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Coparenting Quality During the First Three Months After Birth: The Role of Infant Sleep Quality

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Abstract

The transition to parenthood can be stressful for new parents, as parents must learn to take on new roles and responsibilities. Sleep disruption—which has been linked in prior research to parent distress and fatigue—is common in the early months. The current study is the first to our knowledge to examine infant sleep and its potential indirect influence on parents' perceptions of coparenting quality at 1 and 3 months of infant age. Participants included 150 families. Mothers reported more night waking, poorer sleep quality, more depressive symptoms, and worse perceptions of coparenting quality as compared with fathers. We tested a structural model of infant and parent night waking and sleep quality as predictors of parent distress and coparenting using maximum likelihood estimation. The frequency of infant night waking predicted father and mother night waking, which in turn predicted parent sleep quality. Poor parent sleep quality predicted elevated depressive symptoms, and finally depressive symptoms were negatively related to perceptions of coparenting quality. Significant indirect effects between infant night waking and parent depression and coparenting quality were found. In summary, both mothers' and fathers' perceptions of coparenting were related to the unfolding parental dynamics that take place surrounding infant sleep difficulties. This held true even after controlling for parent education, family income, and infant temperament. Therefore, parenting may indirectly benefit from interventions targeting infant sleep difficulties.

Keywords

Transition to parenthood; coparenting; parent sleep; infant sleep; depression

Among normative life events, the transition to first-time parenthood is one of the most challenging (Leigh & Milgrom, 2008). After the baby is born, the family system must adapt, and parents must learn to take on new roles and responsibilities (Cowan & Cowan, 1992). For instance, the coparenting subsystem, which is conceptually and empirically distinct from the marital subsystem (Hayden et al., 1998; McHale, Kuersten-Hogan, Lauretti, & Rasmussen, 2000), is introduced at this time, and parents must learn to work together to raise their child. The stress experienced during the transition to parenthood often can have a number of negative effects on parents and families such as decreased marital satisfaction, increased conflict, and depression (Goodman, 2004; Lawrence, Rothman, Cobb, Rothman, & Bradbury, 2008; Leigh & Milgrom, 2008). These problems can exacerbate parenting stress, and if left unresolved, may lead to greater problems in parenting practices and psychological well-being, all of which may impact child well-being (Huston & Holmes, 2004; Teti, O'Connell, & Reiner, 1996). It is thus crucial to understand the processes that facilitate and impede parental well-being and coparenting quality during this time of

transition. The present study examines a potentially important but heretofore uninvestigated influence on the early coparenting relationship, infant sleep quality.

Coparenting, or “the ways that parents work together in their roles as parents” (Feinberg, 2003, p. 1499), is an important theoretical mediator between family risk factors across the transition (e.g., poor relationship quality, conflict, difficult infant temperament, lack of social support, etc.) and family and child outcomes (Belsky & Hsieh, 1998; Margolin, Gordis, & John, 2001). More specifically, supportive coparenting, such as when partners endorse and support each others’ parenting behaviors and cooperate with each other in raising their children, has been linked to increased relationship quality, less depression, and less parenting stress (for a review, see Feinberg, 2003), all of which have been linked to favorable child outcomes (Belsky & Hsieh, 1998; Teti et al., 1996). Therefore, examining factors that influence mothers’ and fathers’ perceptions of coparenting becomes important for creating more optimal family outcomes across the transition to parenthood.

Infant Sleep Quality and Parental Functioning

Interestingly, no research to date has examined the potential role of infant sleep quality in shaping coparenting perceptions. Parental concerns about infant sleep are one of the primary complaints heard by pediatricians across an infant's first year of life (Boyle & Croyley, 2004). Indeed, around 17% to 34% of infants have been shown to exhibit sleep problems (Bayer, Hiscock, Hampton, & Wake, 2007; Martin, Hiscock, Hardy, Davey, & Wake, 2007), and there is ample anecdotal and empirical evidence that infant sleep impacts parents’ sleep quality and parent functioning across the transition to parenthood (Bayer et al., 2007; Goyal, Gay, & Lee, 2009; Lam, Hiscock, & Wake, 2003; Martin et al., 2007; Meijer & van den Wittenboer, 2007).

A well-established data base attests to the fact that parents find chronic infant sleep difficulties to be highly stressful. Consistently high levels of infant night waking have been associated with maternal depression (Bayer et al., 2007; Meltzer & Mindell, 2007; Teti & Crosby, 2012), as well as paternal depression (Loutzenhiser & Seigny, 2008). The direction of effects is likely bidirectional (Sadeh, Tikotzky, & Scher, 2010), with some evidence suggesting that depressive symptoms in mothers may be causally linked to infant night waking (Teti & Crosby, 2012) and other evidence suggesting that prolonged infant night waking predisposes mothers to depression (Lam et al., 2003; Meltzer & Mindell, 2007).

Parent sleep quality appears to be one mechanism through which infant sleep problems may alter parent mood or depressive symptoms, and distress may result when a parent's sleep disruption is cumulative. For example, maternal sleep disturbance is associated with elevated maternal depressive symptoms and poorer adaptation to infant sleep (Counterline & Teti, 2010). Further, maternal sleep quality has been found to mediate the relationship between child sleep disruptions and maternal mood and distress (Bayer, et al., 2007; Meltzer & Mindell, 2007). Moreover, adult sleep deprivation and fatigue have been linked with compromised cognitive and physical functioning (Dahl & El-Sheikh, 2007; White, White, & Fox, 2009).

In Figure 1, we present a conceptual model that serves as the basis for the present study and that outlines a pathway by which infant sleep quality might influence coparenting quality. In this model, infant sleep disruption is conceptualized as an environmental stressor that impacts parent sleep quality, and the distress produced from parent sleep disruption in turn undermines the coparenting relationship. This model draws from theoretical formulations that environmentally-influenced stress tends to result in poorer coparenting, specifically less support and more conflict (Feinberg, 2003; see also Belsky, 1984). In addition, the model draws from empirical work that has linked (a) stress with compromised individual

functioning, lower tolerance for frustration, and more negative interpersonal functioning (Crnic & Low, 2002); (b) child sleep problems with parent sleep problems and fatigue and, in turn, parenting problems (Germo, Chang, Keller, & Goldberg, 2007); (c) fatigue with low parenting efficacy, involvement, warmth, and high levels of hostility (Giallo, Rose, & Vittorino, 2011); and (d) elevated depressive symptoms with poorer coparenting (Bronte-Tinkew, Moore, Matthews, & Carrano, 2007; Elliston, McHale, Talbot, Parmley, & Kuersten-Hogan, 2008).

In the current study, various coparenting dimensions were measured, including positive dimensions (agreement, closeness, endorsement of partner, and support), negative dimensions (exposure to conflict and undermining), and how well couples divided tasks (i.e., division of labor). Experiencing a high frequency of infant night waking per night may have three or more possible outcomes: (1) worse overall coparenting quality, (2) increased opportunities for couples to work together to manage their infant's sleep, and (3) within the second option these parents may manage their decreased sleep quality and work well together or they may become distressed over their decreased sleep quality which would lead to a greater frequency of more negative coparenting interactions. More often than not, it is likely that parents—mainly mothers (Tikotzky, Sadeh, & Glickman-Gavrieli, 2011)—get up alone with their infant at night while the other parent sleeps. If infants do not awaken frequently at night then this may not create a problem for how the couple feels about each other and their coparenting relationship. However, as night waking is more frequent some partners may begin to experience distress and become envious or angry at the other spouse who does not have to get up at night with the infant. In other words in the latter group, feelings of agreement, closeness, endorsement, and support would all be hypothesized to decrease as distress about night waking occurs. These partners who are not feeling supported at night may also begin to undermine or feel undermined by their partner as well. Finally, this relates directly to how infant night waking could lead to feelings of a more unequal and negative division of labor in their partnership.

Additional Influences on Coparenting

The coparenting relationship is only one part of the overall family system, and no single piece of the system can be completely understood or disconnected from the broader family environment (Cox & Paley, 1997). Thus, it is important to understand whether other family environment factors are related to and/or may change the potential relationship between infant and parent sleep, distress, and coparenting quality. Indeed, conceptualizations of coparenting note that it is multiply determined (Feinberg, 2003). This study controls for the potential relations between coparenting and other ecological influences on family functioning, including parent education, family income, and infant temperament. Socioeconomic factors such as parent educational level, occupational status, and income have been found to be robust predictors of coparenting quality. For example, parents with more education tend to be better coparents (Van Egeren, 2003), as do fathers with a higher occupational status and income (Van Egeren, 2003; Lindsey, Caldera, & Colwell, 2005). Child characteristics such as temperament may also play a role in coparenting quality. Although relations between coparenting and infant temperament appear to be complex (Davis, Schoppe-Sullivan, Mangelsdorf, & Brown, 2009; Lindsey et al., 2005; McHale et al., 2004; Schoppe-Sullivan, Mangelsdorf, Brown, & Sokolowski, 2007; Van Egeren, 2004), we anticipate that an infant who is not easily soothed may pose a particular challenge to the coparenting subsystem, and parents may experience more failures than successes with difficult-to-soothe infants compared with parents of more easily soothed infants (Feinberg, 2003). This in turn may lead to increased negative coparenting (e.g., criticism and undermining).

Comparing Mothers and Fathers

The conceptual model presented in Figure 1 was also tested separately for mothers and for fathers in the present study, because prior work suggests that coparenting perceptions, and determinants of coparenting perceptions, may be different for mothers and fathers (Van Egeren, 2004). For example, although mothers and fathers within families tended to be similarly satisfied (or dissatisfied) with coparenting, Van Egeren (2004) found that fathers are generally more satisfied with coparenting than mothers and that change over time in coparenting in one spouse was not related to change in coparenting in the other spouse. Reasons for these differences are unclear. Mothers may intentionally or inadvertently exclude fathers from parenting (termed maternal gatekeeping) (Schoppe-Sullivan, Brown, Cannon, Mangelsdorf, & Sokolowski, 2008); however, it is also possible that fathers' behaviors and desired involvement may influence the development of the coparenting relationship for both partners. With respect to this study's conceptual model, we thought it reasonable to expect that linkages between infant night waking, parent night waking, and parent sleep quality would be stronger among mothers than among fathers, because mothers frequently function as the primary caregivers of their infants despite fathers' increasing involvement with children (Pleck, & Masciadrelli, 2004) and because of recent data indicating that mothers of infants are more involved in their nighttime care than fathers (Teti & Crosby, 2012; Tikotzky et al., 2011).

The Current Study

In sum, in the present study we examined coparenting processes in relation to parent and infant sleep quality at 1 and 3 months postpartum. To our knowledge, this study represents the first examination of these relationships. We focused on the early months of infancy as this time period is arguably the most difficult in terms of parents' adjustment to infant night waking. In line with the research presented above, we present the following aims and hypotheses:

Aim 1

We first examined potential differences between mothers and fathers on our main study variables. We hypothesized that mothers would report more night waking and worse sleep quality than fathers, as mothers are generally the primary caregivers in early infancy (Tikotzky et al., 2011). We also expected fathers to rate coparenting as more positive than mothers (Van Egeren, 2004), while mothers would rate more depressive symptoms than fathers.

Aim 2

We were quite interested in how infant night waking in early infancy might play a role in perceptions of coparenting quality, as well as whether differences existed between mothers and fathers. Therefore, based on the conceptual model presented in Figure 1, we tested a model of infant night waking predicting parent night waking, which in turn would be negatively predictive of parents' reports of their sleep quality. Poor sleep quality in turn would predict parent distress (as measured by depressive symptoms), which in turn would be negatively predictive of coparenting quality. We also hypothesized that infant night waking, parent night waking, parent sleep quality, depressive symptoms, and coparenting at 1 month would be predictive of these same variables at 3 months. We tested theoretically plausible cross-lagged paths between month 1 and month 3 parent sleep quality, parent depressive symptoms, and coparenting. Figure 2 shows the hypothesized model for coparenting at 1 and 3 months. As coparenting is multiply determined, we controlled for parent education, family income, and infant soothability. Finally, as it was believed that

infant night waking would indirectly predict depressive symptoms and coparenting quality, these indirect effects were tested.

Aim 3

We wished to determine if the strength of the paths within the model were moderated by parent gender (i.e., mothers vs. fathers). This aim was based on prior observations that mothers are generally more involved at night with their infants than fathers (Tikotzky et al., 2011), prompting speculation that the path between infant night waking and parent night waking would be stronger for mothers than for fathers. Less clear was whether the paths between parent sleep quality, depression, and coparenting quality would differ between mothers and fathers, and thus hypotheses were withheld about these paths.

Method

Participants

Participants in the study were part of Project SIESTA, a NICHD-funded, ongoing, longitudinal study of parenting, infant sleep, and infant development (R01-HD052809), awarded to the second author. One hundred sixty-seven families were recruited from local hospitals when their infants were born (47% male infants). Infants' mean age at the 1 month visit was 1.21 months ($SD = .16$). At 3 months, 155 families completed a follow-up visit (infant age, $M = 3.09$, $SD = .31$). Excluding single parent families, 148 mothers and 132 fathers had complete coparenting data at both month 1 and month 3. All parents included in our analyses were married (87%) or living with a partner (13%), as coparenting was the ultimate outcome. Chi-square and One-way ANOVA tests revealed that those who were not included or who had dropped out of the study were less likely to be married and more likely to have a lower income ($ps < .05$).

When their infants were 1 month old, mothers' average age was 29.6 years old ($SD = 5.3$), ranging in age from 18 to 43. Fathers' average age was 32.1 years old ($SD = 5.6$), ranging in age from 21 to 48. Eighty-four percent of mothers were White, 3% were Asian American, 3% were African American, 6% were Latino, and 3% identified themselves as Other. Eighty-seven percent of fathers were White, 4% were Asian American, 3% were Latino, 4% were African American, and 2% identified themselves as Other. Eighty-eight percent of mothers completed some post-secondary education, and 62% were employed outside the home with 65% of those employed working full-time. Eighty-six percent of fathers completed some post-secondary education, and 95% were employed outside the home with 94% of those employed working full-time. Average annual family income was \$71,550 ($SD = \$48,815$).

Procedure

When infants were 1 and 3 months old, families were visited at three time points across seven days of data collection. At the first visit, parents were given a variety of questionnaires to complete, including a sleep diary. On the 7th day, project staff returned in order to collect the questionnaires. Mothers and fathers also participated in phone interviews each day for 7 days, which assessed things such as parent sleep quality and number of parent night waking. This study was approved by the institutional review boards at both The Pennsylvania State University and the Mount Nittany Medical Center.

Questionnaire Measures

Quality of coparenting—Parents' ratings of the quality of their coparenting were assessed at 1 and 3 months using the Coparenting Relationship Scale (CRS; Feinberg,

Brown, & Kan, 2012). The CRS consists of 35 items that tap into seven dimensions, including each parent's rating of agreement, endorsement, closeness, support and cooperation, division of labor, and competition and undermining in their relationship with their partner within the context of parenting, as well as the extent to which their child is exposed to conflict between them. Parents rate the degree to which a particular statement describes their parenting relationship with their partner on a 7-point Likert-type scale (e.g., My partner and I have different ideas about how to raise a child; 0 = Not true of us, 6 = Very true of us). Parents also indicate on 8 items the number of times within a typical week their child is present for both positive and negative exchanges between them (1 = Never, 7 = Very Often). For this study, we reversed scored items from the negative scales and averaged all of the items to produce an overall perception of coparenting quality score for each parent (1 month: Fathers alpha = .89, Mothers alpha = .90; 3 months: Fathers alpha = .91, Mothers alpha = .92; average Cronbach's alpha = .91). In a sample of primarily White (90%), married couples (82%), Feinberg et al. (2012) found that at 7 months after birth the average coparenting score was 4.89 ($SD = 0.83$) for mothers and 5.07 ($SD = 0.66$) for fathers. The scale also showed high internal consistency in their study (alphas = .93 - .94).

Infant Night Waking—On each morning for seven consecutive days at both 1 and 3 months, parents were asked to complete an infant sleep diary together (adapted from Burnham, Goodlin-Jones, Gaylor, & Anders, 2002), which obtained a variety of information about their infant's sleep at night. For this study, we utilized the data on the number of times during the previous night the infant woke up. This was summed across the seven days of data collection.

Parent Night Waking and Sleep Quality—A phone interview was conducted with each mother and father once a day for the 7 days of data collection at 1 and 3 months (adapted from the 24-Hour Sleep Patterns Interview; Meltzer, Mindell, & Levandoski, 2007). Among other things, participants reported the frequency of their night waking for the prior night and their perceived sleep quality. These items' 7 days of responses were summed to obtain the frequency of mother or father night waking and the total mother or father sleep quality for the 7 days.

Depressive Symptoms—Parents completed the depression subscale of the SCL-90-R at both 1 and 3 months (Derogatis, 1994). The depression subscale contains 13 items (e.g., crying easily, feeling lonely, feeling everything is an effort). Items were rated on a scale of 0 (*not at all*) to 4 (*extremely*). Items were summed, and higher scores indicate greater levels of depressive symptoms (1 month: Fathers alpha = .86, Mothers alpha = .91; 3 months: Fathers alpha = .88, Mothers alpha = .90; average Cronbach's alpha = .89). The SCL-90-R depression subscale has well-established psychometric properties (Groth-Marnat, 2009), and Derogatis (1994) identified a score of 10 or higher on this subscale as suggestive of clinical levels of depressive symptoms. The average scores for mothers and fathers were below this cut-off (see Table 1); yet, our sample included 38 mothers (26%) and 19 fathers (14%) who were at or above this cut-off at either 1 or 3 months.

Infant Temperament—Mothers completed the Infant Behavior Questionnaire (IBQ; Rothbart, 1981) at 3 months. This questionnaire consists of 99 items that assess the frequency with which certain behaviors occurred during the last 2 weeks. Subscales are then derived from the items. The IBQ has demonstrated satisfactory reliability and validity (Goldsmith & Rothbart, 1991). We reasoned that the more difficult an infant is to be soothed the more unsuccessful coparenting would be (Feinberg, 2003). Also, this type of 'difficulty' has been linked with coparenting during infancy (Burney & Leerkes, 2010). Therefore, the soothability dimension, consisting of 18 items, was used to represent an important aspect of

infant temperament that could affect perceptions of coparenting quality (Cronbach's $\alpha = .70$).

Results

Preliminary Analyses

Paired sample t-tests were used to test potential changes over time in study variables within individuals. Infant night waking decreased over time, as did parent night waking; this corresponded with an increase in parent sleep quality. Mothers reported fewer depressive symptoms at 3 months, although there was no significant change for fathers. Perceptions of coparenting quality significantly improved from month 1 to month 3 for fathers, but stayed relatively stable for mothers across the first three months (see Table 1). Cohen (1988) defined effect size as small, $d = .20$, medium, $d = .50$, and large, $d = .80$. The majority of our effect sizes were small (Cohen's $d = .17$ to $.41$, see Table 1). The effects sizes for infant night waking ($d = .95$) and mother night waking ($d = .63$) were medium to large.

Aim 1: Mother and Father Comparisons

We utilized paired sample t-tests to test differences between mothers and fathers within families on our study variables. Mothers reported more frequent night waking, worse sleep quality, more depressive symptoms, and worse perceptions of coparenting than fathers (see Table 1). The effect sizes were small (Cohen's $d = .23$ to $.46$, see Table 1), except for differences in parent night waking, where medium to large effects were observed ($d = .65$ to $.83$).

Aim 2: Models of Infant and Parent Sleep Quality Predicting Parent Distress and Perceptions of Coparenting Quality

Preliminary bivariate correlations were conducted in order to determine the relationship between study variables (see Table 2). As expected for both mothers and fathers, infant night waking was positively related to parent night waking, parent night waking was negatively related to parent reports of sleep quality, parent sleep quality was negatively related to distress (i.e., depressive symptoms), and depressive symptoms were negatively related to perceptions of coparenting quality. There did appear to be small positive associations between parent sleep quality and coparenting quality for mothers, but not for fathers. Direct links between infant and parent night waking and perceptions of coparenting quality were not observed, suggesting that any effects of infant sleep on coparenting quality would be indirect, rather than direct.

Analysis Plan—We utilized Structural Equation Modeling (SEM) using maximum likelihood estimation in the Analysis of Moments Structure (AMOS) software (Arbuckle & Wothke, 1999) to test the fit of our hypothesized model of infant and parent night waking and sleep quality as predictors of parent distress and coparenting quality to the data. In the first model all parents were included together ($N = 280$), and later mothers ($N = 148$) and fathers ($N = 132$) were compared using a multi-group comparison. SEM is preferred over regression as SEM uses maximum likelihood estimation, which minimizes bias (i.e., Type 1 error) in estimates, allows one to include multiple independent and dependent variables in the same analysis, and offers confidence intervals and assessments of goodness of fit for hypothesis testing (Buhi, Goodson, & Neilands, 2007; Kline, 2010). Goodness of fit indexes compare the observed covariances with the covariances predicted by the hypothesized model, and these include the chi-square (χ^2) test, the Root Mean Square Error of Approximation (RMSEA), and baseline comparison indexes such as the Comparative Fit Index (CFI). The χ^2 examines whether or not there is a statistically significant difference between the model and the sample data and degrees of freedom. A non-significant χ^2

statistic is preferable as it reflects “exact fit” between the hypothesized model and the data. The RMSEA reflects good model fit with a score of .06 or lower (the lower the better), while the CFI reflects good model fit with a score of .95 or higher (on a scale of 0 to 1) (Hu & Bentler, 1999).

Results—The hypothesized model, including control variables, showed a good model fit for both fathers’ and mothers’ perceptions of coparenting (Hu & Bentler, 1999) ($\chi^2(46) = 54.65, p = .21$; RMSEA = .02, lo = .00, hi = .05; CFI = .99, AIC = 168.65). Figure 2 shows the model with standardized path estimates for both mothers and fathers as a whole. In general, the frequency of infant night waking predicted father and mother night waking, which in turn predicted parent sleep quality, elevated depressive symptoms, and poorer coparenting quality.¹ Infant and parent night waking, sleep quality, depressive symptoms, and coparenting were significantly related from 1 month to 3 months. Interestingly, the cross-lagged paths demonstrated that more positive coparenting at 1 month was significantly predictive of decreased depressive symptoms at 3 months for both mothers and fathers. In general, depressive symptoms at 1 month were not predictive of coparenting or sleep quality at 3 months. Finally, sleep quality at 1 month did not predict depressive symptoms at 3 months.

Indirect effects were tested using a bootstrapping approach in AMOS, which is desirable in complex models with samples below 400 (Shrout & Bolger, 2002). Bootstrapping involves repeatedly and randomly sampling from the data set, estimating the effects for each sample, and examining the distribution of the estimates. Two thousand iterations were performed in order to ensure stability of the estimates. We were specifically interested in the indirect effect of infant night waking on parent distress and coparenting quality. As expected, significant indirect effects were observed between infant night waking at 1 month and parent depressive symptoms at 1 month ($\beta = .04$, CIs [.02, .07]) and at 3 months ($\beta = .05$, CIs [.03, .09]) and coparenting at 1 month ($\beta = -.01$, CIs [-.002, -.02]) and 3 months ($\beta = -.02$, CIs [-.006, -.03]). There were also significant indirect effects between infant night waking at 3 months and depression ($\beta = .03$, CIs [.01, .06]) and coparenting quality ($\beta = -.01$, CIs [-.002, -.02]) at 3 months (all $ps < .001$).

As coparenting is multiply determined, parent education, family income, and infant soothability were also controlled in the model by including the paths between the controls and the other variables. Because of concerns in our parameter-to-participant ratio, only the paths that showed significant bivariate correlations between our controls and the other variables (see Table 2) for either mothers or fathers were included. Parent education was related to coparenting quality at 1 month ($\beta = .18, p < .01$), but not at 3 months. Family income was only related to coparenting quality at 1 month at the trend level ($\beta = .11, p < .10$). Finally, infant soothability was related to depressive symptoms at 1 month ($\beta = -.15, p < .05$) and 3 months ($\beta = -.10, p < .05$), and to coparenting at 3 months ($\beta = .08, p < .05$).

As it can also be argued that coparenting quality may impact depression and that depression may impact sleep quality (i.e., the reverse of what we hypothesized), we tested our model with these paths reversed such that coparenting quality was theorized to predict depressive symptoms and depressive symptoms was theorized to predict parent sleep quality. The paths were reversed in alternative model 1 such that coparenting predicted depression ($\chi^2(46) = 64.45, p = .03$; RMSEA = .04, lo = .00, hi = .06; CFI = .98, AIC = 180.45), and in alternative model 2 the paths were reversed such that coparenting predicted depression and

¹The pattern of results was similar if the length of infant night waking was used as opposed to the frequency of infant night waking; however, when frequency and length of infant night waking were included in the same model the length of waking was no longer important for predicting the frequency of parent night waking. Thus, the frequency of waking was utilized in our analyses.

depression predicted sleep quality ($\chi^2(46) = 63.56, p = .04$; RMSEA = .04, lo = .00, hi = .06; CFI = .98, AIC = 179.56). The fit for both of these models was adequate; however, as their Akaike's information criterion (AIC) values, which are often used to compare the fit of models, were higher than that of the hypothesized model the fit of the alternative models was worse than our original hypothesized model.

To determine whether the influence of the proposed paths on coparenting quality was different between the various coparenting dimensions, two additional models were tested; one at 1 month, and one at 3 months. In these models, instead of the overall coparenting quality score, three individual dimensions were included as the ultimate outcomes; the rest of the model was identical to our original model. These dimensions included an overall positive dimension (which contained the agreement, closeness, endorsement of partner, and support subscales), an overall negative dimension (which contained the exposure to conflict and competition/undermining subscales), and finally the division of labor subscale. The division of labor subscale was included separately as it is conceptually distinct from the other dimensions. Both models showed a good fit to the data ($\chi^2(27) = 21.65 - 31.70, ps > .24$; RMSEAs < .03, lo = .00, hi = .06; CFIs = .99 - 1.00), and all coparenting dimensions were related to parent depressive symptoms in the ways that we had anticipated. Note that results were similar if all of the individual subscales were utilized as opposed to combining them into overall dimensions; however, overall dimensions were created in order to maintain a sufficient parameter-to-participant ratio. These models also included control variables. At both 1 and 3 months, parent distress (i.e., depressive symptoms) was negatively related to parents' perceptions of positive coparenting ($\beta_s = -.24, -.39, ps < .001$) and the division of labor ($\beta_s = -.19, -.21, ps < .01$) and positively related to perceptions of negative coparenting ($\beta_s = .17, .34, ps < .01$). In other words, whether we ran the model with the overall coparenting score or with various dimensions of coparenting quality the results were similar. It appears that all aspects of the coparenting relationship were significantly predicted by parental distress.

Aim 3: Parent Gender as a Moderator

A multi-group structural equation modeling approach was used to compare the strength of associations between model variables for mothers and fathers. To test for invariance across groups, a model for coparenting at 1 and 3 months with all parameters allowed to be unequal across groups was compared to a model with the loadings constrained to be equal across groups. The model with all parameters freely estimated in the two groups fit the data well ($\chi^2(56) = 59.56, p = .35$; RMSEA = .02, lo = .00, hi = .04; CFI = .99). The invariance model with loadings constrained to be equal across groups demonstrated a worse fit ($\chi^2(73) = 116.84, p < .01$; RMSEA = .05, lo = .03, hi = .06; CFI = .95; $\Delta\chi^2(17) = 57.28, p < .001$). This suggests that there were some differences between mothers and fathers in the model.

Pairwise parameter comparisons, where the path estimates for fathers and mothers were subtracted and then divided by the estimate of the standard error of the difference, revealed that there were significant differences between mothers and fathers on a few paths. The link between infant night waking and parent night waking was stronger for mothers than for fathers at 1 month ($z = -3.79$) and at 3 months ($z = -3.75$), and the link between depressive symptoms at month 1 and depressive symptoms at month 3 was stronger for fathers than mothers ($z = 3.22$).²

²Because of concerns in regards to the parameter-to-participant ratio (Kline, 2010) in this multi-group analysis, multi-group comparisons were run on a model of our variables only at 1 month and on a second model with our variables only at 3 months. In other words, we also compared mothers and fathers on simpler models with better participant-to-parameter ratios, and the same differences appeared (i.e., the link between infant night waking and parent night waking was stronger for mothers).

Discussion

To our knowledge, this paper is the first to examine infant and parent sleep quality and potential effects on mothers' and fathers' perceptions of coparenting during the early months of the transition to parenthood. It is important to examine infant and parent sleep quality at this time as infant night waking can be a significant problem and parents often admit distress over these wakings (Boyle & Cropley, 2004). Indeed, in our study infants woke up during the night approximately 15 times each week at 1 month and 9 times each week at 3 months.

As expected, infant night waking decreased over time, and this coincided with a decrease in parent night waking, an increase in sleep quality, and a decrease in depressive symptoms over time. However, unlike we had expected, coparenting quality appeared to be mostly stable from 1 to 3 months, although a small increase was observed for fathers. It may be that our time frame (1 to 3 months) was too brief to notice significant changes in coparenting quality. For instance, Van Egeren (2004) found coparenting experiences to be stable over the first six months of parenthood. She suggests that within developmental periods the challenges that parents face are relatively stable; thus, perceptions of coparenting are relatively stable. Significant changes in coparenting quality may only be seen after developmental transitions (e.g., greater infant mobility, development of language, etc.) when parents must renegotiate the coparenting system.

Aim 1: Mother and Father Comparisons

In support of our hypotheses, we found that within families mothers experienced more night waking than fathers and also showed worse sleep quality and more depressive symptoms. Fathers tended to rate better overall coparenting quality than mothers within families as well; this is in line with previous research (Van Egeren, 2004). These results support the idea that in general mothers are acting as the primary caregivers of their infants (Pleck, & Masciadrelli, 2004), and this is especially true at night (Tikotzky et al., 2011).

Aims 2 and 3: The Model for Mothers and Fathers

Both mothers' and fathers' perceptions of coparenting appear to be associated with the unfolding parental dynamics that take place surrounding infant sleep difficulties. We found support for our theoretically- and empirically-based conceptual model (see Figure 1) at both 1 month and 3 months postpartum (Aim 2), as (a) infant night waking was predictive of parent night waking, (b) parent night waking was predictive of overall sleep quality, (c) sleep quality was predictive of parent distress (i.e., depressive symptoms), and finally (d) distress predicted perceptions of coparenting quality—even after allowing for the high stability in coparenting quality from month 1 to month 3 (see Figure 2). In other words, there is moderate to high stability in all of the variables from month 1 to month 3; however, infant sleep difficulties are still indirectly linked with parent distress and coparenting. Small differences existed between mothers and fathers (Aim 3); the differences were only in regards to how strong the paths were between infant night waking and parent night waking, suggesting support for our hypothesis. Again, this supports the conclusion that mothers are more involved with caregiving at nighttime (Tikotzky et al., 2011) and are thus more likely to get up with the infant at night. A lack of other differences indicates that mothers' and fathers' perceptions of coparenting are similarly associated with the distress that each experiences surrounding night waking.

It is crucial to note that this model held up even after controlling for other family context factors, including parent education, family income, and infant soothability. This supports the idea that sleep disruption represents a significant stressor during the early months of the transition, as the strength of the paths did not change after entering the control variables.

However, the control variables were not all associated with coparenting quality as would be expected. In our model, parent education, family income, and infant soothability were predictive of coparenting quality sometimes at 1 month and sometimes at 3 months. It may be that pre-birth expectations and marital quality are stronger predictors of coparenting quality (McHale et al., 2004; McHale & Rotman, 2007; Schoppe-Sullivan et al., 2007; Van Egeren, 2003; 2004), as our study took place during the early months after the infants' birth. For example, it is quite possible that those whose expectations are violated will participate in more negative coparenting (e.g., undermining and less endorsement of one's partner) and also perceive less positive coparenting (e.g., less closeness to spouse). Specifically, parents may have particular ideas about how, when, and where their new infants should sleep during the first few months of the transition, and these ideas may not match their spouse's wishes (Germo et al., 2007).

It was not expected (Aim 3) that the link between depressive symptoms at month 1 and month 3 would be stronger for fathers. In general, all of our findings indicate that although fathers are influenced by infant night waking, they are not as involved at night with their infant's night waking; therefore, other factors such as marital quality may have just as strong of an influence on their distress—which in turn would feed into their perceptions of coparenting, according to our model. It may also be that mothers' depressive symptoms are more unstable across the early months of the transition as many mothers experience transient depressed mood (Gjerdingen, Crow, McGovern, Miner, & Center, 2011). This explanation is potentially supported by our data as mothers show a slightly weaker correlation than fathers between their depressive symptoms at 1 month and 3 months ($r = .56$ vs. $r = .75$, $ps < .001$).

Limitations and Future Directions

This study had several limitations. First, it is crucial to note that our results are correlational and do not necessarily indicate causation. Nonetheless, we find it encouraging that the same paths emerged at both month 1 and month 3. In addition, when we reversed the paths' directions and allowed coparenting quality to predict depression, which then impacted sleep quality, the model fit was worse. Second, our participant-to-parameter ratio was not ideal, meaning that our estimates could be somewhat unstable; yet, it is promising that our results do not change when we examine the full model with controls or reduced models where the participant-to-parameter ratios are improved. As coparenting is inherently a triadic concept (i.e., consisting of mother, father, and child), it would have been beneficial to have observational measures of coparenting as well as self-report measures. Future research should examine whether these same paths that we observed in this study hold true for observed coparenting behaviors or whether differences in perceptions and actual behavior emerge—as perceptions and actual behavior have been shown to be distinct at times (Van Egeren, 2004). Studies using observational data might help to clarify whether our findings are specific to the coparenting relationship or whether they represent an impact on couple functioning as a whole, as this study did not address this. Additionally, our study did not look at the bidirectional nature of family interactions and coparenting. It is likely that mothers' and fathers' experiences of night waking, distress, and coparenting quality are interrelated and potentially interact to produce particular feelings about coparenting over and above individual experiences. For example, we might expect a mother and father who are both experiencing poor sleep quality to show higher distress and decreased coparenting quality as compared with families in which only one parent is experiencing sleep disruption. One might also wonder if mothers who are experiencing poor sleep would be more likely to practice maternal gatekeeping—in a sense, blocking father involvement as they may have fewer cognitive resources available to manage potential conflicts—leading to less positive and more negative coparenting. It would have been important to measure pre-birth factors, as we were examining coparenting quality across the early months of the transition and

coparenting has been strongly linked with pre-birth factors, such as marital quality and expectations (McHale et al., 2004; McHale & Rotman, 2007; Van Egeren, 2003; 2004). In addition, the division of labor was not included in this study, and future research should examine whether the interactions that take place between partners at night (or the lack thereof) during and surrounding infant night waking account for part of the distress that may result from infant night waking. Our sample consisted of mostly married, White parents who had completed at least some college. It may be that families of lower socioeconomic status are more at risk for spillover from sleep disruption, as multiple risk factors may already be present. Thus, it is important to examine in these other contexts as well. Finally, as there are many factors that could lead to increased family distress, such as infant health problems, unmet pre-birth expectations, low income, and high work stress, it may be important to examine whether infant night waking is more detrimental as other risk factors increase.

Conclusion & Practical Implications

In summary, both mothers' and fathers' perceptions of coparenting quality are associated with the unfolding parental dynamics that take place surrounding infant sleep difficulties. Therefore, when attempting to intervene in parenting and/or the coparenting relationship, it is important to understand other stressors that may be present in the family during the transition to parenthood. Indeed, parenting may indirectly benefit from interventions targeting infant sleep problems and strategies used by parents to promote infant sleep. Furthermore, although mothers are generally the primary caregivers of their infants at night (Tikotzky et al., 2011), it is critical that both parents work together to find solutions to the distress caused by infant night waking. This is especially important as chronic sleep problems can develop, which can continue into the early childhood years (Lam et al., 2003), if parents do not make a conscious (and informed, we might add) effort to assist their infants in the consolidation of their sleep. Parents should seek to understand infant sleep, how it is different from adult sleep, and potential strategies for assisting with their sleep over time. Before the baby is born, it may be helpful for parents to create a plan for promoting their infant's sleep. At the very least, parents need to be in agreement on sleep arrangements and which strategies they will use with their infant. As mothers were shown in our study to have more fragmented sleep, perhaps mothers and fathers should discuss when and who will get up each night with the infant, and work out arrangements that promote, to whatever extent possible, sleep quality in both parents. As this was a community sample (i.e., not referred for infant sleep problems), the results suggest that even normative variations in infant sleep may feed into aspects of parents' psychological well-being as well as their parenting. Therefore, parents must be proactive and work together.

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References

- Arbuckle, J.L.; Wothke, W. Amos 4.0 user's guide. Small Waters; Chicago: 1999.
- Bayer JK, Hiscock H, Hampton A, Wake M. Sleep problems in young infants and maternal mental and physical health. *Journal of Pediatrics and Child Health*. 2007; 43:66–73. DOI: 10.1111/j.1440-1754.2007.01005.x.
- Belsky J. The determinants of parenting: A process model. *Child Development*. 1984; 55:83–96. DOI: 10.2307/1129836. [PubMed: 6705636]

- Belsky J, Hsieh KH. Patterns of marital change during the early childhood years: Parent personality, coparenting, and division-of-labor correlates. *Journal of Family Psychology*. 1998; 12(4):511–528. DOI: 10.1037/0893-3200.12.4.511.
- Boyle J, Cropley M. Children's sleep: Problems and solutions. *Journal of Family Health Care*. 2004; 14(3):61–63. [PubMed: 15341371]
- Bronte-Tinkew J, Moore KA, Matthews G, Carrano J. Symptoms of major depression in a sample of fathers of infants: Sociodemographic correlates and links to father involvement. *Journal of Family Issues*. 2007; 28:61–99. DOI: 10.1177/0192513X06293609.
- Buhi ER, Goodson P, Neilands TB. Structural equation modeling: A primer for health behavior researchers. *American Journal of Health Behavior*. 2007; 31:74–85. [PubMed: 17181464]
- Burney RV, Leerkes EM. Links between mothers' and fathers' perceptions of infant temperament and coparenting. *Infant Behavior and Development*. 2010; 33:125–135. DOI: 10.1016/j.infbeh.2009.12.002. [PubMed: 20116859]
- Burnham MM, Goodlin-Jones BL, Gaylor EE, Anders TF. Nighttime sleep–wake patterns and self-soothing from birth to one year of age: A longitudinal intervention study. *Journal of Child Psychology and Psychiatry*. 2002; 43:713–725. DOI: 10.1111/1469-7610.00076. [PubMed: 12236607]
- Cohen, J. *Statistical power analysis for the behavioral sciences*. 2nd ed.. Lawrence Erlbaum Associates; Hillsdale, NJ: 1988.
- Countermine MS, Teti DM. Sleep arrangements and maternal adaptation in infancy. *Infant Mental Health Journal*. 2010; 31:647–663. DOI: 10.1002/imhj.20276.
- Cowan, CP.; Cowan, PA. *When partners become parents: The big life change for couples*. Basic Books; New York: 1992.
- Cox MJ, Paley B. Families as systems. *Annual Review of Psychology*. 1997; 48:243–267. DOI: 10.1146/annurev.psych.48.1.243.
- Crnic, K.; Low, C. Everyday stresses and parenting.. In: Bornstein, M., editor. *Handbook of parenting: Practical issues in parenting*. 2nd edition. Vol. 5. Lawrence Erlbaum Associates; Mahwah, NJ: 2002. p. 243-267.
- Dahl RE, El-Sheikh M. Considering sleep in a family context [Introduction to the Special Issue]. *Journal of Family Psychology*. 2007; 21:1–3. DOI: 10.1037/0893-3200.21.1.1. [PubMed: 17371104]
- Davis EF, Schoppe-Sullivan SJ, Mangelsdorf SC, Brown GL. The role of infant temperament in stability and change in coparenting across the first year of life. *Parenting: Science and Practice*. 2009; 9:143–159. DOI: 10.1080/15295190802656836.
- Derogatis, LR. *SCL-90-R Symptom Checklist-90-R: Administration, scoring, and procedures manual*. Minneapolis, MN: National Computer Systems: 1994.
- Elliston D, McHale J, Talbot J, Parmley M, Kuersten-Hogan R. Withdrawal from coparenting interactions during early infancy. *Family Process*. 2008; 47:481–499. DOI: 10.1111/j.1545-5300.2008.00267.x. [PubMed: 19130789]
- Feinberg ME. The internal structure and ecological context of coparenting: A framework for research and intervention. *Parenting: Science and Practice*. 2003; 3:95–131. DOI: 10.1207/S15327922PAR0302_01.
- Feinberg ME, Brown LD, Kan ML. A Multi-Domain Self-Report Measure of Coparenting. *Parenting*. 2012; 12:1–21. DOI: 10.1080/15295192.2012.638870. [PubMed: 23166477]
- Germo GR, Chang ES, Keller MA, Goldberg WA. Child sleep arrangements and family life: Perspectives from mothers and fathers. *Infant and Child Development*. 2007; 16:433–456. DOI: 10.1002/icd.521.
- Giallo R, Rose N, Vittorino R. Fatigue, wellbeing and parenting in mothers of infants and toddlers with sleep problems. *Journal of Reproductive and Infant Psychology*. 2011; 29:236–249. DOI: 10.1080/02646838.2011.593030.
- Gjerdingen D, Crow S, McGovern P, Miner M, Center B. Changes in depressive symptoms over 0-9 months postpartum. *Journal of Women's Health*. 2011; 20(3):381–386. DOI: 10.1089/jwh.2010.2355.

- Goldsmith, HH.; Rothbart, MK. Contemporary instruments for assessing early temperament by questionnaire and in the laboratory.. In: Strelau, J.; Angleitner, A., editors. Explorations in temperament: International perspectives on theory and measurement. Plenum; New York: 1991. p. 249-272.
- Goodman JH. Paternal postpartum depression, its relationship to maternal postpartum depression, and implications for family health. *Journal of Advanced Nursing*. 2004; 45:26–35. DOI: 10.1046/j.1365-2648.2003.02857.x. [PubMed: 14675298]
- Goyal D, Gay C, Lee K. Fragmented maternal sleep is more strongly correlated with depressive symptoms than infant temperament at three months postpartum. *Women's Mental Health*. 2009; 12:229–237. DOI: 10.1007/s00737-009-0070-9.
- Groth-Marnat, G. Handbook of psychological assessment. 5th ed.. Wiley; Hoboken, NJ: 2009.
- Hayden LC, Schiller M, Dickstein S, Seifer R, Sameroff AJ, Miller I, et al. Levels of family assessment: I. Family, marital, and parent–child interaction. *Journal of Family Psychology*. 1998; 12:7–22. DOI: 10.1037/0893-3200.12.1.7.
- Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*. 1999; 6:1–55. DOI: 10.1080/10705519909540118.
- Huston, TL.; Holmes, EK. Becoming parents.. In: Vangelisti, AL., editor. Handbook of family communication. Erlbaum; Mahwah, NJ: 2004. p. 105-133.
- Kline, RB. 3rd Edition. Guilford Press; New York: 2010. Principles and practice of structural equation modeling.
- Lam P, Hiscock H, Wake M. Outcomes of infant sleep problems: A longitudinal study of sleep behavior and maternal well-being. *Pediatrics*. 2003; 111:e203–e207. DOI: 10.1542/peds.111.3.e203. [PubMed: 12612272]
- Lawrence E, Rothman A, Cobb R, Rothman M, Bradbury T. Marital satisfaction across the transition to parenthood. *Journal of Family Psychology*. 2008; 22:41–50. DOI: 10.1037/0893-3200.22.1.41. [PubMed: 18266531]
- Leigh B, Milgrom J. Risk factors for antenatal depression, postnatal depression and parenting stress. *BMC Psychiatry*. 2008; 8:24–35. DOI: 10.1186/1471-244X-8-24. [PubMed: 18412979]
- Lindsey EW, Caldera Y, Colwell M. Correlates of coparenting during infancy. *Family Relations*. 2005; 54:346–359. DOI: 10.1111/j.1741-3729.2005.00322.x.
- Locke HJ, Wallace KM. Short marital adjustment and prediction tests: Their reliability and validity. *Marriage and Family Living*. 1959; 21:251–255.
- Loutzenhiser L, Seigniny PR. Infant sleep quality of family life for first-time parents of three-month-old infants. *Fathering*. 2008; 6:2–19. DOI: 10.3149/fth.0601.2.
- Margolin G, Gordis EB, John RS. Coparenting: A link between marital conflict and parenting in two parent families. *Journal of Family Psychology*. 2001; 15(1):3–21. DOI: 10.1037/0893-3200.15.1.3. [PubMed: 11322083]
- Martin J, Hiscock H, Hardy P, Davey B, Wake M. Adverse associations of infant and child sleep problems and parent health: An Australian population study. *Pediatrics*. 2007; 119:947–955. DOI: 10.1542/peds.2006-2569. [PubMed: 17473096]
- McHale JP, Kazali C, Rotman T, Talbot J, Carleton M, Lieberman R. The transition to coparenthood: Parents' prebirth expectations and early coparental adjustment at 3 months postpartum. *Development and Psychopathology*. 2004; 16:711–733. DOI: 10.1017/S0954579404004742. [PubMed: 15605633]
- McHale JP, Kuersten-Hogan R, Lauretti A, Rasmussen JL. Parental reports of coparenting and observed coparenting behavior during the toddler period. *Journal of Family Psychology*. 2000; 14(2):220–236. DOI: 10.1037/0893-3200.14.2.220. [PubMed: 10870291]
- McHale JP, Rotman T. Is seeing believing? Expectant parents' outlooks on coparenting and later coparenting solidarity. *Infant Behavior and Development*. 2007; 30:63–81. DOI: 10.1016/j.infbeh.2006.11.007. [PubMed: 17292781]
- Meijer AM, van den Wittenboer GLH. Contribution of infants' sleep and crying to marital relationship of first-time parent couples in the 1st year after childbirth. *Journal of Family Psychology*. 2007; 21:49–57. DOI: 10.1037/0893-3200.21.1.49. [PubMed: 17371109]

- Meltzer LJ, Mindell JA. Relationship between child sleep disturbances and maternal sleep, mood, and parenting stress: A pilot study. *Journal of Family Psychology*. 2007; 21:67–73. DOI: 10.1037/0893-3200.21.1.67. [PubMed: 17371111]
- Meltzer LJ, Mindell JA, Levandoski LJ. The 24-hour sleep patterns interview: A pilot study of validity and feasibility. *Behavioral Sleep Medicine*. 2007; 5:297–310. DOI: 10.1080/15402000701557441. [PubMed: 17937584]
- Pleck, JH.; Masciadrelli, BP. Parental involvement by U.S. residential fathers: Levels, sources, and consequences.. In: Lamb, ME., editor. *The role of the father in child development*. 4th ed.. Wiley; New York, NY: 2004. p. 222-271.
- Rothbart MK. The measurement of infant temperament. *Child Development*. 1981; 52:569–578. DOI: 10.2307/1129176.
- Sadeh A, Tikotzky L, Scher A. Parenting and infant sleep. *Sleep Medicine Reviews*. 2010; 14:89–96. DOI: 10.1016/j.smr.2009.05.003. [PubMed: 19631566]
- Schoppe-Sullivan SJ, Brown GL, Cannon EA, Mangelsdorf SC, Sokolowski MS. Maternal gatekeeping, coparenting quality, and fathering behavior in families with infants. *Journal of Family Psychology*. 2008; 22:389–398. DOI: 10.1037/0893-3200.22.3.389. [PubMed: 18540767]
- Schoppe-Sullivan SJ, Mangelsdorf SC, Brown GL, Sokolowski MS. Goodness-of-fit in family context: Infant temperament, marital quality, and early coparenting behavior. *Infant Behavior & Development*. 2007; 30:82–96. DOI: 10.1016/j.infbeh.2006.11.008. [PubMed: 17292782]
- Shrout PE, Bolger N. Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*. 2002; 7:422–445. DOI: 10.1037/1082-989X.7.4.422. [PubMed: 12530702]
- Spanier GB. Measuring dyadic adjustment: New scales for assessing the quality of marriage and similar dyads. *Journal of Marriage and the Family*. 1976; 38:15–28. DOI: 10.2307/350547.
- Teti DM, Crosby B. Maternal depression, dysfunctional cognitions, and infant night waking: The role of maternal nighttime behavior. *Child Development*. 2012; 83:939–953. DOI: 10.1111/j.1467-8624.2012.01760.x. [PubMed: 22506917]
- Teti DM, O'Connell MA, Reiner CD. Parenting sensitivity, parental depression and child health: The mediational role of parental self-efficacy. *Early Development & Parenting*. 1996; 5(4):237–250. DOI: 10.1002/(SICI)1099-0917(199612)5:4<237::AID-EDP136>3.0.CO;2-5.
- Tikotzky L, Sadeh A, Glickman-Gavrieli T. Infant sleep and paternal involvement in infant caregiving during the first 6 months of life. *Journal of Pediatric Psychology*. 2011; 36:36–46. DOI: 10.1093/jpepsy/jsq036. [PubMed: 20444853]
- Van Egeren LA. The development of the coparenting relationship over the transition to parenthood. *Infant Mental Health Journal*. 2004; 25:453–477. DOI: 10.1002/imhj.20019.
- Van Egeren LA. Prebirth predictors of coparenting experiences in early infancy. *Infant Mental Health Journal*. 2003; 24:278–295. DOI: 10.1002/imhj.10056.
- White CP, White MB, Fox MA. Maternal fatigue and its relationship to the caregiving environment. *Families, Systems, & Health*. 2009; 27:325–345. DOI: 10.1037/a0018284.

Figure 1.
Conceptual Model

Figure 2. Model of infant and parent sleep quality predicting parent distress and perceptions of coparenting quality. The figure shows the model with standardized path estimates for both mothers and fathers as a whole.

Table 1

Means and Standard Deviations of Main Study Variables Over Time and Across Parents

Variable	Month 1		Month 3		<i>t</i>	<i>p</i> <	Cohen's <i>d</i> ^a
	M	SD	M	SD			
<i>Infant Night Waking</i>	15.41	6.68	9.35	6.07	9.62	.001	.95
<i>Mothers</i>							
Night Waking	16.32	9.47	10.97	7.25	6.37	.001	.63
Sleep Quality	25.13	4.87	26.35	5.15	-2.98	.01	-.24
Depressive Symptoms	7.89	7.65	6.42	6.27	2.51	.05	.21
Coparenting Quality	6.16	0.66	6.18	0.64	-0.47	ns	-.03
<i>Fathers</i>							
Night Waking	9.35 [*]	7.09	6.65 [*]	6.04	3.86	.001	.41
Cohen's <i>d</i> ^b	.83		.65				
Sleep Quality	26.15 [*]	4.14	27.60 [*]	4.38	-4.20	.001	-.34
Cohen's <i>d</i> ^b	-.23		-.26				
Depressive Symptoms	4.84 [*]	5.39	4.56 [*]	5.74	0.75	ns	.05
Cohen's <i>d</i> ^b	.46		.31				
Coparenting Quality	6.22	0.59	6.32 [*]	0.56	-2.68	.01	-.17
Cohen's <i>d</i> ^b	-.10		-.23				

Note.

^{*} indicates significant ($p < .01$) mean-level differences between mothers and fathers within families.^aThese Cohen's *d* values refer to effect sizes for comparing month 1 and month 3.^bThese Cohen's *d* values refer to effect sizes for comparing mothers and fathers.

Table 2

Bivariate correlations for mothers and fathers between main study variables

	Month 1					Month 3					Control Variables			
	1a	2a	3a	4a	5a	1b	2b	3b	4b	5b	Inc.	Educ.	Sooth.	
Month 1														
1a. Infant Night Waking	--	.36***	-.02	-.09	.15	.43***	.11	.05	-.04	.13	.11	.11	.04	
2a. Parent Night Waking	.61***	.34***	-.35***	.10	.01	.07	.32***	-.08	.07	.05	.09	.08	.08	
3a. Parent Sleep Quality	-.21*	-.21**	.24**	-.19*	.03	.11	-.20*	.60***	-.16 [†]	.01	.08	.10	-.03	
4a. Depressive Symptoms	.03	-.04	-.31***	.13	-.16 [†]	-.09	.19*	-.19*	.71***	-.21*	.00	.04	-.15 [†]	
5a. Coparenting	-.04	-.06	.16*	-.31***	.57***	.07	-.09	.08	-.42***	.74***	.26**	.34***	.11	
Month 3														
1b. Infant Night Waking	.48***	.32***	-.17*	-.02	-.01	--	.28**	-.02	.02	.02	.19*	.24**	-.05	
2b. Parent Night Waking	.38***	.39***	-.20*	-.02	-.07	.65***	.36***	-.37***	.22*	-.02	.02	-.01	.13	
3b. Parent Sleep Quality	-.13	-.14 [†]	.54***	-.26**	.10	-.28***	-.51***	.40***	-.24**	.13	.12	.03	.03	
4b. Depressive Symptoms	-.01	-.09	-.29***	.59***	-.35***	-.03	.02	-.32***	.32***	-.44***	-.07	-.03	-.24**	
5b. Coparenting	-.06	.01	.18*	-.27**	.77***	-.03	-.05	.15 [†]	-.47***	.65***	.24**	.29***	.23**	
Control Variables														
Family Income	.10	.07	.02	-.15 [†]	.17*	.17*	.11	.07	-.15 [†]	.20*	--	.50***	.08	
Parent Education	.17*	.15 [†]	-.09	.13	.10	.12	.10	-.01	.02	.07	.36***	.44***	-.03	
Infant Soothability	.02	.07	.07	-.18*	.11	-.04	-.03	.19*	-.21*	.17*	.06	.01	--	

[†] $p < .10$ * $p < .05$ ** $p < .01$

*** $p < .001$; Mothers ($n = 148$) are below the diagonal, and fathers ($n = 132$) are above the diagonal. Coefficients on the diagonal that are bolded and italicized represent the bivariate correlations between mothers and fathers on the study variables.