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Parental depressive symptoms and children's sleep: the role of family conflict

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Abstract

Background—We used a multi-method and multi-informant design to identify developmental pathways through which parental depressive symptoms contribute to children's sleep problems. Environmental factors including adult inter-partner conflict and parent-child conflict were considered as process variables of this relation.

Methods—An ethnically and socioeconomically diverse sample of children ($n = 268$) participated (M age = 9.44 years, $SD = 8.61$ months). Children wore actigraphs for 7 consecutive nights and also reported on their sleep problems.

Results—Higher levels of maternal depressive symptoms were associated with children's sleep/wake problems. Higher levels of paternal depressive symptoms were associated with shorter time in bed and fewer sleep minutes. Inter-partner conflict and parent-child conflict were mechanisms of effects in the associations between maternal depressive symptoms and children's actigraphy-based and self-reported sleep problems.

Conclusions—Findings build on this scant literature and highlight the importance of identifying pathways of risk and familial and environmental influences on children's sleep problems.

Keywords

Children; sleep; depression; family conflict; actigraphy

Introduction

Sleep problems among school-aged children are common (i.e., comparatively shorter sleep durations, lower sleep efficiency, and erratic sleep schedules) and can lead to problems in cognitive (Buckhalt, El-Sheikh, Keller, & Kelly, 2009), emotional (Chorney, Detweiler, Morris, & Kuhn, 2008), and behavioral adjustment domains (Pesonen et al., 2010). Consequently, it is imperative to identify factors that may contribute to sleep disturbance in children. Although evidence suggests that parental psychopathology acts as a distal risk factor for sleep problems in infants and young children (Seifer, 2011), little is known about this association in either elementary school-aged children or in the context of paternal depression. Similarly, the pathways through which parental psychopathology leads to sleep problems are not well understood.

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Parental depression and children's sleep

Parental psychopathology, particularly maternal depression, is a well-identified risk factor for child maladjustment (Goodman & Tully, 2008). Moreover, findings from several large-scale longitudinal studies support the link between parental depression and sleep problems in young children (Seifer, 2011). For example, cross-lagged analyses of the NICHD Study of Early Childcare indicated mothers' depressive symptoms, when children were 1 month of age, predicted greater increases in the duration of nighttime awakenings through 36 months (Warren, Howe, Simmens, & Dahl, 2006). Similarly, maternal depressive symptoms and family dysfunction contributed to anxiety and sleep problems among 3- and 4-year-old twins (Gregory, Eley, O'Connor, Rijdsdijk, & Plomin, 2005). A survey study of over 1,000 Taiwanese children ages 4–9 found higher rates of insomnia, late sleeping, sleep talking, and nightmares among children of parents with higher levels of mental distress (Shang, Gau, & Soong, 2006). However, as Seifer (2011) notes, there is a noticeable gap in research surrounding the relations between parental depressive symptoms and school-aged children's sleep.

A number of methodological limitations exist in the understanding of direct effects between parental depression and children's sleep. Few studies have included fathers' depressive symptoms as an independent predictor of children's sleep. In a review of the literature, Kane and Garber (2004) found significant support for links between fathers' depressive symptoms and maladaptive outcomes for offspring, so it stands to reason that paternal depressive symptoms might also influence sleep, a primary domain of children's biobehavioral adjustment. Further, previous studies have primarily used parent-reports of children's sleep, often exclusively using the less rigorous sleep items from the Child Behavior Checklist (Gregory et al., 2011). In addition to the typical concerns related to mono-informant bias, there is evidence to suggest that parents with psychopathology or families with higher levels of conflict may be less reliable in their report of children's behavioral problems (Grills & Ollendick, 2002). Therefore, it is particularly unfortunate that studies looking at parental depression and child sleep have relied on parental reports of children's sleep. To our knowledge, no previous studies have employed actigraphy while investigating the relations between parental depressive symptoms and children's sleep.

Pathways to child sleep disturbances

Why does parental depression relate to children's sleep? Few studies have considered processes that explain the association between parental depression and children's sleep. Although many possible explanations exist (i.e., attachment, dysfunctional parenting), we focused on family conflict as a potential process variable between parental depression and sleep. It has been well established that rates of inter-partner and parent–child conflict are greater in homes marked with maternal depression (Hammen, Brennan, & Shih, 2004). Although less studied, paternal depression has also been linked to increased family conflict including parent–child conflict (Kane & Garber, 2009). The emotional insecurity theory (Cummings & Davies, 2010) guides the current study and provides a rationale for the proposed links between parental depression, family conflict, and children's sleep. According to this theory, negative family relationships (e.g., those with high conflict) undermine a child's sense of safety, stability, and security within the family. Children who are exposed to higher levels of familial conflict (both inter-partner and parent–child) often feel unsafe and question the stability and future of the family. The elevated levels of vigilance that often accompany emotional insecurity may make sleep difficult to attain given that sleep and vigilance are antithetical (Dahl, 1996; Keller & El-Sheikh, 2011).

Indeed, cross-sectional and longitudinal evidence supports the conceptual links between marital conflict and children's sleep. El-Sheikh, Buckhalt, Cummings, and Keller (2007)

demonstrated that exposure to marital conflict was associated concurrently with emotional insecurity, which in turn was related to a reduced sleep duration and quality. Likewise, in a 2-year longitudinal study Kelly and El-Sheikh (2011) found that marital conflict predicted a more inconsistent sleep schedule in addition to children's self-reports of sleep/wake problems and daytime sleepiness. To a lesser extent, previous research has also supported the link between poor mother-child relations and sleep disturbances (El-Sheikh, Hinnant, Kelly, & Erath, 2010). A large-scale cross-sectional study by Liu et al. (2000) revealed that poor parent-child relationships were associated with Chinese children's sleep problems. Further, Bell and Belsky (2008) found that mother-child conflict and insensitivity in mother-child interactions in third grade predicted children's sleep problems in sixth grade. The current study is the first to explicitly consider effects of mother- and father-child conflict (verbal and physical) on many objective and subjective sleep variables.

The current study

Multiple informants reported on parental depressive symptoms and family conflict and we utilized self-reported and actigraphy-derived measures to assess children's sleep. In a recent meta-analysis, Dewald, Meijer, Oort, Kerkhof, and Bogels (2010) found that sleep duration, quality, and sleepiness were uniquely associated with developmental outcomes in childhood. Consequently, we examine various sleep parameters separately (rather than creating a latent construct). Sleep problems are conceptualized along a continuum (vs. group designations or clinical cut-offs) to increase generalizability of study findings to the understanding of developmental outcomes for the majority of children in the general population.

Using a large community sample, our primary objective was to investigate associations between parental depressive symptoms and children's sleep and to assess various conceptually motivated pathways through which parental depressive symptoms may serve as a risk factor for sleep problems in children. We hypothesized that parental depressive symptoms would be associated positively with inter-partner and parent-child conflict, which in turn would be related to greater sleep problems. Verbal/psychological and physical conflict are examined separately, as they may differentially influence sleep. Given the novelty of these research questions, no specific hypotheses were advanced regarding differential effects of maternal versus paternal depressive symptoms on children's sleep.

Method

Participants

The current sample included 268 children (139 boys, 129 girls) in late childhood ($M_{\text{age}} = 9.44$ years, $SD = 8.61$ months) and their families. Children were recruited from three neighboring districts in the Southeastern United States. Children attended the third or fourth grade in one of seven schools. Of families who contacted our lab in response to letters sent home from schools, 90% participated. Inclusion criteria included the child not having a diagnosed sleep disorder, learning disability or mental retardation. Representative of the community, European American children comprised 64% of the sample; 36% were African American. Families spanned a wide range of socioeconomic status levels (SES; Hollingshead, 1975) with 32% classified as unskilled workers, 24% as skilled workers, and 44% as professional. The mean family income was in the \$20,000–\$35,000 range. The majority of children lived with their biological mother ($n = 252$); of these children, 58% ($n = 146$) also lived with their biological father, 21% ($n = 52$) lived with their mother's partner (e.g., stepfather), and 21% lived with a single mother ($n = 54$). The remaining 16 children lived with a single father, father and step-mother, or adoptive parents. For simplicity, we refer to couples as mothers and fathers. Fourteen children who lived with extended family members were not included due to our focus on parental depression.

Procedures

For brevity, only procedures and measures pertinent to the current investigation are discussed. A research assistant instructed parents to place an actigraph watch on the child's nondominant wrist at bedtime for seven consecutive nights prior to the scheduled laboratory visit. Parents were called each night to report child bed- and wake-times to validate actigraphy assessments. To help reduce potential confounding variables, sleep data were collected during the regular school year and only data from medication free nights were used. Families typically visited our university-based laboratory following the completion of actigraphy assessments (M days between actigraphy assessments and lab visit = 3.41 days, $SD = 8.51$). Children completed questionnaires via interview with a trained researcher. The University IRB approved this study.

Measures

Parental depressive symptoms—Mothers and fathers reported on their own depressive symptoms using the 13-item depression scale from the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1994), which has established psychometric properties. Likert response choices range from 0 (not at all) to 4 (extremely); higher scores indicate greater depressive symptoms. For the current study $\alpha = .88$ for mothers' and $.83$ for fathers' depressive symptoms.

Inter-partner conflict—Children completed the Revised Conflict Tactics Scale (CTS2; Straus, 1995), which measures the frequency of conflict tactics used between parents within the past year. The CTS2 is a widely used measure for the assessment of inter-partner conflict and has very good psychometric qualities (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). The eight-item Verbal Aggression scale and the nine-item Physical Aggression scale were used. Likert response choices ranged from 0 (this has not happened) to 6 (more than 20 times); higher scores reflect more conflict. Mothers' and fathers' reports of verbal ($r = .86$, $p < .001$) and physical conflict were correlated ($r = .63$, $p < .001$) and thus, were mean composited to create an overall inter-partner verbal conflict variable and an inter-partner physical conflict variable. Cronbach's alpha = $.83$ for verbal conflict and $.85$ for physical conflict.

Parent-child conflict—Children completed the Parent-Child Conflict Tactics Scale (CTSPC; Straus, 1999), a widely used measure that has well-established psychometric properties (Straus, 1999). The five-item Verbal Aggression (e.g., yelled, screamed at child) and the nine-item Physical Aggression (e.g., spanked child, slapped on head or face) scales assessed the frequency of mother and father conflict directed toward the child within the last year. Response choices ranged from 0 (this has not happened) to 6 (more than 20 times); higher scores reflect more conflict. Cronbach's alphas ranged from $.63$ to $.70$.

Actigraphy-measured sleep—Actigraphy was used to examine children's sleep and has good reliability, especially when used for multiple consecutive nights (Acebo et al., 1999). The actigraphs were Octagonal Basic Motionloggers (Ambulatory Monitoring Inc., Ardsley, NY), a lightweight (45 g) wristwatch like device that measures motion in 1-min epochs using zero crossing mode. The Octagonal Motionlogger Interface with Actme software and the analysis software package (ActionW2; 2000 Ambulatory Monitoring Inc.) were used to analyze the data. Children were considered awake or asleep using Sadeh's scoring algorithm, which encompassed movement at a threshold level for a predetermined amount of time (Sadeh, Acebo, Seifer, Aytur, & Carskadon, 1995; Sadeh, Sharkey, & Carskadon, 1994). The actigraph and analysis software package have established validity for the assessment of children's sleep quantity and quality when compared with polysomnography (Sadeh et al., 1994; Sadeh et al., 1995).

Using all available nights, actigraphy-based sleep parameters were derived: (a) Time in bed – time from bedtime to wake time (in minutes); (b) sleep minutes – total minutes scored as sleep between sleep onset time and wake time; (c) sleep latency – total minutes between bed time and sleep onset time; and (d) sleep activity – percentage of epochs with activity. To capture the variability in sleep schedule over the week, the variability in sleep onset time and variability in wake time were computed using the mean-centered coefficient of variance statistic (Snedecor & Cochran, 1967). Variability in sleep onset time and wake time were correlated ($r = .45, p < .001$) and were mean composited to create (e) Variability in sleep schedule. Sleep onset time was determined by the 1st minute of three consecutive minutes of sleep and wake time was marked as the last minute of five consecutive minutes scored as sleep prior to a large amount of recorded activity. Approximately 64% of children had all seven nights of actigraphy data, 16% had six nights, 10% had five nights, 3% had four nights or fewer, and 7% had no actigraphy data ($M = 6.05$ days, $SD = 1.82$). Reasons for missing data included the use of medicine (only medication free nights were used), forgetting to wear the actigraph, and mechanical problems. These rates of valid actigraphy data are considered very good (Acebo et al., 1999). Intraclass correlations indicated good night-to-night stability over the week of assessment for most sleep parameters: Time in bed ($\alpha = .83$), sleep minutes ($\alpha = .90$), sleep latency ($\alpha = .41$), sleep activity ($\alpha = .94$), and variability in sleep schedule ($\alpha = .75$).

Subjective reports of sleep—Children's reports on the School Sleep Habits Survey (SHS; Wolfson & Carskadon, 1998) were used to examine children's daytime sleepiness and sleep/wake problems within the last 2 weeks. The SHS has good reliability and validity (Wolfson et al., 2003) and has been used in many studies of children's sleep (e.g., Buckhalt et al., 2009). The nine-item Sleepiness Scale ($\alpha = .70$) and the 10-item Sleep/Wake Problems Scale ($\alpha = .62$) were used. The Sleepiness Scale measured daytime sleepiness during nine daily activities (e.g., sleeping in class); one item about driving was excluded. The Sleep/Wake Problems Scale assessed the frequency of several sleep and wake problems (e.g., oversleeping and night awakenings).

Results

Preliminary analyses

About 5% of mothers and 1% of fathers had scores indicating potentially clinical levels of depressive symptomatology, using established cutoff scores (Aben, Verhey, Lousberg, Lodder, & Honig, 2002). Based on child reports, within the last year 65% of men and 61% of women used at least one form of verbal aggression toward their adult partner; 15% of men and 14% of women used at least one form of physical aggression toward their adult partner. Regarding parent-child conflict, 59% of fathers and 62% of mothers used at least one form of verbal aggression; 63% of fathers and 61% of mothers used at least one form of physical aggression. Overall, there was a wide range of conflict in the sample (Table 1).

Analysis plan

Amos 17 was used for all analyses. We examined inter-partner and parent-child conflict as mediators or intervening variables in the link between parental depressive symptoms and children's sleep. In both a mediation model and intervening variable model, the independent variable shares a significant relation with the mediator or intervening variable, which in turn is significantly associated with the outcome variable (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Thus, mediating and intervening variables bridge the association between the independent and dependent variables. In a mediation model, the relation between the predictor and outcome variable is significant prior to the introduction of the mediating variable (Baron & Kenny, 1986), whereas in an intervening model, no such

significant association exists. This approach to examining mediation and intervening effects is one of many, but is particularly unlikely to be vulnerable to Type I errors (MacKinnon et al., 2002). Because analyses were based on cross-sectional data, our reference to prediction is in the statistical sense as opposed to prediction of change in the mediator or outcome variable that may be inferred with longitudinal data (Baron & Kenny, 1986; MacKinnon, Fairchild, & Fritz, 2007).

To reduce outlier effects, data points that exceeded 4 *SDs* were removed. Specifically, the following number of data points were removed: one for paternal depressive symptoms, mother–child verbal conflict, father–child verbal conflict, time in bed and sleep minutes; two for inter-partner verbal conflict, mother–child physical conflict and sleep latency; three for father–child physical conflict and variability in sleep schedule; five for sleep activity; and six for inter-partner physical conflict. Further, parental depressive symptoms, inter-partner conflict, and parent–child conflict were substantially skewed and were log transformed. Two models were fit: one for actigraphy-measured sleep and one for self-reported sleep. Maternal and paternal depressive symptoms, in addition to inter-partner conflict and parent–child conflict were examined simultaneously within each model. Because African American children (Buckhalt et al., 2009), children with physical illness (Ancoli-Israel, 2006), and children from lower SES backgrounds (Buckhalt et al., 2009) may have more sleep problems, and gender- as well as age-related effects (Sadeh, Raviv, & Gruber, 2000) are associated with sleep, we controlled initially for race/ethnicity, SES, family income, physical illness, gender, and age. However, $\Delta\chi^2$ tests indicated that each control variable did not significantly change model fit, and thus these variables were not included as covariates to enhance statistical power. Further, not all children lived with a father figure, thus we controlled for single mother status. When single mother status was allowed to predict the inter-partner and parent–child conflict variables, model fit significantly changed in both the actigraphy measured ($\Delta\chi^2 = 12.8$, $\Delta df = 6$, crit $\chi^2 = 12.59$) and self-reported sleep models ($\Delta\chi^2 = 12.7$, $\Delta df = 6$, crit $\chi^2 = 12.59$). Consequently, single mother status was allowed to predict the conflict variables. However, based on $\Delta\chi^2$ tests, single mother status was not related to the sleep parameters, thus these pathways were not estimated ($df = 5$ in actigraphy-measured sleep model and $df = 2$ in subjectively measured sleep model). For a stringent examination, the following were allowed to covary: maternal and paternal depressive symptoms, the inter-partner and parent–child conflict variables, and the sleep parameters.

Full information maximum likelihood estimation, which is robust against violations of normality (Bollen, 1989) was used to handle missing data. Multiple fit indices were examined and are reported to assess model fit: the relative chi-square index (χ^2/df ; Bollen, 1989); the comparative fit index (CFI; Bentler & Bonnet, 1990); and the root-mean-square error of approximation (RMSEA; Browne & Cudek, 1993).

Parental depressive symptoms and children's sleep: inter-partner and parent–child conflict as mediators/intervening variables

Actigraphy-measured sleep—To examine the mediating or intervening role of inter-partner or parent–child conflict we first entered maternal and paternal depressive symptoms in the model to examine their direct relations with the actigraphy-measured sleep parameters (without the process variables included). Higher levels of paternal depressive symptoms were associated with shorter time in bed ($b = -1.69$, $p < .01$) and to a moderate extent fewer sleep minutes ($b = -2.15$, $p < .05$).

Next, the inter-partner and parent–child conflict variables were entered into the model. This model fit the data well: $\chi^2(5) = 3.8$ *ns*, $\chi^2/df = 0.76$, CFI = 1.00, RMSEA = .00 *ns* (Figure 1). Greater maternal depressive symptoms were related to elevated levels of each inter-

partner and parent–child conflict variable, with the exception of mother–child physical conflict. Higher levels of inter-partner physical conflict were related to shorter time in bed and to a moderate extent, fewer sleep minutes ($p = .08$). Greater mother–child verbal conflict was moderately associated with more variability in sleep schedule ($p = .08$) and greater father–child verbal conflict was related to more sleep activity. Given that higher levels of maternal depressive symptoms were not directly associated with any of the sleep parameters, inter-partner physical conflict served as an intervening variable in the relation between maternal depressive symptoms and both time in bed and sleep minutes. In addition, mother–child verbal conflict served as an intervening variable in the maternal depressive symptoms – variability in sleep schedule association. Finally, father–child verbal conflict was an intervening variable in the relation between maternal depressive symptoms and sleep activity. $\Delta\chi^2$ tests indicated that the removal of any of the significant intervening variables (inter-partner physical conflict, mother–child verbal conflict, father–child verbal conflict) significantly reduced model fit, which further provides support for their importance in the model.

Subjective reports of sleep—To examine the mediating or intervening role of inter-partner or parent–child conflict, we first entered in the model maternal and paternal depressive symptoms to examine their direct relations with the self-reported sleep variables. Higher levels of maternal depressive symptoms were related to more sleep/wake problems ($b = .12, p < .05$).

Next, the inter-partner and parent–child conflict variables were entered. This model fit the data well: $\chi^2(2) = .06$ *ns*, $\chi^2/df = .03$, CFI = 1.00, RMSEA = .00 *ns* (Figure 2). Similar to the actigraphy-measured sleep model, higher levels of maternal depressive symptoms were associated with greater levels of inter-partner conflict and parent–child conflict with the exception of mother–child physical conflict. More inter-partner verbal conflict was related to greater sleep/wake problems and greater inter-partner physical conflict was associated with more sleepiness. More mother–child physical conflict was associated with more sleep/wake problems. Because maternal depressive symptoms was directly associated with sleep/wake problems and inter-partner verbal conflict, and inter-partner verbal conflict was related to sleep/wake problems, we conducted additional analyses to examine whether inter-partner verbal conflict mediated the association between maternal depressive symptoms and sleep/wake problems. We constrained the pathways from the parent–child conflict variables and inter-partner physical conflict to sleep/wake problems to remove their effects from the model. While examining a potential mediator, we temporarily constrained the pathways between the other potential mediators/intervening variables and the outcome variable of interest. Serving as a mechanism of effect, inter-partner verbal conflict fully mediated the association between maternal depressive symptoms and sleep/wake problems. Further, higher levels of maternal depressive symptoms were associated with greater inter-partner physical conflict, which in turn was associated with more sleepiness; inter-partner physical conflict served as an intervening variable in this association. $\Delta\chi^2$ tests indicated that the removal of any of the significant mediating/intervening variables significantly reduced model fit, which further provides support for their importance in the model.

Discussion

This study addressed gaps in the literature by examining the association between parental depressive symptoms and school-aged children's sleep. We found support for direct effects of maternal depressive symptoms on children's sleep/wake problems. Further, our findings are the first to show that father's depressive symptoms were directly associated with children's time in bed and sleep minutes. Despite conservative model testing, findings support inter-partner and parent–child conflict as pathways of effects in the relation between

maternal depressive symptoms and children's sleep measured using self-report and actigraphy. Our findings illustrate the importance of considering multiple facets of the family context for a better explication of children's sleep.

Our results add to the understanding of relations between parental depressive symptoms and children's sleep while showing slightly different relations compared to the literature with younger children and using only subjectively reported sleep. Higher levels of maternal depressive symptoms were associated with greater sleep/wake problems, but with none of the actigraphy-measured sleep variables. Father's depressive symptoms on the other hand, were directly related to actigraphy-measured time in bed and sleep minutes. Perhaps characteristic gender differences in the expression of depression (Nolen-Hoeksema & Aldao, 2011) explain the findings. Mothers may show more sadness compared to fathers (Mirowsky & Ross, 1995). Children, therefore, might be more consciously aware of their mothers' sadness, leading to worry at bedtime. Fathers' depressive symptoms might not be as obvious to children but nonetheless interfere with family functioning in a way that reduces the time available for sleep. Finally, findings of direct associations may be in line with the hypothesis that parental depressive symptoms increase vigilance in children and disrupt sleep. Further clarification of the role of vigilance linking parental depression is a future direction of this research.

The cross-sectional nature of this study leaves open the possibility that the direction of effects between parental depressive symptoms and children's sleep differs between mothers and fathers. Although previous research supported the hypothesis that maternal depressive symptoms would predict children's sleep problems (Warren et al., 2006), no such evidence exists for fathers. An alternative explanation for our findings is that mothers' depressive symptoms are leading to child sleep problems but shorter child sleep duration are actually predictive of paternal depressive symptoms. Future longitudinal work can help ascertain directionality of effects and can consider the chronicity of depressive symptoms, in addition to other possible moderating factors.

Few studies have identified mechanisms through which parental depressive symptoms may influence children's sleep (Seifer, 2011). Consistent with prior research (Hammen et al., 2004), mothers' depressive symptoms appear to have wide ranging impacts on family conflict which, in our study, were found to be associated with children's sleep. It is not clear why paternal symptoms were not associated with conflict precluding assessments of family conflict as a pathway of effects in the models. Although less studied than maternal depression, previous research has documented relations between paternal depression symptoms and family conflict (Kane & Garber, 2009). Sample characteristics may have resulted in these null effects and findings should be considered tentative. For example, mothers in our sample displayed much higher levels of depression symptoms than fathers, which may have influenced study results.

Because previous research has shown that children respond differently to verbal versus physical inter-partner conflict (El-Sheikh & Cheskes, 1995), we examined verbal and physical conflict tactics across three dyads (mother-child, father-child and inter-partner) separately. Our statistical approach allowed us to consider the influence of each conflict variable on sleep, while controlling for the effect of others. However, many children in our sample experience verbal and physical conflict with both caregivers and are also exposed to inter-partner conflict. Therefore, our findings likely underestimate the associations between depressive symptoms, conflict and sleep. Nevertheless, using this model we find unique associations between all of the conflict variables, except father-child physical conflict, and different parameters of sleep. Differential associations between conflict and sleep parameters may exist because the intensity of emotions or coping strategies are different

depending upon whether the child observed the conflict or was an active participant in the conflict and on the quality of the child's relationship with each parent. Overall, although not examined directly, we believe these findings are consistent with the emotional security theory (Cummings & Davies, 2010), which suggests that children's emotional insecurity is heightened from exposure to familial conflict; the vigilance and arousal that often accompanies emotional insecurity may interfere with the relaxation needed for sleep (Dahl, 1996; El-Sheikh et al., 2007). Future research might seek to better understand individual or family characteristics, including child-parent attachment and parenting practices not examined in this study, which may function as mechanisms of effects or have a protective function for sleep regulation of children who experience family conflict.

The multi-method and multi-informant design, inclusion of paternal depressive symptoms and examination of a range of children's sleep parameters are strengths of this study. However, the design is not without limitations and findings should be interpreted within the study's context and limitations. The cross-sectional design limits inferences about direction of effects and reciprocal relations may exist between study variables (e.g., Kelly & El-Sheikh, 2011). The community sample consisted of normative levels of depressive symptoms, family conflict, and sleep problems; whether results would generalize to clinical samples is speculative and the clinical significance of the findings is not evident. Nonetheless, despite these limitations, this study builds on the extant literature by demonstrating that family conflict is among important process variables in the link between maternal depressive symptoms and children's sleep disruptions and highlights the importance of considering children's sleep within the family context.

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References

- Aben I, Verhey F, Lousberg R, Lodder J, Honig A. Validity of the Beck Depression Inventory, Hospital Anxiety and Depression Scale, SCL-90, and Hamilton Depression Rating Scale as screening instruments for depression and stroke patients. *Psychosomatics*. 2002; 43:386–393. [PubMed: 12297607]
- Acebo C, Sadeh A, Seifer R, Tzischinsky O, Wolfson A, Hafer A, Carskadon MA. Estimating sleep patterns with actigraphy monitoring in children and adolescents: How many nights are necessary for reliable measures? *Sleep*. 1999; 22:95–103. [PubMed: 9989370]
- Ancoli-Israel S. The impact and prevalence of chronic insomnia and other sleep disturbances associated with chronic illness. *The American Journal of Managed Care*. 2006; 12:S221–S229. [PubMed: 16686592]
- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical consideration. *Journal of Personality and Social Psychology*. 1986; 51:1173–1182. [PubMed: 3806354]
- Bell BG, Belsky J. Parents, parenting, and children's sleep problems: Exploring reciprocal effects. *British Journal of Developmental Psychology*. 2008; 26:579–593.
- Bentler PM, Bonnet DG. Comparative fit indexes in structural models. *Psychological Bulletin*. 1990; 107:238–246. [PubMed: 2320703]
- Bollen, KA. *Structural equations with latent variables*. New York: John Wiley & Sons; 1989.
- Browne, MW.; Cudek, R. *Testing structural equation models: Alternative ways of assessing model fit*. Newbury Park, CA: Sage; 1993. p. 136-262.

- Buckhalt JA, El-Sheikh M, Keller PS, Kelly RJ. Concurrent and longitudinal relationships between children's sleep and cognitive functioning: The moderating role of parent education. *Child Development*. 2009; 80:875–892. [PubMed: 19489909]
- Chorney DB, Detweiler MF, Morris TL, Kuhn BR. The interplay of sleep disturbance, anxiety, and depression in children. *Journal of Pediatric Psychology*. 2008; 33:339–348. [PubMed: 17991689]
- Cummings, EM.; Davies, PT. *Marital conflict and children: An emotional security perspective*. New York: Guilford; 2010.
- Dahl RE. The impact of inadequate sleep on children's daytime cognitive function. *Seminars in Pediatric Neurology*. 1996; 3:44–50. [PubMed: 8795841]
- Derogatis, LR. *SCL-90-R: Administration, scoring and procedures manual*. Minneapolis, MN: Author; 1994.
- Dewald JF, Meijer AM, Oort FJ, Kerkhof GA, Bogels SM. The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Medicine Reviews*. 2010; 14:179–189. [PubMed: 20093054]
- El-Sheikh M, Buckhalt JA, Cummings EM, Keller PS. Sleep disruptions and emotional insecurity are pathways of risk for children. *Journal of Child Psychology and Psychiatry*. 2007; 48:88–96. [PubMed: 17244274]
- El-Sheikh M, Cheskes J. Background verbal and physical anger: A comparison of children's responses to adult-adult and adult-child arguments. *Child Development*. 1995; 66:446–458. [PubMed: 7750376]
- El-Sheikh M, Hinnant JB, Kelly RJ, Erath S. Maternal psychological control and child internalizing symptoms: Vulnerability and protective factors across bioregulatory and ecological domains. *Journal of Child Psychology and Psychiatry*. 2010; 51:188–198. [PubMed: 19703095]
- Goodman, SH.; Tully, EC. Children of depressed mothers: Implications for the etiology, treatment, and prevention of depression in children and adolescents. In: Abela, JRZ.; Hankin, BL., editors. *Handbook of depression in children and adolescents*. New York: Guilford; 2008. p. 415–440.
- Gregory AM, Cousins JC, Forbes EE, Trubnick L, Ryan ND, Axelson DA, Dahl RE, et al. Sleep items in the child behavior checklist: A comparison with sleep diaries, actigraphy, and polysomnography. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2011; 50:499–507. [PubMed: 21515199]
- Gregory AM, Eley TC, O'Connor TG, Rijdsdijk FV, Plomin R. Family influences on the association between sleep problems and anxiety in a large sample of pre-school aged twins. *Personality and Individual Differences*. 2005; 39:1337–1348.
- Grills AE, Ollendick TH. Issues in parent-child agreement: The case of structured diagnostic interviews. *Clinical Child and Family Psychology Review*. 2002; 5:57–83. [PubMed: 11993545]
- Hammen C, Brennan PA, Shih JH. Family discord and stress predictors of depression and other disorders in adolescent children of depressed and non-depressed women. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2004; 43:994–1002. [PubMed: 15266194]
- Hollingshead, AB. *Four factor index of social status*. New Haven, CT: Yale University Press; 1975.
- Kane P, Garber J. The relations among depression in fathers, children's psychopathology, and father-child conflict: A meta-analysis. *Clinical Psychology Review*. 2004; 24:339–360. [PubMed: 15245835]
- Kane P, Garber J. Parental depression and child externalizing and internalizing symptoms: Unique effects of father's symptoms and perceived conflict as a mediator. *Journal of Child and Family Studies*. 2009; 18:465–472.
- Keller P, El-Sheikh M. Children's emotional security and sleep: Longitudinal relations and directions of effects. *Journal of Child Psychology and Psychiatry*. 2011; 52:64–71. [PubMed: 20500540]
- Kelly RJ, El-Sheikh M. Marital conflict and children's sleep: Reciprocal relations and socioeconomic effects. *Journal of Family Psychology*. 2011; 25:412–122. [PubMed: 21553963]
- Liu X, Sun Z, Uchiyama M, Shibui K, Kim K, Okawa M. Prevalence and correlates of sleep problems in Chinese schoolchildren. *Sleep*. 2000; 23:1053–1062. [PubMed: 11145320]
- MacKinnon DP, Fairchild AJ, Fritz MS. Mediation analysis. *Annual Review of Psychology*. 2007; 58:593–614.

- MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*. 2002; 7:83–104. [PubMed: 11928892]
- Mirowsky J, Ross CE. Sex differences in distress: Real or artifact? *American Sociological Review*. 1995; 60:449–468.
- Nolen-Hoeksema S, Aldao A. Gender and age differences in emotion regulation strategies and their relationship to depressive symptoms. *Personality and Individual Differences*. 2011; 51:704–708.
- Pesonen AK, Raikonen K, Paavonen EJ, Heinonen K, Komsu N, Lahti J, Strandberg T, et al. Sleep duration and regularity are associated with behavioral problems in 8-year-old children. *International Journal of Behavioral Medicine*. 2010; 17:298–305. [PubMed: 19844792]
- Sadeh A, McGuire J, Sachs H, Seifer R, Tremblay A, Civita R, Havden RM. Sleep and psychological characteristics of children on a psychiatric inpatient unit. *Journal of the American Academy of Child & Adolescent Psychiatry*. 1995; 34:813–820. [PubMed: 7608056]
- Sadeh A, Raviv A, Gruber R. Sleep patterns and sleep disruptions in school-age children. *Developmental Psychology*. 2000; 36:291–301. [PubMed: 10830974]
- Sadeh A, Sharkey KM, Carskadon MA. Activity-based sleep-wake identification: An empirical test of methodological issues. *Sleep*. 1994; 17:201–207. [PubMed: 7939118]
- Seifer, R. Parental psychopathology and children's sleep. In: El-Sheikh, M., editor. *Sleep and development: Familial and socio-cultural considerations*. New York: Oxford University Press; 2011. p. 79-98.
- Shang G, Gau S, Soong W. Association between childhood sleep problems and perinatal factors, parental mental distress and behavioral problems. *Journal of Sleep Research*. 2006; 15:63–73. [PubMed: 16490004]
- Snedecor, GW.; Cochran, WG. *Statistical methods*. 6. Ames, IA: Iowa State University Press; 1967.
- Straus, MA. *Manual for the Conflict Tactics Scale*. Durham, NH: Family Research Laboratory, University of New Hampshire; 1995.
- Straus, MA. Child-report, adult-recall, and sibling versions of the revised conflict tactics scales. Durham, NH: University of New Hampshire; 1999. Unpublished manuscript
- Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The revised Conflict Tactics Scales (CTS-2): Development and preliminary psychometric data. *Journal of Family Issues*. 1996; 17:283–316.
- Warren SL, Howe G, Simmens SJ, Dahl RE. Maternal depressive symptoms and child sleep: Models of mutual influence over time. *Development and Psychopathology*. 2006; 18:1–16. [PubMed: 16478549]
- Wolfson AR, Carskadon MA. Sleep schedules and daytime functioning in adolescents. *Child Development*. 1998; 69:875–887. [PubMed: 9768476]
- Wolfson AR, Carskadon MA, Acebo C, Seifer R, Fallone G, Lubyak SE, Martin JL. Evidence for the validity of a sleep habits survey of adolescents. *Sleep*. 2003; 26:213–216. [PubMed: 12683482]

Key points

- Little is known about relations between parental depression and children's sleep.
- Maternal and paternal depressive symptoms were directly related to disruptions in children's sleep.
- Inter-partner conflict and parent-child conflict served as process variables in the associations between parental depressive symptoms and children's sleep disruptions.
- Findings highlight the importance of identifying pathways of risk and familial and environmental influences on children's sleep problems.

Figure 1.

Examination of inter-partner conflict and parent–child conflict as mechanisms of effects in the relation between parental depressive symptoms and actigraphy measures of children’s sleep. Unstandardized coefficients are provided. For ease of interpretation, the thicker lines indicate direct effects between paternal depressive symptoms and time in bed and sleep minutes. The following were allowed to covary: maternal and paternal depressive symptoms, the inter-partner and parent–child conflict variables, and the sleep parameters. These are not shown to improve the clarity of presentation. R^2 indicates that amount of variance explained. Model fit: $\chi^2(5) = 3.8$ ns, $\chi^2/df = 0.76$, $CFI = 1.00$, $RMSEA = .00$ ns. $^\dagger p < .10$, $*p < .05$, $**p < .01$, $***p < .001$

Figure 2.

Examination of inter-partner conflict and parent–child conflict as mechanisms of effects in the relation between parental depressive symptoms and children’s self-reports of sleep. Unstandardized coefficients are provided. The dotted line between maternal depressive symptoms and children’s sleep/wake problems denotes that this association went from statistically significant to nonsignificant when inter-partner verbal conflict was entered into the model. The following were allowed to covary: maternal and paternal depressive symptoms, the inter-partner and parent–child conflict variables, and the sleep parameters. These are not shown to improve the clarity of presentation. R^2 indicates that amount of variance explained. Model fit: $\chi^2(2) = .06$ ns, $\chi^2/df = .03$, $CFI = 1.00$, $RMSEA = .00$ ns. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Table 1

Partial correlations and descriptive statistics among study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Maternal depressive symptoms	–														
2. Paternal depressive symptoms	.28**	–													
3. Inter-partner verbal conflict	.23**	-.04	–												
4. Inter-partner physical conflict	.20**	-.10	.60**	–											
5. Mother-child verbal conflict	.12*	-.12	.44**	.30**	–										
6. Mother-child physical conflict	.01	-.05	.34**	.30**	.59**	–									
7. Father-child verbal conflict	.09	-.09	.53**	.26**	.68**	.50**	–								
8. Father-child physical conflict	.14*	.03	.43**	.35**	.43**	.79**	.57**	–							
9. Time in bed ^a	-.03	-.15 [†]	-.07	-.18**	-.11	-.09	-.06	-.04	–						
10. Sleep minutes ^a	-.08	-.16 [†]	-.06	-.12 [†]	-.06	.03	-.10	.03	.71**	–					
11. Sleep latency ^a	-.02	-.13	-.04	-.05	-.12 [†]	-.14*	-.01	-.08	-.13*	-.36**	–				
12. Sleep activity ^a	.01	-.06	.03	-.03	-.02	-.08	.14*	.02	-.05	-.55**	.31**	–			
13. Variability in sleep schedule ^a	.00	-.05	.05	.02	.13 [†]	.05	.00	-.03	-.14*	-.08	.06	.31**	–		
14. Sleepiness ^b	.03	-.13	.06	.14*	.05	.04	.04	.02	-.02	-.01	.08	.08	.02	–	
15. Sleep/wake problems ^b	.08	-.03	.30**	.19**	.19**	.15*	.15*	.07	-.13*	-.04	.09	.21**	.43**	–	
<i>M</i>	7.98	4.24	3.17	.41	2.93	3.48	3.22	3.07	8h 37 m	7 h 37 m	10.78 m	41.24	0.09	14.69	18.97
<i>SD</i>	7.56	4.45	4.18	1.18	3.71	4.74	4.17	4.24	38 m	57 m	6.06 m	12.78	0.04	4.63	5.17

Note. All correlations are controlling for whether a father figure lived within the household.

^a Actigraphy derived.^b Self-reported sleep measure.[†] $p < .10$;* $p < .05$;** $p < .01$.