



HHS Public Access

Author manuscript

Child Dev. Author manuscript; available in PMC 2020 July 01.

Published in final edited form as:

Child Dev. 2019 July ; 90(4): e468–e485. doi:10.1111/cdev.13027.

Parental Depression, Over-Reactive Parenting, and Early Childhood Externalizing Problems: Moderation by Social Support

Lindsay Taraban,

Department of Psychology, University of Pittsburgh

Daniel S. Shaw,

Department of Psychology, University of Pittsburgh

Misaki N. Natsuaki,

Department of Psychology, University of California Riverside

David Reiss,

Yale Child Study Center

Leslie D. Leve,

Prevention Science Institute, University of Oregon

Jody M. Ganiban, and

Department of Psychology, George Washington University

Jenae M. Neiderhiser

Department of Psychology, The Pennsylvania State University

Abstract

This study used a large ($N = 519$), longitudinal sample of adoptive families to test over-reactive parenting as a mediator of associations between parental depressive symptoms and early childhood externalizing, and parents' social support satisfaction as a moderator. Maternal parenting (18 months) mediated the association between maternal depressive symptoms (9 months) and child externalizing problems (27 months). Paternal parenting was not a significant mediator.

Unexpectedly, we found a cross-over effect for the moderating role of social support satisfaction, such that *partners'* social support satisfaction reduced the strength of the association between each parent's own depressive symptoms and over-reactive parenting. Results point to the importance of accounting for broader family context in predicting early childhood parenting and child outcomes.

Keywords

parental depression; parenting; social support; family context; child externalizing problems

Correspondence concerning this article should be addressed to Lindsay Taraban and Daniel S. Shaw, Department of Psychology, University of Pittsburgh, 210 South Bouquet Street, Pittsburgh, PA 15260. let42@pitt.edu; danielshaw@pitt.edu.

DR. LESLIE LEVE (Orcid ID: 0000-0003-3061-4524)

Much attention has been devoted to understanding the impact of parental depressive symptoms on child outcomes. Most of this research has focused on mothers, on the basis that women are more often primary caregivers for their children, especially during early childhood, and the higher rates of depression in women compared to men (Shaw, Connell, Dishion, Wilson, & Gardner, 2009). Among two-parent families, the co-parenting literature indicates that mothers spend a higher proportion of overall time with their young children compared to fathers, and take on the majority of responsibility for day-to-day care even when they are working full-time (Craig, 2006). However, as the traditional view of family roles has shifted, with many fathers taking a more active, or even primary, caregiving role (Pew Research Center, 2016), researchers have become increasingly interested in understanding paternal depression and its potential influence on family processes and child outcomes (Lewis & Lamb, 2003). Although rates of maternal depression are consistently higher than rates of paternal depression (Goodman, 2007), paternal depression is not uncommon. A recent study indicated that up to 30% of men experience symptoms of depression during their lifetime, with rates between 4 and 26% in the first year of fatherhood (Kim & Swain, 2007). Importantly, both maternal and paternal depression are associated with reductions in parenting quality (Lovejoy et al., 2000; Wilson & Durbin, 2010) and higher levels of child emotional and externalizing problems during early childhood (Fletcher, Feeman, & Garfield, 2011; Goodman, 2007).

In considering the potential influence of parental depression on parenting and child outcomes, the broader context in which the parent-child relationship is embedded is important (e.g., Belsky, 1984). Parents' relationships with close others — including friends, extended family, and spouses — may influence the extent to which depressive symptoms negatively interfere with parenting and child outcomes. This may be especially the case for fathers, as research has indicated that the impact of paternal depression on child outcomes is strongly influenced by the familial environment. For example, among a large, longitudinal population-based cohort, familial context was found to mediate two-thirds of the association between *paternal* depression at 8 weeks postpartum and child outcomes at age 7 (Gutierrez-Galve et al., 2015). Conversely, family-level factors accounted for less than one-fourth of the association between *maternal* depression and child outcomes during the same time period. Thus, although the broader family context is important for both mothers and fathers, evidence suggests that fathers' impact on children may be particularly susceptible to the larger family environment.

Parental Depression, Parenting, and Child Outcomes

Decades of research on maternal depression has supported an association between maternal depressive symptoms and multiple dimensions of parenting, including higher levels of harsh parenting and lower levels of sensitive and responsive parenting (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Maternal parenting behaviors have, in turn, been consistently linked to a host of child outcomes. Specifically, maternal parenting that is harsh or over-reactive is associated with lower levels of child social competence, academic achievement, and emotion regulation abilities, as well as elevated levels of emotional and externalizing problems, particularly in early childhood (Belsky & Fearon, 2002; Leerkes, Blankson, & O'Brien, 2009; Dishion et al., 2008). Over-reactive parenting can be thought of as a sub-domain of

harsh parenting specifically related to issues of discipline, and includes such behaviors as yelling at, insulting, physically punishing, and swearing at one's child (Miller-Lewis et al., 2006). In addition to replicated evidence showing direct associations between parental depressive symptoms and parenting and between parenting and child outcomes, maternal parenting has been found to mediate associations between maternal depressive symptoms in early childhood and later adverse child outcomes, including multiple types of externalizing behaviors (NICHD ECCRN, 1999), although this has not always been the case, especially in the context of poverty (Shelleby & Shaw, 2014).

As a growing number of fathers take on childcare responsibilities (Yogman & Garfield, 2016), understanding the relation between paternal symptoms of depression, paternal parenting behaviors, and child outcomes becomes especially important. It is unfortunate that research on this topic is still relatively scarce, with most studies in this area using a cross-sectional approach (Wilson & Durbin, 2010). Despite this methodological limitation, paternal depressive symptoms are associated with impairments in fathers' parenting in a similar manner to mothers'. A recent meta-analysis conducted by Wilson & Durbin (2010) used 28 published and unpublished studies to explore how both maternal and paternal depression are associated with parenting behaviors. Analyses revealed that paternal depressive symptoms are significantly associated with lower levels of positive paternal parenting and higher levels of harsh, over-reactive paternal parenting (Wilson & Durbin, 2010). Moreover, similar, albeit slightly more modest, effect sizes were found for fathers compared to mothers ($d = .16$ for fathers and $d = .22$ for mothers), indicating that depressive symptoms take a nearly comparable toll on the parenting of mothers and fathers. A small number of cross-sectional studies has likewise found associations between paternal depression and higher levels of child conduct and emotional problems in early childhood (Fletcher, Feeman, & Garfield, 2011; Goodman, 2004). A prior longitudinal study using the current sample (Pemberton et al., 2010) found that adoptive father depressive symptoms at 9 months predicted child externalizing problems at 27 months, even after accounting for adoptive mother depressive symptoms. It is not clear, however, from these reports whether the association between paternal depressive symptoms and child externalizing problems would be mediated by fathers' parenting or whether other factors would mediate associations between paternal depressive symptoms and child externalizing problems. Based on research that fathers spend less time in direct contact with their children compared to mothers (Gutierrez-Galve et al, 2014), especially in early childhood (Montague & Walker-Andrews, 2002), we may not expect parenting to mediate the association between paternal depressive symptoms and child externalizing problems. For fathers who are especially involved in their children's lives, however, depressive symptoms may more likely be related to child functioning through impairments in fathers' parenting. Thus, one of the goals of the present study was to test whether parenting mediated associations between depressive symptoms and child outcomes for mothers and for fathers in this sample during early childhood.

Importantly, both maternal and paternal depression have been found to be more strongly associated with parenting in infancy and early childhood (Lovejoy et al., 2000; Wilson & Durbin, 2010) compared to later developmental periods, possibly because of the greater physical and psychological demands of rearing infants and toddlers as compared to school-

age children (Shaw & Bell, 1993). Relatedly, the association between maternal depression and adverse child outcomes has been found to be stronger in early childhood compared to middle childhood and adolescence (Goodman et al., 2011), likely because of the high level of physical and psychological dependence of infants and young children on their caregivers (Shaw & Bell, 1993). Therefore, early childhood seems to be a particularly important time for examining relations between parental depressive symptoms and parenting and between parenting and child externalizing problems.

Parental Depression and Social Support

It is important to remember that for both mothers and fathers, depression does not exist in a vacuum, but is influenced by other aspects of the familial environment. Belsky's (1984) process of parenting model captured the multi-determined nature of parenting, and emphasized the role of the social environment in shaping parents' interactions with their children. The social environment is a broad construct, and can include factors such as marital quality, work, and social support (Belsky, 1984). Parents' satisfaction with their social networks has been particularly studied for its relation to parenting behaviors (McEachern et al., 2013). Social support in parents' lives can come from a variety of sources, including their romantic partner, close friends, extended family, and religious groups. Social support is generally thought to have three main components: emotional (e.g., encouragement, nurturance), informational (e.g., advice, useful information), and instrumental (e.g., financial assistance; Barnett, de Baca, Jordan, Tilley, & Ellis, 2015), and has been linked to both depressive symptoms and parenting. Mothers' report of higher levels of social support is associated with lower levels of maternal depressive symptoms (Cairney et al., 2003), and higher levels of parenting efficacy (Suzuki et al., 2009) and parenting quality (Ceballos & McLoyd, 2002). Thus, although social support is generally thought to be a protective factor in terms of parenting, the relationship between social support and parenting is somewhat complex, with a number of studies finding social support to be positively associated with negative parenting (Driscoll & Easterbrooks, 2007), and for some mothers, limiting support from their family of origin has been associated with more optimal parenting (Easterbrooks, Chaudhuri, Bartlett, & Copeman, 2011). These studies raise the possibility that it is not just the presence or absence of social support that matters, but the quality, source, and content of that support as it relates to parenting. Related work with fathers is scarce, but there is evidence that lack of social support contributes to paternal depression in the postpartum period (Kim & Swain, 2007). Little research has moved beyond exploring direct associations among these variables to testing whether parents' satisfaction with their social support networks may interact with depressive symptoms in predicting subsequent parenting behavior.

Consistent with established theories (e.g., Belsky, 1984), it is plausible that for parents, high levels of perceived support from sources such as the marital relationship, friends, neighbors, and extended family may serve to buffer the adverse impact that depressive symptoms have on parenting. Conversely, for parents whose social support system is lacking, it may be more difficult to maintain positive parenting practices in the context of depressive symptoms, as these parents may not have adequate encouragement and support from close others within and outside their family (e.g., friends, relatives, religious groups). Additionally, depressed

parents may struggle to provide adequate support and positive social interaction for their spouse, and elevated levels of depressive symptoms may also place strain on the marital relationship. Thus, regardless of their own level of social support satisfaction, these parents may benefit from having a partner who is highly satisfied with their social support network, likely tapping sources outside of the marriage to have their social needs met. This may be especially the case for fathers, based on research indicating that paternal depressive symptoms are closely tied to the broader family context (Gutierrez-Galve et al., 2015; Kim & Swain, 2007). For this reason we tested the potential moderating role of both own and *partners'* social support satisfaction on associations between depressive symptoms and parenting.

Theory about why parental social support may moderate the association between paternal over-reactive parenting and child externalizing problems in early childhood follows a similar logic. Although over-reactive parenting has an established positive association with child externalizing problems, based on principles implicit in social learning (Patterson, 1982) and attachment (Shaw & Bell, 1993) models, a child exposed to over-reactive parenting who nonetheless has parents who feel highly satisfied with their social relationships may benefit from their parents' social well-being, perhaps in the form of their parents being in a good mood more often, or their parents being able to drop the child off with a friend when they feel they are at their wit's end. Thus, social support may be a protective factor in terms of reducing both over-reactive parenting and adverse child outcomes.

Adoption Design

In biologically-related families, children share 50% of their genes with each parent, raising the possibility that associations between parental depressive symptoms and child behavior problems may be due to shared genes that influence both the parents' depression and the children's behavior problems, rather than the environmental impact of being raised by a depressed parent. Prior literature supports both the heritability of depression (Pemberton et al., 2010) and the importance of the environment in shaping children's emotional development (Rutter, 2000). Thus, the ability to parse genetic from environmental effects is essential for developing an accurate understanding of associations between parental depression and child outcomes. The present study utilized an adoption design, in which children were placed for adoption shortly after birth. Because adoptive parents and the adopted child are genetically unrelated, associations between adoptive parent characteristics, depression and parenting, and child outcomes in this study are attributable to environmental rather than genetic effects. Furthermore, we included birth mother risk for psychopathology as a predictor in all analyses, to account for heritable effects of the birth mother's psychopathology on the child's behavior problems. This approach thus allowed us to examine the *rearing environmental effects* of parental depressive symptoms, parenting, and social support, without the confound of shared genetic influences.

Despite the fact that roughly 2% of children in the United States are adopted, very little research has explored how adoptive parents may differ from other types of parents (Rueter, Keyes, Iacono, & McGue, 2009). Thus, understanding family processes among adoptive families and whether and how these processes differ from the general population represents

an important target for research. Adoptive parents in this sample shared a variety of characteristics with adoptive parents at large, such as tending to be older at the birth of their first child, and having high levels of socioeconomic status. A large study conducted using the ECLS-K sample of 13,000 families with young children found that adoptive parents invested more resources (economic, cultural, social) in their children compared to other family types (Hamilton, Cheng, & Powell, 2007). However, after controlling for SES and higher maternal age, adoptive families were not significantly different from two-parent families in terms of investment. Prior research has found associations between higher maternal age and both higher levels of satisfaction with the parenting role and higher quality observed parenting (Ragozin et al., 1982). Similarly, higher income has been found to be related to higher levels of maternal warmth (Davis-Kean, 2005). Thus, although we accounted for parental age and family income in all analyses, we may assume that mothers in this sample tended to be more satisfied with and skilled at the parenting role compared to mothers in general, based on their higher age and higher family income. Research has not yet explored whether these findings extend to fathers as well, although it makes logical sense that they would.

Present Study

Using data from a large, longitudinal sample of adopted children and their families increased our ability to parse genetic from environmental effects of paternal depression and parenting on child outcomes, by accounting for genetic contributions of the child's birth mother. Based on theory and existing literature, we hypothesized: a) that in line with prior research, maternal over-reactive parenting (18 months) would mediate the association between maternal depressive symptoms (9 months) and child externalizing problems (27 mo.); b) that controlling for maternal depressive symptoms, paternal over-reactive parenting (18 months) would likewise mediate the association between paternal depressive symptoms (9 months) and child externalizing problems (27 months); and c) that high levels of parental social support satisfaction would attenuate the strength of the associations between depressive symptoms and over-reactive parenting, and between over-reactive parenting and child externalizing problems for both mothers and fathers.

Method

Participants

Participants for this study were drawn from Cohorts I and II of the Early Growth and Development Study (EGDS), which included 561 linked sets of adopted children, adoptive mothers, adoptive fathers, and birth mothers (Leve et al., 2013). The current sample included 519 families, after eliminating single parents and same-sex couples because of the present study's focus on cohabiting mothers and fathers. Recruitment of this ongoing, multisite, longitudinal sample took place from 2003 to 2010, through rolling enrollment at adoption agencies in the Mid-Atlantic, West/Southwest, and Pacific Northwest ($N = 45$ agencies in 15 states). Adoption agencies reflected the variable adoption philosophies of the United States, and included both open and closed adoptions, with most infants placed within three weeks after birth.

Adoptive families in this sample were financially well-resourced, with a median household income of > \$100,000 per year. The majority of adoptive parents were Caucasian (Adoptive Mother (AM)= 91.8%, Adoptive Father (AF) = 90.2%; African-American, AM = 3.9%, AF = 5.0%; Hispanic/Latino, AM = 2.0%, AF = 1.7%; Multi-ethnic AM = 0.9%, AF = 1.1%), with a mean age of 37.4 years (SD = 5.6 years) for mothers and 38.4 years (SD = 5.8 years) for fathers at the time of the child's birth. Most AFs (72.5%) and AMs (79%) reported earning at least a 4-year college degree, with roughly a third of those also attending graduate school. The majority of adoptive parents were married (91.1%) at the time of the child's birth. Birth mothers were also primarily Caucasian (70.1%), with a median annual income of < \$15,000. Roughly 41% of birth mothers had a high school diploma, with only 4% having earned a 4-year college degree. Due to high levels of missing data, birth father data were not included in this study. Approximately 31% of birth mothers were married at the time of the adopted child's birth and were a mean age of 24.4 years (SD = 6.0 years). Just over half of adoptive children participating in the study were male (57.2 %). The majority of children were Caucasian (55.6%; Multi-racial =19.3%; African American = 13%; Latino = 10.9%). The median age of placement for adopted children was 2 days ($M = 6.2$, $SD = 12.45$; range = 0–91 days). See Leve et al., 2013 for additional details regarding study sample and methods.

Procedure

As part of the larger longitudinal study, in-person assessments were conducted with birth mothers at 9- and 18-months postpartum, and in-home assessments were conducted with adoptive parents and the adoptive child when children were 9, 18, and 27 months old. For both the birth- and adoptive-parent assessment, the interviewer asked computer-assisted interview questions to the participant, and each participant independently completed a set of questionnaires. Domains assessed for both birth and adoptive parents included personality, psychosocial adjustment, life events, and adoption placement. Interviewers conducting the in-person assessments had completed 40 hours of training, including a two-day group session, pilot interviews, and videotaped feedback, prior to administering interviews with study participants. Assessments lasted from 2 to 4 hours, and were videotaped for later coding.

Measures

Parental depressive symptoms—Adoptive father and mother depressive symptoms were measured at 9 and 18 months using the Beck Depression Inventory (BDI; Beck & Steer, 1993). The BDI is well-established and widely-used and measures feelings, cognitions, and physical symptoms related to depression. Parents rated the intensity with which they had experienced 20 depressive symptoms on a scale from 0–3. For fathers, internal consistencies for the BDI depression factor were .75 and .81 at 9 and 18 months, respectively. For mothers, internal consistencies were .71 and .79. Parents' mean scores on the BDI ranged between 3 and 4 ($SD = 3.22$ – 3.91) at the 9 and 18 month assessments. As these scores are well below the cutoff score of 10 indicative of mild depression, parents in this sample generally reported low levels of depressive symptoms.

Parental Social Support—Fathers and mothers individually completed the General Life Satisfaction Questionnaire (GLS; Crnic et al., 1984) at child age 9 and 27 months to assess their satisfaction with perceived social support in three broad areas: intimate relationships, friendships, and neighborhood/community. Parents used a 4-point scale to report on the frequency of support and participation in pleasant activities, and their level of satisfaction with each. This study used the “general life satisfaction” subscale, which averaged 8 items that asked about satisfaction with support in relationships, friendships, and the community. Internal consistencies at 9 (AF, $\alpha = .81$; AM, $\alpha = .71$) and 27 months (AF, $\alpha = .84$; AM, $\alpha = .81$) were adequate.

Over-reactive parenting—Over-reactive parenting at 18 months was measured using fathers’ and mothers’ reports on their own parenting using the over-reactivity subscale of the Parenting Scale (Arnold, O’Leary, Wolf, & Acker, 1993). The over-reactivity scale is designed to measure parents’ displays of anger, meanness, and irritability in response to infant challenges (e.g., “When my child misbehaves...”). Items were rated on a 7-point scale, with the low end of the scale representing adaptive parenting responses (e.g., “...I handle it without getting upset.”) and the high end of the scale representing harsh parenting responses (e.g., “...I get so frustrated or angry that my child can see I’m upset.”). Internal consistency for this measure was good ($\alpha = .84$).

Birth Mother Psychopathology—Birth mothers’ histories of externalizing and internalizing disorders were measured using portions of the computerized-Diagnostic Interview Schedule (DIS; Blouin, Perez, & Blouin, 1988) and the Composite International Diagnostic Interview (CIDI; Kessler & Üstün, 2004), respectively. Both measures were administered to birth mothers at 18 months postpartum, and were combined to create a composite psychopathology score (Hails, 2017). Birth mothers’ scores for externalizing problems were captured using the antisocial personality disorder (ASPD) and conduct disorder (CD) scales of the DIS. Using a computerized interview, birth mothers reported on their symptoms within the past 12 months and lifetime diagnoses. The DIS is used to make diagnoses consistent with the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, 2000), and has demonstrated acceptable test-retest reliability ($\kappa = .49$). Internalizing disorders were measured using the CIDI, which assessed birth mothers’ histories of agoraphobia, separation anxiety, dysthymia, generalized anxiety disorder, major depression, panic disorder, recurrent brief depression and social phobia. The CIDI was administered as a structured interview, and is also consistent with DSM-IV criteria. Birth mothers’ externalizing scores (DIS) and internalizing scores (CIDI) were converted to z-scores and then combined into a composite score representing general history of psychopathology. Although the data were moderately skewed right (i.e., more mothers reporting lower levels of psychopathology compared to high levels), there were no significant outliers. Hence, all data were retained.

Child Externalizing Problems—During the 27-month assessment, both parents completed the age 1.5–5 version of the Child Behavior Checklist (Achenbach & Rescorla, 2000). Using a 3-point scale (not true, true, very true), adoptive parents reported on the child’s emotional and behavioral problems over the past 2 months. The current study used

24 items that comprise the externalizing problems subscale (AM, $\alpha = 0.87$, AF, $\alpha = 0.90$). Sample items from this subscale included “destroys things belonging to his or her family or to other children,” “gets in many fights,” and “physically attacks people.” Mother and father reports of child externalizing problems were correlated at .40 ($p < .001$), and were averaged to reduce reporter bias. Symptom levels in this sample were predominantly in the normal range ($M = 11.34$, $SD = 5.67$).

Covariates

Adoption Openness: To control for similarities between birth and adoptive families resulting from contact and knowledge between parents, we controlled for the level of openness in the adoption at 9 months in all analyses. The openness of adoption variable included birth and adoptive parents’ reported perception of the level of openness of the adoption, their knowledge of one another, and their current and anticipated contact with one another. Scores on these measures were standardized and then aggregated to create an overall “adoption openness” score for each family. See Ge et al. (2008) for further details.

Perinatal Risk: To account for the potential confound of obstetric complications, we collected information on perinatal risk using birth mother self-reports and medical record data. The perinatal risk variable included six maternal reported aggregate scores characterizing total obstetric complications, perinatal internalizing symptoms, pregnancy complications, exposure to toxins, substance use, and neonatal complications. Additional details on the measures can be found in Marceau et al. (2016) for self-report and medical record data.

Child Negative Emotionality (NE): We included child negative emotionality as a covariate in all analyses to mitigate the possibility that associations between over-reactive parenting and later child externalizing problems were not the result of parents with more temperamentally-difficult children tending to engage in higher levels of over-reactive parenting. Thus, including child NE as a covariate is consistent with the focus of this paper on early parental contributions to child development. Child NE was measured at the 9-month assessment using adoptive mother and father report on an abridged version of the 6-month Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979). The ICQ consists of 24-items, which parents rated on a 7-point scale, with 7 indicating a *very difficult temperament*. The current project used the sum of 6 items which comprise the fussy-difficult scale (AM, $\alpha = .81$; AF, $\alpha = .82$). Adoptive mother and adoptive father reports on the measure were correlated (9 months, $r = .68$, $p < .001$), and were averaged by dyad to compute each child’s NE score.

Additional Covariates: Family income, child gender, and the target parent’s age at the time of the child’s birth were also included as covariates in all analyses.

Data Analysis

Analyses were conducted in SPSS, using the Process macro (Hayes, 2013). Process is an add-on to the SPSS software that simplifies the analysis of conditional process models, including moderated mediation models. The predictor, mediator, outcome, moderator, and

covariates are entered simultaneously—as opposed to the stepwise method typically utilized in moderation analyses—producing a single set of results estimating the full model. A benefit of Process is that it automatically generates bootstrap confidence intervals, which account for possible non-normality of the sampling distribution. These 95% bias-corrected bootstrap confidence intervals are reported in all study tables to aid in interpretation of results. Covariates included in all models were family income, parent age, openness of adoption, obstetric complications, and child gender, as well as the alternate parent’s depressive symptoms and the child’s negative emotionality at child age 9 months (i.e., baseline). Additionally, all moderated mediation models included birth mother psychopathology as a predictor; the baseline mediation models were computed both with and without birth mother psychopathology.

We conducted separate moderated mediation models for mothers and fathers (see Figure 1). We started with a baseline mediation model (e.g., paternal depression → paternal over-reactive parenting → child externalizing problems), then added the social support moderators (parent’s own social support satisfaction, partner’s social support satisfaction) to the baseline mediation model in separate equations. Specifically, we tested whether social support at 9 months moderated the association between parental depression (9 months) and over-reactive parenting (18 months), and whether social support at 27 months moderated the association between over-reactive parenting and child externalizing problems (27 months). Significant interactions were probed by assessing overall model fit and the beta values of the interaction terms, then plotting the interactions and examining the values of the simple slopes, as described in Cohen, Cohen, West, and Aiken (2003). Moderator variables were plotted at one standard deviation above and below the mean, and at the mean.

Results

Descriptive statistics are reported in Table 1. All bivariate correlations among primary study variables are reported in Table 2. All variables were correlated in expected directions. Both mothers’ and fathers’ depressive symptoms at 9 months were negatively associated with their reported satisfaction with social support at 9 and 27 months and positively associated with their reports of over-reactive parenting at 18 months. Maternal and paternal depression at 9 months and 18-month maternal and paternal over-reactive parenting were positively and significantly related to child externalizing problems (as reported by both parents) at 27 months.

Baseline Mediation Model

Prior to exploring potential moderators, a baseline mediation model was computed for each parent. For mothers, over-reactive parenting at 18 months fully mediated the association between maternal depressive symptoms at 9 months and child externalizing problems at 27 months. Adding birth mother psychopathology to the model did not significantly alter model results. Coefficients for the full model, including birth mother psychopathology, are presented in Table 3.

For fathers, over-reactive parenting did not mediate the association between paternal depression and child behavior problems. Specifically, the path from paternal depression to

paternal over-reactive parenting was significant, but the path from paternal over-reactive parenting to child externalizing problems and the path from paternal depression to child externalizing problems were not significant. Including birth mother risk for psychopathology as a covariate did not substantially impact the magnitude of any model paths. Coefficients for the full model are presented in Table 4.

Moderation by parents' own social support

For mothers, maternal social support satisfaction did not moderate associations between 9-month maternal depressive symptoms and 18-month over-reactive parenting or between 18-month parenting and 27-month child externalizing problems. Similarly, paternal social support also was not found to moderate the association between paternal depressive symptoms and parenting, or between paternal harsh parenting and child externalizing problems. Coefficients and model fit statistics for mothers and fathers are presented in Tables 5 and 6, respectively.

Moderation by partner's social support

Fathers' reported satisfaction with social support emerged as a significant moderator of the association between 9-month maternal depressive symptoms and 18-month maternal over-reactive parenting. Specifically, in the context of high paternal social support satisfaction (+1 SD above the mean), the association between maternal depression and maternal over-reactive parenting was not significant; in the context of moderate- to low-levels of paternal social support satisfaction, the association between maternal depression and over-reactive parenting was positive and significant (Figure 2). Paternal social support did not moderate the association between maternal over-reactive parenting and child externalizing problems (27 months). Coefficients and model fit statistics are presented in Table 7.

Parallel findings emerged for fathers, with mothers' social support satisfaction (9-months) moderating the association between 9-month paternal depressive symptoms and 18-month paternal over-reactive parenting (Table 8). Again, in the context of high maternal social support satisfaction, the association between paternal depression and over-reactive parenting was not significant; in the context of moderate to low levels of maternal social support satisfaction, the association between paternal depression and harsh parenting was positive and significant (Figure 3).

Discussion

In line with established theories that highlight the importance of contextual influences on parenting behaviors (e.g., Belsky, 1984), this project tested whether maternal and paternal over-reactive parenting mediated associations between parental depressive symptoms and child externalizing problems, and further, whether these associations were moderated by parental social support satisfaction. Using an adoption design that included data on birth mothers allowed the exploration of the *environmental effects* of depression, parenting, and social support on child externalizing problems, without the confound of shared genetic influence. Although increasing steadily, research on fathers has lagged behind societal changes in the role of fathers in childrearing, with many fathers taking on increased—if not

primary—caregiving roles (Lewis & Lamb, 2003). Parental depression repeatedly has been positively linked to harsh and over-reactive parenting (Lovejoy et al., 2000; Wilson & Durbin, 2010), but little research has explored the mediating role of paternal parenting or how contextual factors may impact the strength of associations between paternal depression, paternal over-reactive parenting and later child externalizing problems. In line with hypotheses, maternal over-reactive parenting (18 months) emerged as a significant mediator of associations between maternal depressive symptoms (9 months) and child externalizing problems (27 months), controlling for paternal depressive symptoms. Paternal over-reactive parenting, however, was not a mediator of this association. Somewhat surprisingly, while parents' own social support did not moderate associations between their depressive symptoms and parenting behavior, their *partners'* social support did, with high levels of partner social support satisfaction lessening the association between depressive symptoms and harsh parenting for both mothers and fathers.

Before reviewing findings related to our primary variables, it is interesting to note that openness of adoption was negatively associated with both over-reactive parenting and child externalizing problems in nearly all analyses. One plausible explanation for these findings is that birth parents with lower levels of psychopathology may be more likely to opt for an open adoption. However, adoption openness and birth mother psychopathology were not significantly correlated in this sample ($r = -.03$). Another possibility may be that adoptive parents who choose to adopt from agencies favoring open adoptions may be more tolerant and even responsive to their child's needs, less defensive and less worried about external influences on their child's behavior. Alternatively, perhaps children benefit from having contact with their birth parents, and this has a positive influence on their behavior and makes parenting these children easier. Overall, it is as yet unclear what third variable influence may be accounting for the association between openness and parent and child behaviors, and—although outside the scope of the present study—this presents an interesting topic for future research.

The Mediating Role of Parenting

Consistent with findings from samples of well-resourced families (NICHD ECCRN 1999), we expected that maternal over-reactive parenting at 18 months would mediate associations between 9-month maternal depressive symptoms and 27-month child externalizing problems. This hypothesis was supported, as maternal over-reactive parenting fully mediated associations between maternal depressive symptoms and subsequent child externalizing problems. Further, adding birth mother psychopathology as a predictor to the model did not significantly alter the results. Children in this sample did not share any genes with their rearing parents, and genetic predispositions for externalizing problems would have therefore been at least partially accounted for by including birth mother psychopathology in the models. Therefore, the significant relations between maternal depressive symptoms and over-reactive parenting and between over-reactive parenting and child externalizing problems are free from the confound of shared genetic influences. Thus, although child externalizing problems are known to have a heritable component (Hicks et al., 2004), results from this study highlight the important role of maternal mental health and parenting behaviors in predicting child externalizing problems in early childhood.

Based on prior evidence that fathers spend less time in direct contact with their children compared to mothers (Gutierrez-Galve et al, 2014), especially in early childhood (Montegue & Walker-Andrews, 2002), it was unclear whether paternal parenting would likewise mediate associations between paternal depressive symptoms and child externalizing problems. Still, we hypothesized that paternal over-reactive parenting would emerge as a mediator in this adoption sample of financially-secure fathers. However, this hypothesis was not supported. Although the path from paternal depression (9 months) to paternal over-reactive parenting (18 months) was significant, the path from paternal over-reactive parenting (18 mo.) to child externalizing problems (27 mo.) was not.

Taken as a whole, these analyses indicate that while parental depressive symptoms are significantly associated with impairments in parenting for both mothers and fathers, the relation between over-reactive parenting and subsequent child outcomes may differ based on parent gender. That paternal over-reactive parenting was not significantly associated with child externalizing problems in this sample is somewhat surprising, as that these men endured the long and arduous adoption process to become fathers, and were likely highly invested in their parenting role. Still, it is possible that these fathers were less involved in the direct care of their young children compared to mothers in this sample, which could lessen the salience of paternal parenting for child behavioral outcomes. Another possibility is that children in this sample responded differently to over-reactive outbursts from their fathers versus their mothers, perhaps being more affected by over-reactive maternal parenting compared to paternal parenting. Further, although we made an effort to account for the broader family context in exploring associations in this study, there are other contextual factors—such as who provided primary care for the child, the amount of time fathers spent with their children, and whether or not there were siblings in the home—that could arguably impact the findings of the present study. Overall, this provocative finding necessitates replication, and future research would benefit from further exploration of potential underlying causes.

Moderation by Social Support

Contrary to our hypothesis, parents' own social support satisfaction did not moderate associations between their depressive symptoms and parenting or between their parenting and child externalizing problems. Although social support has at times been found to be associated with less optimal parenting (e.g., Driscoll & Easterbrooks, 2007), this has tended to be the case among low-income and minority samples, and when social support is perceived as intrusive (Easterbrooks, Chaudhuri, Bartlett, & Copeman, 2011). Because parents in this sample were reporting specifically on their *satisfaction* with social support, it is likely that high levels of social support as reported in this sample were perceived as positives in parents' lives. Interestingly, *partners'* social support satisfaction emerged as a significant moderator of the association between depressive symptoms and over-reactive parenting for both fathers and mothers, such that in the context of high levels of partner social support satisfaction, the association between depressive symptoms and over-reactive parenting became non-significant. When partners' satisfaction with social support was in the low to moderate range, however, depressive symptoms were associated with higher levels of over-reactive parenting.

That partners', but not parents' own, social support satisfaction emerged as a protective factor in terms of attenuating the association between paternal depressive symptoms and parenting was somewhat surprising and perhaps counterintuitive. Although intimate relationship social support was included as part of the social support construct, it seems unlikely these findings are being driven by marital quality alone. Were this the case, we would have expected parents' own social support satisfaction (as a proxy for marital quality) to moderate the association between depressive symptoms and parenting. Furthermore, recent research has found high levels of marital satisfaction to actually strengthen the association between maternal depressive symptoms and harsh parenting (Taraban et al., 2017). One possibility that might account for the current pattern of findings is that for parents who have a depressed spouse, it might be especially important to have sustaining social relationships outside of the marriage because of their partner's challenge to provide positivity and support. Those partners who are able to maintain social connections separate from the marriage may benefit from an increased sense of well-being overall, and be more able to support and care for their depressed spouses, also easing the burden of parenting responsibilities, and increasing overall positive affectivity in the home. The coparenting literature also supports this interpretation as theory has suggested that social support may influence parenting behaviors based on its effect on the quality of the coparenting relationship (McHale et al., 2003). In a study of parents and their 11- to 15-month old infants, mothers with higher levels of perceived social support were rated as being more supportive of fathers' parenting during an observed free-play task (Lindsey, Caldera, & Colwell, 2005). Thus, social support may increase the likelihood that a parent will encourage and coach the positive parenting behaviors of his or her partner, something that could be especially beneficial when that partner is struggling with symptoms of depression, ultimately leading to more optimal parenting behaviors in that partner.

For fathers specifically, another possibility is that the nature and content of social interactions differ in important ways between women and men, and this may have implications for the impact these relationships have on family life. Women tend to have friendships marked by high levels of warmth and disclosure, and may be more likely to have discussions about parenting and talk about stressors at home, while men's friendships tend to be characterized by less disclosure and more focus on doing activities together (Caldwell & Peplau, 1982). Thus, the extramarital social lives of women may have more bearing on the quality of parenting and home life compared to the social lives of men. Women whose spouses are experiencing depressive symptoms who nonetheless have supportive and satisfying friendships may receive advice and empathy from these close others that increases their ability to care for their spouse and positively shape his parenting behavior.

Finally, some research suggests that women are more likely to have relatively large social support networks, while men are more likely to rely exclusively on their spouse for social support (Antonucci & Akiyama, 1987). Thus, one possibility for fathers is that there is less variability in the quality and quantity of extramarital social support for men compared to women. As our measure of social support captured satisfaction with the marital relationship *and* other relationships, we are not able to directly address this issue, but it remains an important question for future research.

Limitations and Conclusions

This study has a number of important strengths, such as its focus on fathers, utilization of a large longitudinal sample, ability to explore environmental effects while accounting for children's genetic predisposition for externalizing problems, and consistency with a family systems perspective by considering father, mother, and contextual factors. Still, there are limitations that should be considered.

First, this was a study of adoptive parents, and there are likely characteristics unique to this population. Although prior work with this sample has found that adoptive parents and children are affected by many of the same stressors and outcomes as biologically-related parents and children (e.g., Leve et al., 2009), parents in this sample did have experiences—such as participation in the highly-effortful, lengthy adoption process—that biological parents have not, and this may impact their interactions in the parenting role. Additionally, evidence suggests that adoptive mothers are more satisfied with and skilled at the parenting role compared to mothers in general, based on their higher age at the birth of the child and their higher income (Davis-Kean, 2005; Ragozin et al., 1982). We are not aware of any research documenting differences in the way that social support functions in adoptive versus non-adoptive families, but we acknowledge that differences may exist. Overall then, we must be somewhat cautious of our extension of these findings to non-adoptive families.

Second, other characteristics of the sample should be taken into account in assessing the generalizability of findings. Parents included in this sample were married, limiting our generalizability to other caregiving roles, such as non-married romantic partners, step-parents, and single parents, and were relatively low-risk in terms of socioeconomic status and levels of depressive symptomatology. It remains unclear how parental depression may interact with family context among a low-income, higher-risk sample, likely marked by higher levels of familial stress and caregiver transiency. It is possible that when depression is severe, partners' social support may not be effective in ameliorating links between depressive symptoms and harsh parenting, as depressed parents may need more targeted intervention. On the other hand, the buffering effects model, which has received a good deal of empirical support, posits that social support is beneficial specifically in terms of ameliorating the impact of stressors on parents (Armstrong, Birnie-Lefcovitch, & Ungar, 2005), with the expectation that social support would more strongly influence the parenting of mothers and fathers who are experiencing more severe stressors. Thus, it is also possible that partners' social support would be even more protective for highly depressed parents, and that parents' own social support also may play a beneficial role in this case. In terms of child characteristics, although a sizeable proportion of the adopted children in this study were racial or ethnic minorities (44%), the majority of adoptive parents were European-American, potentially limiting the generalizability of our findings to the parenting behaviors of non-Caucasian parents. Future research would benefit from extending these findings to more diverse samples, in terms of caregiving role, risk-status, ethnic background, and clinically-meaningful levels of parental depression and child externalizing problems.

Second, in terms of key variables, this study focused on over-reactive parenting, which has demonstrated consistent associations with parental depression and child emotional and behavioral outcomes in past research (Dishion et al., 2008). However, parental depression is

related to multiple dimensions of parenting, including lower levels of positive parenting and higher levels of disengaged parenting (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Thus, this study is limited in its ability to capture the full range of parenting behaviors likely associated with parental depressive symptoms. Further, although we included reports by both parents on key variables when possible, we did not have access to an observational measure of parenting or child externalizing behavior during the infancy and early childhood period. Thus, it is possible that parents in this sample who were experiencing symptoms of depression may have over-reported their own or their partners' use of over-reactive parenting behaviors, their children's externalizing behavior problems, and may have been less satisfied with their social support networks compared to their non-depressed counterparts. Importantly, we accounted for both parents' depressive symptoms in all analyses, indicating that social support satisfaction is not simply a proxy for the severity of depressive symptoms. Still, the replication of this study's results using an observational measure of parenting and an observational or other-report (such as teacher-report) of child externalizing behavior would strengthen the implications of these findings.

Third, because of constraints based on when social support was measured, we used social support at 27 months as a moderator of the association between over-reactive parenting (18 months) and child externalizing problems at 27 months. It is not ideal that the moderator and outcome were measured at the same time point. Both maternal ($r = .46$) and paternal ($r = .58$) social support satisfaction were relatively stable over the course of the study, increasing our confidence that the 27-month social support measure does not threaten the validity of our results. Still, an 18-month measure of social support would have been more appropriate for that particular statistical analysis.

Although much research has been devoted to understanding relations between maternal depression and parenting, less work has been conducted on fathers, and even fewer studies have examined these relations in a larger ecological context. The findings of the current study replicate previous findings that both maternal and paternal depressive symptoms are associated with higher levels of harsh and over-reactive parenting and with child externalizing problems in early childhood (Fletcher, Feeman, & Garfield, 2011; Wilson & Durbin, 2010), and do so while accounting for heritable contributions to these effects and while accounting for the other parent's symptoms of depression. Further, this study was the first to find an interactive effect of depressive symptoms and social support in predicting parental over-reactive parenting, with partners' social support moderating such associations. Results of this study indicate that the relations among these variables are complex, but support continued research on both fathers and mothers, and exploration of parental depression in the context of the larger family environment.

Acknowledgments

This project was supported by grant R01 HD042608 from the Eunice Kennedy Shriver National Institute of Child Health & Human Development and the National Institute on Drug Abuse, NIH, U.S. PHS (PI Years 1–5: David Reiss, MD; PI Years 6–10: Leslie Leve, PhD). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Child Health & Human Development or the National Institutes of Health. In addition, this project was supported by grant R01 DA020585 from the National Institute on Drug Abuse, the National Institute of Mental Health and OBSSR, NIH, U.S. PHS (PI: Jenae Neiderhiser, Ph.D.), ECHO grant UG3 OD023389 (PIs: Jenae Neiderhiser, Ph.D., Leslie Leve, Ph.D., and Jody

Ganiban, Ph.D.), and by grant R01 MH092118 from the National Institute of Mental Health, NIH, U.S. PHS (PIs: Jenae Neiderhiser, Ph.D. and Leslie Leve, Ph.D.).

References

- Achenbach, TM, Rescorla, LA. Manual for the ASEBA preschool forms & profiles: An integrated system of multi-informant assessment; Child behavior checklist for ages 1 1/2-5; Language development survey; Caregiver-teacher report form. University of Vermont; 2000.
- Antonucci TC, Akiyama H. 1987; An examination of sex differences in social support among older men and women. *Sex Roles*. 17(11-12):737–749. DOI: 10.1007/BF00287685
- Arnold DS, O’Leary SG, Wolff LS, Acker MM. 1993; The Parenting Scale: A measure of dysfunctional parenting in discipline situations. *Psychological Assessment*. 5(2):137–144. DOI: 10.1037/1040-3590.5.2.137
- Barnett MA, de Baca TC, Jordan A, Tilley E, Ellis BJ. 2015; Associations among child perceptions of parenting support, maternal parenting efficacy and maternal depressive symptoms. *Child & Youth Care Forum*. 44(1):17–32. DOI: 10.1007/s10567-008-0034-z
- Beck AT, Steer RA, Beck JS, Newman CF. 1993; Hopelessness, depression, suicidal ideation, and clinical diagnosis of depression. *Suicide and Life-Threatening Behavior*. 23(2):139–145. [PubMed: 8342213]
- Belsky J. 1984; The Determinants of Parenting: A Process Model. *Child Development*. 55(1):83–96. DOI: 10.2307/1129836 [PubMed: 6705636]
- Belsky J, Fearon RMP. 2002; Early attachment security, subsequent maternal sensitivity, and later child development: Does continuity in development depend upon continuity of caregiving? *Attachment & Human Development*. 4(3):361–387. DOI: 10.1080/14616730210167267 [PubMed: 12537851]
- Cairney J, Boyle M, Offord DR, Racine Y. 2003; Stress, social support and depression in single and married mothers. *Social Psychiatry and Psychiatric Epidemiology*. 38(8):442–449. DOI: 10.1007/s00127-003-0661-0 [PubMed: 12910340]
- Caldwell MA, Peplau LA. 1982; Sex differences in same-sex friendship. *Sex Roles*. 8(7):721–732. DOI: 10.1007/BF00287568
- Ceballo R, McLoyd VC. 2002; Social support and parenting in poor, dangerous neighborhoods. *Child Development*. 73(4):1310–1321. DOI: 10.1111/1467-8624.00473 [PubMed: 12146749]
- Center, P. R. Six Facts about American Fathers. 2106. Retrieved from <http://www.pewresearch.org/fact-tank/2016/06/16/fathers-day-facts/#>
- Cohen, J, Cohen, P, West, SG, Aiken, LS. Applied multiple regression/correlation analysis for the behavioral sciences. 3rd. Lawrence Erlbaum Associates Publishers; Mahwah, NJ: 2003.
- Conger RD, Elder GH Jr. 1994 Families in troubled times: The Iowa youth and families project. *Families in troubled times: Adapting to change in rural America*. :3–19.
- Conger RD, Ge X, Elder GH, Lorenz FO, Simons RL. 1994; Economic stress, coercive family process, and developmental problems of adolescents. *Child Development*. 65(2):541–561. DOI: 10.2307/1131401 [PubMed: 8013239]
- Crnic KA, Greenberg MT, Robinson NM, Ragozin AS. 1984; Maternal stress and social support: Effects on the mother-infant relationship from birth to eighteen months. *American Journal of Orthopsychiatry*. 54(2):224–235. DOI: 10.1111/j.1939-0025.1984.tb01490.x [PubMed: 6731590]
- Davies PT, Sturge-Apple ML, Cummings EM. 2004; Interdependencies among interparental discord and parenting practices: The role of adult vulnerability and relationship perturbations. *Development and Psychopathology*. 16(3):773–797. DOI: 10.1017/S0954579404004778 [PubMed: 15605636]
- Dishion TJ, Shaw D, Connell A, Gardner F, Weaver C, Wilson M. 2008; The Family Check-Up with high-risk indigent families: Preventing problem behavior by increasing parents’ positive behavior support in early childhood. *Child Development*. 79(5):1395–1414. DOI: 10.1111/j.1467-8624.2008.01195.x [PubMed: 18826532]
- Easterbrooks MA, Cummings EM, Emde RN. 1994; Young children’s responses to constructive marital disputes. *Journal of Family Psychology*. 8(2):160–169. DOI: 10.1037/0893-3200.8.2.160

- Erel O, Burman B. 1995; Interrelatedness of marital relations and parent-child relations: A meta-analytic review. *Psychological Bulletin*. 118(1):108–132. DOI: 10.1037/0033-2909.118.1.108 [PubMed: 7644602]
- Fletcher RJ, Feeman E, Garfield C, Vimpani G. 2011; The effects of early paternal depression on children's development. *Medical Journal of Australia*. 195(11):685–689. [PubMed: 22171866]
- Ganiban JM, Ulbricht JA, Spotts EL, Lichtenstein P, Reiss D, Hansson K, Neiderhiser JM. 2009; Understanding the role of personality in explaining associations between marital quality and parenting. *Journal of Family Psychology*. 23(5):646–660. DOI: 10.1037/a0016091 [PubMed: 19803601]
- Garfield CF, Duncan G, Rutsohn J, McDade TW, Adam EK, Coley RL, Chase-Lansdale PL. 2014; A longitudinal study of paternal mental health during transition to fatherhood as young adults. *Pediatrics*. 133(5):836–843. DOI: 10.1542/peds.2013-3262 [PubMed: 24733877]
- Goodman SH. 2007; Depression in mothers. *Annual Review of Clinical Psychology*. 3:107–135. DOI: 10.1146/annurev.clinpsy.3.022806.091401
- Goodman SH, Rouse MH, Connell AM, Broth MR, Hall CM, Heyward D. 2011; Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child and Family Psychology Review*. 14(1):1–27. DOI: 10.1007/s10567-010-0080-1 [PubMed: 21052833]
- Gutierrez-Galve L, Stein A, Hanington L, Heron J, Ramchandani P. 2015; Paternal depression in the postnatal period and child development: mediators and moderators. *Pediatrics*. 135(2):e339–e347. [PubMed: 25560437]
- Hails K. 2017A genetically informed study of the interaction of prenatal alcohol exposure and parental depression in risk for children's emerging externalizing problems.
- Hajal N, Neiderhiser J, Moore G, Leve L, Shaw D, Harold G, Reiss D. 2015; Angry responses to infant challenges: Parent, marital, and child genetic factors associated with harsh parenting. *Child Development*. 86(1):80–93. [PubMed: 25641632]
- Harold GT, Leve LD, Elam KK, Thapar A, Neiderhiser JM, Natsuaki MN, Reiss D. 2013; The nature of nurture: Disentangling passive genotype–environment correlation from family relationship influences on children's externalizing problems. *Journal of Family Psychology*. 27(1):12–21. DOI: 10.1037/a0031190 [PubMed: 23421830]
- Harrist AW, Ainslie RC. 1998; Marital Discord and Child Behavior Problems Parent-Child Relationship Quality and Child Interpersonal Awareness as Mediators. *Journal of Family Issues*. 19(2):140–163.
- Hayes, AF. Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford Press; New York, NY: 2013.
- Kim P, Swain JE. 2007 Sad dads. *Psychiatry*. Feb.:36–47.
- Kouros CD, Papp LM, Goeke-Morey MC, Cummings EM. 2014; Spillover between marital quality and parent–child relationship quality: Parental depressive symptoms as moderators. *Journal of Family Psychology*. 28(3):315–325. DOI: 10.1037/a0036804 [PubMed: 24821519]
- Lagacé-Séguin DG, d'Entremont MRL. 2006; Less than optimal parenting strategies predict maternal low-level depression beyond that of child transgressions. *Early Child Development and Care*. 176(3–4):343–355.
- Leerkes EM, Blankson AN, O'Brien M. 2009; Differential effects of maternal sensitivity to infant distress and nondistress on social-emotional functioning. *Child Development*. 80(3):762–775. DOI: 10.1111/j.1467-8624.2009.01296.x [PubMed: 19489902]
- Leve LD, Neiderhiser JM, Ge X, Scaramella LV, Conger RD, Reid JB, Reiss D. 2007; The Early Growth and Development Study: A prospective adoption design. *Twin Research and Human Genetics*. 10(1):84–95. DOI: 10.1375/twin.10.1.84 [PubMed: 17539368]
- Leve LD, Neiderhiser JM, Scaramella LV, Reiss D. 2010; The Early Growth and Development Study: Using the prospective adoption design to examine genotype–environment interplay. *Behavior Genetics*. 40(3):306–314. DOI: 10.1007/s10519-010-9353-1 [PubMed: 20358398]
- Leve LD, Neiderhiser JM, Shaw DS, Ganiban J, Natsuaki MN, Reiss D. 2013; The Early Growth and Development Study: A prospective adoption study from birth through middle childhood. *Twin Research and Human Genetics*. 16(1):412–423. DOI: 10.1111/j.1467-8624.2012.01859.x. [PubMed: 23218244]

- Lewis C, Lamb ME. 2003; Fathers' influences on children's development: The evidence from two-parent families. *European Journal of Psychology of Education*. 18(2):211–228. DOI: 10.1016/0163-6383(87)90011-7
- Lovejoy MC, Graczyk PA, O'Hare E, Neuman G. 2000; Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review*. 20(5):561–592. DOI: 10.1016/S0272-7358(98)00100-7 [PubMed: 10860167]
- Mamun AA, Clavarino AM, Najman JM, Williams GM, O'Callaghan MJ, Bor W. 2009; Maternal depression and the quality of marital relationship: A 14-year prospective study. *Journal of Women's Health*. 18(12):2023–2031. DOI: 10.1089/jwh.2008.1050
- Marceau K, De Araujo-Greecher M, Miller ES, Massey SH, Mayes LC, Ganiban JM, Neiderhiser JM. 2016; The perinatal risk index: early risks experienced by domestic adoptees in the United States. *PLoS one*. 11(3):e0150486. [PubMed: 27010541]
- McEachern AD, Fosco GM, Dishion TJ, Shaw DS, Wilson MN, Gardner F. 2013; Collateral benefits of the family check-up in early childhood: Primary caregivers' social support and relationship satisfaction. *Journal of Family Psychology*. 27(2):271–281. DOI: 10.1037/a0031485 [PubMed: 23458695]
- Melby, J, Conger, R, Book, R, Rueter, M, Lucy, L, Repinski, D, Huck, S. The Iowa family interaction coding manual. Ames, IA: Iowa Youth and Families Project; 1990.
- Melby JN, Conger RD, Ge X, Warner TD. 1995; The use of structural equation modeling in assessing the quality of marital observations. *Journal of Family Psychology*. 9(3):280–293. DOI: 10.1037/0893-3200.9.3.280
- Montague DP, Walker-Andrews AS. 2002; Mothers, fathers, and infants: The role of person familiarity and parental involvement in infants' perception of emotion expressions. *Child Development*. 73(5):1339–1352. [PubMed: 12361304]
- Network, N. E. C. R. 1999; Chronicity of maternal depressive symptoms, maternal sensitivity, and child functioning at 36 months. *Developmental Psychology*. 35(5):1297–1310. DOI: 10.1037/0012-1649.35.5.1297 [PubMed: 10493655]
- Papp LM, Goeke-Morey MC, Cummings EM. 2004; Mothers' and fathers' psychological symptoms and marital functioning: Examination of direct and interactive links with child adjustment. *Journal of Child and Family Studies*. 13(4):469–482. DOI: 10.1023/B:JCFS.0000044728.34058.c0
- Patterson, GR. Coercive family process. Vol. 3. Castalia Publishing Company; 1982.
- Paulson JF, Bazemore SD. 2010; Prenatal and postpartum depression in fathers and its association with maternal depression: A meta-analysis. *JAMA: Journal of the American Medical Association*. 303(19):1961–1969. DOI: 10.1001/jama.2010.605 [PubMed: 20483973]
- Pemberton CK, Neiderhiser JM, Leve LD, Natsuaki MN, Shaw DS, Reiss D, Ge X. 2010; Influence of parental depressive symptoms on adopted toddler behaviors: An emerging developmental cascade of genetic and environmental effects. *Development and Psychopathology*. 22(4):803–818. DOI: 10.1017/S0954579410000477 [PubMed: 20883583]
- Planalp EM, Braungart-Rieker JM, Lickenbrock DM, Zentall SR. 2013; Trajectories of parenting during infancy: The role of infant temperament and marital adjustment for mothers and fathers. *Infancy*. 18(Suppl 1):E16–E45. DOI: 10.1111/inf.12021
- Reuben, JD, Shaw, DS. The Oxford handbook of coercive relationship dynamics. Oxford University Press; New York, NY: 2016. Parental depression and the development of coercion in early childhood; 69–85.
- Rhoades KA, Leve LD, Harold GT, Neiderhiser JM, Shaw DS, Reiss D. 2011; Longitudinal pathways from marital hostility to child anger during toddlerhood: Genetic susceptibility and indirect effects via harsh parenting. *Journal of Family Psychology*. 25(2):282–291. DOI: 10.1037/a0022886 [PubMed: 21480707]
- Rothbart MK, Ahadi SA, Evans DE. 2000; Temperament and personality: origins and outcomes. *Journal of Personality and Social Psychology*. 78(1):122. [PubMed: 10653510]
- Rutter M, Sroufe LA. 2000; Developmental psychopathology: Concepts and challenges. *Development and Psychopathology*. 12(03):265–296. [PubMed: 11014739]

- Shaw DS, Bell RQ. 1993; Developmental theories of parental contributors to antisocial behavior. *Journal of Abnormal Child Psychology*. 21(5):493–518. DOI: 10.1007/BF00916316 [PubMed: 8294650]
- Shaw DS, Connell A, Dishion TJ, Wilson MN, Gardner F. 2009; Improvements in maternal depression as a mediator of intervention effects on early childhood problem behavior. *Development and Psychopathology*. 21(2):417–439. DOI: 10.1017/S0954579409000236 [PubMed: 19338691]
- Shelleby EC, Shaw DS. 2014; Outcomes of parenting interventions for child conduct problems: A review of differential effectiveness. *Child Psychiatry and Human Development*. 45(5):628–645. DOI: 10.1007/s10578-013-0431-5 [PubMed: 24390592]
- Suzuki S, Holloway SD, Yamamoto Y, Mindnich JD. 2009; Parenting self-efficacy and social support in Japan and the United States. *Journal of Family Issues*. 30(11):1505–1526. DOI: 10.1177/0192513X09336830
- Yogman M, Garfield C, Health F. 2016; Fathers' roles in the care and development of their children: the role of pediatricians. *Pediatrics*. 138(1):e20161128. [PubMed: 27296867]

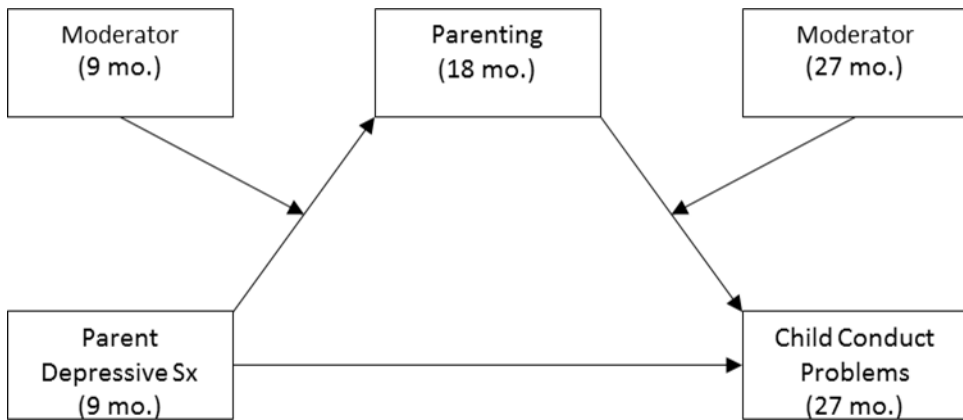


Figure 1. Moderated mediation model used in all statistical analyses, with moderators (maternal social support satisfaction, paternal social support satisfaction) substituted in as described in the text.

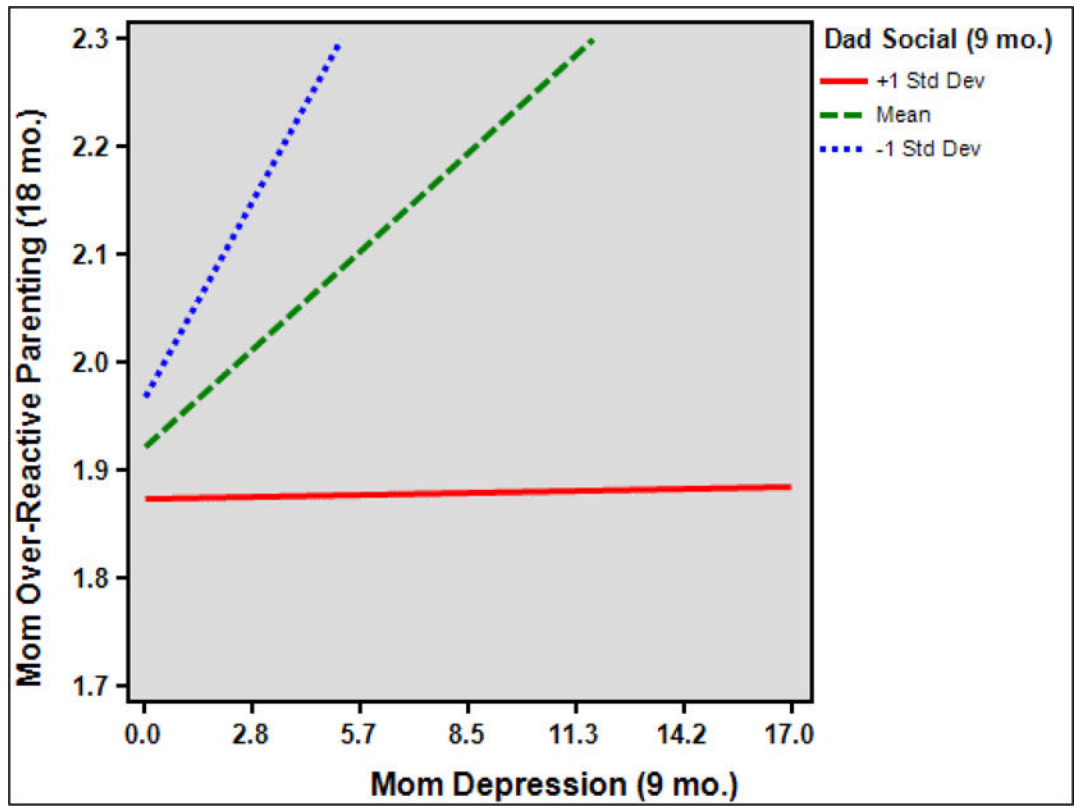


Figure 2. Association between maternal depression (9 mo.) and maternal over-reactive parenting (18 mo.) moderated by paternal social support satisfaction (9 mo.).

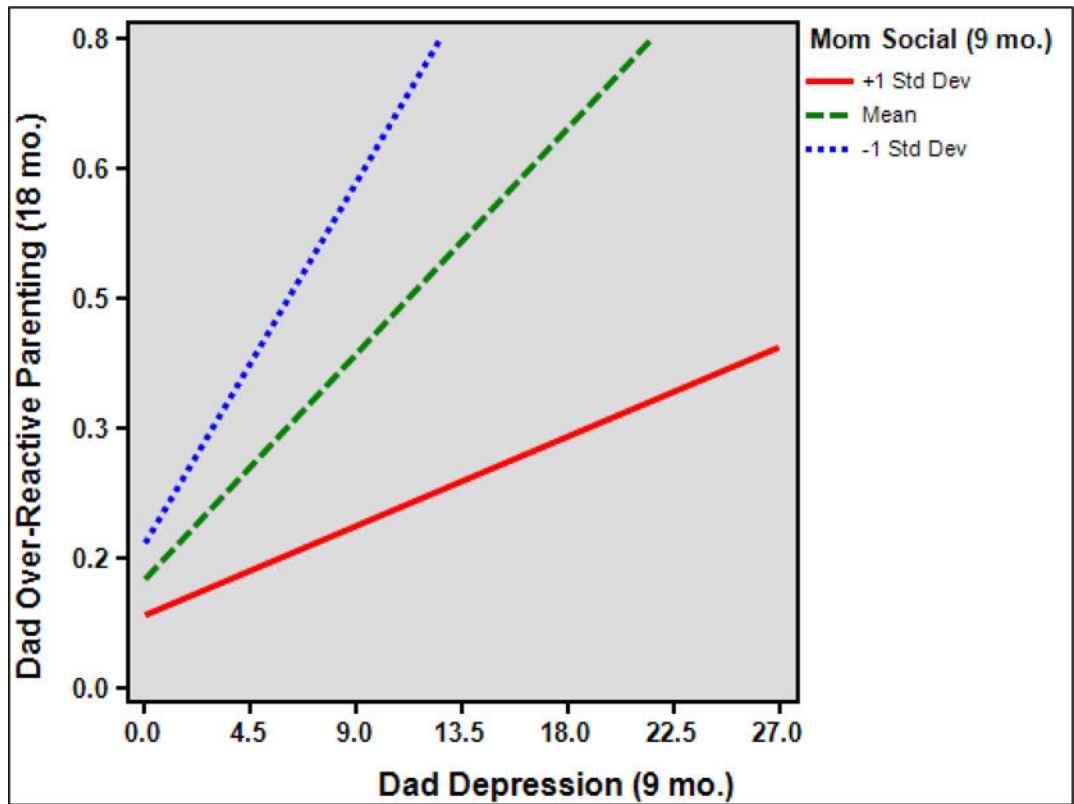


Figure 3. Association between paternal depression (9 mo.) and paternal over-reactive parenting (18 mo.) moderated by maternal social support satisfaction (9 mo.).

Table 1

Descriptive Statistics of Study Variables

Measure	Child Age	Range	Mean	SD
Paternal Depression	9 mo.	0–27.37	3.02	3.22
Maternal Depression	9 mo.	0–17	3.63	3.30
Paternal Social Support	9 mo.	1.25–4	3.35	.44
Maternal Social Support	9 mo.	1–4	3.49	.39
Birth Mother Psychopathology	9 mo.	–2.12–7.06	.01	1.62
Paternal Overreactivity	18 mo.	1–4.40	1.89	.61
Maternal Overreactivity	18 mo.	1–4.90	1.86	.60
Paternal Social Support	27 mo.	1.25–4	3.24	.53
Maternal Social Support	27 mo.	1.25–4	3.34	.51
Child Externalizing	27 mo.	0–37.5	11.34	5.67
Child NE	9 mo.	6.50–34	16.22	4.54
Obstetric Complications	9 mo.	0–6	2.22	1.31
Adoption Openness	9 mo.	–2.23–1.86	.04	.93

Note. NE = negative emotionality.

Table 2

Correlations among primary study variables.

	1	2	3	4	5	6	7	8	9	10
1. Paternal Depressive Sx (9 mo.)	–									
2. Maternal Depressive Sx (9 mo.)	.10*	–								
3. Paternal Social Support (9 mo.)	-.31*	-.08	–							
4. Maternal Social Support (9 mo.)	-.10*	-.28**	.26***	–						
5. Paternal Overreactivity (18 mo.)	.21**	.10*	-.10*	-.10*	–					
6. Maternal Overreactivity (18 mo.)	.00	.18*	-.04	-.13**	.33**	–				
7. Birth Mother Psychopathology (18 mo.)	-.04	.01	-.02	-.01	-.06	-.04	–			
8. Child Externalizing (27 mo.)	.17**	.13**	-.02	-.02	.17**	.24**	.10*	–		
9. Paternal Social Support (27 mo.)	-.29**	-.06	.58**	.21**	-.19**	-.05	-.08	-.11*	–	
10. Maternal Social Support (27 mo.)	-.10*	-.24*	.22*	.46*	-.07	-.11*	-.05	-.12*	.28*	–

Note.

* p < .05,

** p < .01

Table 3

Baseline mediation model, mothers: maternal depressive symptoms (9 mo.) predicting child externalizing (27 mo.), mediated by maternal over-reactive parenting (18 mo.).

Outcome:		Over-reactive Parenting (18 mo.)	
		β(SE)	CI
Maternal Depressive Sx (9 mo.)		.04(.01) **	[.02, .06]
Paternal Depressive Sx		-.01(.01)	[-.02, .01]
Birth Mother Psychopathology		-.02(.02)	[-.06, .02]
Child NE		.02(.01) **	[.01, .04]
Mother Age		-.01(.01)	[-.02, .00]
Income		.00(.00)	[-.00, .01]
Adoption Openness		-.08(.03) *	[-.14, -.02]
Obstetric Complications		-.02(.02)	[-.06, .03]
Child Gender		.03(.06)	[-.09, .15]
F	4.71 **		
R	.34		
R²	.11		

		Child Externalizing (27 mo.)	
		β(SE)	CI
Maternal Overreactivity (18 mo.)		1.86(.49) **	[.89, 2.83]
Maternal Depressive Sx (9 mo.)		.08(.09)	[-.09, .25]
Paternal Depressive Sx		.15(.08)	[-.02, .32]
Birth Mother Psychopathology		.31(.17)	[-.04, .65]
Child NE		.39(.06) **	[.26, .51]
Mother Age		-.10(.05)	[-.20, .01]
Income		-.02(.03)	[-.08, .04]
Adoption Openness		-.63(.30) *	[-1.22, -.04]
Obstetric Complications		.21(.22)	[-.21, .64]
Child Gender		-.17(.56)	[-1.23, .93]
F	9.04 **		
R	.46		
R²	.21		

Note.

*
p < .05,

**
p < .01

Table 4

Baseline mediation model, fathers: paternal depressive symptoms (9 mo.) predicting child externalizing (27 mo.), mediated by paternal over-reactive parenting (18 mo.).

Outcome:		Over-reactive Parenting (18 mo.)	
		β(SE)	CI
Paternal Depressive Sx (9 mo.)		.03(.01) **	[.01, .05]
Maternal Depressive Sx (9 mo.)		.02(.01) *	[.00, .04]
Birth Mother Psychopathology		-.00(.02)	[-.04, .04]
Child NE		.02(.01) **	[.01, .04]
Father Age		-.01(.01)	[-.02, .00]
Income		-.01(.00) *	[-.01, .00]
Adoption Openness		-.06(.03)	[-.13, .01]
Obstetric Complications		-.02(.03)	[-.07, .03]
Child Gender		-.09(.07)	[-.22, .04]
F	5.43 **		
R	.36		
R²	.13		
		Child Externalizing (27 mo.)	
		β(SE)	CI
Paternal Over-reactive (18 mo.)		.32(.49)	[-.64, 1.27]
Paternal Depressive Sx (9 mo.)		.15(.09)	[-.03, .32]
Maternal Depressive Sx (9 mo.)		.12(.09)	[-.05, .30]
Birth Mother Psychopathology		.30(.18)	[-.05, .65]
Child NE		.44(.07) **	[.31, .57]
Father Age		-.03(.05)	[-.13, .07]
Income		-.05(.05)	[-.15, .05]
Adoption Openness		-.75(.30) *	[-1.35, -.15]
Obstetric Complications		.22(.22)	[-.22, .67]
Child Gender		-.23(.58)	[-1.37, .91]
F	7.49 **		
R	.43		
R²	.19		

Note.

*
p < .05,

**
p < .01

Table 5

Moderated mediation model: maternal depressive symptoms (9 mo.) predicting child externalizing (27 mo.), mediated by maternal over-reactive parenting (18 mo.), moderated by maternal social support satisfaction at 9 months and 27 months.

Outcome:		Over-reactive Parenting (18 mo.)	
		β(SE)	CI
Maternal Depressive Sx (9 mo.)		.04(.01)**	[.02, .05]
Maternal Social Support (9 mo.)		-.12(.09)	[-.29, .05]
Depression * Social Support		.01(.02)	[-.03, .05]
Paternal Depressive Sx		-.01(.01)	[-.03, .01]
Birth Mother Psychopathology		-.02(.02)	[-.06, .02]
Child NE		.02(.01)**	[.01, .04]
Mother Age		-.01(.01)	[-.02, .00]
Income		-.00(.00)	[-.00, .01]
Adoption Openness		-.08(.03)*	[-.14, -.01]
Obstetric Complications		-.02(.02)	[-.07, .03]
Child Gender		.04(.06)	[-.09, .16]
F	4.01**		
R	.34		
R²	.12		

	Child Externalizing (27 mo.)	
	β(SE)	CI
Maternal Over-reactive Parenting (18 mo.)	1.82(.50)**	[.84, 2.80]
Maternal Social Support (27 mo.)	1.32(1.70)	[-2.03, 4.67]
Parenting * Social Support	-.72(.91)	[-2.51, 1.06]
Maternal Depressive Sx (9 mo.)	.07(.09)	[-.10, .25]
Paternal Depressive Sx	.15(.09)	[.02, .31]
Birth Mother Psychopathology	.33(.18)	[-.02, .67]
Child NE	.40(.06)**	[.27, .52]
Mother Age	-.10(.05)	[-.20, .01]
Income	-.02(.03)	[-.08, .04]
Adoption Openness	-.64(.30)*	[-1.23, -.05]
Obstetric Complications	.20(.22)	[-.23, .62]
Child Gender	-.18(.56)	[-1.28, .93]
F	7.67**	
R	.47	
R²	.22	

Note.

*
p < .05,

**
p < .01

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 6

Moderated mediation model: paternal depressive symptoms (9 mo.) predicting child externalizing (27 mo.), mediated by paternal over-reactive parenting (18 mo.), moderated by paternal social support satisfaction at 9 months and 27 months

Outcome:		Over-reactive Parenting (18 mo.)	
		β(SE)	CI
Paternal Depressive Sx (9 mo.)		.03(.01) **	[.01, .06]
Paternal Social Support (9 mo.)		-.01(.08)	[-.16, .14]
Depression * Social Support		.00(.02)	[-.04, .04]
Maternal Depressive Sx		.02(.01)*	[.00, .04]
Birth Mother Psychopathology		-.00(.02)	[-.04, .04]
Child NE		.02(.01) **	[.01, .04]
Father Age		-.01(.01)	[-.02, .00]
Income		-.01(.00)*	[-.01, -.00]
Adoption Openness		-.06(.03)	[-.13, .01]
Obstetric Complications		-.02(.03)	[-.07, .03]
Child Gender		-.10(.07)	[-.22, .04]
F	4.32 **		
R	.36		
R²	.13		

	Child Externalizing (27 mo.)	
	β(SE)	CI
Paternal Over-reactive Parenting (18 mo.)	.27(.49)	[-.70, 1.24]
Paternal Social Support (27 mo.)	-.48(.60)	[-1.66, .71]
Parenting * Social Support	.32(.82)	[-1.30, 1.94]
Paternal Depressive Sx (9 mo.)	.13(.09)	[-.05, .31]
Maternal Depressive Sx	.16(.09)	[-.01, .34]
Birth Mother Psychopathology	.28(.18)	[-.07, .064]
Child NE	.44(.07) **	[.31, .57]
Father Age	-.06(.05)	[-.16, .04]
Income	-.00(.03)	[-.07, .06]
Adoption Openness	-.74(.31)*	[-1.34, -.14]
Obstetric Complications	.22(.22)	[-.22, .66]
Child Gender	-.31(.58)	[-1.45, .84]
F	6.02 **	
R	.43	
R²	.18	

Note.

*
p < .05,

**
p < .01

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 7

Moderated mediation model: maternal depressive symptoms (9 mo.) predicting child externalizing (27 mo.), mediated by maternal over-reactive parenting (18 mo.), moderated by paternal social support satisfaction at 9 months and 27 months.

Outcome:		Over-reactive Parenting (18 mo.)	
		β(SE)	CI
Maternal Depressive Sx (9 mo.)		.03(.01) **	[.01, .05]
Paternal Social Support (9 mo.)		-.11(.07)	[-.26, .03]
Depression * Social Support		-.07(.02) **	[-.22, .03]
Paternal Depressive Sx		-.01(.01)	[-.03, .01]
Birth Mother Psychopathology		-.02(.02)	[-.05, .02]
Child NE		.02(.01) **	[.01, .03]
Mother Age		-.01(.01)	[-.02, .00]
Income		.00(.00)	[-.00, .01]
Adoption Openness		-.09(.03) **	[-.15, -.02]
Obstetric Complications		-.02(.02)	[-.06, .03]
Child Gender		.01(.06)	[-.11, .13]
F	5.04 **		
R	.38		
R²	.14		

	Child Externalizing (27 mo.)	
	β(SE)	CI
Maternal Over-reactive Parenting (18 mo.)	1.94(.51) **	[.93, 2.95]
Paternal Social Support (27 mo.)	-1.26(1.69)	[-4.59, 2.07]
Parenting * Social Support	.68(.91)	[-1.10, 2.46]
Maternal Depressive Sx (9 mo.)	.08(.09)	[-.09, .25]
Paternal Depressive Sx	.14(.09)	[-.04, .31]
Birth Mother Psychopathology	.30(.17)	[-.04, .64]
Child NE	.38(.06) **	[.26, .51]
Mother Age	.10(.05)	[-.20, .01]
Income	-.02(.03)	[-.08, .04]
Adoption Openness	-.60(.30) *	[-1.20, -.01]
Obstetric Complications	.22(.22)	[-.21, .64]
Child Gender	-.25(.56)	[-1.35, .86]
F	7.31 **	
R	.46	
R²	.21	

Note.

*
p < .05,

**
p < .01

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 8

Moderated mediation model: Paternal depressive symptoms (9 mo.) predicting child externalizing (27 mo.), mediated by paternal over-reactive parenting (18 mo.), moderated by maternal social support satisfaction at 9 months and 27 months.

Outcome:		Over-reactive Parenting (18 mo.)	
		β(SE)	CI
Paternal Depressive Sx (9 mo.)		.03(.01)*	[.01, .05]
Maternal Social Support (9 mo.)		-.05(.09)	[-.22, .12]
Depression* Social Support		-.06(.02)*	[-.10, .01]
Maternal Depressive Sx		.02(.01) ⁺	[-.00, .04]
Birth Mother Psychopathology		.00(.02)	[-.04, .04]
Child NE		.02(.01)**	[.01, .04]
Father Age		-.01(.01)	[-.02, .00]
Income		-.01(.00)*	[-.01, .00]
Adoption Openness		-.05(.03)	[-.12, .01]
Obstetric Complications		-.03(.03)	[-.08, .02]
Child Gender		-.09(.07)	[-.22, .04]
F	4.95**		
R	.38		
R²	.14		

		Child Externalizing (27 mo.)	
		β(SE)	CI
Paternal Over-reactive Parenting (18 mo.)		.35(.49)	[-.61, 1.31]
Maternal Social Support (27 mo.)		-.05(.58)	[-1.19, .1.10]
Parenting* Social Support		-.71(.97)	[-2.62, 1.20]
Paternal Depressive Sx (9 mo.)		.14(.09)	[-.04, .31]
Maternal Depressive Sx		.11(.09)	[-.06, .29]
Birth Mother Psychopathology		.32(.18)	[-.04, .67]
Child NE		.45(.07)**	[.32, .58]
Father Age		-.05(.05)	[-.15, .05]
Income		-.01(.03)	[-.07, .05]
Adoption Openness		-.76(.31)*	[-1.36, -.15]
Obstetric Complications		.20(.23)	[-.25, .64]
Child Gender		-.28(.58)	[-1.42, .86]
F	6.38**		
R	.44		
R²	.19		

Note.

⁺
p < .06,

*
p < .05,

**
p < .01

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript