Toddler Emotional States, Temperamental Traits, and Their Interaction: Associations with
Mothers' and Fathers' Parenting

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ABSTRACT

We investigated the degree to which toddlers' observed emotional states, toddlers' temperamental traits, and their interaction accounted for variance in mothers' and fathers' parenting. Main effects of two emotional states (positive emotion and negative emotion), three temperamental traits (negative affectivity, effortful control, and surgency) as well as state-by-trait interactions, were examined in relation to parental sensitivity, positive affect, and negative affect. The hypothesis that toddlers' temperamental traits would moderate the association between their observed emotional states and parenting was partially supported. Significant state-by-trait interactions were found in models predicting the probability that mothers and fathers expressed negative affect towards their toddlers. For parental sensitivity and positive affect, only main effects of temperament and/or emotion expression accounted for variance in parenting.

Keywords: temperament; emotion; parenting; fathers; toddlers

1. Introduction

Contemporary views of child development emphasize that children play an active and meaningful role in their own development (e.g., Bell, 1968; Sameroff, 1990; Thomas & Chess, 1984). Both transactional and bioecological models of development (Belsky, 1984; Sameroff, 1990; Wachs & Kohnstamm, 2001) assert that not only do parents influence children's development, but that children's characteristics influence parenting behaviors, which further contributes to their developmental trajectory. The characteristic of children most often considered is temperament, i.e. biologically-based individual differences in negative affectivity, effortful control, and extraversion/surgency (Rothbart & Bates, 2006), dimensions that are related to adult personality dimensions (Halverson, Kohnstamm, & Martin, 2014). Transactional and bioecological models predict that more challenging temperamental traits, such as negative affectivity, challenge parents' sensitivity and warmth and may explain why parents of difficult children appear to engage in more harsh or negative parenting. In contrast, transactional or bioecological models predict that more desirable child traits, such as effortful control or positivity, should elicit more sensitive and less negative parenting (Kiff, Lengua & Zelewski, 2011).

Although there is some correlational evidence consistent with bidirectional models of parent-child influences, associations between child temperament and parenting are inconsistent, with overall effect sizes ranging from small to modest (Crockenberg, 1986; Kiff et al., 2011; Paulussen-Hoogeboom, Stams, Hermanns, & Peetsma, 2007). Specifically, children's negative affectivity has been associated with lower levels of parental sensitivity, responsiveness, or warmth (Booth-LaForce & Oxford, 2008; Davidov & Grusec, 2006; Feldman, Greenbaum, Mayes & Erlich, 1997; Kochanska, Friesenborg, Lang & Martel, 2004; Mertesacker, Bade,

Haverkock, & Pauli-Pott, 2004; Mills-Koonce et al., 2007; Pettit & Bates, 1984; Scaramella et al., 2008; van den Boom & Hoeksma, 1994), and higher levels of intrusiveness, rejection, or negativity (Arcus, 2001; Bridgett et al., 2009; Calkins, Hungerford, & Dedmon, 2004; Cole, Teti & Zahn-Waxler, 2003; Crockenberg & Smith, 1982; Kochanska et al., 2004; Martini, Root & Jenkins, 2004; van den Boom & Hoeksma, 1994; Zhou, Eisenberg, Wang & Reiser, 2004). In the only known study to directly assess bidirectional effects by examining these relations longitudinally, Scaramella and colleagues (2008) found partial support for child effects on parenting, finding that higher toddler distress reactivity is associated with less supportive parenting, but is unrelated to harsh parenting, one year later. However, several published studies find no main effects of child temperament on parenting (Clark, Kochanska & Ready, 2000; Hagekull, Bohlin, & Rydell, 1997; Karraker, Lake & Parry, 1994; Planalp, Braungart-Rieker, Lickenbrock & Zentall, 2013) or report significant associations only in certain situations (e.g. during free play vs. frustrating task) or for certain parenting behaviors but not others (Calkins et al., 2004; Ciciolla, Crnic & West, 2013; Mills-Koonce et al., 2007). Lastly, a few studies find negative affectivity is with *more* sensitive parenting (Meier, Wolke, Gutbrod & Rust, 2003; Washington, Minde, & Goldberg, 1986; Zahr, 1991).

One possible explanation for this mixed evidence is that other factors influence associations between children's temperament and parenting (Crockenberg, 1986; Paulussen et al., 2007; Putnam, Sanson & Rothbart, 2002). For example, we may also need to consider the emotion that a child expresses when parenting is measured. It may be that the *interaction* between children's in-the-moment emotional states and their temperamental traits may better predict parenting behavior than either children's emotional states or traits on their own. How parents behave toward children expressing negative or positive emotion may depend, at least in

part, on the parental perceptions of their children's typical emotional and behavioral patterns (temperamental traits). In other words, rather than having a direct effect on parenting, child temperament may moderate associations between children's in-the-moment emotional states and parenting quality. The present study investigates how toddler emotional states and temperamental traits, individually and in interaction, explain variance in mothers' and fathers' sensitivity and affect toward their toddlers.

1.1 The State/Trait Distinction

In her review of evidence linking temperament and parenting, Crockenberg (1986) asserts that the term "difficult temperament" does not refer to whether or not young children express negative emotion; all young children cry and have tantrums, regardless of their temperamental characteristics. Indeed, toddlerhood in particular is characterized by high-frequency and high-intensity negative emotion expression (e.g., Brownell & Kopp, 2007; Edwards & Liu, 2002; Potegal & Davidson, 2003; Shaw & Bell, 1993). Importantly, Crockenberg's assertion distinguishes emotional traits and states: *traits* are relatively stable characteristics that must be inferred based on behavioral patterns across situations and time, and *states* are single, discrete, directly observable behaviors (Strelau, 2001). Yet predicting an emotional state based on knowledge of a temperamental trait is difficult, because behaviors and emotional states are "codetermined by many factors, and the more or less stable tendency to behave in a given way (trait) is only one of them" (Strelau, 2001, p. 321). Thus, although some studies find significant associations between parent-rated temperament and experimenter-observed emotion expressions (e.g., Calkins et al., 2004; Pauli-Pott et al., 2000), many find little or no association (e.g., Kubicek & Emde, 2012; Tan, Armstrong & Cole, 2013). Given that emotions are multiply determined, the observation of toddlers' emotional states during a single observation such as a

home visit is just a snapshot of their behaviors; toddlers described as low in negative affectivity may nonetheless express negative emotion, and those described as high in negative affectivity may not express any negative emotion at that time.

The distinction between traits and states is often made in adult personality research (e.g., Hamaker, Nesselroade, & Molenaar, 2007; Zelenski & Larsen, 2000), but is made less often in the child development literature. An investigation of possible interactions between children's states and traits could address a number of unexplored questions. For example, does parental sensitivity toward toddlers who are expressing negative emotion depend upon parental perceptions of toddler temperamental traits? Are parents equally sensitive towards toddlers with particular temperamental traits when they express negative emotion, but differentially sensitive towards these toddlers when they express positive emotion? Such investigations can address the inconsistent associations between children's temperament and parenting quality, providing a more nuanced understanding of how emotional states and temperament traits account for variations in specific parenting qualities.

1.2 Observed Emotional States, Temperamental Traits and Parenting

As with studies of temperament and parenting, associations between observed child emotion and parenting are also inconsistent. In general, more frequent positive emotion expression in children is linked with greater parent sensitivity (Braungart-Rieker, Garwood, Powers, & Wang, 2001; Miller, McDonough, Rosenblum, & Sameroff, 2002) and more frequent negative emotion expression with less sensitivity (Braungart-Rieker et al., 2001; Feldman, Dollberg, & Nadam, 2011; Miller et al., 2002; Mills-Koonce et al., 2007; Nozadi et al., 2013; Owens, Shaw & Vondra, 1998; Scaramella et al., 2008). Yet, other studies find that observed negative emotion expression is unrelated to parent sensitivity (Meier et al., 2003; Mills-Koonce

et al., 2007; Pauli-Pott et al., 2000), or that more negative emotion expression is associated with greater parental responsiveness (Crockenberg & Smith, 1982).

Though these studies use direct observations of children's emotion expressions to predict parenting, those expressions are often assumed to reflect temperament (and thus independent indices of temperament are not used). Moreover, in many of these studies, child emotion expressions and parenting are measured during separate observations, often during different types of tasks (see Braungart-Rieker et al., 2001, Miller et al., 2002 and Mills-Koonce et al., 2007 for exceptions). This is notable, given that studies measuring child emotion and parenting within the same observation find wide variability in parenting, child emotion expressions, and in the association between the two, depending on the type of task in which these variables are observed (see Miller et al., 2002; Mills-Koonce et al., 2007). Similarly, many studies linking temperament and parenting do not take into account the emotions that children express when parenting is being assessed. Thus, the possibility that parenting might relate both to children's concurrent emotional states and their temperamental traits, and that state and traits may interact to account for variance in parenting, has not yet been considered.

1.2.1 Indirect evidence for state-by-trait interactions. No published study has examined whether relations between observed child emotion expressions and observed parenting qualities are moderated by parental perception of children's temperament. However, a few studies have offered indirect evidence for this hypothesis. Notably, a study of infants described as being high or low in irritability found that mothers of more irritable infants were less responsive to infants' *positive* cues than mothers of less irritable infants, but that mothers were equally responsive to their infants' *negative* cues regardless of trait irritability level (van den Boom & Hoeksma, 1994). In addition, attention should be paid to the situational contexts in

which children's emotions and parenting are observed. For example, during more challenging tasks during which infants are more negative, more aroused, and less positive, mothers have been observed to be less sensitive, less positive and more intrusive (Miller et al., 2002). Interestingly, in a different study, maternal reports of child anger proneness were significantly and inversely related to maternal sensitivity when sensitivity was observed during free play but unrelated when sensitivity was observed a challenging task (Ciciolla et al., 2013). Taken together, these results suggest that when children are emotionally negative, mothers are generally less sensitive, regardless of children's temperamental negativity, but that temperament effects emerge in situations in which children are expected to be happy or content. Moreover, these results suggest that studies examining the link between temperament and parenting without considering the context (including the emotional context) in which parenting is observed may miss important information. Thus, the present study extends upon the extant literature by considering both observed child emotion expression and mother-rated child temperamental traits. We examined the link between child emotion expressions and parenting, assessed during the same observation (an unstructured home observation during which there was variability in families' activities that contributed to family members' behavior). Moreover, we examined the moderating role that child temperamental traits played in this association.

1.3 Which Aspects of Temperament Matter?

Rothbart and Bates (2006) conceptualize temperament in terms of three higher-order dimensions. Negative affectivity, the trait most often studied in parenting research, reflects the degree to which children react negatively to environmental change and how readily their distress can be soothed. Many studies have examined associations between parenting and negative affectivity but fewer have examined associations between parenting and the other two

dimensions: effortful control and surgency/extraversion (for review, see Kiff et al., 2011).

Effortful control reflects the degree to which children engage in inhibitory control such as stopping behavior and shifting and focusing their attention and is associated with less hostile, controlling, or over-reactive parenting (Bridgett et al., 2009; Morrell & Murray, 2003).

Surgency/extraversion, hereafter referred to as surgency, reflects the extent to which children express high intensity positive affect and are active, impulsive, stimulation-seeking, and social; this dimension has been linked to less sensitive or more negative parenting (Karreman, de Haas, van Tuijl, van Aken, & Deković, 2010; Planalp et al., 2013). However, it should be noted that positive emotionality, an aspect of surgency, has been linked to fewer negative parenting practices (Bridgett, Laake, Gartstein & Dorn, 2013).

Thus, several temperament dimensions may account for variability in parenting qualities. The present study investigated the relative strength of associations of each dimension with mothers' and fathers' parenting, and the degree to which these traits moderate associations between toddler positive or negative emotional states and parenting qualities.

1.4 Parenting

Most studies examining associations between child temperament and parenting focus on sensitivity, which is defined as the tendency to perceive, interpret and respond to child cues in developmentally appropriate ways (Ainsworth, Blehar, Waters & Wall, 1978), and is consistently associated with better developmental outcomes in children (e.g., Calkins, 1994; De Wolff & van IJzendoorn, 1997; NICHD Early Child Care Research Network, 2004). Research has focused less on associations between children's temperament and parental emotional expressions (Kiff et al., 2011), despite links between parental emotion expression and child socioemotional outcomes. Parents' positive emotion expression is associated with children's

more positive and less negative emotion expression (Robinson et al., 2009), better emotion regulation (Brophy-Herb, Stansbury, Bocknek, & Horodyski, 2012; Garner, 1995), and greater use of effortful control (Robinson et al., 2009). In contrast, parents' negative emotion expression is associated with children's greater anger (Robinson et al., 2009), poorer emotion regulation (Garner, 1995; Rubin, Hastings, Chen, Stewart & McNichol, 1998), and lower effortful control (Robinson et al., 2009). The present study therefore examined parental sensitivity, positive affect, and negative affect and related these to children's emotional states, temperamental traits, and their interaction.

In addition to a focus on sensitivity, most studies have focused on mothers despite increasing calls for studying fathers and recognizing their importance for children's outcomes (e.g., Cabrera, Shannon, & Tamis-LeMonda, 2007; Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000). Initially, research with fathers focused on predicting their *involvement* (e.g., Mehall, Spinrad, Eisenberg, & Gaertner, 2009; NICHD, 2000; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008), but there is growing interest in the quality of fathers' parenting (Cabrera et al., 2000; Goeke-Morey & Cummings, 2007). Thus, the present study examined the interaction of toddler traits and states on both mothers' and fathers' sensitivity and affect toward their children.

It has been asserted that challenging child characteristics such as negative affectivity should have a stronger influence on fathering than on mothering, given that participation in caregiving is viewed as more of a choice for fathers than mothers, particularly when children are young (Brown, McBride, Bost, & Shin, 2011). Some studies find stronger associations between negative child characteristics and parenting stress or perceived competence for fathers than for mothers (Grych & Clarke, 1999; Wilkie & Ames, 1986), and some report more direct links

between child negative temperament characteristics and fathering (Goldberg, Clarke-Stewart, Rice, & Dellis, 2002; Nelson & Simmerer, 1984; NICHD, 2000). Yet overall, the links between temperament and fathering are modest and mixed, with some studies finding no relations (e.g., Planalp et al., 2013; Schoppe-Sullivan, Kotila, Jia, Lang & Bower, 2013; Woodworth, Belsky, & Crnic, 1996) or similar relations for mothers and fathers (Lindsey, Cromeens, & Caldera, 2010). In contrast, the association between children's emotional states and parenting may be stronger for mothers than for fathers (Braungart-Rieker et al., 2001).

1.5 The Present Study

In sum, the present study investigated the unique and interacting contributions of maternal ratings of toddlers' temperamental traits and the frequency of toddlers' positive and negative emotion expressions to concurrently observed parenting. The study considers how multiple dimensions of toddler temperament (negative affectivity, effortful control, and surgency) may moderate the association between child emotional states and three aspects of mothers' and fathers' parenting: sensitivity, positive affect, and negative affect.

2. Method

Data was drawn from a longitudinal study of the development of emotion regulation and the contributions of children's language development, parenting, and parenting stress to its development. Families were assessed semi-annually from target child age 18 months to 48 months, in both home and laboratory observations. The present study used home observation and questionnaire data from the 18-month age point.

2.1 Participants

A total of 120 families meeting the study criteria were recruited from rural and semi-rural households when the target child was 18 months. Families were considered eligible for the study

if their total household income was above the poverty line as defined by the U.S. government, but below the national median income for the family's size, and the target child had lived with the family since at least three months of age and had no history of developmental delays.

Total annual income ($M=\$40,572$, $SD=\$14,387$) in the sample ranged from \$15,000-\$70,000. Families were primarily two-parent households; only two families (1.7%) reported at 18 months that the target child's father figure was not involved in a caregiving role. Parent education ranged from some high school to an advanced degree; 42.5% of mothers and 31.4% of fathers had a college degree or higher. At child age 18 months, mothers were on average 31.03 years ($SD=5.64$) and fathers were on average 32.64 ($SD=6.23$) years of age. The average number of children in each household was 1.83 ($SD=.85$), with the largest family having 5 children and many families (42.2%) having only one child.

Target children (65% male) were on average 18.44 months ($SD=.57$) at the 18-month home visit. Most (93.3 %) of the children were identified as White, and 6.7% were identified as biracial by their mothers. Participants were primarily first or only (43.3%) and second-born (40%) children.

2.2 Procedures

Home observations were conducted by trained graduate students and project staff (research assistants) and were scheduled for a time when both parents were expected to be home. For this unstructured home observation, families were asked to behave as they normally would and to ignore the research assistant. The research assistant observed the target child and parents for six 10-minute intervals; after each 10-minute interval, the assistant rated each person (target child, mother and father) on behaviors, interaction quality, and emotion expression.

2.3 Measures

2.3.1 Parenting. Global ratings of mothers' and fathers' parenting were made based on the Parent-Child Interaction Rating System (PCIRS; Belsky, Woodworth, & Crnic, 1996), which includes six scales for each parent, including sensitivity, intrusiveness, detachment, stimulation of cognition, positive affect and negative affect. For the purposes of the present study, three scales (sensitivity, positive affect and negative affect) are considered. Each scale was rated on a 1 (not at all) to 5 (predominantly) Likert scale. Ratings from each of the six 10-minute epochs were averaged to generate a mean sensitivity score and a mean positive affect score for mothers and for fathers. Creation of parents' negative affect score is described below. Because a live-observation system was used, in order to minimize the burden on families of having two persons in their homes, inter-rater reliability was assessed in 8% of cases.

2.3.1.1 Sensitivity. Sensitivity in the PCIRS was defined as parenting behaviors that are attuned to the target child's needs, moods, interests and level of development. Example markers of sensitivity include: contingent responding to toddler's vocalizations, acknowledging the target child's affect and providing appropriate soothing or attention focusing, and appropriate levels of stimulation guided by toddler's interest. Interrater reliability was strong ($ICC=.83$ for mothers and $.79$ for fathers).

2.3.1.2 Positive Affect. Mothers' and fathers' positive affect was defined as displays of warmth, affection, and positive regard directed toward the target child (e.g., speaking in a warm tone of voice, smiling, laughing, giving praise, appearing enthusiastic and attentive). Interrater reliability was strong for mothers ($ICC=.79$) and moderate ($.66$) for fathers.

2.3.1.3 Negative Affect. Negative affect was defined as negative emotion or hostility directed toward the target child. Example indicators included: disapproval, tense body or facial expressions, negative tone of voice, abruptness, threatening the toddler or punishing without

explanation. Interrater reliability was moderate ($ICC=.67$ for mothers and $.55$ for fathers). In this sample, the mean negative affect score was low (mothers $M=1.40$, $SD=.46$; fathers $M=1.23$, $SD=.33$) and the distributions were highly positively skewed; neither square root nor log transformations of parents' negative affect achieved a normal distribution. For this reason, a dichotomous outcome score was created; parents who received a rating higher than 1 during any of the six rating periods in the observation were considered as having expressed negative affect, whereas parents who received a rating of 1 for all six rating periods were determined not to have expressed negative affect. For mothers, 72.5% expressed negative affect and for fathers, 46.7% expressed negative affect.

2.3.2 Toddler Traits. Mothers were asked to rate their toddler's temperament using the Toddler Behavior Assessment Questionnaire (TBAQ-R; Goldsmith, 1996; adapted by Rothbart, 1996). The assessment of toddler temperament has evolved over time. This questionnaire is a 105-item version for which mothers rated the frequency specific toddler behaviors, within the last month, on a 1 (Never) to 7 (Always) Likert scale. The three higher-order factors (negative affectivity, effortful control, and surgency) that emerge for all of the Rothbart temperament measures were calculated. A *negative affectivity* score ($\alpha=.81$) was calculated by averaging the scaled scores of anger, sadness, fear, and soothability (reversed), *effortful control* ($\alpha=.82$) was calculated from the mean of scaled scores for attention focusing, attention shifting, and inhibitory control, and *surgency* ($\alpha=.77$) was calculated by averaging the scaled scores of high pleasure, positive anticipation, activity, impulsivity, and fear (reversed). Because this scale was an interim scale, its scoring was reviewed and affirmed by the Rothbart team (Putnam, personal communication, 2003).

2.3.3 Toddler States. Using a separate coding system, observers also noted each time a clear emotion expression was displayed by the target child, and rated these expressions as positive, negative, or mixed. Observers were trained to use nonverbal (vocal, facial, postural) and situational cues to identify emotion expressions. Given the infrequency of mixed expressions, the frequency of negative and mixed expressions across all six rating periods were summed to create a frequency of negative emotion expression score, and all positive emotion expressions were summed to create a frequency of positive emotion expression score. Interrater agreement was high (Cohen's kappa = .91 for positive emotion and .83 for negative emotion).

2.3.4 Covariates. Three covariates were considered in analyses. Given that parent education level is a socioeconomic factor that robustly relates to parenting quality (for review see Hoff-Ginsberg & Tardif, 1995), maternal and paternal education level was controlled for in mother and father models, respectively. The mean number of children present during the observation (which ranged from 1 to 4.33 in our sample) was also included as a covariate, given that the presence of other children may influence the extent to which parents are able to be responsive to target child's cues. Though child gender was considered as a possible covariate, gender was unrelated to parenting variables at the bivariate level and was not a significant predictor in any regression analyses. Child gender was therefore removed from all analyses.

2.4 Data Analytic Plan

2.4.1 Missing data and data preparation. Multiple imputation (MI) was used to address missing data given that only 106 fathers were present during the home visit. Multiple imputation was conducted in SAS 9.3 using PROC MI and PROC MIANALYZE. Following the guidelines outlined by Graham and colleagues (2007), 20 imputations were conducted. All variables in the

analyses were included in the imputation model and predictors were centered and interactions terms were computed prior to imputation.

Given that imputing missing dependent variables introduces needless noise to model estimates, we used a method called multiple imputation then deletion (MID; von Hippel, 2007). MID includes all cases, even those with missing dependent variables, in the imputation models, but deletes cases with missing dependent variables from subsequent analyses. This method allows cases with missing dependent variables to contribute to values imputed for missing independent variables, but protects the model from needless noise and problematic imputations. This method has been shown to provide more accurate standard error estimates than using imputed dependent values (von Hippel, 2007). Thus, though we excluded fathers who were not present in the home visit, and therefore continued to have a sample of N=106 for father models, we eliminated the need to use listwise deletion for other variables missing in the model (e.g. missing temperament ratings), and therefore maximized the statistical power possible in our analyses.

2.4.2 Regression analyses. A series of multiple regression analyses for each parent were conducted to assess the degree to which toddler emotional states, temperamental traits, and their interaction, account for variance in two of the criterion variables: sensitivity and positive affect. For the third criterion, parent negative affect, logistic regression analyses were conducted using a dichotomous outcome (parent was or was not negative toward the target child). Each model was run separately for mothers and fathers, resulting in six total models. Each model initially included two potential covariates (the respective parent's education level and the number of children present), the main effects of three toddler temperamental traits (negative affectivity, effortful control, and surgency) the main effects of toddler emotional states (frequency of

positive emotion expression and frequency of negative emotion expression), and six possible state-by-trait interactions (the interaction of positive emotion and negative emotion with each temperamental trait). Nonsignificant covariates and nonsignificant interactions were dropped from the models. Significant interactions were probed by analyzing estimates at one standard deviation above and below the mean of the hypothesized moderator (temperamental trait) (Aiken & West, 1991; Holmbeck, 2002).

3. Results

3.1 Descriptive Statistics

Of the 118 fathers in the study, 106 provided usable data from the home visit. Nine fathers were not present for the home visit and three were home but did not interact with their toddler during the visit. These two sets of fathers did not differ in their level of education, $t(116) = .295, p = .77$, but fathers with missing data came from families with higher household income, $t(118) = 2.34, p = .02$. Paired t -tests for families with both mothers and fathers present revealed that mothers were rated as higher than fathers on all parenting variables (see Table 1 for descriptive statistics for parenting variables).

Descriptive statistics for toddler traits and states are found in Table 2. As a group, toddlers were not high in difficult traits; the sample mean for negative affectivity fell below the midpoint of the 7-point Likert scale, whereas the sample mean for effortful control and surgency fell slightly above the midpoint. However, there was adequate range and variability for all three temperamental traits assessed. In addition, toddlers varied in the frequency of positive and negative emotion expressions across the 60-minute observation (0-36 for positive expressions, 1-32 for negative expressions).

Correlations among study variables are shown in Table 3. In general, mothers' and fathers' parenting behaviors were significantly correlated. Fathers' negative affect was unrelated

to their sensitivity or positive affect and mothers' negative affect was only marginally related to the other parenting variables. Of note, toddlers' temperamental traits were not related to the frequency of their positive or negative emotional states (range $r = -.08 - .07$).

At the bivariate level, toddler negative affectivity was significantly correlated with all three maternal parenting variables (inversely for sensitivity and positive affect). Toddler effortful control was significantly correlated with maternal positive affect but unrelated to mothers' sensitivity or negative affect. Surgency was unrelated to any maternal parenting variables at the bivariate level. Toddler emotional states were only significantly correlated with maternal positive affect and were unrelated with maternal sensitivity or to maternal negative affect. For fathers, toddler temperamental traits were unrelated to parenting at the bivariate level (range $r = -.08 - .11$). Toddler positive emotion expression was significantly correlated with paternal sensitivity and positive affect, whereas toddler negative emotion expression was significantly associated only with paternal negative affect.

3.2 Mothers' Parenting

3.2.1 Sensitivity. After accounting for maternal education and the number of children present, only one main effect, toddler negative affectivity, was associated with maternal sensitivity, although the effect was marginal ($\beta = -.15, p = .094$). Higher levels of toddler negative affectivity were associated with lower levels of maternal sensitivity (see Table 4). There were no significant state-by-trait interactions, so these variables were dropped from analyses. The overall model, $F(7, 119) = 6.87, p < .0001$, which included covariates as well as main effects of toddler temperamental traits and emotional states, accounted for 30% of the variance in mothers' sensitivity (Table 4).

3.2.2 Positive Affect. After accounting for maternal education and the number of children present, only toddler emotional states (both the frequency of positive emotion expressions and the frequency of negative emotion expressions) contributed significant variance to maternal positive affect. Mothers were more positive towards toddlers who more frequently expressed positive emotion, although this effect was marginally significant ($\beta = .15, p = .070$), whereas mothers' positive affect was inversely related to the frequency of negative emotion expression ($\beta = -.19, p = .025$). The overall model (see Table 5), $F(7, 119) = 5.90, p < .0001$, accounted for 27% of the variance in mothers' positive affect.

3.2.3 Negative Affect. In the logistic regression predicting mothers' likelihood of expressing negative affect (Table 6), neither covariate was significant, so both were dropped from the model. The main effects of two toddler temperamental traits (negative affectivity and surgency) and one toddler emotional state (negative emotion) were significant, and two significant state-by-trait interactions (*frequency of negative emotion expression X negative affectivity* and *frequency of negative emotion expression X surgency*) were retained in the model¹.

The two significant interactions were probed by calculating the estimated probabilities for the statistical prediction of maternal negative affect by toddler negative emotion expression at one standard deviation above and below the mean of a) negative affectivity and b) surgency. Figure 1a shows the estimated probabilities of mothers' negative affect expression as a function of toddler negative emotion expression at low and high toddler negative affectivity. At low toddler negative affectivity, the frequency of toddler negative emotion expression appeared to have little to no effect on the probability that mothers expressed negative affect towards their

¹ The possible three-way interaction (*frequency of negative emotion X negative affectivity X surgency*) was included as a follow-up but was insignificant and was dropped from the model.

toddler. At high toddler negative affectivity, however, an increase in the frequency of toddler negative emotion expression is associated with greater probability of mothers expressing negative affect, an association that flattens around the sample mean for frequency negative emotion expression and above, as the probability of maternal negative affect expression approaches 1.

The interaction of the frequency of negative emotion expression with toddler surgency showed a similar pattern. Figure 1b shows the estimated probabilities of mothers' negative affect expression as a function of toddler negative emotion expression at high and low surgency. The figure shows that, at low toddler surgency, toddler negative emotion expression appears unrelated to the probability that mothers expressed negative affect. However, at high toddler surgency, higher frequency of toddler negative emotion expression is associated with increased probability of mothers expressing negative affect towards their toddlers. This association is asymptotic (i.e. flattens as it approaches a value of 1).

The overall model, $\chi^2(7) = 14.15, p = .049$, accounted for significant variance in mothers' likelihood of expressing negative affect and correctly classified 75.20% of the cases.

3.2.4 Summary. No evidence for child emotional state by temperamental trait interaction was found for maternal sensitivity or positive affect; only main effects of toddler temperament traits (for maternal sensitivity) and toddler emotional states (for maternal positive affect) accounted for significant or marginally significant variance in these parenting variables. Negative affectivity was inversely related to mothers' sensitivity, and both the frequency of toddler positive emotion and negative emotion (inversely) accounted for significant variance in mothers' positive affect. For mothers' likelihood of expressing negative affect, two toddler traits (negative affectivity and surgency) moderated the association between the frequency of toddler

negative emotion expression and mothers' negative affect. At low toddler negative affectivity or surgency, the frequency of toddler negative emotion expression appeared unrelated to mothers' probability of expressing negative affect. However, at high toddler negative affectivity or surgency, higher frequency of toddler negative emotion expression was associated with increased likelihood of mothers expressing negative affect.

3.3 Fathers' Parenting

3.3.1 Sensitivity. In the model predicting fathers' sensitivity (see Table 7), after accounting for the number of children present and fathers' education level, only one variable (the frequency of toddler positive emotion expression) accounted for significant variance in fathers' sensitivity ($\beta = .28, p = .003$). Fathers whose toddlers more frequently expressed positive emotion were rated as more sensitive. There were no significant state-by-trait interactions. The overall model, $F(7,105) = 3.38, p = .004$, accounted for 19% of the variance in fathers' sensitivity.

3.3.2 Positive Affect. In the model predicting father's positive affect (see Table 8), there were no significant covariates and no significant state-by-trait interactions. Only one of the five predictors (the frequency of toddler positive emotion expression) accounted for significant variance in fathers' positive affect, ($\beta = .44, p < .0001$). Higher frequency of toddler positive emotion expression was associated with higher levels of fathers' positive affect. The overall model, $F(7,105) = 5.13, p = .0003$, accounted for 20% of the variance in fathers' positive affect.

3.3.3 Negative Affect. In the model predicting the likelihood of fathers expressing negative affect (Table 9), covariates were dropped from the model because neither accounted for significant variance fathers' negative affect expression. Two state-by-trait interactions

(*frequency of negative emotion expression X negative affectivity and frequency of positive emotion expression X negative affectivity*) were retained in the model².

The interactions were probed by calculating the estimated probabilities for the statistical prediction of paternal negative affect by a) toddler negative emotion expression and b) toddler positive emotion expression at one standard deviation above and below the mean for toddler negative affectivity. Figure 2a shows the estimated probabilities of fathers' negative affect as a function of toddler negative emotion expression at low and high toddler negative affectivity. At low toddler negative affectivity, the frequency of toddler negative emotion appears unrelated to the probability of fathers' expressing negative affect. In contrast, at high toddler negative affectivity, higher frequency of toddler negative emotion expression is associated with increased likelihood of fathers expressing negative affect.

Toddler negative affectivity also moderated the association between the frequency of toddlers' positive emotion expression and the probability that fathers expressed negative affect. Figure 2b shows the estimated probabilities of fathers' negative affect expression as a function of toddler positive emotion expression at low and high negative affectivity. At low toddler negative affectivity, increases in the frequency of toddler positive emotion are associated with decreased probability of fathers expressing negative affect, whereas at high toddler negative affectivity, increases in the frequency of toddler positive emotion expression are associated with increased probability that fathers expressed negative affect.

The final model also included a marginal main effect of surgency; higher levels of surgency were associated with a marginally higher likelihood of fathers expressing negative affect (odds ratio= 3.02, $p = .061$). This overall model, $\chi^2(7) = 12.53$, $p = .085$, accounted for

² The possible three-way interaction (*frequency of negative emotion expression X frequency of positive emotion expression X negative affectivity*) was included as a follow-up but was insignificant and was dropped from the model.

marginally significant variance in fathers' likelihood of expressing negative affect, and correctly classified 72.60% of the cases.

3.3.4 Summary. For fathers' sensitivity and positive affect, only the frequency of toddler positive emotion expression accounted for variance in fathers' parenting, such that higher frequency of toddler positive emotion expression was associated with higher levels of paternal sensitivity and positive affect. In contrast, two state-by-trait interactions and one marginal main effect accounted for fathers' likelihood of expressing negative affect. Toddler trait negative affectivity moderated the association between both toddler negative emotion expression and toddler positive emotion expression. At high toddler negative affectivity, higher frequencies of either toddler negative or positive emotion expression were associated with increased probability of fathers expressing negative affect. At low toddler negative affectivity, however, toddler negative emotion expression was unrelated to fathers' probability of expressing negative affect, and toddler positive emotion expression is inversely related to fathers' negative affect. Finally, higher levels of surgency were associated with marginally higher likelihood of fathers' negative affect expression.

3.4 Follow-up Analyses

Though we felt it was more appropriate to treat negative affect as a dichotomous variable (did or did not express negative affect) given the skewed distribution of negative affect and the constrained variability in the intensity and frequency of parents' negative affect expression, we followed up our analyses using an estimator more robust to assumptions of normality (M-estimation using PROC ROBUST REG in SAS 9.3). Treating negative affect as a continuous variable did not significantly change our conclusions, although the interactions predicting fathers' negative affect became marginally significant.

4. Discussion

Based on research indicating inconsistent associations between temperament and parenting (Kiff et al., 2011; Paulussen et al., 2007), as well as between observed child emotion expression and parenting (e.g. Braungart-Rieker et al., 2001; Mills-Koonce et al., 2007), we hypothesized that children's temperamental traits may moderate the association between their emotional states and parenting behaviors. We examined the unique and interacting contributions of toddler emotional states and temperamental traits to mothers' and fathers' parenting. Our hypotheses were partially supported. The following sections of the discussion address the main findings, limitations of the study, and future research directions.

4.1 Toddler temperament and emotion expressions as contributors to variance in parenting

Toddler temperamental traits were unrelated to toddlers' emotional states observed in the home, supporting our examination of state-by-trait interactions. For both mothers and fathers, the likelihood of their expressing negative affect toward their toddlers was accounted for by child emotional state by temperamental trait interactions. There was no evidence for state-by-trait interactions for mothers' or fathers' sensitivity or positive affect toward the child.

4.1.1 Associations between temperament and emotion expression. Maternal ratings of dimensions of toddler temperament—negative affectivity, effortful control and surgency—were unrelated to the frequency of toddler negative or positive emotion expressions observed in the home. Though significant relations between parent-rated temperament and observed emotion expression have been found (Calkins et al., 2004), the present finding was consistent with studies that found few associations (Kubicek & Emde, 2012; Tan et al., 2013). The results underscored Crockenberg's (1986) assertion that temperament differences do not predict *whether* emotion expressions occur, but patterns of children's emotions and behaviors over time and across

contexts. Although it is possible to form a hypothesis in which toddlers' emotional states mediate the association between temperament and parenting, the present study's dissociation between observed toddler emotion and maternal ratings of toddler temperament supports instead an investigation of both the individual and interactive ways in which temperamental traits and emotional states predicted variance in parenting.

4.1.2 Prediction of parent negative affect. State-by-trait interactions accounted for significant variance in both mothers' and fathers' probability of expressing negative affect. For mothers, the extent to which toddlers' negative emotional states predicted mothers' negative affect toward their toddlers depended on toddlers' level of trait negative affectivity and surgency. For fathers, the association of both toddler negative and positive emotion expressions with father negative affect was moderated by toddler negative affectivity.

4.1.2.1 Moderation of toddler negative states by traits. For mothers and fathers, higher frequency of toddler negative emotion was associated with higher probability of parents expressing negative affect, but only if the toddler was high in trait negative affectivity. At low toddler negative affectivity, however, the frequency of toddler negative emotion expression was unrelated to the likelihood that mothers or fathers expressed negative affect towards their toddler. For mothers, a similar pattern emerged for the state-by-trait interaction of child negative emotion expression with surgency, such that, for toddlers higher in either negative affectivity or surgency, more negative emotion expression was associated with higher probability of mothers expressing negative affect. For these toddlers, even average frequency of negative emotion expression was associated with high probability of mothers expressing negative affect towards them.

There are several possible explanations for these findings. Parents of toddlers who are high in trait negativity may perceive even low or moderate frequency of toddler negative

emotion expression as having the potential for an escalation in negative emotion. These parents may feel worried or frustrated and they may have developed less tolerance for their toddlers' negative emotions; indeed, higher temperamental negativity is associated with higher parenting stress (Noel, Peterson & Jesso, 2008; Voigt, Brandl, Pietz, Pauen, Kliegel, & Reuner, 2013). For toddlers who are low in trait negativity, however, parents may feel less frustrated in response to toddler negative emotion expression; they may anticipate being able to tolerate the negative emotion or being able to quickly soothe or calm their toddler. These parents may not feel or show negative emotions as a result.

Interestingly, though negative affectivity and surgency were inversely related in this sample, both moderated the association between maternal negative affect and child negative emotion expressions in a similar way. It is possible that both traits represent a parenting challenge. High surgency is marked by a high level of child activity and increased interpersonal demands upon others. Moreover, the expression of emotion may be qualitatively different, for example more intense or more situationally inappropriate, for toddlers who are high versus low in negative affectivity or surgency. Indeed, negative affectivity and surgency are both associated with higher levels of aggression (Rothbart, Ahadi, & Hershey, 1994), suggesting that negative emotion may be expressed more intensely and may be coupled with inappropriate or disruptive behaviors for toddlers who are high in either trait. Future research should examine how not only the valence, but the intensity, duration and type of emotional states may relate to parenting and may be moderated temperamental traits.

4.1.2.2 Moderation of toddler positive states by traits. For fathers only, the association of toddler positive emotion expression with parent negative affect was moderated by toddler negative affectivity. For toddlers who were high in trait negative affectivity, higher frequency of

toddler positive emotion expression was associated with greater likelihood of fathers expressing negative affect, whereas for toddlers low in negative affectivity, higher frequency of positive emotion expression was associated with decreased likelihood of fathers expressing negative affect. Thus, for toddlers high in negative affectivity, the expression of *any* emotion, positive or negative, was associated with increased probability that fathers expressed negative affect. It is possible that fathers, who in general interacted less with the target children than mothers in our sample, may be drawn in to interactions with their toddlers when their toddlers are highly emotionally expressive, and therefore have more opportunity to express negative affect. As noted above, it is also possible that toddlers high in trait negative affectivity may express emotions differently (e.g. more intensely). It is largely unknown whether there are qualitative differences in the way that young children who are high in negative affectivity express positive emotion. It may be that fathers interpret the positive expressions of toddlers high in negative affectivity differently than positive expressions of toddlers low in these traits.

4.1.2.3 Summary. In sum, state-by-trait interactions accounted for variance in the probability that mothers and fathers expressed negative affect towards their toddlers. These findings revealed links between child temperament and parenting that may not otherwise have been detected without consideration of both states and traits as well as state-by-trait interactions.

It is important to point out that though the occurrence of parent negative affect was high (about 73% of mothers and 47% of fathers expressed negative affect at least once), there was little variability in the intensity or the frequency of parent negative affect. Few parents were intensely or predominantly negative towards their children. Expression of negative emotion during parent-child interactions is typical, and a range of parental emotion expression (including negative emotion) at moderate intensity is associated with better child socioemotional outcomes

(Denham, Mitchell-Copeland, Strandberg, Auerback & Blair, 2007; Dunn & Brown, 1994; Wong, Diener & Isabella, 2008). Thus, though negative affect is sometimes conceptualized as negative parenting, the level of parent negative affect observed in the present study should not generally be viewed as constituting risk. More research that includes populations exhibiting a wider range of parent negative affect is needed in order to better understand how state-by-trait interactions predict parent negativity.

Finally, though we present our significant interactions as state-by-trait interactions (children's temperamental traits moderating the association between their concurrent emotional states and parenting), these interactions could also be understood as trait-by-state interactions. Though it is not a focus of the present study, the possibility that the association between child temperament and parenting may depend upon the emotional state of the child is critical to consider. Future research on the effects of temperament on parenting might benefit from accounting for the emotions children express during observations of parenting and from treating emotion expressions as potential moderators of temperament effects.

4.1.3 Parents' supportive parenting behaviors. Whereas state-by-trait interactions were found in models predicting parents' negative affect, no interactions were found in models predicting more supportive parenting behaviors (sensitivity and positive affect). For mothers, despite the fact that toddlers' negative affectivity was unrelated to the frequency of their negative emotion expression during the home observation, negative affectivity was the only state or trait associated with mothers' sensitivity, although the effect was marginal. Consistent with a number of studies linking negative temperamental traits with lower quality parenting (Calkins et al., 2004; Ciciolla et al., 2013; Mertesacker et al., 2004; van den Boom & Hoeksma, 1994), mothers who rated their toddlers as higher in negative affectivity exhibited lower levels of sensitivity. In

contrast, mothers' positive affect expression was unrelated to child temperamental traits; instead, mothers expressed more positive affect if their toddler more frequently expressed positive emotion and less positive affect if their toddler was more frequently negative. These results are not surprising given that family members' emotion expressions tend to be correlated (Halberstadt, Crisp & Eaton, 1999) and parental "matching" of child positive emotion expression is associated with the development of emotional competence (Denham et al., 1997). Thus, the results suggest that mothers in our sample modulate their positive affect based upon their toddlers' emotional cues, regardless of their toddlers' temperamental traits, whereas mothers' level of sensitivity is less tied to toddlers' concurrent emotion expressions and more closely related to their perceptions of their toddler's trait negativity.

Interestingly, for fathers, only child positive emotional states, and not child temperamental traits, were significantly related to fathers' supportive parenting behaviors (sensitivity and positive affect). The hypothesis that fathers' parenting quality is more susceptible to challenging child characteristics than mothers' parenting (Brown et al., 2011) was not supported, at least for sensitivity and positive affect. One interpretation of the present results is that toddlers' positive emotions elicit more sensitive and more positive parenting from fathers. Alternatively, and discussed further below, fathers' positive parenting may elicit more frequent positive emotion from their toddlers. Indeed, fathers have been found to be more rewarding, engaging and expressive of enjoyment during play than mothers (Lamb, 1976) and children are rated as more cooperative, interested and responsive during play with fathers (Clarke-Stewart, 1978). Thus, the strength of the associations between child positive emotion and fathers' parenting could be understood, in part, as child positive emotion being elicited by fathers.

4.2 Limitations and future directions

There are several limitations of the present study that we acknowledge and consider in terms of future research directions. They include the need to investigate bidirectionality of parent and child effects directly, the need to study more finely grained aspects of temperament as well as specific emotions, and variations in sample characteristics that might lead to additional or different conclusions.

4.2.1 Direction of effects. The findings suggest but do not directly address the directionality of effects of partners' emotion and behaviors in their interactions. Parents and children elicit and react to each other's emotions. One way to address bidirectional effects is to employ methods that take into account for interdependence in dyadic interaction or use dynamic approaches (Cook & Kenny, 2005; Teti & Cole, 2011). Methods (e.g., second-by-second coding, time-series analyses) that more closely examine the temporal relations between child emotion expressions and parenting behaviors would enable more direct assessment of bidirectional effects and, by extension, would enable a more accurate and nuanced examination of state-by-trait interactions.

In addition, not only are the associations between parenting and child states bidirectional during parent-child interactions, but on a broader timescale, parenting quality also contributes to the development of children's temperamental traits over time, and vice-versa (Scaramella et al., 2008). Research that employs a longitudinal design is needed in order to accurately interpret direction of effects. Moreover, the relations found in the present study may exist in certain child developmental periods but not necessarily all. Examining the study hypotheses on multiple time scales (across development as well as in-the-moment temporal dynamics), is therefore an important future direction in this line of research.

4.2.2 Measurement of toddler temperament and emotion. A limitation of the measurement of temperament in this study is that we relied solely on mothers', and not fathers' perceptions of their toddlers' temperament. Though mothers' and fathers' ratings of their child's temperament are generally significantly (though modestly) correlated (for review, see Martin & Halverson, 1991; Rothbart, Ahadi, Hershey & Fisher, 2001; Spinath & Angleitner, 1998), it is likely that fathers' own perceptions of their toddlers' temperamental traits are better predictors of their parenting behaviors. Future research that employs both mothers' and fathers' subjective ratings of child temperament will help better elucidate the role of parents' *perceptions* of child traits, and their interaction with child concurrent emotional states, in accounting for variance in parenting quality. In addition, parenting and child emotion expression were measured in a single setting (an unstructured home observation). Given the wide variability in parent and child behavior across different assessment contexts (Miller et al., 2002) and the biases inherent in relying solely on home observations (see Rothbart & Goldsmith, 1985), future studies should examine state-by-trait interactions across multiple settings.

Finally, home observers assessed only the valence (positive versus negative) of child emotion expressions and were not asked to identify discrete emotional categories. Given that parents use different socialization strategies in response to specific emotions (O'Neal & Magai, 2005), one might expect a different pattern of results depending on if a child is exhibiting sadness, anger or fear. Similarly, researchers have found that specific components of temperament dimensions may differentially predict parenting; though parents' ratings of child impulsivity (an aspect of surgency) have been linked to greater parental negativity (Karreman et al., 2010), other aspects of surgency, such as positive emotionality, have been associated with fewer negative parenting practices (Bridgett et al., 2013). Thus, an important extension of this

work is to examine the associations of discrete emotional expressions as well as more finely-grained aspects of temperament with parenting.

4.2.3 Sample characteristics. There are several features of the design we used that could be improved upon in future studies. Given the numerous and complex interactions tested, a larger sample size is preferable. Replication with larger samples may reveal significant state-by-trait interactions that the present study lacked the power to detect. In addition, the findings are limited to an economically strained sample that did not present with many risk factors in terms of family conflict, parental psychopathology, or child behavior problems. Future studies may consider examining these relations in populations of varying risk, for example, sampling below the poverty line, recruiting high-conflict families, or oversampling for high levels of child negative affectivity or parent psychopathology, which would increase variability and provide more statistical power to investigate state-trait interactions. Moreover, whereas state-by-trait interactions were found only for negative parenting behaviors in the present study, it is possible that more supportive parenting behaviors may be more susceptible to influence by state-by-trait interactions in higher risk families.

An important next step in this line of research is consideration of parents' own characteristics, which may moderate the associations between child emotional states, child temperamental traits and parenting behavior. Parent psychopathology, for example, has been found to interact with toddler temperamental traits to predict parenting (Dix, Moed, & Anderson, 2014; Mertesacker et al., 2004; Pauli-Pott et al., 2000). Moreover, parents' own self-regulation relates to their parenting quality (for review, see Bridgett, Burt, Edwards & Deater-Deckard, 2015), and evidence suggests that difficult child behaviors are more strongly related to parenting quality for mothers who have lower executive function skills (Deater-Deckard, Sewell, Petrill, &

Thompson, 2010). Future studies that consider three-way interactions between child state, child traits and parent traits (e.g. self-regulation or psychopathology) will enhance our understanding of the complex ways that child characteristics relate to parenting.

4.3 Conclusions

Transactional models emphasize bidirectional effects of parenting and child characteristics, emphasizing that children's own traits (such as temperament) elicit specific parenting behaviors and influence parenting quality. Yet the extant literature suggests that the associations between temperament and parenting are inconsistent and complex. The present study is the first to test the hypothesis child temperamental traits moderate the association between child positive and negative emotional states and parenting. These state-by-trait interactions were assessed for multiple temperamental traits (negative affectivity, effortful control, and surgency), and were observed in both mothers and fathers. In this sample, evidence for state-by-trait interactions were found for both mothers' and fathers' negative affect, but not for parents' positive affect or sensitivity.

This line of research has implications for understanding the transactional processes that contribute to the development and maintenance of temperamental traits and socioemotional functioning over time. The present study makes important first steps towards understanding the relative and interacting contributions of child emotional states and temperamental traits to variance in parenting quality. More research that extends upon these findings, including longitudinal designs, consideration of discrete emotions and research with higher-risk populations is warranted.

References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage Publications, Inc.
- Ainsworth, B., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. New York, NY: Psychological Press.
- Arcus, D. (2001). Inhibited and uninhibited children: Biology in the social context. In T.D. Wachs, & G.A. Kohnstamm (Eds.), *Temperament in context*. (pp. 43-60). Mahwah, New Jersey: Lawrence Erlbaum Associates Publishers.
- Bell, R. Q. (1968). A reinterpretation of direction of effects in studies of socialization. *Psychological Review*, 75, 81–95.
- Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, 83-96.
- Belsky, J., Woodworth, S., & Crnic, K. (1996). Trouble in the second year: Three questions about family interaction. *Child Development*, 67, 556-578.
- Booth-LaForce, C., & Oxford, M. L. (2008). Trajectories of social withdrawal from grades 1 to 6: Prediction from early parenting, attachment, and temperament. *Developmental Psychology*, 44, 1298-1313.
- Braungart - Rieker, J. M., Garwood, M. M., Powers, B. P., & Wang, X. (2001). Parental sensitivity, infant affect, and affect regulation: Predictors of later attachment. *Child development*, 72(1), 252-270.
- Bridgett, D. J., Burt, N. M., Edwards, E. S., & Deater-Deckard, K. (2015). Intergenerational transmission of self-regulation: A multidisciplinary review and integrative conceptual framework. *Psychological bulletin*, 141(3), 602.

- Bridgett, D. J., Gartstein, M. A., Putnam, S. P., McKay, T., Iddins, E., Robertson, C., Ramsay, K., & Rittmueller, A. (2009). Maternal and contextual influences and the effect of temperament development during infancy on parenting in toddlerhood. *Infant Behavior and Development, 32*, 103-116.
- Bridgett, D. J., Laake, L. M., Gartstein, M. A., & Dorn, D. (2013). Development of infant positive emotionality: the contribution of maternal characteristics and effects on subsequent parenting. *Infant and Child Development, 22*(4), 362-382.
- Brophy-Herb, H. E., Stansbury, K., Bocknek, E., & Horodyski, M. A. (2012). Modeling maternal emotion-related socialization behaviors in a low-income sample: Relations with toddlers' self-regulation. *Early Childhood Research Quarterly, 27*, 352-364.
- Brown, G. L., McBride, B. A., Bost, K. K., & Shin, N. (2011). Parental involvement, child temperament, and parents' work hours: Differential relations for mothers and fathers. *Journal of Applied Developmental Psychology, 32*, 313-322.
- Brownell, C. A., & Kopp, C. B. (Eds.). (2007). *Socioemotional development in the toddler years: Transitions and transformations*. New York: Guilford Press.
- Cabrera, N. J., Shannon, J. D., & Tamis-LeMonda, C. (2007). Fathers' influence on their children's cognitive and emotional development: From toddlers to Pre-K. *Applied Development Science, 11*, 208-213.
- Cabrera, N. J., Tamis-LeMonda, C. S., Bradley, R. H., Hofferth, S., & Lamb, M. E. (2000). Fatherhood in the twenty-first century. *Child Development, 71*, 127-136.
- Calkins, S.D. (1994). Origins and outcomes of individual differences in emotion regulation. *Monographs of the Society for research in Child Development, 59*, 53-72.

- Calkins, S. D., & Bell, K. L. (1999). Developmental transitions as windows to parental socialization of emotion. *Psychological Inquiry*, 10, 368-372.
- Calkins, S. D., Hungerford, A., & Dedmon, S. E. (2004). Mothers' interactions with temperamentally frustrated infants. *Infant Mental Health Journal*, 25, 219-239.
- Ciciolla, L., Crnic, K. A., & West, S. G. (2013). Determinants of change in maternal sensitivity: Contributions of context, temperament, and developmental risk. *Parenting: Science and Practice*, 13, 178-195.
- Clarke-Stewart, K. A. (1978). And daddy makes three: The father's impact on mother and young child. *Child Development*, 49, 466-478.
- Clark, L.A., Kochanska, G., & Ready, R. (2000). Mothers' personality and its interaction with child temperament as predictors of parenting behavior. *Journal of personality and social psychology*, 79, 274-285.
- Cole, P.M., Teti, L.O., & Zahn-Waxler, C. (2003). Mutual emotion regulation and the stability of conduct problems between preschool and early school age. *Development and Psychopathology*, 1, 1-18.
- Cook, W. L., & Kenny, D. A. (2005). The actor-partner interdependence model: A model of bidirectional effects in developmental studies. *International Journal of Behavioral Development*, 29(2), 101-109.
- Crockenberg, S. B. (1986). Are temperamental differences in babies associated with predictable differences in care giving? *New Directions for Child Development*, 31, 53-73.
- Crockenberg, S. B., & Smith, P. (1982). Antecedents of mother-infant interaction and infant irritability in the first three months of life. *Infant Behavior and Development*, 5, 105-119.

- Davidov, M., & Grusec, J. E. (2006). Untangling the links of parental responsiveness to distress and warmth to child outcomes. *Child Development, 77*, 44-58.
- Deater - Deckard, K., Sewell, M. D., Petrill, S. A., & Thompson, L. A. (2009). Maternal working memory and reactive negativity in parenting. *Psychological Science*.
- De Wolff, M., & van IJzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development, 68*, 571-591.
- Denham, S. A., Mitchell-Copeland, J., Strandberg, K., Auerbach, S., & Blair, K. (1997). Parental contributions to preschoolers' emotional competence: Direct and indirect effects. *Motivation and Emotion, 21*, 65-86.
- Dix, T., Moed, A., & Anderson, E. R. (2014). Mothers' Depressive Symptoms Predict Both Increased and Reduced Negative Reactivity Aversion Sensitivity and the Regulation of Emotion. *Psychological science*, 0956797614531025.
- Dunn, J., & Brown, J. (1994). Affect expression in the family, children's understanding of emotions, and their interactions with others. *Merrill-Palmer Quarterly, 40*, 120-137.
- Edwards, C. P., & Liu, W. (2002). Parenting toddlers. *Handbook of Parenting, 1*, 45-71.
- Feldman, R., Dollberg, D., & Nadam, R. (2011). The expression and regulation of anger in toddlers: Relations to maternal behavior and mental representations. *Infant Behavior and Development, 34*(2), 310-320.
- Feldman, R., Greenbaum, C. W., Mayes, L. C., & Erlich, S. H. (1997). Change in mother-infant interactive behavior: Relations to change in the mother, the infant, and the social context. *Infant Behavior and Development, 20*, 151-163.
- Garner, P. W. (1995). Toddlers' emotion regulation behaviors: The roles of social context and family expressiveness. *The Journal of Genetic Psychology, 156*(4), 417-430.

- Goeke-Morey, M. C., & Mark Cummings, E. (2007). Impact of father involvement: A closer look at indirect effects models involving marriage and child adjustment. *Applied Development Science, 11*, 221-225.
- Goldsmith, H. H. (1996). Studying temperament via construction of the Toddler Behavior Assessment Questionnaire. *Child development, 67*(1), 218-235.
- Goldberg, W. A., Clarke-Stewart, K. A., Rice, J. A., & Dellis, E. (2002). Emotional energy as an explanatory construct for fathers' engagement with their infants. *Parenting: Science and Practice, 2*, 379-408.
- Graham, J.W., Olchowski, A.E., & Gilreath, T.D. (2007). How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science, 8*, 206-213.
- Grych, J. H., & Clark, R. (1999). Maternal employment and development of the father–infant relationship in the first year. *Developmental Psychology, 35*, 893.
- Hagekull, B., Bohlin, G., & Rydell, A. M. (1997). Maternal sensitivity, infant temperament, and the development of early feeding problems. *Infant Mental Health Journal, 18*, 92-106.
- Halberstadt, A. G., Crisp, V. W., & Eaton, K. L. (1999). Family expressiveness: A retrospective. New York, NY: Cambridge University Press.
- Halverson, C. F., Kohnstamm, G. A., & Martin, R. P. (2014). The developing structure of temperament and personality from infancy to adulthood. Psychology Press.
- Hamaker, E. L., Nesselroade, J. R., & Molenaar, P. C. M. (2007). The integrated trait--state model. *Journal of Research in Personality, 41*, 295-315.
- Hoff-Ginsberg, E., & Tardif, T. (1995). *Socioeconomic status and parenting*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

- Holmbeck, G.N. (2002). Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. *Journal of pediatric psychology*, 27, 87-96.
- Karraker, K. H., Lake, M. A., & Parry, T. B. (1994). Infant coping with everyday stressful events. *Merrill-Palmer Quarterly*, 40, 171-189.
- Karreman, A., de Haas, S., van Tuijl, C., van Aken, M. A., & Deković, M. (2010). Relations among temperament, parenting and problem behavior in young children. *Infant behavior and development*, 33(1), 39-49.
- Kiff, C. J., Lengua, L. J., & Zalewski, M. (2011). Nature and Nurturing: Parenting in the Context of Child Temperament. *Clinical Child and Family Psychology Review*, 14, 251-301.
- Kochanska, G. (1995). Children's temperament, mothers' discipline, and security of attachment: Multiple pathways to emerging internalization. *Child Development*, 66(3), 597-615.
- Kochanska, G., Friesenborg, A. E., Lange, L. A., & Martel, M. M. (2004). Parents' Personality and Infants' Temperament as Contributors to Their Emerging Relationship. *J Pers Soc Psychol*, 86(5), 744-759.
- Kubicek, L. F., & Emde, R. N. (2012). Emotional Expression and Language: A Longitudinal Study of Typically Developing Earlier and Later Talkers from 15 to 30 Months. *Infant Mental Health Journal*, 33, 553-584.
- Lamb, M. E. (1978). Qualitative aspects of mother-and father-infant attachments. *Infant Behavior and Development*, 1, 265-275.
- Lindsey, E. W., Cromeens, P. R., & Caldera, Y. M. (2010). Mother-child and father-child mutuality in two contexts: consequences for young children's peer relationships. *Infant and Child Development*, 19, 142-160.
- Martin, R. P., & Halverson, C. F. (1991). Mother-father agreement in temperament ratings. In

- J. Strelau, & A. Angleitner (Eds.), *Explorations in Temperament: International Perspectives on Theory and Measurement*, (pp. 235-248). New York, NY: Springer.
- Martini, T. S., Root, C. A., & Jenkins, J. M. (2004). Low and middle income mothers' regulation of negative emotion: Effects of children's temperament and situational emotional responses. *Social Development, 13*, 515-530.
- Mehall, K. G., Spinrad, T. L., Eisenberg, N., & Gaertner, B. M. (2009). Examining the relations of infant temperament and couples' marital satisfaction to mother and father involvement: A longitudinal study. *Fathering, 7*(1), 23.
- Meier, P., Wolke, D., Gutbrod, T., & Rust, L. (2003). The influence of infant irritability on maternal sensitivity in a sample of very premature infants. *Infant and Child Development, 12*, 159-166.
- Mertesacker, B., Bade, U., Haverkock, A., & Pauli-Pott, U. (2004). Predicting maternal reactivity/sensitivity: The role of infant emotionality, maternal depressiveness/anxiety, and social support. *Infant Mental Health Journal, 25*, 47-61.
- Miller, A. L., McDonough, S. C., Rosenblum, K. L., & Sameroff, A. J. (2002). Emotion regulation in context: Situational effects on infant and caregiver behavior. *Infancy, 3*, 403-433.
- Mills-Koonce, W. R., Gariépy, J.-L., Propper, C., Sutton, K., Calkins, S., Moore, G., & Cox, M. (2007). Infant and parent factors associated with early maternal sensitivity: A caregiver-attachment systems approach. *Infant Behavior and Development, 30*, 114-126.
- Morrell, J., & Murray, L. (2003). Parenting and the development of conduct disorder and hyperactive symptoms in childhood: A prospective longitudinal study from 2 months to 8 years. *Journal of Child Psychology and Psychiatry, 44*, 489-508.

Nelson, J. A. N., & Simmerer, N. J. (1984). A correlational study of children's temperament and parent behavior. *Early Child Development and Care, 16*, 231-250.

NICHD Early Child Care Research Network (2000). Poor children in working families: Parent employment and poverty as predictors of developmental outcomes.

NICHD Early Child Care Research Network (2004). Affect dysregulation in the mother-child relationship in the toddler years: Antecedents and consequences. *Development and Psychopathology, 16*, 43-68.

Noel, M., Peterson, C., & Jesso, B. (2008). The relationship of parenting stress and child temperament to language development among economically disadvantaged preschoolers. *Journal of Child Language, 35*(04), 823-843.

Nozadi, S. S., Spinrad, T. L., Eisenberg, N., Bolnick, R., Eggum-Wilkens, N. D., Smith, C. L., ... & Sallquist, J. (2013). Prediction of toddlers' expressive language from maternal sensitivity and toddlers' anger expressions: A developmental perspective. *Infant Behavior and Development, 36*(4), 650-661.

O'Neal, C. R., & Magai, C. (2005). Do parents respond in different ways when children feel different emotions? The emotional context of parenting. *Development and Psychopathology, 17*(02), 467-487.

Owens, E. B., Shaw, D. S., & Vondra, J. I. (1998). Relations between infant irritability and maternal responsiveness in low-income families. *Infant Behavior and Development, 21*(4), 761-777.

Pauli-Pott, U., Mertesacker, B., Bade, U., Bauer, C., & Beckmann, D. (2000). Contexts of relations of infant negative emotionality to caregiver's reactivity/sensitivity. *Infant Behavior and Development, 23*, 23-29.

- Paulussen-Hoogeboom, M. C., Stams, G. J. J. M., Hermanns, J. M. A., & Peetsma, T. T. D. (2007). Child negative emotionality and parenting from infancy to preschool: A meta-analytic review. *Developmental Psychology, 43*, 438-453.
- Pettit, G. S., & Bates, J. E. (1984). Continuity of individual differences in the mother-infant relationship from six to thirteen months. *Child Development, 55*, 729-739.
- Planalp, E. M., Braungart-Rieker, J. M., Lickenbrock, D. M., & Zentall, S. R. (2013). Trajectories of parenting during infancy: The role of infant temperament and marital adjustment for mothers and fathers. *Infancy, 18*, E16-E45.
- Potegal, M., & Davidson, R. J. (2003). Temper tantrums in young children: 1. Behavioral composition. *Journal of Developmental and Behavioral Pediatrics, 24*, 140-147.
- Putnam, S.P., Sanson, A.V., & Rothbart, M.K. (2002). Child temperament and parenting. In Bornstein, M.D. (Ed.), *Handbook of parenting: Volume 1 Child and Parenting*, (255-277). Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc., Publishers.
- Robinson, L. R., Morris, A. S., Heller, S. S., Scheeringa, M. S., Boris, N. W., & Smyke, A. T. (2009). Relations between emotion regulation, parenting, and psychopathology in young maltreated children in out of home care. *Journal of Child and Family Studies, 18*, 421-434.
- Rothbart, M. K. (1996). Children's behavior questionnaire. *Oregon: University of Oregon*.
- Rothbart, M. K., Ahadi, S. A., & Hershey, K. L. (1994). Temperament and social behavior in childhood. *Merrill-Palmer Quarterly (1982-), 21-39*.
- Rothbart, M. K., Ahadi, S. A., Hershey, K. L., & Fisher, P. (2001). Investigations of Temperament and Three to Seven Years: The Children's Behavior Questionnaire. *Child Development, 72*, 1394-1408.

- Rothbart, M.L., & Bates, J.E. (2006). Temperament. In W. Damon, R. Lerner, & N. Eisenberg (Eds.), *Handbook of child psychology: Vol. 3 Social, emotional, and personality development* (6th ed., pp 99-166). New York, NY: Wiley.
- Rothbart, M. K., & Goldsmith, H. H. (1985). Three approaches to the study of infant temperament. *Developmental Review*, 5(3), 237-260.
- Rubin, K. H., Hastings, P., Chen, X., Stewart, S., & McNichol, K. (1998). Intrapersonal and maternal correlates of aggression, conflict, and externalizing problems in toddlers. *Child Development*, 69, 1614-1629.
- Sameroff, A. J. (1990). Neo-environmental perspectives on developmental theory. In Hodapp, R.M., Burack, J.A., & Zigler, E. (Eds.), *Issues in the developmental approach to mental retardation*, (pp. 93-113). New York, NY: Cambridge University Press.
- Sarkadi, A., Kristiansson, R., Oberklaid, F., & Bremberg, S. (2008). Fathers' involvement and children's developmental outcomes: a systematic review of longitudinal studies. *Acta Paediatrica*, 97, 153-158.
- Scaramella, L. V., Sohr-Preston, S. L., Mirabile, S. P., Robison, S. D., & Callahan, K. L. (2008). Parenting and children's distress reactivity during toddlerhood: An examination of direction of effects. *Social Development*, 17, 578-595.
- Schoppe-Sullivan, S. J., Kotila, L. E., Jia, R., Lang, S. N., & Bower, D. J. (2013). Comparisons of levels and predictors of mothers' and fathers' engagement with their preschool-aged children. *Early Child Development and Care*, 183, 498-514.
- Shaw, D.S., & Bell, R.Q. (1993). Developmental theories of parental contributors to antisocial behavior. *Journal of Abnormal Child Psychology*, 21, 493-518.

- Spinath, F. M., & Angleitner, A. (1998). Contrast effects in Buss and Plomin's EAS questionnaire: A behavioral-genetic study on early developing personality traits assessed through parental ratings. *Personality and Individual Differences*, 25, 947-963.
- Strelau, J. (2001). The concept and status of trait in research on temperament. *European Journal of Personality*, 15, 311-325.
- Tabachnick, B. G., & Fidell, L. S. (2007). Multivariate analysis of variance and covariance. Using multivariate statistics, 3, 402-407.
- Tan, P. Z., Armstrong, L. M., & Cole, P. M. (2013). Relations between temperament and anger regulation over early childhood. *Social Development*, 22, 755-772.
- Teti, D. M., & Cole, P. M. (2011). Parenting at risk: New perspectives, new approaches. *Journal of Family Psychology*, 25, 625-634.
- Thomas, A., & Chess, S. (1984). Genesis and evolution of behavioral disorders: From infancy to early adult life. *The American Journal of Psychiatry*, 141, 1-9.
- van den Boom, D. C., & Hoeksma, J. B. (1994). The effect of infant irritability on mother-infant interaction: A growth-curve analysis. *Developmental Psychology*, 30, 581-590.
- Voigt, B., Brandl, A., Pietz, J., Pauen, S., Kliegel, M., & Reuner, G. (2013). Negative reactivity in toddlers born prematurely: indirect and moderated pathways considering self-regulation, neonatal distress and parenting stress. *Infant Behavior and Development*, 36(1), 124-138.
- von Hippel, P. T. (2007). Regression with missing Ys: An improved strategy for analyzing multiply imputed data. *Sociological Methodology*, 37(1), 83-117.

- Wachs, T. D., & Kohnstamm, G. A. (2001). The bidirectional nature of temperamental-context links. In T.D. Wachs & G.A. Kohnstamm (Eds.) *Temperament in context* (201-222). Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
- Washington, J., Minde, K., & Goldberg, S. (1986). Temperament in preterm infants: Style and stability. *Journal of the American Academy of Child Psychiatry*, 25, 493-502.
- Wilkie, C. F., & Ames, E. W. (1986). The relationship of infant crying to parental stress in the transition to parenthood. *Journal of Marriage and the Family*, 48, 545-550.
- Wong, M. S., Diener, M. L., & Isabella, R. A. (2008). Parents' emotion related beliefs and behaviors and child grade: Associations with children's perceptions of peer competence. *Journal of Applied Developmental Psychology*, 29, 175-186.
- Woodworth, S., Belsky, J., & Crnic, K. (1996). The determinants of fathering during the child's second and third years of life: A developmental analysis. *Journal of Marriage and the Family*, 58, 679-692.
- Zahr, L. K. (1991). The relationship between maternal confidence and mother–infant behaviors in premature infants. *Research in Nursing & Health*, 14, 279-286.
- Zelenski, J. M., & Larsen, R. J. (2000). The distribution of basic emotions in everyday life: A state and trait perspective from Experience Sampling data. *Journal of Research in Personality*, 34, 178-197.
- Zhou, Q., Eisenberg, N., Wang, Y., & Reiser, M. (2004). Chinese children's effortful control and dispositional anger/frustration: Relations to parenting styles and children's social functioning. *Developmental Psychology*, 40, 352-366.

Tables and Figures

Table 1.

Descriptive Statistics of Parenting

	Mothers (N=120)		Fathers (N=105)	
	Mean (SD)	Range	Mean (SD)	Range
Sensitivity	3.32 (.80)	1.33 - 5.00	2.79 (.93)	1.00 - 4.83
Positive Affect	2.88 (.70)	1.33 - 4.33	2.55 (.75)	1.00 - 4.17
Negative Affect	1.40 (.46)	1.00 - 3.33	1.23 (.31)	1.00 - 2.33

Table 2.

Descriptive Statistics of Toddler Traits and States

	Mean (SD)	Range
<i>Temperamental Traits (rated by mothers)</i>		
Negative Affectivity	3.45 (.55)	2.04 – 4.75
Effortful Control	4.52 (.56)	3.11 - 5.88
Surgency	4.55 (.58)	2.95 - 5.70
<i>Emotional States (observed)</i>		
Frequency of Positive Emotion Expression	16.47 (7.29)	0 - 36
Frequency of Negative Emotion Expression	11.46 (5.84)	1 - 32

Table 3.
Intercorrelations Among Study Variables

	1 ^a	2 ^a	3 ^a	4	5	6	7 ^a	8	9	10 ^a	11	12	13	14	15
<i>Covariates</i>															
1. Ch. Gender ^a	1														
2. Maternal Education ^a	.05	1													
3. Paternal Education ^a	-.07	.62***	1												
4. # Children Present	-.00	-.05	-.13	1											
<i>Parenting</i>															
5. Mother Sensitivity	-.12	.43***	.39***	-.30**	1										
6. Mother Pos. Affect	-.02	.32***	.34***	-.29**	.77***	1									
7. Mother Neg. Affect _(yes/no) ^a	.12	-.10	-.09	-.02	-.15 ^m	-.16 ^m	1								
8. Father Sensitivity	-.07	.13	.23*	-.27**	.38***	.30**	-.16	1							
9. Father Pos. Affect	-.02	.03	.13	-.16	.23*	.36*	-.24*	.80***	1						
10. Father Neg. Affect _(yes/no) ^a	.08	-.12	-.10	-.11	-.18 ^m	-.21*	-.39***	-.02	-.04	1					
<i>Toddler Traits</i>															
11. Negative Affectivity	.03	.02	.14	.18 ^m	-.20*	-.20*	.20*	-.04	.01	-.08	1				
12. Effortful Control	.18*	.06	-.10	-.22*	.13	.21*	-.11	.07	.07	.02	-.40***	1			
13. Surgency	-.05	-.08	-.22*	-.02	.03	.14	.07	-.02	-.02	.11	-.26**	.33***	1		
<i>Toddler States</i>															
14. Freq. Pos. Emotion Exp.	.08	.07	.10	-.14	.11	.24**	.00	.31**	.44***	-.01	.00	.07	.01	1	
15. Freq. Neg. Emotion Exp.	-.04	-.13	-.12	.07	-.09	-.26**	.13	.03	-.11	.21*	.04	.07	-.08	-.19*	1

Note. ^m $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$

^aSpearman's Rho nonparametric correlation

Table 4.

Regression Model Predicting Mothers' Sensitivity

	B	SE B	β	<i>p</i>
<i>Covariates</i>				
# Children Present	-.259	.083	-.253	.002
Parent Education	.181	.034	.419	<.0001
<i>Trait & State Main Effects</i>				
Negative Affectivity	-.214	.128	-.151	.094
Effortful Control	.019	.131	.021	.884
Surgeency	-.004	.123	-.022	.972
# Positive Emotion Expressions	.004	.009	.038	.624
# Negative Emotion Expressions	-.002	.011	-.021	.837
<i>Model Statistics</i>				
R ²			.30	
Adj. R ²			.26	
<i>F</i>			6.87, <i>p</i> <.0001	

Table 5.
Regression Model Predicting Mothers' Positive Affect

	B	SE B	β	<i>p</i>
<i>Covariates</i>				
# Children Present	-.188	.074	-.206	.011
Parent Education	.095	.031	.249	.002
<i>Trait & State Main Effects</i>				
Negative Affectivity	-.109	.113	-.095	.335
Effortful Control	.117	.116	.108	.315
Surgency	.116	.112	.063	.303
# Positive Emotion Expressions	.014	.008	.148	.070
# Negative Emotion Expressions	-.022	.010	-.194	.025
<i>Model Statistics</i>				
R^2			.27	
Adj. R^2			.22	
<i>F</i>			5.90, $p < .0001$	

Table 6

Logistic Regression Model Predicting the Likelihood of Mothers Expressing Negative Affect

	B	SE B	Wald's χ^2	e ^B (odds ratio)	p
<i>Trait & State Main Effects</i>					
Negative Affectivity	1.289	.523	6.753	3.29	.014
Effortful Control	-.620	.486	1.971	.538	.203
Surgency	1.066	.512	5.528	2.904	.037
# Positive Emotion Expressions	.005	.032	.015	1.005	.877
# Negative Emotion Expressions	.101	.049	4.587	1.106	.040
<i>State-by-Trait Interactions</i>					
Negative Emotion X Negative Affectivity	.221	.092	5.413	1.247	.016
Negative Emotion X Surgency	.211	.100	4.104	1.235	.035
<i>Model Statistics</i>					
Wald χ^2 (df)	14.15, p =.049 (7)				

Table 7.
Regression Model Predicting Fathers' Sensitivity

	B	SE B	β	<i>p</i>
<i>Covariates</i>				
# Children Present	-.242	.113	-.200	.033
Parent Education	.084	.046	.173	.067
<i>Trait & State Main Effects</i>				
Negative Affectivity	-.100	.171	-.063	.556
Effortful Control	.023	.178	.015	.897
Surgency	-.039	.163	-.031	.810
# Positive Emotion Expressions	.037	.012	.281	.003
# Negative Emotion Expressions	.016	.015	.098	.292
<i>Model Statistics</i>				
R^2			.19	
Adj. R^2			.13	
<i>F</i>			3.38, <i>p</i> =.004	

Table 8.

Regression Model Predicting Fathers' Positive Affect

	B	SE B	β	<i>p</i>
<i>Trait & State Main Effects</i>				
Negative Affectivity	-.036	.134	-.034	.787
Effortful Control	.027	.142	.027	.848
Surgency	-.064	.128	-.083	.625
# Positive Emotion Expressions	.046	.010	.435	<.0001
# Negative Emotion Expressions	-.004	.012	-.040	.716
<i>Model Statistics</i>				
R^2			.20	
Adj. R^2			.16	
<i>F</i>			5.13, <i>p</i> =.0003	

Table 9

Logistic Regression Model Predicting the Likelihood of Fathers Expressing Negative Affect

	B	SE B	Wald's χ^2	e ^B (odds ratio)	p
<i>Trait & State Main Effects</i>					
Negative Affectivity	-.059	.459	.000	.943	.898
Effortful Control	-.763	.464	2.425	.466	.100
Surgency	.809	.432	3.020	2.246	.061
# Positive Emotion Expressions	.015	.033	.182	1.015	.645
# Negative Emotion Expressions	.091	.042	4.550	1.095	.031
<i>State-by-Trait Interactions</i>					
Negative Emotion X Negative Affectivity	.176	.085	4.216	1.192	.037
Positive Emotion X Negative Affectivity	.132	.068	3.815	1.141	.050
<i>Model Statistics</i>					
Wald χ^2 (df)	12.53, p=.085 (7)

Figure 1a. Probability of mother expressing negative affect: toddler negative emotion expression moderated by toddler negative affectivity

Figure 1b. Probability of mother expressing negative affect: toddler negative emotion expression moderated by toddler surgency

Figure 2a. Probability of father expressing negative affect: toddler negative emotion expression moderated by toddler negative affectivity

Figure 2b. Probability of father expressing negative affect: toddler positive emotion expression moderated by toddler negative affectivity