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Toddlers' Differential Susceptibility to the Effects of Coparenting on Social-Emotional Adjustment

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Abstract

The present study tested whether infants high in negative affectivity are differentially susceptible to observed coparenting behavior in relation to their subsequent social-emotional development. Data came from a longitudinal study of 182 U.S. dual-earner, primiparous couples and their infant children. At 9-months postpartum, child negative affectivity was reported by mothers and fathers and supportive and undermining coparenting behavior were assessed from mother-father-infant observations. At 27-months mothers reported on toddlers' externalizing behavior and dysregulation using a clinical assessment tool designed to identify competencies and areas of concern in toddlers' social-emotional development. Hierarchical regression analyses revealed partial support for the differential susceptibility hypothesis. Specifically, infants high in negative affectivity had lower levels of dysregulation when embedded in a more supportive coparenting context, and higher levels of dysregulation when embedded in a less supportive coparenting context. In contrast, supportive coparenting behavior was not relevant for the dysregulation of infants initially low in negative affectivity.

Externalizing and dysregulation patterns detected in early childhood can persist throughout development (Campbell, Shaw, & Grilliom, 2000; Miller-Lewis et al., 2006) and predict later disruptive behaviors (Denham et al., 2002; Fanti & Hnrich, 2010), highlighting the importance of examining early social-emotional precursors to maladaptive behavior. The

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coparenting relationship, or the "executive subsystem" of the family (Minuchin, 1974), refers to the ways in which parents work together to raise their children (Feinberg, 2003), and has unique associations with social-emotional development, predicting child adjustment even when controlling for couple relationship quality, mother-child, and father-child relationship quality (Karreman, van Tuijl, van Aken, & Dekovic, 2008, McHale & Rasmussen, 1998). However, even as theoretical perspectives on development (Boyce & Ellis, 2005; Lerner, 2006) have increasingly highlighted the dual roles of individual characteristics and the caregiving environment as important contributors to children's early mastery of social, emotional, and regulatory skills, research on coparenting and child social-emotional adjustment has continued to examine main effects of coparenting (Teubert & Pinquart, 2010). The caregiving environment, however, does not affect all children in the same way.

According to the differential susceptibility hypothesis (Belsky, 1997, 2005), children's genetically-influenced characteristics impact the degree to which they are affected by the caregiving environment. Children who possess "susceptibility factors" are at risk for poorer developmental outcomes when raised in negative caregiving environments, but experience superior developmental outcomes when raised in positive caregiving environments. Few studies, however, have considered the differential susceptibility perspective when investigating the link between coparenting and child social-emotional adjustment. To address this gap, the present study examined whether the social-emotional adjustment of toddlers high in negative affectivity is more strongly associated with coparenting quality than the adjustment of toddlers low in negative affectivity.

Coparenting

The degree to which parents coordinate childrearing is considered an important socialization factor in child development and social-emotional adjustment (McHale, 1997; McHale, Kuersten-Hogan, Lauretti, & Rasmussen, 2000; Teubert & Pinquart, 2010). Coparenting is a distinct aspect of the family system that is different from the marital relationship in its focus on how parents relate to one another in their roles as parents, rather than in their roles as romantic partners (Katz & Gottman, 1996). Feinberg's (2003) model of coparenting underscores the importance of *support* and *undermining* within the coparenting relationship. Supportive coparenting is characterized by warm, cooperative behavior between parents, whereas undermining includes hostile, critical, or competitive behaviors between parents. The intensity of these supportive and undermining behaviors has been consistently linked to child outcomes (Teubert & Pinquart, 2010) even after controlling for couple relationship quality or parent-child relationship quality (Karreman et al., 2008; McHale & Rasmussen, 1998), with support linked to infants' secure attachment (Brown, Schoppe-Sullivan, Mangelsdorf, & Neff, 2010) and undermining linked to preschoolers' externalizing behavior (Schoppe, Mangelsdorf, & Frosch, 2001). Although often negatively correlated, as is the case in the present study, support and undermining coparenting are conceptualized as different dimensions of coparenting, and have been most often treated separately in prior research. Parents have displayed (or reported) support while simultaneously also displaying (or reporting) undermining in the same interaction (or assessment; Margolin, Gordis & John, 2001; McHale, Kuersten & Lauretti, & Rasmussen, 2000). Prior studies have also shown

that even though correlated, supportive and undermining coparenting can play different roles in children's adjustment (Schoppe-Sullivan et al., 2009).

Within the coparenting literature, very few studies have tested the differential susceptibility hypothesis, or whether some infants are *more susceptible* to the coparenting environment than others. Existing studies have shown that the coparenting relationship "buffers" the risk of temperamental vulnerabilities. For example, Schoppe-Sullivan, Weldon, Cook, Davis, and Buckley (2009) found coparenting moderated the association between child effortful control and externalizing behavior, such that preschool-aged children with low effortful control were less likely to increase in externalizing behavior in the context of supportive coparenting. Kolak and Volling (2013) also found supportive coparenting "buffered" the risk of developing externalizing problems for preschool-aged children with high negative affectivity. Although these studies were the first to examine whether coparenting could moderate associations between child temperament and externalizing behavior, neither study tested whether those children with temperamental vulnerabilities (i.e., low effortful control or high negative affectivity) were differentially susceptible to the coparenting relationship. In addition, neither study controlled for child gender—even though males are at a heightened risk for externalizing behavior compared to females (Belsky, Hsieh, & Crnic, 1998). Moreover, both studies examined externalizing outcomes in the preschool years, even though meaningful individual differences in child social-emotional adjustment are already apparent at toddlerhood, and these differences tend to persist over time (Briggs-Gowan, Carter, Bosson-Heenen, Guyer, & Horwitz, 2006). Thus, the present study sought to test children's differential susceptibility to coparenting at an earlier point in development than has been studied before, while also controlling for child gender.

Differential Susceptibility

At the core of the differential susceptibility hypothesis is the view that some individuals posses biologically rooted characteristics, or "susceptibility traits" that increase their vulnerability to the environmental context—for better and for worse. Namely, some individuals possess risk alleles that influence their developmental plasticity and susceptibility to features of the environment (Belsky & Pluess, 2009). In the presence of a *positive* rearing environment, for example, a given genetic characteristic will increase the likelihood of a *positive* social-emotional outcome in the child. However, in the presence of a *negative* rearing environment, a genetic characteristic will increase the likelihood of a *negative* social-emotional outcome in the child.

Even as recent research examining how the caregiving environment and child temperament interact in the course of child development has been conceptualized through a differential susceptibility lens (Belsky, 2005; Belsky, Bakermans-Kranenburg & van IJzendoorn, 2007), whether or not coparenting may be more influential for some children than for others remains largely unexplored. According to Belsky's differential susceptibility hypothesis (1997, 2005), infants with negative or difficult temperaments have a heightened susceptibility to caregiving quality (Belsky et al., 1998). Temperament is a phenotypic marker of underlying genetic characteristics that often follows a differential susceptibility pattern in the empirical literature (Belsky & Pluess, 2009). Children with a "difficult"

temperament (i.e., high negative affectivity) are at an increased risk for subsequent social-emotional maladjustment when they experience a poor-quality caregiving environment (i.e., low-quality childcare or parenting; see Belsky & Pluess, 2009) – but, in contexts of high-quality caregiving, are better adjusted than even those children low in negative affectivity (Boyce & Ellis, 2005).

Evidence of negative affectivity as a risk factor for further social-emotional maladjustment when expressed in the context of a low-quality caregiving environment has accumulated during the past two decades (Belsky, Hsieh, & Crnic, 1998; Morrell & Murray, 2003). However, as demonstrated by Belsky (1997, 2005), children high in negative affectivity also tend to benefit disproportionately from a supportive rearing environment, such that children high in negative affectivity show higher levels of positive social-emotional adjustment compared to children with low levels of negative affectivity (see Boyce & Ellis, 2005). Thus, toddler negative affectivity is a prime candidate indicator of genetic susceptibility to the caregiving environment, but has received little attention in research linking coparenting to child adjustment.

Present Study

Using longitudinal data from a sample of toddlers and their parents followed from 9 to 27 months, and informed by the differential susceptibility hypothesis, the present study sought to extend the research on coparenting and toddler social-emotional adjustment. Two research questions guided this study: 1) Does coparenting predict toddler dysregulation and externalizing behavior beyond the influence of negative affectivity? 2) Is there support for the differential susceptibility hypothesis, such that infants high in negative affectivity appear more susceptible to the effects of coparenting on social-emotional adjustment? Using a differential susceptibility framework to guide our hypotheses, we predicted that infants in a highly supportive coparenting context, and high in negative affectivity, would exhibit the lowest levels of externalizing and dysregulation in toddlerhood, whereas infants high in negative affectivity and in highly undermining coparenting contexts would exhibit the highest levels of externalizing and dysregulation in toddlerhood. Previous research indicates that male children are at greater risk for the development of externalizing behavior (Belsky et al., 1998), as are children from low socioeconomic status families (see Hoff, Laursen, & Bridges, 2012). Moreover, parents' adjustment in their couple relationship has been linked to coparenting (Schoppe-Sullivan, Mangelsdorf, Frosch, & McHale, 2004) and child social-emotional adjustment (Cummings & Davies, 1994; Howes & Markman, 1989). Hence, we controlled for child gender, and parents' education, income, and relationship adjustment.

Method

Participants

Data were drawn from a longitudinal study of the transition to parenthood among 182 different-sex, dual-earner couples residing in a large, Midwestern city who became parents for the first time between 2008 and 2010. Additional follow-up data were collected about toddlers' social-emotional development from 60% of families who participated in the larger study. Expectant couples were recruited primarily from childbirth education classes,

advertisements (i.e., newspapers, flyers), pregnancy and health centers, and participant referrals. Eligible expectant parents had to be married or cohabiting, 18 years or older, expecting their first biological child, able to read and speak English, and working full-time prior to their child's birth and planning to return to work shortly after their child's birth. In accordance with approved procedures by the University's Institutional Review Board, informed consent was obtained from each parent at each phase of the study and parental permission was obtained for participation of children.

Of the 182 couples, 86% were married. The median level of education for expectant parents was a bachelor's degree, with 75% of mothers and 65% of fathers having obtained at least this education level. The median annual family income was $79,500. On average, mothers were 28.24 years old (*SD* = 4.02; *Range* 18–42), and fathers were 30.20 years old (*SD* = 4.81; *Range* 18–50). The majority of participants were White (85% of mothers and 86% of fathers), with 6% of mothers and 7% of fathers self-identifying as Black, 3% of mothers and 3% of fathers self-identifying as Asian, 2% of mothers and 4% of fathers self-identifying as other races, and 4% of mothers and 1% of fathers self-identifying as more than one race. Four percent of mothers and 2% of fathers identified themselves as Hispanic. Of the children born to participating parents, 49% were female.

Procedure

The current study utilized data collected at 9 months and approximately 27 months postpartum. When children were 9 months of age, parents were asked to complete mailed surveys. Following survey completion, parents and their infants visited the lab at a local science center for 1.5 hours. During this time parents were videotaped while playing with their child in various situations. From the original sample, 153 families participated in the observational portion of the 9-month assessment. The most common reason given for nonparticipation at the 9-month assessment was that the family was too busy to participate.

When children were about 27 months of age (min = 14.63; max = 45.23; $M = 27.26$; $SD = 11.37$), a separate follow-up study was conducted (n = 114), in which mothers reported on their toddler's social-emotional development using the Infant Toddler Social Emotional Assessment (ITSEA; Carter & Briggs-Gowan, 2006). Attrition analyses were conducted on the data set that was screened for multivariate outliers; three cases were removed. There was not a significant difference in family income among those who did and those who did not participate in the 27-month follow-up ($t(117) = -.41$, $p = .68$). There was a statistically significant association between marital status and participation in the 27-month follow-up (chi-square with one degree of freedom = 4.00, $p = 0.045$). Specifically, of those who participated in the follow-up, 90% were married, whereas in the original wave of data collection, 86% were married. There was also a statistically significant association between maternal education level and participation in the 27-month follow-up (chi-square with one degree of freedom = 5.76, $p = .02$). Specifically, of those who participated in the follow-up 85% had a bachelor's degree or higher, whereas in the original wave of data collection 79% had a bachelor's degree or higher. Missing values were recovered using multiple imputations.

Measures

Child negative affectivity.—At the 9-month postpartum assessment, mothers and fathers were asked to independently complete the 37-item Revised Infant Behavior Questionnaire—Very Short Form (IBQVSF; Putnam, Helbig, Gartstein, Rothbart, & Leerkes, 2014) as a measure of their infant's temperament. This questionnaire was designed to evaluate three broad temperament factors: surgency, negative affect, and effortful control. For each item, parents rated the degree to which their child exhibited a particular behavior within the past week. Items were rated on a scale of 0 to 7, where 0 means that the described behavior does not apply, 1 means that the parent has never observed their infant exhibiting the described behavior, and 7 means the parent has very frequently observed their infant exhibiting the described behavior. The current study focused specifically on mothers' and fathers' reports on the negative affectivity subscale, as negative affectivity is a prime candidate indicator of genetic susceptibility to the caregiving environment. Given that mothers' and fathers' reports of infant negative affectivity were significantly and moderately correlated in the original (non-imputed) data (r= .464, p < .001), these reports were averaged. Reliability was high on the negative affect (α= .99) subscale.

Social-emotional adjustment.—In the follow-up study (occurring at approximately 2 years postpartum), mothers completed the ITSEA (Carter & Briggs-Gowan, 2006; Carter, Briggs-Gowan, Jones & Little, 2003), a clinical assessment tool designed to identify competencies and areas of concern in toddlers' social-emotional development. The ITSEA has been empirically validated and includes four domains and 17 sub-scales that capture competencies, global developmental delays, and specific language delays. The assessment has been validated in a variety of family contexts (Carter et al., 2003), and has been used with children from 12 to 48 months old (Briggs-Gowan et al., 2006). This study focused on mothers' ratings of externalizing and dysregulation behaviors in children, as these aspects of children's maladjustment often remain stable over time (see Briggs-Gowan et al., 2006). All ITSEA items were rated on a scale of 0 to 2, with higher values indicating greater levels of dysregulation of externalizing. The dysregulation scale (α = .75) assessed the child's sleep difficulty, eating issues, and sensory sensitivity (21 items; e.g., my child "dislikes food(s) because of how they feel"). The externalizing scale (α = .80) assessed the child's level of activity and impulsivity, aggression and defiance, and aggression toward peers (24 items; e.g., the child "gets hurt so often I can't take my eyes off of him/her" and the child "hits, bites, or kicks you and/or the other parent"). In one case, the toddler was older than 48 months at follow-up and removed from the analysis. Due to item overlap between the negative affectivity subscale of the IBQ-VSF and the negative emotionality subscale of dysregulation on the ITSEA, negative emotionality items were removed from the dysregulation scale.

Coparenting behavior.—At 9 months postpartum, observations of coparenting behavior were obtained from mother-father-infant interaction episodes. In these episodes, parents were first given a novel toy (jack-in-the-box) and asked to introduce the new toy to their children together for 5 minutes. The introduction of this toy placed the child in an uncertain situation that could elicit various forms of support or undermining between parents. Second,

parents were given another toy (pop-up toy) and asked to play together as they normally would with their infant for an additional 5 minutes.

A team of trained research assistants rated the quality of couples' coparenting behavior from the videotaped family play episodes at 9 months postpartum using scales originally developed by Cowan and Cowan (1996) and used to assess coparenting behavior in families with infants in previous research (Altenburger et al., 2014). All coparenting scales were rated on a scale of 1 to 5, with higher scores indicating greater levels of the behavior of interest. The scales we focused on in the present study as indicators of supportive coparenting were *cooperation* (degree of emotional and instrumental support between partners) and *pleasure* (degree to which parents enjoy collaborating in the parental role and watching each other interact with the infant). The scales that indicated undermining coparenting were *competition* (degree to which parents interfere with each other's efforts to interact with the child and/or vie for the infant's attention/affection) and *displeasure* (degree to which parents display dislike for the other parent's style of interacting with or relationship with the infant). In this study, cooperation and competition were rated at the level of the coparenting subsystem. Pleasure and displeasure were rated at the level of the individual parent. To create a "support" variable, mothers' and fathers' pleasure were averaged and summed with scores of parents' overall cooperation. To create an "undermining" variable, mothers' and fathers' displeasure were averaged and summed with scores of parents' overall competition. Prior research supports the use of cooperation and parents' pleasure as indicators of supportive coparenting, and competition and parents' displeasure as indicators of undermining coparenting (Altenburger et al., 2014). Coders overlapped on 56.2% randomly selected episodes and Gammas ranged from .64 to .91, reflecting acceptable interrater reliability. Coparenting scores were combined across episodes.

Control variables.—At the 9-month session, each partner completed one questionnaire designed to measure adjustment in the couple subsystem: the brief Dyadic Adjustment Scale (Sabourin, Valois, & Lussier, 2005). The brief DAS consisted of 4 items measuring overall adjustment in the couple relationship and required respondents to rate how often (1 = *never*; 6 = *all of the time*) three situations arose within their relationship (e.g., "how often do you discuss or have you considered divorce, separation, or terminating your relationship?") as well as to report their overall happiness in the relationship (0 = extremely unhappy; 6 = perfect). Reliability was acceptable: $\alpha_m = .74$; $\alpha_f = .78$. Parents' scores on the DAS were significantly and moderately correlated ($r = .51$, $p < .001$) and thus averaged.

Parents also reported on their level of education, household income, and child gender. Given that the age of the child at follow-up varied, child age was also included as a control variable. Child age was computed by calculating the number of days between the child's date of birth and ITSEA completion date; child age in days was divided by 30 to create an estimate of child age in months. In cases where the ITSEA completion date was not provided, we used parent reported child age, in months.

Results

Analysis Plan

Missing Data Analysis.—Prior to the main data analysis, the data were screened for multivariate outliers and missing values. Mahalanobis distance is a commonly used method to screen for multivariate outliers within a given data set (Filzmoser et al., 2014). Thus, multivariate outliers were first identified and flagged using Mahalanobis Distances with a criterion level of $p < .001$. Data were additionally screened for multivariate outliers using studentized residuals. Items with values greater than the absolute value of 1.96 were flagged. Prior research has eliminated observations with studentized residuals greater than 2 (Variyam & Kraybill, 1992). Three multivariate outliers were removed in total.

Examination of the usable missing values of interest revealed a moderate percentage of missingness ranging from 16.7 to 20.6% at 9-months postpartum and 38.3 to 40% at approximately 27-months postpartum, with an arbitrary pattern of missing responses. Thus, to address concerns that this amount of missing data might bias results, values for missing data were imputed using the multiple imputation technique in IBM SPSS Statistical Package Version 22 and Version 23.

Data were missing completely at random (MCAR), as indicated by a non-significant Little's MCAR test, $\chi^2(756) = 812.857$, $p > .05$. MCAR refers to data where the "missing mechanism does not depend on the variable of interest, or any other variable, which is observed in the dataset" (Scheffer, 2002, p. 153). When MCAR is the mechanism of missingness, multiple imputation can estimate within 1% of the true value even when 50% of values included in the estimation model are missing (Scheffer, 2002).

Multiple value imputations are a recommended statistical technique for handling wave and item nonresponse (Graham, 2012). Regression-based single imputation procedures often underestimate variance, as imputed values from a single imputation do not deviate from the regression line. In contrast, multiple imputations return error variance lost from regression-based single imputation by adding random error variance and obtaining multiple random draws from the population (Graham, 2009) in a manner that is more efficient than other missing data analytic procedures (Yuan, 2010). As described by Yuan, the number of imputations selected (m) is a function of the desired "relative efficiency," where the rate of missing data (λ) is considered, in the following formula (2010):

$$\text{relative efficiency} = (1 + \lambda/m)^{-1}$$

For example, using the relative efficiency formula, in a data set with 50% missing values, *10* imputations will approximate the values created in a data set of infinite imputations with 95% efficiency. Given the relatively moderate percentage of missing data within our sample, 10 data sets were imputed.

Results of multiply imputed data sets are often pooled to provide a final estimate that has incorporated all data sets. However, statistical methods for pooled data have not been

developed for all statistical analyses (i.e., PCA, EFA, and SEM) in commonly used statistical programs like SPSS. Because R^2, and F test analyses cannot be performed on pooled data sets, alternatives must be utilized. Prior research has averaged imputed values across data sets to analyze data (Jensen & Shafer, 2013). Combining imputed values into a single dataset will not change conclusions substantially, as maximum median and variance values were relatively small. Thus, the median values across all imputed data were used to obtain a single value for each variable in an aggregate dataset to calculate the change in R^2 and F values and to graph the significant interaction in Table 2, as these analyses cannot be performed on pooled data in SPSS. Unstandardized beta coefficients can be calculated across multiply imputed pooled data sets. Thus, these values were reported in Table 2 and Table 3.

Main Analyses.—Data analysis took place in two stages. First, associations among control variables (relationship adjustment, parents' education, household income, child gender, and child age), child negative affectivity, observed supportive and undermining coparenting behavior at 9-months postpartum, and mothers' perceptions of children's externalizing behavior and dysregulation at approximately 2 years postpartum were computed. Second, a series of hierarchical regression models was conducted to analyze the combined associations of child negative affectivity and observed supportive and undermining coparenting at 9-months postpartum with toddlers' social-emotional adjustment. Supportive and undermining coparenting were highly correlated ($r = -.63$; $p < .001$). Because multicollinearity is a risk when predictors are highly correlated, separate regression models were conducted to examine the associations of negative affectivity and coparenting (undermining or support) with child adjustment (dysregulation or externalizing), resulting in a total of four separate regression models. In each model, control variables were entered on the first step. Child negative affectivity was entered on the second step. Next, observations of coparenting were entered (support or undermining) to examine whether coparenting could predict child social-emotional adjustment beyond negative affectivity. On the fourth and final step, Coparenting × Negative Affectivity interaction terms were entered.

Associations Among Control Variables, Child Negative Affectivity, Observed Coparenting Behavior, and Child Social-Emotional Adjustment

Intercorrelations among control variables, child negative affectivity, observed supportive and undermining coparenting, and mothers' reports of children's externalizing and dysregulation are presented in Table 1. Control variables were associated with child adjustment. Specifically, greater maternal education ($r = -.21$; $p < .05$) and family income ($r = -.24$; $p < .01$) were associated with lower externalizing behavior. As expected, children rated higher on negative affectivity at 9-months postpartum were rated significantly higher on externalizing ($r = .33$; $p < .01$) and dysregulation ($r = .33$; $p < .01$) at follow-up. Observed supportive coparenting behavior was significantly associated with dysregulation ($r = -.24$; $p < .05$). Observed undermining coparenting behavior was associated with dysregulation ($r = .23$; $p < .05$).

Regressions Predicting Child Adjustment From Negative Affectivity and Coparenting Behavior

In the second stage of analysis, regression analyses were conducted to test whether 1) observed coparenting could predict child social-emotional adjustment beyond negative affectivity and 2) whether children high in negative affectivity were differentially susceptible to supportive and undermining coparenting behavior (see Tables 2 and 3).

Researchers have argued that separate effects of the components of SES should be examined, as different aspects of SES are associated with different outcomes (Duncan & Magnuson, 2003). Accordingly, parents' education and household income were included as separate predictors in regression models. When predicting toddler dysregulation, the Observed Support × Negative Affectivity interaction was significant, in addition to the main effects of observed supportive coparenting and negative affectivity at 9-months postpartum (Table 2). A graphical representation of the Observed Support × Negative Affectivity interaction is presented in Figure 1. A simple slopes analysis indicated that the slope of the line representing low levels of negative affectivity (one standard deviation below the mean) was not significantly different from zero, $t(169) = -1.24$, $p = .22$, whereas the slope of the line representing high levels of negative affectivity (one standard deviation above the mean) was significantly different from zero, $t(169) = -5.70$, $p < .001$. Thus, children exhibiting high levels of negative affectivity who were in families with high levels of supportive coparenting behavior were significantly more well-regulated when compared to children with high levels of negative affectivity who were in families with lower levels of supportive coparenting behavior.

When predicting externalizing behavior, supportive coparenting predicted externalizing above and beyond negative affectivity, although this association only approached significance (Table 3). Counter to expectations, there were no statistically significant interactions between supportive or undermining coparenting and negative affectivity when predicting externalizing behavior. Undermining coparenting did not predict externalizing behavior or dysregulation.

Discussion

Rapid developmental changes occurring from birth through the early preschool and elementary school years have significant implications for subsequent behavioral adjustment (Fox & Rutter, 2010), and researchers have increasingly recognized that early social-emotional and behavioral problems are not transient (Briggs-Gowan et al., 2006). This study built upon prior research, which showed associations between coparenting and child adjustment (McHale & Rasmussen, 1999; Schoppe et al., 2001), by being among the first to take a differential susceptibility approach (Belsky, 2005) and test whether infants high in negative affectivity are more vulnerable to coparenting behavior – for the better as well as for the worse. Our findings corroborate prior research on the importance of coparenting (Teubert & Pinquart, 2010) by demonstrating that—even when controlling for family factors and infant negative affectivity, which have previously shown robust associations with subsequent social-emotional outcomes – supportive coparenting continued to predict toddler

social-emotional adjustment. Moreover, this was especially true for susceptible children – those rated high in negative affectivity in infancy.

Regarding dysregulation in toddlerhood, infants who were high in negative affectivity appeared more susceptible to supportive coparenting behavior than children who were low in negative affectivity. Thus, this study provides evidence that children with more difficult temperaments are affected by supportive coparenting “for the best” and “for the worst”- such that when these children are embedded in highly supportive coparenting rearing environments they have very low levels of dysregulation (i.e., “for the best”) and when they are embedded in low supportive coparenting rearing environments they have higher levels of dysregulation (i.e., “for the worst”). This finding has important implications for targeting supportive coparenting processes in families rearing children with high negative affectivity. However, it is important to note that children with high negative affectivity in supportive coparenting environments did not necessarily have lower dysregulation than children with low negative affectivity. Thus, we can only claim that a differential susceptibility pattern was partially supported.

It is unclear why there is evidence for differential susceptibility only when dysregulation was the outcome. However, given that the relationship between parent and child is hypothesized to be asymmetrical early in children’s development (see Sameroff, 2010), such that parents might influence their children to a greater extent than the children influence parents, it is possible that when parents are supportive of one another’s parenting strategy they are also more sensitive to their child’s needs. Therefore, even if children are high in negative affectivity and, thus, show high levels of distress, fear, difficulty to soothe, and anger, highly supportive parents might serve to regulate infant’s emotions early in development, *in addition* to the proposed heightened sensitivity to environmental stimuli characteristic of these children (as proposed by Belsky, 2005).

Because children with difficult temperaments struggle to internally regulate, Bradley and Corwyn (2008) have suggested that infants are more accepting of assistance with regulation from external sources. Perhaps during supportive coparenting interactions parents are better able to coordinate and reinforce each other’s messages about emotion regulation and positive responses to sensory situation. In supportive coparenting interactions, parents may also learn from one another, for example, how to interpret the infant’s cues, or how to properly soothe the child. Once again, this consistency in responsiveness across parenting partners may aid in the child’s internalization of regulatory strategies. Indeed, other research has emphasized the coordination among family members as a key context in which children learn to regulate their emotions (Favez et al., 2012). It may be that these highly coordinated and reinforcing messages among parenting partners help children who are already highly sensitive to their environments gain the additional knowledge and skills they need to sufficiently regulate their emotions and their engagement with the world.

In contrast, there was no evidence for differential susceptibility when examining the associations between undermining coparenting behavior and children’s dysregulation and externalizing. This finding is consistent with previous research, which found the effect of child temperament on externalizing behavior was moderated by supportive coparenting but

not undermining coparenting in a sample of preschool-aged children (Schoppe-Sullivan et al., 2009). Bradley and Corwyn (2008) also did not find evidence for differential susceptibility in children high in negative affectivity and embedded in harsh parenting contexts. Coupled, these findings may indicate that it is the strengths, or lack thereof, that the family holds that may have the greatest impact on children with high levels of negative affectivity. Thus, it may be more appropriate in coparenting interventions to focus on fostering supportive interactions, rather than suppressing undermining displays. Although coparenting and parenting are two different phenomena, there are associations between parenting and coparenting and both are relationships embedded within the larger family system. Additional research is needed to replicate the findings from our study and that of Schoppe-Sullivan et al. (2009), to examine the evidence, or lack thereof, for differential susceptibility in the context of adverse environmental contexts. It is also possible that observer influence (i.e., parent's knowledge they were being videotaped) might have obscured potential associations. Although undermining ranged from 1.33 to 16 across imputed data sets, the mean was low ($M = 6.28$). This low mean potentially reflects parents' possible reluctance to engage in negative coparenting in front of the camera.

Study limitations should be noted. In particular, attrition was relatively high when reports of child social-emotional adjustment were collected at 27-months postpartum. Although sample size was recovered using multiple imputation, we encourage efforts to replicate our analyses. Moreover, due to the original sampling methods (i.e., convenience and snowball sampling) there could also be a potential selection bias; our sample was drawn from the community and parents had relatively high levels of education and income and were required to be in a cohabiting or marital relationship with their child's father and employed full-time. This may further limit the generalizability of our findings. Future research should examine how coparenting processes emerge in different populations and interact with child characteristics in association with child social-emotional development. An additional limitation of our study was the exclusive reliance on maternal reports of toddler social-emotional adjustment. While future research endeavors should incorporate multiple reports of child social-emotional adjustment, it is important to note that mothers included in our sample reported higher levels of time spent with their children compared to fathers (Kotila, Schoppe-Sullivan, & Kamp Dush, 2013) and previous research has demonstrated reasonable interrater agreement between mothers and fathers (Carter, Briggs-Gowan, Jones & Little, 2003). Thus, we have utilized reports of child social-emotional adjustment from the individual who might be best positioned to evaluate the child's behavior, as a result of increased time spent with the child.

Notwithstanding these limitations, our findings have potentially important implications for early prevention and intervention efforts. Early identification of infants high in negative affectivity can make parents more aware of how their behavior may affect children's social-emotional development, and receiving intervention support aimed specifically at fostering supportive coparenting could be especially helpful for these families and children. As the coparenting field moves forward, researchers should consider the role of coparenting in conjunction with other factors such as child characteristics and other family relationships in the service of constructing a more complete understanding of influences on early social-emotional development. Investigating differential susceptibility models demonstrates that

there is not necessarily a one-size-fits-all model for identification and intervention with children and families most at-risk for negative developmental outcomes; understanding the nuances of individual and familial difference can help target our collective efforts to those with the greatest need.

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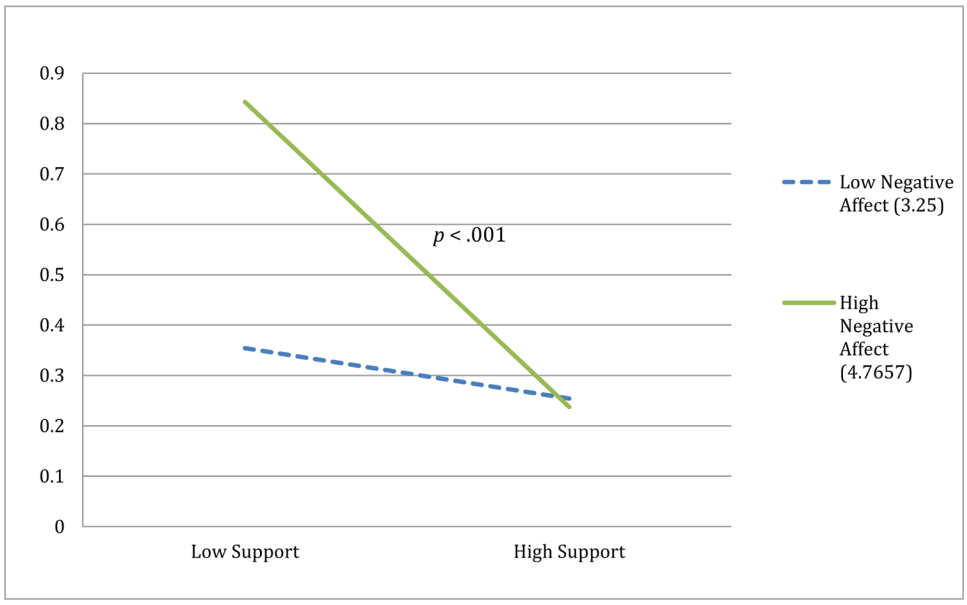

Figure 1. Children's negative affectivity moderates the relation between supportive coparenting behavior and toddler dysregulation

Note: The interaction was computed in the aggregated data set of 178 participants.

Table 1

Descriptive statistics and intercorrelations for control variables, child negative affectivity, observed coparenting behavior, and toddler social-emotional adjustment

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Control variables										
1. Relationship Adjustment	1									
2. Maternal Education	.14	1								
3. Paternal Education	.15	.61***	1							
4. Family Income	.11	.46***	.50***	1						
5. Child Age	.08	.06	.01	.16	1					
9-months										
6. Negative	−.25**	−.13	−.14	−.23*	−.01	1				
7. Support	.14	.03	.09	.01	−.02	.02	1			
8. Undermining	−.21*	.03	−.04	−.06	−.02	−.02	−.63***	1		
27-months										
9. Externalizing	−.19	−.21*	−.19	−.24*	.05	34***	−.16	.02	1	
10. Dysregulation	−.14	−.08	−.10	−.08	.08	.36***	−.24*	.23*	40**	1
M	5.18	5.86	5.45	81,668	27.97	3.98	15.17	6.28	.48	.37
SD	.49	1.38	1.55	42,372	10.67	.76	3.00	2.00	.23	.21
N	179	179	179	179	179	179	179	179	179	179

*$p < .05$;

**$p < .01$;

***$p < .001$

Note: "*SD*" reflects the standard deviation across variables in the aggregated data set. Variable anchors for ordinal variables were as follows: relationship adjustment (computed as a combination of four items scored from 1 = *never* to 6 = *all of the time* and one item scored from 0 = *extremely unhappy* to 6 = *perfect*), parental education (1 = *less than high school*; 8 = *doctorate degree*), negative affectivity (0 = *behavior does not apply*; 7 = *very frequently observed infant exhibiting behavior*), support (computed as a combination of pleasure and cooperation subscales which were scored from 1= *no observed behavior* to 5 = *very frequently observed behavior*; possible observed values in the composite variable ranged from 0 to 20), undermining (computed as a combination of displeasure and competition subscales which were scored from 1= *no observed behavior* to 5 = *very frequently observed behavior*; possible observed values in the composite variable ranged from 0 to 20), externalizing (0 = *not true/rarely*; 2 = *Very true/often*), and dysregulation (0 = *not true/rarely*; 2 = *Very true/often*). Parents reported child age in months. Family income was reported as average annual household earnings.

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Table 2

Regressions testing child negative affectivity as a moderator of the associations between coparenting behavior and child dysregulation

	ΔR^2	ΔF	*B*	95% CI	ΔR^2	ΔF	*B*	95% CI
			Support				**Undermining**	
Step 1:	.08	2.42*			.08	2.42*		
Relationship Adjustment			−.09	−.19 – .01			−.09	−.19 – .01
Infant Gender			.05	−.05 – .16			.05	−.05 – .16
Maternal Education			⁻.02	−.06 – .03			−.02	−.06 – .03
Paternal Education			.004	−.04 – .05			.004	−.04 – .05
Family Income			-5.11×10^{-7}	$-1.92\times10^{-6} – 8.98\times10^{-7}$			-5.11×10^{-7}	$-1.92\times10^{-6} – 8.98\times10^{-7}$
Child Age			.003	−.001 – .01			.003	−.001 – .01
Step 2:	.12	25.34***			.12	25.34***		
Negative Affect			.10***	.040 – .16			10***	.040 – .16
Step 3:	.07	16.99***			.09	20.82***		
Support			–.02**	−.04 – (–.01)			-----	-----
Undermining			-----	-----			.03*	.003 – .05
Step 4:	.07	19.00***			.06	15.46***		
Support*Negative Affect			–.03*	−.05 – (−.004)			-----	-----
Undermining *Negative Affect			-----	-----			.03	−.003 – .06
F for Step 4			F(9, 169) = 9.84***				F(9,169) = 9.87***	

* $p \leq .05$;

** $p \leq .01$;

*** $p \leq .001$

Note: Supportive and undermining coparenting were included in separate regressions. Beta value was computed in pooled imputed data set. R^2 and *F* values were computed using an aggregated data set of all multiple imputations. There were 178 participants included in the aggregated data set.

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Table 3

Regressions testing child negative affectivity as a moderator of the associations between coparenting behavior and child externalizing

	ΔR^2	ΔF	*B*	95% CI	ΔR^2	ΔF	*B*	95% CI
			Support				**Undermining**	
Step 1:	.16	5 47***			.16	5 47***		
Relationship Adjustment			–.12*	−.22 – (–.02)			–.12*	−.22 – (−.02)
Infant Gender			.01	−.08 – .11			.01	−.08 – .11
Maternal Education			−.03	−.08 – .02			−.03	−.08 – .02
Paternal Education			.004	−.04 – .05			.004	−.04 – .05
Family Income			-1.41×10^{-6}*	$-2.81\times10^{-6} – 5.08\times10^{-10}$			$–1.4\times10^{-6}$*	$-2.81\times10^{-6} – 5.08\times10^{-10}$
Child Age			.002	−.003 – .007			.002	–.003 – .007
Step 2:	.07	14.71*			.07	14.71*		
Negative Affect			.08**	.02 – .14			.08**	.02 – .14
Step 3:	.02	3.89*			.001	.21		
Support			–.01	−.03 – .01			-----	-----
Undermining			-----	-----			.001	−.02 – .02
Step 4:	.04	10.41**			.02	5.51*		
Support*Negative Affect			−.02	−.04 – .001			-----	-----
Undermining*Negative Affect			-----	-----			.02	−.01 – .05
F for Step 4			$F(9, 169) = 7.60$***				$F(9, 169) = 6.33$***	

* $p \leq .05$;

** $p \leq .01$;

*** $p \leq .001$

Note: Supportive and undermining coparenting were included in separate regressions. Beta value was computed in pooled imputed data set. R^2 and *F* values were computed using an aggregated data set of all multiple imputations. There were 178 participants included in the aggregated data set.