family systems. Past research has focused primarily on dyadic parent-child contexts. Family systems theory, however, calls for examinations of parenting in other contexts, particularly the triadic context (Minuchin, 1985; 1988). Children in two-parent families spend a significant amount of time in triadic interaction with both parents present (Craig, 2006). Thus, it is important for researchers to examine this often ignored context.

Parents act differently toward their children when their spouse is present than they do in dyadic parent-child interactions (Belsky, 1979; Buhrmester, Camparo, Christensen, Gonzalaz, & Hinsaw, 1992; Goldberg, Clark-Stewart, Rice, & Dellis, 2002; Lindsey & Caldera, 2006). As such, studying the quality of interaction in a triadic context allows researchers to see a unique and more complex slice of family life (McHale, 1995; McHale & Rasmussen, 1998). Changes in parenting across time have been investigated in the dyadic context, and we extend our work to further understand the predictors of change in parenting in the triadic context.

1.1. Determinants of Parenting: Marital Quality

Belsky (1984) proposed that parenting is multiply determined and is dependent on parental, infant, and contextual factors (see also Belsky & Jaffee, 2006). In this model, factors pertaining to parents' psychological resources are highlighted. Specifically, parental personality and marital quality are proposed to be the most influential determinants of parenting quality and style (Belsky, 1984; see also Prinzie, Stams, Dekovic, Reijntjes, & Belsky, 2009; Verhoeven, Junger, Van Aken, Deković, & Van Aken, 2007).

It has been well documented that there is a positive association between marital quality and parenting. A meta-analysis by Erel and Burman (1995) reported a positive association between marital quality and parent-child relations (d = .46) and a comparably strong effect size during the infants' first year of life (d = .47). More recent research has established that marital quality plays a role in parenting not only in dyadic contexts, but also in triadic contexts. Kitzmann (2000) found that negativity in marital interactions was associated with more negativity in subsequent family-level interactions. On the other hand, parents who are in loving, supportive marriages may develop patterns of positive interactions as they work cooperatively in parenting (Talbot & McHale, 2004), and these interactions may strengthen over time as parents become more comfortable interacting with their infants.

1.2. Differential Susceptibility

The theory of differential susceptibility (Belsky, 1997; Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007) proposes that certain individuals are more susceptible to the effects of both positive and negative environmental influences. Belsky (2005) argues that it may be evolutionarily adaptive for children within the same family to differ in their levels of vulnerability to environmental influences and that these differences in vulnerability may increase reproductive success by protecting some children in the family from unsuccessful parenting practices (see also Belsky & Pluess, 2009).

Although the theory of differential susceptibility was originally applied to the study of infant behavior (e.g., Feldman, Greenbaum, & Yirmiya, 1999), researchers have recently extended this theory to adults by examining the differential susceptibility of certain parents with respect to parental sensitivity (van IJzendoorn, Bakermans-Kranenburg, & Mesman, 2008). These researchers examined the associations between daily hassles and parental sensitivity. They found that parents with certain genetic compositions (i.e., DRD4-7R and COMTval alleles) displayed a negative association between daily hassles and parental sensitivity. Parents without this genetic combination did not show an association between daily hassles and sensitivity.

The current investigation extends this line of research by examining the differential susceptibility of parents with certain personality traits to the effects—both positive and negative—of marital quality on parenting. This study examined two higher-order personality factors: Negative Affect and Constraint (Tellegen, 1982), and we will describe each of these with respect to the theory of differential susceptibility.

1.2.1 Negative Affect—Much of the research on differential susceptibility has examined infants and children high on negative emotionality or stress reactivity and their differential susceptibility to rearing environments (e.g., Belsky, Hsieh, & Crnic, 1998; Boyce & Ellis, 2005). Researchers theorized that children high on negative emotionality may be particularly hyperreactive to stress and thus more easily influenced by their environments (Boyce & Ellis, 2005). Negative Affect in adulthood is associated with both stress reactivity and negative emotionality in infancy and childhood (Caspi, 2000; Caspi et al., 2003; Caspi & Silva, 1995). Thus, we predicted that parents who were high on Negative Affect would be differentially susceptible to both positive and negative effects of marital quality. We

predicted that these parents would increase in sensitivity when in high quality marriages and decrease when in low quality marriages as they adjusted to their new infant.

1.2.2 Constraint—Research has also found evidence for the differential susceptibility of fearful, "uptight," or inhibited infants and children to environmental stimuli. An investigation by Gilissen and colleagues (Gilissen, Koolstra, van IJzendoorn, Bakermans-Kranenburg, & van der Veer, 2007) found that temperamentally fearful children were more susceptible to the quality of their relationship with their parents. These children showed more fear responses to frightening stimuli when they had low quality relationships with their parents and fewer fear responses when those relationships were high quality. Additionally, Kochanska, Aksan, & Joy (2007) found that fearful 15-month-olds were more vulnerable to the effects of power-assertive parenting than were less fearful children. A similar effect has been found with animal populations; Suomi (1995) found that more "uptight" monkeys were more affected by the quality of care that they received than were more "laid-back" monkeys.

Constraint may reflect adult fearfulness (Goldsmith, Losoya, Bradshaw, & Campos, 1994), and those high on Constraint have been described in the literature as "fearful and rigid" (Eder & Mangelsdorf, 1997). Additionally, behavioral inhibition in childhood has been associated with Constraint in adulthood (Caspi & Silva, 1995). Thus we predicted that parents high on Constraint would be differentially susceptible to the effects of marital quality on parenting. We predicted that these parents would show increases in sensitivity when in high quality marriages and decreases when in low quality marriages.

1.3. The Present Study

In summary, this investigation examined the differential susceptibility of some parents to the effects of marital quality on changes in triadic sensitivity across the first year of life. We expected parents with certain personality traits (i.e., high on Negative Affect and Constraint) to be particularly affected by their level of marital quality and increase in sensitivity when in high quality marriages and decrease when in low quality marriages. We predicted that parents without these endogenous characteristics would be less influenced by their marital quality.

2. Method

2.1. Participants

Sixty-five families in the Midwest area participated in the first three phases of a larger longitudinal research project. Participants were recruited through childbirth education classes, local newsletters, and fliers posted around the community: in doctors' offices, grocery stores, restaurants, and similar public places. Couples participated in the first phase of the study when mothers were in the third trimester of pregnancy and in the second phase when the children were approximately 3.5 months old. Families participated in the third phase when children were approximately 1 year old. Families received compensation for their participation in each phase.

All families in the study delivered healthy, full-term infants; 30 of these infants were female, and 35 were male. Mothers' ages ranged from 22 to 41 years at the time of the first visit, and

the mean age was 29 years (*SD* = 4.61). Fathers' ages ranged from 22 to 64 years, and the mean age was 32 years (*SD* = 6.80). Participants were primarily Caucasian, and the majority had completed college.

2.2. Phase 1: Third Trimester Home Visits

2.2.1. Procedure and measures—During the mothers' third trimester of pregnancy, mothers and fathers filled out identical questionnaire packets about themselves, their families, and their relationships. Participants were asked to complete the questionnaires separately from their spouses. Means and standard deviations for all measures are presented in Table 1. For the purposes of this investigation, the focus was on two types of questionnaires completed during the first phase: demographic and personality measures.

2.2.2. Demographic information—Each parent-to-be provided information concerning employment, family income, parent education, race, and the pregnancy.

2.2.3. Parental personality—Partners were asked to independently complete the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982). This 300-item measure is designed for use with non-clinical samples. This measure consists of three higher-order factors: Positive Affect, Negative Affect, and Constraint. These three MPQ scales were internally consistent; the average Cronbach's alpha for both mothers and fathers was .83 (all alphas > .70). These scales have been shown to be reliable over a 30-day re-test period (DiLalla, Gottesman, & Carey, & Vogler, 1997). For the purpose of this investigation, only Negative Affect and Constraint were examined. Negative Affect is similar to Neuroticism and is associated with stress reactivity, anxiety proneness, and aggression. Constraint reflects rigidity, traditionalism, and inhibition. Research has shown that personality is generally stable in adulthood (McCrae & Costa, 1994), thus a measure of personality taken shortly before their child's birth should be representative of individuals' personality through their child's first year of life.

2.3. Phase 2: 3.5 Month Postpartum Home Visit

2.3.1. Procedure and measures—Families were again contacted when their infants were approximately 3.5 months of age. Couples filled out questionnaires asking about their marital satisfaction. Marital interaction was coded during a family play session. During the home visit, couples were asked to change their infant into a "onesie" (a one-piece bodysuit or outfit) together, and their parenting quality was coded from this interaction.

2.3.2. Marital quality—Each member of the couple independently completed the Dyadic Adjustment Scale (DAS; Spanier, 1976). This measure assesses overall marital satisfaction as well as agreement on issues such as religion, intimacy, and finances. Cronbach's alphas were .90 for mothers and .85 for fathers. Lower scores reflect lower levels of marital satisfaction, and scores below 107 indicate marital distress (Crane, Allgood, Larson, & Griffin, 1990). Approximately 13% of mothers and 24% of fathers in this sample were characterized as maritally distressed, based on their DAS scores. While these percentages are somewhat high, research has shown that many parents experience a decline in marital

satisfaction following the birth of a child (Belsky & Pensky, 1988; Belsky & Rovine, 1990; Cowan & Cowan, 1992).

Mothers and fathers participated in a family play session with their infants. Families were instructed to play together with a colorful jungle gym with moveable parts. Marital interaction during this episode was videotaped and subsequently coded for approximately five minutes on 10 dimensions: Engagement, Enjoyment, Mother Positive Affect, Father Positive Affect, Mother Negative Affect, Father Negative Affect, Irritation, Cooperation, Balance, and Global Interaction Quality. Interactions were coded by a doctoral graduate student and a trained undergraduate research assistant. Gamma coefficients were used to calculate interrater reliability because, like Cohen's kappa, chance agreement is taken into account, yet gamma is more appropriate for use with ordinal rating scale data (Hays, 1981; Liebetrau, 1983). Gamma coefficients ranged from .66 to .97. Principal components analysis yielded two factors with composite loadings > .70. The first construct, Positive Marital Interaction, consisted of: Engagement, Enjoyment, Mother Positive Affect, Father Positive Affect, Cooperation, Balance, and Global Marital Quality. The second construct, Negative Marital Interaction, consisted of: Irritation, Mother Negative Affect, and Father Negative Affect. The two constructs were negatively correlated, $r(97) = -.54$, $p < .001$, thus Negative Marital Interaction was subtracted from Positive Marital Interaction to create an Observed Marital Interaction score. Mother- and father-reported marital satisfaction scores were positively correlated with one another, $r(62) = .61$, $p < .01$, and their average was positively correlated with Observed Marital Quality, $r(62) = .26$, $p < .05$. Thus, to create a more comprehensive measure of marital quality, we standardized the scores and summed Observed Marital Interaction with the average of maternal and paternal marital satisfaction, creating a composite called marital quality.

2.3.3. Parental sensitivity—Sensitivity was assessed in the triadic context during a task in which parents were asked to change their infant into a “onesie,” provided by researchers as a gift. Parents were instructed to behave as they normally would with their infants. The interaction was videotaped and subsequently coded by a doctoral graduate student and an undergraduate research assistant. Maternal and paternal sensitivity were coded separately but during the same episode. Sensitivity was assessed using global rating scales adapted from Goldstein, Diener, and Mangelsdorf (1996; originally adapted from Ainsworth, Bell, & Stayton, 1974, and Isabella, 1993). This coding scheme (Ainsworth et al., 1974) has been used in multiple investigations of both maternal and paternal sensitivity (e.g., Schoppe-Sullivan et al., 2006; Velderman, Bakermans-Kranenburg, Juffer, & van IJzendoorn, 2006). Sensitivity is described as providing an appropriate level of stimulation to the infant and warmly and promptly responding to the infants’ cues. The sensitivity measure was coded using a 5-point Likert scale (*1 = low*, *5 = high*) and was coded globally for the entire 5-minute episode. Agreement within-one-scale-point between coders was 100% for mothers and 96.6% for fathers. Gammas were .97 for mothers and .77 for fathers.

2.4. Phase 3: 13 Month Postpartum Laboratory Visit

2.4.1. Procedure and measures—The family (mother, father, child) was invited to the laboratory for the third phase of this study when their infants were approximately 13 months

old. Couples filled out questionnaire data, and parenting quality was coded during a family play session.

2.4.2. Parental sensitivity—Families were asked to play together as they normally would for 15 minutes and then asked to clean up the toys with their children. The interaction was videotaped, and sensitivity was coded based on the free play and up to five minutes of the cleanup time. The parental sensitivity scales were changed slightly from those used at Phase 2 in order to be appropriate for parent-infant interactions with one-year-old infants, although the underlying construct was identical. Sensitivity was coded by trained coders using a global rating scale adapted from Lindahl and Malik (2001). This scale has been used in multiple investigations (e.g., Lindahl, Malik, Kaczynski, & Simons, 2004). The sensitivity global rating scale employed a 7- point likert scale (1 = *highly insensitive*, 7 = *highly sensitive*). Each coder coded both mother-and father-child interactions; however, sensitivity for mothers and fathers was coded separately. Coders overlapped on 64% of the tapes, and gamma coefficients were .78 and .83 for mothers and fathers, respectively. Agreement within one scale point was 95% for mothers and 93% for fathers. This scale was transformed to a 5-point scale (by multiplying it by 5/7) in order to be consistent with the 3-month measure of sensitivity.

3. Results

Analyses were conducted in several steps. First, preliminary analyses examined the stability of sensitivity between 3.5 months and 13 months for both mothers and fathers. Difference (change) scores on sensitivity between these two time points were then computed for both mothers and fathers. Next, the data were examined for consistency with the theory of differential susceptibility (Belsky et al., 2007).

3.1. Preliminary Analyses: Stability and Change in Sensitivity

Correlations between sensitivity measures across time were computed. Maternal sensitivity was not significantly correlated across time, $r(65) = .20$, $p = .11$ (see Table 2). Paternal sensitivity, however, was significantly correlated across time, $r(65) = .25$, $p < .05$. Fisher r-to-z transformations were used to examine the difference in magnitude of these correlations. These correlations were not significantly different from one another, $z = -.26$, $p = .79$. Additionally, a 2x2 ANOVA revealed that mothers and fathers did not differ significantly on sensitivity, collapsed across time point, $F(1,256) = 2.03$, $p = .16$, and the two time points did not differ significantly on sensitivity ratings, collapsed across parent, $F(1,256) = 1.11$, $p = .29$. However, mothers and fathers differed on their levels of sensitivity between the two time points, $F(1,256) = 5.05$, $p < .05$. As shown in Table 1, mothers slightly increased in sensitivity, and fathers decreased slightly.

In order to create a measure of change in sensitivity across the first year of life, difference scores were calculated between 3-month and 12-month sensitivity ratings separately for mothers and fathers (Sensitivity Change). Difference scores are the most appropriate method for assessing within-person change between two time points and have been shown to be better estimates of change than are residual scores (Rogosa & Willet, 1983). They are a more intuitive and clear method for measuring change over time and have been shown to be

reliable, particularly when scores across time have low to moderate correlations (Rogosa & Willett, 1983), as was the case in this investigation. Change scores have also been shown to be appropriate for use as the dependent variable in regression analyses (Allison, 1990) and have been used in many other investigations to assess change over time (e.g., Lawrence, Nylen, & Cobb, 2007; Morrow & Nolen-Hoeksema, 1990). Based on Rogosa and Willett's (1983) finding that standardization can remove potentially valuable information about change over time, we left the sensitivity scores unstandardized, although, as mentioned previously, the measure of sensitivity at 13 months was transformed so that both measures were on a 5-point scale.

We computed Sensitivity Change scores by subtracting the 3-month sensitivity scores from the 12-month sensitivity scores. For both mothers and fathers, a low difference score reflected a decrease in triadic sensitivity score between 3-months and 12-months, and a high difference score reflected an increase in triadic sensitivity between the two time points. Mothers' and fathers' Sensitivity Change scores were positively correlated, $r(65) = .40$, $p < .001$. It is important to note that we were measuring relative, not absolute, stability (see Holden & Miller, 1999 for a review).

Associations between changes in sensitivity and demographic variables (i.e., education level, age, income, race, and months of marriage) were investigated. Change in sensitivity for both mothers and fathers was associated with father's level of education, $r(64) = .49$, $p < .001$, and $r(64) = .24$, $p = .05$, respectively. Higher levels of paternal education were associated with increases in sensitivity over time. Because change in sensitivity for both mothers and fathers was associated with levels of father education, this variable was controlled for in subsequent analyses.

3.2. Primary Analyses: Predicting Changes in Sensitivity and Testing for Differential Susceptibility

Belsky and colleagues (2007) provide criteria for testing for differential susceptibility. The first of these criteria is that there is independence of the susceptibility factor (parental personality) and the predictor (marital quality). As shown in Table 3, marital quality was not significantly correlated with any of the parental personality measures, although the association between marital quality and maternal Negative Affect was a trend.

The second test for differential susceptibility examines the association between the susceptibility factor (personality) and the outcome (change in sensitivity). Differential susceptibility requires a nonsignificant association between these factors. As shown in Table 3, change in parental sensitivity was not associated with personality for that parent, although paternal negative affect was associated with changes in maternal sensitivity.

The next criterion for differential susceptibility is that there is a significant interaction between the susceptibility factor (parental personality) and the predictor (marital quality). Belsky and colleagues (2007) also recommend a comparison of the plotted regression against a prototype in which one line has a simple slope not significantly different from zero, and the other line has a significant slope.

Regression analyses were conducted to answer this question and test for an interaction between parental personality and marital quality in predicting changes in sensitivity. For all interactions, predictor and susceptibility variables were centered by subtracting their means to minimize multicollinearity, and interaction terms were computed by multiplying predictor and susceptibility variables. Father's level of education was entered in the first step of the regression for all analyses as a covariate. For the next step, predictor and susceptibility variables were entered as main effects. The interaction term was entered in the last step. Analyses were conducted to examine interactions between each of the two personality constructs (i.e., Negative Affect and Constraint) and marital quality for each parent. Thus, four regression analyses were computed in total.

3.2.1. Changes in Maternal Sensitivity—The marital quality×maternal Negative Affect model was significant, $F(4,58) = 6.14$, $p < .001$, accounting for 30% of the variance. The interaction term was also significant, $\beta = .23$, $p < .05$ (see Table 4). We plotted this interaction at one SD above and below the means of the variables comprising the interaction term (see Aiken & West, 1991). As shown in Figure 1, when mothers were high on Negative Affect, they increased in sensitivity when in high quality marriages and decreased when in low quality marriages, $\beta = .28$, $p < .10$. There was no significant association between marital quality and maternal sensitivity change when mothers were low on Negative Affect, $\beta = -.18$, $p = .27$. Although the significance of the simple slope of the line representing mothers high on Negative Affect was a trend, this figure is consistent with the theory of differential susceptibility.

The model examining marital quality and maternal Constraint was also significant, $F(4,58) = 6.23$, $p < .001$, accounting for 30% of the variance (see Table 5). The interaction term was significant, $\beta = .23$, $p < .05$. Interestingly, as shown in Figure 2, neither line was significantly different from zero. Although this does not fit with the differential susceptibility theory, the direction of the effects indicates that mothers who were high on Constraint tended to increase in sensitivity when in high quality marriages.

3.2.2. Changes in Paternal Sensitivity—The model with marital quality and paternal Constraint as predictors was significant, $F(4,58) = 2.74$, $p < .05$, accounting for 16% of the variance (see Table 6). The paternal Constraint×marital quality interaction was significant, $\beta = .28$, $p < .05$, and is presented in Figure 3. When fathers were high on Constraint, they increased in sensitivity when they were in high quality marriage and decreased when in low quality marriages, $\beta = .45$, $p < .05$. There was no significant association between marital quality and paternal sensitivity change for fathers who were low on Constraint, $\beta = -.13$, $p = .43$. This figure is consistent with the theory of differential susceptibility—fathers who are high on Constraint seem to be differentially affected by their marital quality.

4. Discussion

The current investigation tested the theory of differential susceptibility (Belsky, 1997) of parents with particular personality traits. We found support for this theory—that certain individuals are more vulnerable to environmental factors than others—for both Negative Affect and Constraint. The results of this investigation suggest that when parents were high

on a relevant personality construct (i.e., Constraint and Negative Affect), marital quality was associated with changes in sensitivity over time. However, parents who were low on the construct were not vulnerable to the effects of marital quality on their parenting.

Although most of the research on differential susceptibility has examined infants with difficult temperament, we extended this research to adults. Parents who were high on Negative Affect—a personality factor which has repeatedly been associated with negativity or difficulty in infancy (e.g., Caspi, 2000)—were more susceptible to environmental influences (i.e., marital quality) on their parenting. Specifically, mothers who were high on Negative Affect increased in triadic sensitivity when they were in high quality marriages and decreased when in low quality marriages.

For fathers, a high level of Constraint was associated with an increase in triadic sensitivity when marital quality was high and a decrease when marital quality was low. Again, this finding is consistent with the theory of differential susceptibility. Fathers who were high on Constraint—a construct which has been associated with fearfulness and rigidity in childhood (e.g., Gilissen et al., 2004)—were more susceptible to the effects of their level of marital quality. Interestingly, for the model examining the interaction between marital quality and maternal Constraint, both the overall model and the interaction term were significant. However, neither line in the regression plot was significantly different from zero. The line representing mothers high on Constraint, however, was positively sloped, which is consistent with the interaction between paternal Constraint and marital quality. Despite this, this interaction is more consistent with contrastive effects—in which the slopes of the lines are in opposite directions—than with differential susceptibility (see Belsky et al., 2007).

We speculate that the processes behind these interactions are similar to the processes hypothesized to operate in findings on the differential susceptibility of infants with corresponding temperamental make-ups. Infants high on negative emotionality are especially reactive to both positive and negative environmental factors (e.g., Belsky et al., 1998; Boyce & Ellis, 2005). Thus, parents high on Negative Affect may be especially affected by their marital quality, and their parenting quality may change accordingly. A similar mechanism is thought to be present in infants who are particularly fearful or uptight.

In the present study, we found that the correlation between sensitivity at the two time points (the stability of sensitivity) was significant for fathers, although the correlations for mothers and fathers were comparable and modest. Indeed, with a slightly larger sample, the correlations for mothers may have also been significant. Past research has documented nonsignificant correlation of maternal sensitivity measures at 3- and 12-months (Crockenberg & McCluskey, 1986). Additionally, in their meta-analysis examining stability in parenting, Holden and Miller (1999) found lower levels of stability across time in parenting during infancy than in other periods of childhood. Thus our results are consistent with previous research.

Change in sensitivity for both mothers and fathers was associated with paternal education. Paternal education was consistently associated with predicted outcome variables in our sample (e.g., marital quality, maternal depression), although these associations were not

found with income level. Thus, we believe that, in our sample, paternal education is a better measure of socioeconomic status (SES) than is income. Researchers have consistently found that lower SES is associated with lower quality parenting (e.g., de Wolff & van IJzendoorn, 1997; Dodge, Pettit, & Bates, 1994). Thus it seems logical that these higher SES parents would be better equipped to increase in sensitivity as they become more comfortable interacting with their infants.

4.1. Limitations and Future Directions

In the current investigation, sensitivity was measured differently at 3 months and 13 months (via a task in which parents changed the infant into a "onesie" at 3 months and a family play task at 13 months). Given the considerable developmental changes taking place between 3 and 13 months of age, the use of identical measures at both time points may have been difficult. Studies similar to the current investigation (e.g., Crockenberg & McCluskey, 1986; Pianta, Sroufe, & Egeland, 1989) have also used different measures of sensitivity at different time points. For example, Crockenberg and McCluskey (1986) assessed sensitivity at 3 months during home observations and at 12 months during the Strange Situation.

One limitation of the current investigation was the low variability of the sensitivity measures. The low variability could be due in part to the short duration of the activities or to the fact that very little child distress was present, leaving fewer opportunities for parental responsivity to infants' cues. Recent research suggests that sensitivity to infant distress may be more predictive of child outcomes than is sensitivity to non-distress (Leerkes, Blankson, & O'Brien, 2009; McElwain & Booth-LaForce, 2006). Thus, further research using different measures, or measuring sensitivity under more stressful circumstances, may provide more variability, thus painting a clearer picture of sensitivity during this period. However, the fact that we were able to find predictors of change in the current investigation, despite the low variability of our earlier measure, speaks to the strength of these findings.

The present study consisted of mostly middle-class European-American families. Looking at more diverse samples would likely yield even more information about the important role that contextual factors play in family systems and child development. Future research should explore these questions in other samples in order to better understand the generalizability of these findings.

Despite these limitations, the results of this study suggest that endogenous factors (i.e., personality) may create "vulnerabilities" in parents that make them differentially susceptible to the effects of the family environment on parenting. Some parents' sensitivity seems to be relatively unaffected by their marital quality, while others seem to be affected—both positively and negatively—by the quality of their marriages. In sum, future research should examine the differential susceptibility of parents with respect to various social-contextual factors to further illuminate individual differences in parenting across time.

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References

Aiken, LS.; West, SG. Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage Publications; 1991.

Ainsworth, MDS.; Bell, SM.; Stayton, DJ. Infant-mother attachment and social development: "Socialization" as a product of reciprocal responsiveness to signals. In: Richards, MPM., editor. The integration of a child into a social world. London: Cambridge University Press; 1974. p. 98-135.

Allison PD. Change scores as dependent variables in regression analysis. Sociological Methodology. 1990; 20:93–114.

Belsky J. Mother-father-infant interaction: A naturalistic observational study. Developmental Psychology. 1979; 15:601–607.

Belsky J. The determinants of parenting: A process model. Child Development. 1984; 55:83–96. [PubMed: 6705636]

Belsky J. Theory testing, effect-size evaluation, and differential susceptibility to rearing influence: The case of mothering and attachment. Child Development. 1997; 68:598–600. [PubMed: 9306638]

Belsky, J. Differential susceptibility to rearing influence: An evolutionary hypothesis and some evidence. In: Ellis, BJ.; Bjorklund, DF., editors. Origins of the social mind: Evolutionary psychology and child development. NY: Guilford Press; 2005. p. 139-163.

Belsky J, Bakermans-Kranenburg MJ, van IJzendoorn MH. For bette *and* for worse: Differential susceptibility to environmental influences. Current Directions in Psychological Science. 2007; 16:300–304.

Belsky J, Hsieh K, Crnic K. Mothering, fathering, and infant negativity as antecedents of boys' externalizing problems and inhibition at age 3 years: Differential susceptibility to rearing experience? Development & Psychopathology. 1998; 10:301–319. [PubMed: 9635226]

Belsky, J.; Jaffee, SR. The multiple determinants of parenting. In: Cicchetti, D.; Cohen, DJ., editors. Developmental psychopathology: Vol. 3: Risk, disorder, and adaptation. 2nd ed. Hoboken, NJ: Wiley; 2006. p. 38-85.

Belsky J, Pensky E. Marital change across the transition to parenthood. Marriage & Family Review. 1988; 12:133–156.

Belsky J, Pluess M. Beyond diathesis stress: Differential susceptibility to environmental influences. Psychological Bulletin. 2009; 135:885–908. [PubMed: 19883141]

Belsky J, Rovine M. Patterns of marital change across the transition to parenthood: Pregnancy to three years postpartum. Journal of Marriage & the Family. 1990; 52:5–19.

Bornstein MH, Tamis-LeMonda CS. Activities and interactions of mothers and their firstborn infants in the first six months of life: Covariation, stability, continuity, correspondence, and prediction. Child Development. 1990; 61:1206–1217. [PubMed: 2209190]

Boyce WT, Ellis BJ. Biological sensitivity to context: I. An evolutionary-developmental theory of the origins and functions of stress reactivity. Development & Psychopathology. 2005; 17:271–301. [PubMed: 16761546]

Buhrmester D, Camparo L, Christensen A, Gonzalaz LS, Hinsaw SP. Mothers and fathers interacting in dyads and triads with normal and hyperactive sons. Developmental Psychology. 1992; 28:500–509.

Caspi A. The child is father of the man: Personality continuities from childhood to adulthood. Journal of Personality and Social Psychology. 2000; 78:158–172. [PubMed: 10653512]

Caspi A, Harrington H, Milne B, Amell JW, Theodore RF, Moffitt TE. Children's behavioral styles at age 3 are linked to their adult personality traits at age 26. Journal of Personality. 2003; 71:495–513. [PubMed: 12901429]

Caspi A, Silva PA. Temperamental qualities at age three predict personality traits in young adulthood: Longitudinal evidence from a birth cohort. Child Development. 1995; 66:486–498. [PubMed: 7750379]

Cowan, CP.; Cowan, CA. When partners become parents: The big life change for couples. NY: Basic Books; 1992.

Cox MJ. Progress and continued challenges in understanding the transition to parenthood. Journal of Family Issues. 1985; 6:395–408. [PubMed: 12340555]

Cox MJ, Paley B. Understanding families as systems. Current Directions in Psychological Science. 2003; 12:193–196.

Craig L. Does father care mean fathers share? A comparison of how mothers and fathers in intact families spend time with their children. Gender & Society. 2006; 20:259–281.

Crane DR, Allgood SM, Larson JH, Griffin W. Assessing marital quality with distressed and nondistressed couples: A comparison and equivalency table for three frequently used measures. Journal of Marriage and the Family. 1990; 52:87–93.

Crockenberg SB, McCluskey K. Change in maternal behavior during the baby's first year of life. Child Development. 1986; 57:746–753.

Darling N, Steinberg L. Parenting style as context: An integrative model. Psychological Bulletin. 1993; 113:487–496.

de Wolff MS, van IJzendoorn MH. Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. Child Development. 1997; 68:571–591. [PubMed: 9306636]

DiLalla DL, Gottesman II, Carey G, Vogler GP. Joint factor structure of the Multidimensional Personality Questionnaire and the MMPI in a psychiatric and high-risk sample. Psychological Assessment. 1997; 5:207–215.

Dodge KA, Pettit GS, Bates JE. Socialization mediators of the relation between socioeconomic status and child conduct problems. Child Development. 1994; 65:649–665. [PubMed: 8013245]

Dougherty WJ, Kouneski EF, Erickson MF. Responsible fathering: An overview and conceptual framework. Journal of Marriage and the Family. 1998; 60:277–292.

Eder, RA.; Mangelsdorf, SC. The emotional basis of early personality development. In: Hogan, R.; Johnson, JA., editors. Handbook of personality psychology. San Diego, CA: Academic Press; 1997. p. 209-240.

Erel O, Burman B. Interrelatedness of marital relations and parent-child relations: A meta-analytic review. Psychological Bulletin. 1995; 118:108–132. [PubMed: 7644602]

Feldman R, Greenbaum CW, Yirmiya N. Mother-infant affect synchrony as an antecedent of the emergence of self-control. Developmental Psychology. 1999; 35:223–231. [PubMed: 9923477]

Gilissen R, Koolstra CM, van IJzendoorn MH, Bakermans-Kranenburg MJ, van der Veer R. Physiological reactions of preschoolers to fear-inducing film clips: Effects of temperamental fearfulness and quality of the parent-child relationship. Developmental Psychobiology. 2007; 49:187–195. [PubMed: 17299791]

Goldberg WA, Clarke-Stewart A, Rice JA, Dellis E. Emotional energy as an explanatory construct for fathers' engagement with their infants. Parenting: Science and Practice. 2002; 2:379–408.

Goldsmith, HH.; Losoya, SH.; Bradshaw, DL.; Campos, JJ. Genetics of personality: A twin study of the five-factor model and parent-offspring analyses. In: Halverson, CF., Jr; Kohnstamm, GA.; Martin, RP., editors. The developing structure of temperament and personality from infancy to adulthood. Hillsdale, NJ: Lawrence Erlbaum; 1994. p. 241-265.

Goldstein LH, Diener ML, Mangelsdorf SC. Maternal characteristics and social support across the transition to motherhood: Associations with maternal behavior. Journal of Family Psychology. 1996; 10:60–71.

Hays, WL. Statistics. 3rd ed.. New York: Holt, Rinehart, and Winston; 1981.

Holden GW, Miller PC. Enduring and different: A meta-analysis of the similarity n parents' child rearing. Psychological Bulletin. 1999; 125:223–254. [PubMed: 10087937]

Isabella RA. Origins of attachment: Maternal interactive behavior across the first year. Child Development. 1993; 64:605–621. [PubMed: 8477637]

Kitzmann KM. Effects of marital conflict on subsequent triadic family interactions and parenting. Developmental Psychology. 2000; 36:3–13. [PubMed: 10645740]

Kochanska G, Aksan N, Joy ME. Children's fearfulness as a moderator of parenting in early socialization: Two longitudinal studies. Developmental Psychology. 2007; 43:222–237. [PubMed: 17201521]

Lawrence E, Nylen K, Cobb RJ. Prenatal expectations and marital satisfaction over the transition to parenthood. Journal of Family Psychology. 2007; 21:155–164. [PubMed: 17605538]

Leerkes EM, Blankson AN, O'Brien M. Differential effects of maternal sensitivity to infant distress and non-distress on social-emotional functioning. Child Development. 2009; 80:762–775. [PubMed: 19489902]

Lemelin J, Tarabulsy GM, Provost MA. Predicting preschool cognitive development from infant temperament, maternal sensitivity, and psychosocial risk. Merrill-Palmer Quarterly. 2006; 52:779–806.

Liebetrau, AM. Measures of association. Newbury Park, CA: Sage Publications; 1983.

Lindahl, KM.; Malik, NM. The system for coding interactions and family functioning. In: Kerig, P.; Lindahl, KM., editors. Family observational coding systems: Resources for systemic research. Mahwah, NJ: Erlbaum; 2001. p. 77-91.

Lindahl KM, Malik NM, Kaczynski K, Simons JS. Couple power dynamics, systemic family functioning, and child adjustment: A test of a meditational model in a multiethnic sample. Development and Psychopathology. 2004; 16:609–630. [PubMed: 15605628]

Lindsey EW, Caldera YM. Mother-father-child triadic interaction and mother-child dyadic interaction: Gender differences within and between contexts. Sex Roles. 2006; 55:511–521.

McCrae RR, Costa PT. The stability of personality: Observation and evaluations. Current Directions in Psychological Science. 1994; 3:173–175.

McElwain NL, Booth-LaForce C. Maternal sensitivity to distress and nondistress as predictors of infant-mother attachment security. Journal of Family Psychology. 2006; 20:247–255. [PubMed: 16756400]

McHale JP. Coparenting and triadic interactions during infancy: The roles of marital distress and child gender. Developmental Psychology. 1995; 31:985–996.

McHale JP, Rasmussen JL. Coparental and family-group level dynamics during infancy: Early family precursors of child and family functioning during preschool. Developmental Psychology. 1998; 10:39–59.

Minuchin P. Families and individual development: Provocations from the field of family therapy. Child Development. 1985; 56:289–305. [PubMed: 3886321]

Minuchin, P. Relationships within the family: A systems perspective on development. In: Hinde, RA.; Stevenson-Hinde, J., editors. Relationships within families. Oxford: England, Clarendon; 1988. p. 7-26.

Morrow J, Nolen-Hoeksema S. Effects of response to depression on the remediation of depressive affect. Journal of Personality and Social Psychology. 1990; 58:519–527. [PubMed: 2324941]

NICHD Early Child Care Research Network. Child care and mother-child interaction in the first three years of life. Developmental Psychology. 1999; 35:1399–1413. [PubMed: 10563730]

Pianta RC, Sroufe LA, Egeland B. Continuity and discontinuity in maternal sensitivity at 6, 24, and 42 months in a high-risk sample. Child Development. 1989; 60:481–487. [PubMed: 2924663]

Prinzie P, Stams G, Dekovic M, Reijntjes A, Belsky J. The relations between parents' Big Five personality factors and parenting: A meta-analytic review. Journal of Personality and Social Psychology. 2009; 97:351–362. [PubMed: 19634980]

Rogosa DR, Willett JB. Demonstrating the reliability of the difference score in the measurement of change. Journal of Educational Measurement. 1983; 20:335–343.

Schoppe, Sullivan SJ.; Diener, ML.; Mangelsdorf, SC.; Brown, GL.; McHale, JL.; Frosch, CA. Attachment and sensitivity in family context: The roles of parent and infant gender. Infant & Child Development. 2006; 15:367–385.

Spanier G. Measuring dyadic adjustment: New scales for assessing the quality of marriage and similar dyads. Journal of Marriage and the Family. 1976; 38:15–28.

Suomi, S. Influence of attachment theory on ethological studies of biobehavioral development in nonhuman primates. In: Goldberg, S.; Muir, R.; Kerr, J., editors. Attachment theory: Social, developmental, and clinical perspectives. Hillsdale, NJ: Academic Press; 1995. p. 185-202.

Talbot JA, McHale JP. Individual parental adjustment moderates the relationship between marital and coparenting quality. Journal of Adult Development. 2004; 11:191–205. [PubMed: 21127730]

Tellegen, A. Brief manual for the Multidimensional Personality Questionnaire. Minneapolis: Department of Psychology, University of Minnesota; 1982.

van IJzendoorn MH, Bakermans-Kranenburg MJ, Mesman J. Dopamine system genes associated with parenting in the context of daily hassles. Genes, Brain, & Behavior. 2008; 7:403–410.

Velderman MK, Bakermans-Kranenburg MJ, Juffer F, van IJzendoorn MH. Effects of attachment-based interventions on maternal sensitivity and infant attachment: Differential susceptibility of highly reactive infants. Journal of Family Psychology. 2006; 20:266–274. [PubMed: 16756402]

Verhoeven M, Junger M, Van Aken C, Deković M, Van Aken MAG. Parenting during toddler-hood: Contributions of parental, contextual and child characteristics. Journal of Family Issues. 2007; 28:1663–1691.

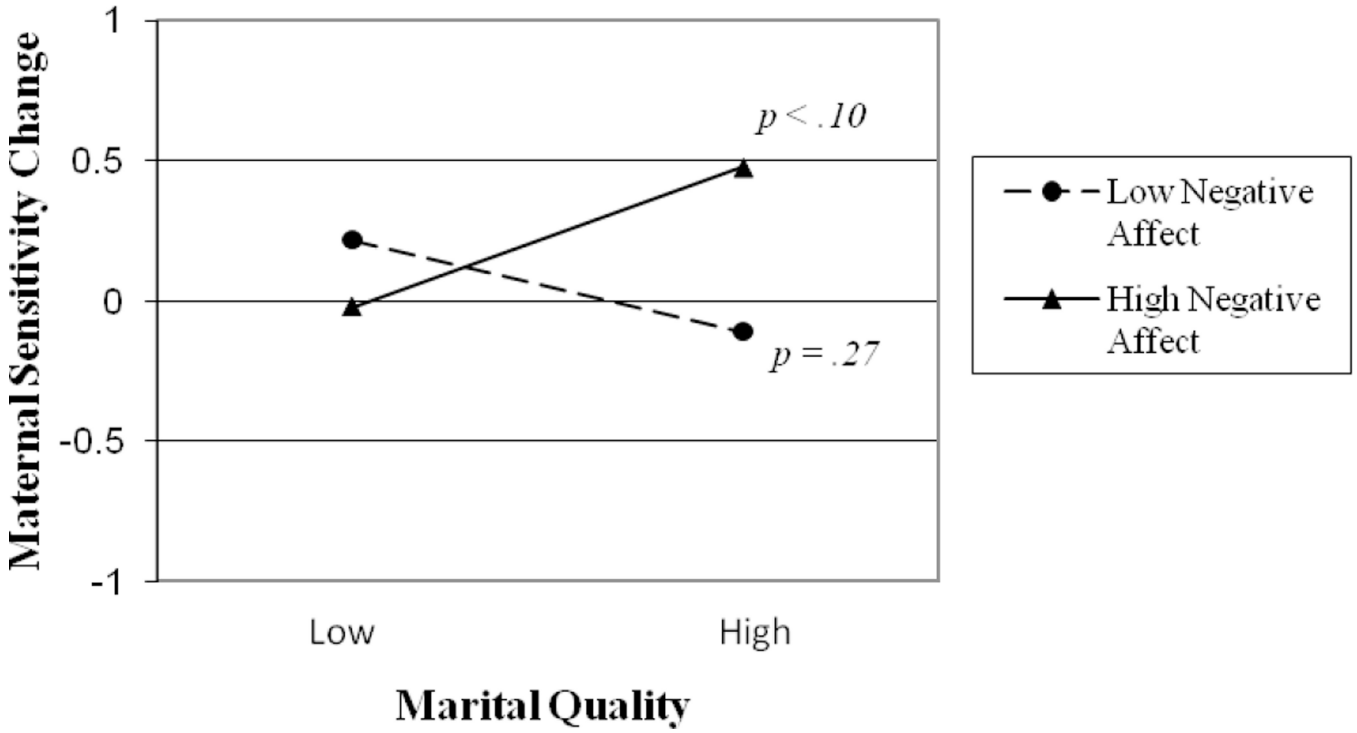

Figure 1.
Change in maternal sensitivity as a function of maternal Negative Affect and marital quality.

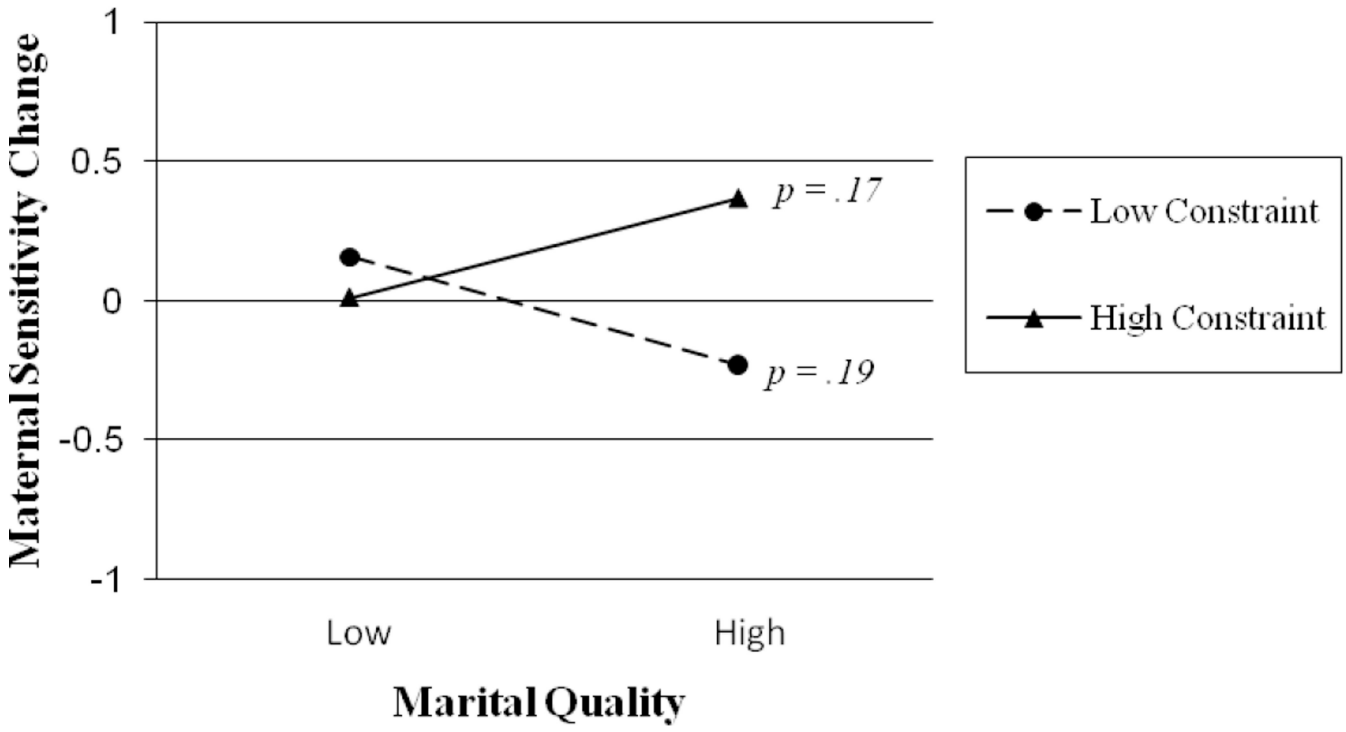

Figure 2.
Changes in maternal sensitivity as a function of maternal Constraint and marital quality.

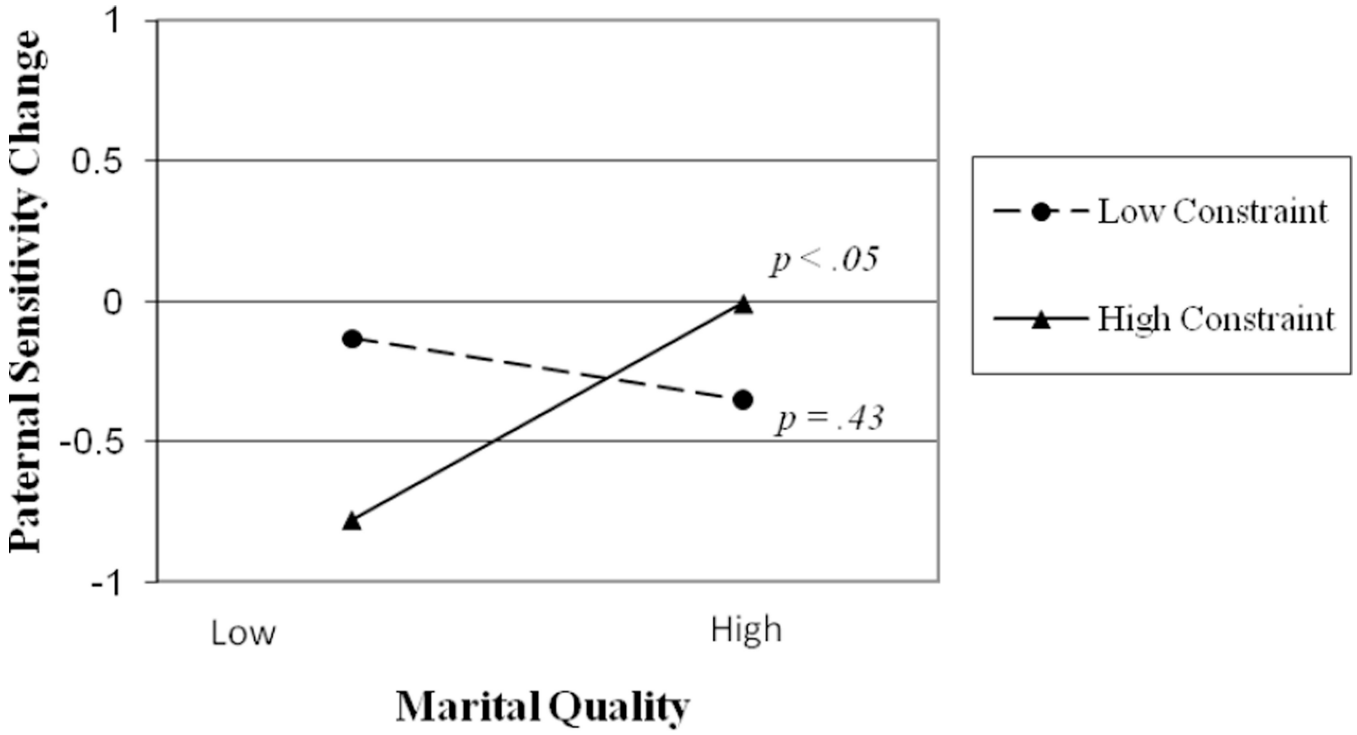

Figure 3.
Changes in paternal sensitivity as a function of paternal Constraint and marital quality.

Table 1

Descriptive Statistics for Study Measures

Measure	Mean	SD	Min	Max
3-month Mother Triadic Sensitivity	3.69	.56	2	5
12-month Mother Triadic Sensitivity	3.79	.75	2.14	5
3-month Father Triadic Sensitivity	3.76	.43	2	4.5
12-month Father Triadic Sensitivity	3.46	.86	2.14	5
Maternal Sensitivity Change	.10	.84	−2.36	2
Paternal Sensitivity Change	−.30	.86	−2.57	2
3-month Maternal DAS	118.05	11.12	79	143
3-month Paternal DAS	111.74	10.65	77	133
Observed Marital Interaction	−.07	1.62	−5.49	2.82
Marital Quality	.08	2.14	−7.17	4.54
Mother Constraint	168.18	14.10	125.10	197.45
Mother Negative Affect	122.80	12.48	107.10	161.92
Father Constraint	160.05	12.50	132.99	183.73
Father Negative Affect	126.12	13.09	101.49	156.94

Table 2

Intercorrelations of parental sensitivity

	3 month maternal	3 month paternal	12 month maternal	12 month paternal
3 month maternal		.05	.20	.14
3 month paternal			−.15	.25*
12 month maternal				.46**

* $p < .05$,

** $p < .01$.

Table 3

Intercorrelations between predictor and susceptibility variables

	1	2	3	4	5	6
1. Marital quality						
2. Maternal Constraint	.07					
3. Paternal Constraint	−.03	.32**				
4. Maternal Negative Affect	−.24†	.02	−.32**			
5. Paternal Negative Affect	−.17	−.03	−.15	.37**		
6. Maternal Sensitivity Change	.21	.01	.07	−.07	−.32**	
7. Paternal Sensitivity Change	.18	.09	−.10	.19	−.18	.40**

† $p < .10$,

* $p < .05$,

** $p < .01$.

Table 4

Predicting Change in Maternal Triadic Sensitivity from Marital Quality×Maternal Negative Affect Interaction

Predictors	***Change in Maternal Sensitivity***				
	B	**β**	**SE**	**ΔR^2**	**Total R^2**
Covariate					
Father's education	.35**	.46	.09	.24	.24
Step 1.					
Marital Quality	.03	.05	.06		
Negative Affect	.01	.10	.01	.00	.25
Step 3.					
Marital Quality×Negative Affect	.01*	.23	.01	.05	.30

Notes. Standardized betas and estimated standard errors for the final steps are reported above.

* $p \leq .05$,

** $p < .01$.

Table 5

Predicting Change in Maternal Triadic Sensitivity from Marital Quality×Maternal Constraint Interaction

Predictors	***Change in Maternal Sensitivity***				
	B	**β**	**SE**	**ΔR2**	**Total R^2**
Covariate					
Father's education	.42**	.55	.09	.24	.24
Step 1.					
Marital Quality	−.00	−.01	.06		
Constraint	.01	.13	.01	.01	.25
Step 3.					
Marital Quality×Constraint	.01*	.23	.00	.05	.30

Notes. Standardized betas and estimated standard errors for the final steps are reported above.

* $p \leq .05$,

** $p < .01$.

Table 6

Predicting Change in Paternal Triadic Sensitivity from Marital Quality×Paternal Constraint Interaction

Predictors	***Change in Paternal Sensitivity***				
	B	**β**	**SE**	**ΔR²**	**Total R²**
Covariate					
Father's education	.17	.23	.10	.06	.06
Step 1.					
Marital Quality	.08	.16	.07		
Constraint	−.01	−.09	.01	.03	.09
Step 3.					
Marital Quality×Constraint	.01*	.28	.01	.07	.16

Notes. Standardized betas and estimated standard errors for the final steps are reported above.

* $p \leq .05$,

** $p < .01$.