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Marital Hostility and Child Sleep Problems: Direct and Indirect Associations via Hostile

Parenting

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Abstract

The current study examined two family process predictors of parent-reported child sleep problems at 4.5 years in an adoption sample: marital hostility and hostile parenting. Participants were 361 linked triads of birth parents, adoptive parents, and adopted children. We examined direct and indirect pathways from marital hostility to child sleep problems via hostile parenting. Mothers' marital hostility at 9 months was associated with child sleep problems at 4.5 years. Fathers' marital hostility at 9 months evidenced an indirect effect on child sleep problems at 4.5 years via fathers' hostile parenting at 27 months. Findings were significant even after controlling for genetic influences on child sleep (i.e., birth parent internalizing disorders). The findings suggest targets for prevention and intervention programs that are potentially modifiable (e.g., hostile parenting, marital hostility), and inform theory by demonstrating that relations among marital hostility, hostile parenting, and child sleep problems are significant after accounting for genetic influences.

Keywords: sleep problems, marital hostility, parenting, early childhood, adoption

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Parenting

Sleep problems during infancy and early childhood, including difficulties initiating and

maintaining sleep, are relatively common, with prevalence rates between 34% and 45%

(McGreavey, Donnan, Pagliani, & Sullivan, 2005; Simola et al., 2010). Furthermore, childhood

sleep problems are associated with later behavioral, affective, academic, cognitive, and

neurological functioning (El-Sheikh, Buckhalt, Keller, Cummings, & Acebo, 2007b; Gregory &

O'Connor, 2002; Sadeh, Gruber, & Raviv, 2002). Because child sleep problems are a precursor

to subsequent adjustment problems, it is important to more fully understand the processes

associated with the exacerbation or amelioration of sleep problems during early childhood.

However, studies examining relations among family processes and child sleep in early childhood

are relatively rare and none have jointly considered genetic and environmental influences in

explicating the effects of the family environment on sleep during early childhood.

Family Environmental Influences on Child Sleep Problems

Researchers have theorized that to achieve deep sleep, an individual must experience

his/her sleeping environment as reasonably predictable, controllable, and free of potential threats

(Dahl & El-Sheikh, 2007). Exposure to stressful family interactions during the day, including

marital hostility and hostile parenting, could interfere with children feeling safe at bedtime and

throughout the night. Marital hostility may be perceived by the child as a potential source of

threat to the family system (Davies & Cummings, 1994). This threat, however, could also

function indirectly via its impact on parenting (Harold, Shelton, Goeke-Morey, & Cummings,

2004; Kaczynski, Lindahl, Malik, & Laurenceau, 2006; Rhoades et al., 2011; Schoppe-Sullivan,

Schermerhorn, & Cummings, 2007). The spillover hypothesis (Erel & Burman, 1995) suggests

that parents' negative thoughts and emotions during marital conflict affect subsequent parent-child interactions. Thus, an association between marital hostility and child sleep problems could be either direct, as a function of the threatening nature of marital hostility to the child's well-being in the family system, and/or indirect, via more proximal parenting behaviors.

Marital conflict has been shown to predict concurrent and subsequent child sleep problems (El-Sheikh, Buckhalt, Cummings, & Keller, 2007a; Kelly & El-Sheikh, 2011). More specifically, Kelly and El-Sheikh (2011) reported that marital conflict predicts increases in child sleep disruptions over a 2-year period during middle childhood. Associations have also been found between maternal sensitivity and independence-encouraging behaviors and child sleep (Priddis, 2009; Sadeh, Mindell, Luedtke, & Wiegard, 2009). For example, one study found that infants whose mothers demonstrated more observed emotional availability at bedtime woke up fewer times, required less maternal care during the night, and had fewer sleep difficulties (Teti, Kim, Mayer, & Countermine, 2010).

The majority of parenting research has focused on mothers. Some recent work, however, has indicted that fathers' parenting behaviors are significantly influenced by marital relations, with effects either being equivalent for mothers and fathers or stronger for fathers than for mothers (Kerig, Cowan, & Cowan, 1993; Schofield et al., 2009). Our inclusion of both mothers *and* fathers in the current study enabled us to further investigate similarities and/or differences in associations among marital and parenting hostility and child sleep problems for mothers versus fathers. Additionally, the majority of the research in this area has been conducted during either infancy or middle childhood. Because child sleep problems are associated with difficulties that likely make the school transition more challenging, including ADHD (Cortese, Faraone, Konofal, & Lecendreux, 2009), neurobehavioral task deficits (Sadeh et al., 2002), and daytime

sleepiness (Fallone, Acebo, Seifer, & Carskadon, 2005), it is important to examine predictors of child sleep problems prior to school entry, as early school success is crucial in predicting subsequent educational outcomes (Gutman, Sameroff, & Cole, 2003). The current study addresses this gap in the literature by examining predictors of child sleep problems from age 9 months to 4.5 years.

The Adoption Design

Research on family influences on child sleep has typically been conducted with biologically-related families. In studies of children and their biological rearing parents, the fact that children share half of their genes with each parent introduces genetic confounds that may, in part, account for associations between child sleep and family factors. Specifically, in biological families, the same genes that influence parents' behaviors (e.g., their marital hostility and/or parenting behaviors) might also affect child sleep problems. Thus, the association between marital hostility or hostile parenting and child sleep problems may be due to genetic influences shared between parent and child (i.e., passive gene-environment correlation; Horwitz & Neiderhiser, 2011), rather than from specific family environmental influences. The present study, an adoption design where children were placed at birth with genetically-unrelated parents allowed for the examination of associations between family processes and child sleep problems *without* the potential influence of shared genes between parent and child.

An adoption design that links adoptive families with the child's birth parents provides an added advantage, because it can provide a control for potential genetic influences on child sleep by including phenotypes in birth parents that have known genetic overlap with sleep problems (depression/anxiety). We include birth parent internalizing disorders as a genetic control variable in the present study for two primary reasons: (1) children of mothers with internalizing disorders

demonstrate more sleep problems than children whose mothers do not have these disorders (Field, 1995; Gregory et al., 2005; Stoléru, Nottelmann, Belmont, & Ronsaville, 1997), suggesting that maternal internalizing disorders may serve as a potential familial/genetic risk for child sleep problems; and (2) there is substantial genetic overlap between depression/anxiety and sleep problems (Gregory et al., 2011; Gregory, Rijsdijk, Lau, Dahl, & Eley, 2009), suggesting a common genetic factor that partially accounts for both depression/anxiety disorders and sleep problems. Because the children in the present study are reared by genetically-unrelated parents, associations between birth parent internalizing diagnoses and child sleep problems *are most reasonably inferred* to be due to genetic factors. We include a measure of prenatal exposure in the present study to further control for contributions from the birth parents.

Study Aims and Hypotheses

A previous study using this sample found that marital instability when children were 9 months old was associated with child sleep problems at 18 months, even after accounting for child sleep problems at 9 months (Mannering et al., 2011). The current study extends the findings of Mannering et al. (2011) by (a) examining both direct and indirect associations between observed marital hostility and parent-reported child sleep via hostile parenting; and (b) investigating child sleep from 18 months to 4.5 years of age, encompassing a developmental period when establishing a healthy sleep routine is critical for a successful transition to school. By including information on both mothers and fathers, we can also test similarities/differences in the effects of marital hostility and hostile parenting on child sleep problems for mothers versus fathers. Using a full adoption design with data from birth parents, we also accounted for genetic influences (i.e., birth parent internalizing disorder) and prenatal influences on child sleep problems.

We tested the following three hypotheses using a prospective adoption study, with assessments at 9, 18, and 27 months, and 4.5 years. First, we hypothesized that mothers' and fathers' observed marital hostility during infancy (i.e., 9 months) would predict parents' reports of children's difficulties initiating and maintaining sleep (hereafter referred to as "child sleep problems") during the preschool period (i.e., 4.5 years). Second, we hypothesized that both mothers' and fathers' hostile parenting during toddlerhood (i.e., 27 months) would predict child sleep problems during the preschool period. Third, consistent with the spillover hypothesis, we hypothesized a significant indirect effect of marital hostility on child sleep problems via hostile parenting for both mothers and fathers.

Method

Participants and Procedures

Participants were 361 adoption-linked sets of adopted children, their adoptive mothers and fathers, and their birth mothers and a subset of birth fathers ($n = 121$) who participated in Cohort I of the Early Growth and Development Study (EGDS) (Cohort II was recruited subsequently and contains an additional 200 families; however, age 4.5 data have not been collected for Cohort II). Eligibility criteria included: (1) domestic adoption placement, (2) placement occurred within 3 months postpartum, (3) non-relative placement, (4) no known major medical conditions, and (5) birth and adoptive parents were able to understand English at the eighth-grade level. Informed consent was appropriately obtained prior to assessment. In the full EGDS study, the children were approximately 9 months old during the first child assessment ($M = 9.2$, $SD = 0.96$), 18 months old during the second assessment ($M = 17.95$, $SD = 0.96$), 27 months old during the third child assessment ($M = 27.6$, $SD = 1.56$), and 4.5 years old during the fourth child assessment ($M = 4.62$, $SD = 0.16$). Forty-three percent of the children were female.

The median child age at adoption placement was 2 days. The adoptive parents were typically college educated, middle- to upper-class families. The adoptive mother and adoptive father mean ages at the child's birth were 37.75 (SD = 5.46) and 38.39 years (SD = 5.82), respectively. The ethnicity of adoptive mothers and fathers was: 91.7% and 90.7% Caucasian, 3.6% and 5.1% African American, 2.2% and 1.7% Hispanic or Latino, 1.1% and 1.1% multiracial, 0.6% and 0.6% Asian, 0.3% and 0% American Indian or Alaskan Native, 0% and 0.3% Native Hawaiian or Pacific Islander, and 0.6% and 0.6% unknown or unreported. Birth mothers and birth fathers typically had less than a college education and had household annual incomes less than $25,000. Birth mother and birth father mean age at the child's birth was 24.12 years (SD = 5.89) and 25.45 years (SD = 7.20), respectively. The ethnicity of birth mothers and fathers was: 71.7% and 72.4% Caucasian, 11.4% and 8.7% African American, 6.7% and 8.7% Hispanic or Latino, 4.4% and 4.7% multiracial, 2.8% and .08% American Indian or Alaskan Native, 1.9% and 0% Asian, 0.3% and 0% Native Hawaiian or Pacific Islander, and 0.8% and 4.7% unknown or unreported. For full demographic information refer to Leve, Neiderhiser, Scaramella, & Reiss (2010). The sample included 20 same-sex adoptive couples. There were no significant differences in any of the study variables for same-sex versus male-female couples. We ran all models first including and then excluding same-sex couples; the results were unchanged. Results presented here do not include the same-sex couples, due to our focus on mother- and father-specific influences. Results from the analyses that included the same-sex couples are available from the first author upon request.

Retention rates remained high throughout the course of the study (87–92% for birth mothers; 83–91% for birth fathers, and 84–98%, for adoptive families across the study assessments). There were three significant differences in demographic characteristics at the first

assessment between families who had complete data and those who were missing data at a later assessment. Families with missing data reported slightly lower household incomes, slightly longer marriages, and slightly older adoptive father age at child birth ($ps < .05$).

Measures

  Marital hostility. As part of the 9-month in-home assessment, parents participated in a 20-min videotaped marital interaction task. Parents were instructed to discuss 19 topics about their relationship. Topics were designed to elicit both positive and negative emotions, for example: how they met, what they enjoy doing with each other, and what they find the most frustrating about each other and their relationship. Trained observational coders who were blind to all study hypotheses coded this task by using the Iowa Family Interaction Rating Scales – Marital Interaction Code (Dogan et al., 2004; Melby et al., 1990). We included the following variables in our marital hostility construct: antisocial behavior, hostility, and negative mood.

  The antisocial code includes instances in which a mother/father resists, defies, or is inconsiderate of their partner by being noncompliant, insensitive, or obnoxious, as well as when he/she is uncooperative or withdraws from social interaction. The hostility code includes hostile, angry, critical, disapproving and/or rejecting behavior toward the partner's behaviors, appearance, or state. The negative mood code captures how much the mother/father appears unhappy, dissatisfied, sad, pessimistic, angry, and/or expresses negative sentiments toward self, others outside the interaction task, or things in general. The codes obtained from the 20-minute marital interaction task have previously demonstrated satisfactory reliability and have been significantly associated with self and spouse ratings of marital hostility and marital quality (Melby, Conger, Ge, & Warner, 1995).

  All codes were rated on a 1-7 scale (1 = not at all characteristic; 7 = mainly

characteristic). Approximately 30% of the interactions were coded by two observers. ICC's for these three codes ranged from .63 to .66, with a mean ICC of .64. The three codes were significantly intercorrelated for both mothers and fathers (rs = .45–.49 for mothers and .43–.46 for fathers) and were used as indicators of two latent marital hostility constructs: mother marital hostility and father marital hostility.

Child sleep problems. At 4.5 years, child sleep problems were measured using the Tayside Children's Sleep Questionnaire (McGreavey et al., 2005). This questionnaire contains 10 items that assess disorders of initiating and maintaining sleep in children 1 to 5 years old. Items are rated on a 6-point scale from 0 (*never*) to 5 (*every night*), with the exception of the question about length of time to fall asleep, which is rated from 0 (*less than 15 minutes*) to 5 (*more than 60 minutes*). The ten items are: "how long after going to bed does your child fall asleep"; "child goes to bed reluctantly"; "child has difficulty getting to sleep at night"; "child does not fall asleep in his or her own bed"; "child wakes up two or more times in the night"; "after waking up, the child has difficulty falling asleep again by himself or herself"; "the child sleeps in parents bed at some time during the night"; "if the child wakes up, he or she uses a comforter (e.g. pacifier or blanket)"; "child wants a drink during the night"; and "do you think your child has sleeping difficulties." Mothers and fathers independently completed this scale (mother α = .75; father α = .71). These two measures (mother-report and father-report) were used as indicators of a latent child sleep problems variable at 4.5 years. This parent-report sleep measure has demonstrated reliability, face, content, and discriminant validity (McGreavey et al., 2005), and was independently evaluated as adhering to most psychometric tool development requirements (Spruyt & Gozal, 2011), although it has yet to be standardized or subjected to confirmatory factor analyses.

Hostile parenting. Mother and father hostility toward the child was assessed at 27 months using the 18-item Iowa Family Interaction Rating Scales (Melby et al., 1995). The hostility subscale (mother α = .77; father α = .70) consists of 5 items rated on a 1 to 7 scale: 1 (*never occurs*) to 7(*always occurs*). Items include: "How often did you"… "get angry with him or her"; "shout or yell at him or her because you were angry with him or her"; "criticize him/her and his/her ideas"; "argue with him/her whenever you disagreed about something"; and "hit, push, grab, or shove him or her." Mothers and fathers completed the scale and independently rated their own behavior toward their child.

Covariates/Control variables.

Birth mother and birth father internalizing disorders. We assessed lifetime internalizing disorders in birth mothers and birth fathers using the Composite International Diagnostic Interview (CIDI; Kessler & Üstün, 2004) at child age 18 and 48 months. The CIDI was obtained twice to more fully capture potential genetic risk, because birth parent internalizing disorder that presents at any point in the child's life may impart genetic risk to the child, and because birth parent internalizing disorder onset might have occurred after the first CIDI interview. The CIDI is a comprehensive, standardized interview that assesses 17 major diagnostic areas according to the definitions and criteria of the tenth revision of the International Classification of Diseases and the fourth edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders. Moderate to good concordance was found for lifetime disorder prevalence assessed via the CIDI versus the Structured Clinical Interview for DSM-IV (SCID). The CIDI underestimates lifetime prevalence compared to the SCID (Haro et al., 2006). Birth parents were classified as having a clinically significant internalizing disorder if one or both birth parents met DSM-IV diagnostic criteria for lifetime Major Depressive Disorder, Generalized Anxiety

Disorder, Panic Disorder, Social Phobia, or Specific Phobia at either assessment period. If birth mothers or fathers did not meet criteria for any lifetime disorder at the first assessment and were missing the second assessment, they were classified as missing because they did not have an opportunity to endorse symptoms at the most recent assessment. Sixty-two percent of the birth mothers and 17% of the birth fathers met criteria for one or more disorder. As is typically found (e.g., Eaton et al., 2012), more women than men endorsed a lifetime internalizing disorder, although the percentage of birth parents, especially birth mothers, reporting lifetime internalizing disorder is considerably higher than what is typically seen in nationally representative samples (Eaton et al., 2012). This is likely due to differences between women who choose adoption and those who either do not have children or who choose to parent. To create a composite birth parent variable, we coded positive lifetime history for any dyad where the birth mother and/or birth father met criteria for one or more internalizing disorder(s). Sixty-eight percent of the dyads met criteria for a positive lifetime history of internalizing disorder (*n* meeting criteria = 246).

  Child sleep problems at 18 months. At 18 months, mothers completed the Sleep Habits Questionnaire (SHQ; Goodlin-Jones, Sitnick, Tang, Liu, & Anders, 2008) and the sleep problems subscale of the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000). To create a measure that most closely mirrored the outcome measure of child sleep problems at 4.5 years, 2 items were selected from the SHQ and 3 items were selected from the CBCL that closely matched the items on the age 4.5 measure of child sleep. The items from the SHQ include: "falls asleep within 20 minutes (reverse coded)" and "how often has your child wakened you at night." The items from the CBCL include: "trouble getting to sleep", "sleeps less than most children", and "wakes up often at night." Parents rated the frequency of each behavior on a 3-point scale: *rarely, sometimes*, or *usually*. A mean score was computed for mothers and fathers; higher scores

indicated greater sleep problems (α = .72 for mothers and .72 for fathers). Mother and father

ratings were highly correlated (r = .74); thus, a mean mother/father rating was used in all

analyses. Because this measure was constructed for this study and has not been validated, we

also conducted all analyses controlling for the bedtime resistance subscale of the SHQ (see

measure description in the "Measures used in supplementary analyses" section, below).

Overreactive parenting. At 18 months, mothers and fathers completed the Parenting

Scale (Arnold, O'Leary, Wolf, & Acker, 1993). The Parenting Scale is a 30-item measure

designed to assess parental discipline strategies. Parents rated their likelihood of using specific

discipline strategies in response to child misbehaviors on 7-point scales anchored by one

effective and one ineffective discipline strategy. A score of 1 indicated effective discipline and a

score of 7 indicated dysfunctional discipline. We computed the Overreactive subscale based on

confirmatory factor analyses of the Parenting Scale (Rhoades & O'Leary, 2007; mother α = .69;

father α = .62). Thus, the Overreactive subscale contains five items (e.g., "When I'm upset and

under stress…I'm picky and on my child's back/I am no more picky than normal"; "When my

child misbehaves…I raise my voice or yell/I speak to my child calmly). Although the internal

consistencies of these subscales are moderately low, they are reasonable given the small number

of items (5) included in each subscale and similar to those found in other studies using the same

factors (e.g., Rhoades & O'Leary, 2007). The Parenting Scale has demonstrated validity;

mothers of clinic children reported more overreactive discipline than mothers of non-clinic

children and mother-reported overreactivity on the Parenting Scale is significantly correlated

with observed overreactivity and observed and mother-reported child behavior in children as

young as 18 months (Arnold et al., 1993; Jouriles et al., 1991).

Adoption openness. To control for similarities between birth and adoptive parents that

might result from contact between parents, we included the level of openness in the adoption

(e.g., contact and knowledge about the other party) as a covariate in all analyses. Openness in the

adoption was measured using a composite of birth mother, adoptive mother, and adoptive father

ratings of perceived adoption openness completed at the first assessment (Ge et al., 2008). Inter-

rater agreement was high (*r* range = .72–.85, *p* values all < .001).

     Obstetric complications. Perinatal obstetric complications can confound genetic

influence estimates (see Pemberton et al., 2010 and Natsuaki, et al., 2010 for examples of

associations among perinatal complications and genetic influences) and this variable was

therefore included as a covariate. Obstetric complications were assessed at 4 months using birth

mother report of her: (1) Maternal/Pregnancy Complications (e.g., illness, exposure to drugs); (2)

Labor and Delivery Complications (e.g., prolonged labor, cord complications); and (3) Neonatal

Complications (e.g., prematurity, low birth weight) using a pregnancy screener and a pregnancy

calendar method. Scoring was derived from the McNeil-Sjostrom Scale for Obstetric

Complications (McNeil & Sjostrom, 1995), with item scores ranging from 1 (*not harmful or*

relevant) to 6 (*very great harm to or deviation in offspring*). The obstetric complications total

was created by calculating the frequency of scores greater than or equal to 3, indicating risk that

is at least "potentially, but not clearly, harmful or relevant."

     Child gender. Because child gender may be associated with family processes (Davies &

Lindsay, 2004; Shek, 2008; Stroud, Durbin, Wilson, & Mendelsohn, 2001) and child sleep

problems (Simola et al., 2010), child gender was included as a covariate (coded 1 for boys and 2

for girls) in all analyses.

     Family income. Because child sleep problems may be associated with SES (Kelly & El-

Sheikh, 2011), we included family income at 9 months as a covariate. We asked mothers and

fathers to report their individual income and we then combined those reports to obtain an estimate of family income.

Measures used in supplementary analyses.

Child bedtime resistance. At 9 months, mothers and fathers completed the Sleep Habits Questionnaire (SHQ; Goodlin-Jones et al., 2008). We used the 6-item Bedtime Resistance subscale from this questionnaire, which assesses difficulty initiating or maintaining sleep (e.g., "child needs parent in room to fall asleep", "child struggles at bedtime"). Parents rated the frequency of each behavior during the past week on a 3-point scale: *rarely* (0–1), *sometimes* (2–4), or *usually* (5 or more). A mean score was computed for each parent; higher scores indicated greater bedtime resistance (mother $\alpha = .74$, father $\alpha = .71$). Mother- and father-reported bedtime resistance scores were correlated ($r = .80$) and were averaged to create a composite parent measure of child sleep problems.

Total Behavior Problems. At 4.5 years, mothers and fathers completed the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000). The Total Problems scale was used ($\alpha = .95$ for mothers and .96 for fathers). Mother and father reports were significantly correlated ($r = .43$, $p < .001$) and were averaged.

Data Analytic Plan

Hypothesis testing proceeded in three steps: testing direct and indirect effects of marital hostility and hostile parenting on child sleep problems, evaluation of mother vs. father differences, and supplementary analyses. First, we evaluated the fit of the model to the data using Mplus 6.11 (Muthén & Muthén, 2007), which uses full information maximum likelihood (FIML) to estimate parameters when data are missing. FIML produces unbiased estimates when data are missing at random (MAR). For all variables included in the current study there was less than

15% missing. The Little's test of missing data indicated that the data were missing completely at random (MCAR); Little's MCAR χ^2 (456) = 481.33, $p = ns$. The model was deemed to have adequate fit if the chi-square was nonsignificant, the comparative fit index (CFI) was > .95, and the root mean square error of approximation (RMSEA) was < .06 (Hu & Bentler, 1999). All indirect effects were estimated with bias-corrected bootstrapping and were considered statistically significant if the corresponding 95% confidence interval did not include zero (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Preacher & Hayes, 2008). In addition to the hypothesized paths, the initial model accounted for the influence of birth parent internalizing disorders, adoption openness, obstetric complications, child gender, and family income (not shown in Figure 1 for clarity).

Second, we tested for mother vs. father differences. We first ran the full model with all mother-specific and father-specific paths freely estimated. We then ran three models in which the paths from (1) mother marital hostility and father marital hostility to child sleep problems, (2) from mother hostile parenting and father hostile parenting to child sleep problems, and (3) from mother marital hostility to mother hostile parenting and from father marital hostility to father hostile parenting were constrained to be equal. To evaluate whether these paths were significantly different, χ^2 difference tests were conducted. As an additional test, we ran two additional models: one that included only mothers' marital and parental hostility and one that included only fathers' marital and parental hostility.

Third, we ran supplementary analyses to test for potential measurement artifacts. To test whether sleep problems are simply a proxy for overall child behavior problems, we re-analyzed the model controlling for total CBCL score at 4.5 years. To test whether the results were influenced by our use of a measure of sleep items at 18 months that was created by combining

items across two instruments specifically for this study, we re-analyzed the model using a standard assessment: the Bedtime Resistance subscale of the Sleep Habits Questionnaire at 9 months.

Results

Descriptive Statistics and Correlations

Bivariate correlations, means, standard deviations, and sample sizes for all study variables are provided in Table 1. Mothers' and fathers' marital hostility were positively associated with fathers' hostile parenting. Mothers' observed negative mood and hostility and fathers' negative mood toward their partners were associated with child sleep at 4.5 years. Fathers' hostile parenting at 27 months was associated with child sleep problems at 4.5 years.

Models Predicting Child Sleep Problems at 4.5 Years

We evaluated the full hypothesized model which provided a good fit to the data (see Figure 1), $\chi^2 (103) = 124.54$, $p = ns$; CFI = .98; RMSEA = .03. This model accounted for birth parent internalizing diagnosis, adoption openness, obstetric complications, child gender, and family income. There were significant associations between child gender and father hostile parenting ($\beta = -.15$, $p < .05$), with fathers of girls reporting less hostile parenting than fathers of boys, and between income and sleep problems ($\beta = .18$, $p < .05$). No other control variables were significantly associated with marital hostility, hostile parenting, or child sleep. Fathers' marital hostility significantly predicted fathers' hostile parenting at 27 months ($\beta = .14$, $p < .05$). Fathers' hostile parenting at 27 months significantly predicted parent-reported child sleep problems at 4.5 years after controlling for child sleep problems at 18 months ($\beta = .24$, $p < .001$). Mothers' marital hostility predicted parent-reported child sleep problems at 4.5 years ($\beta = .14$, $p < .05$). In addition, the indirect path from fathers' marital hostility to parent-reported child sleep problems

at 4.5 years via fathers' hostile parenting at 27 months was significant (unstandardized 95% bias-corrected bootstrapped confidence interval = .05–.73). The model accounted for 28% of the variance in child sleep problems at 4.5 years.

Mother/Father Differences

To test for differences between mothers and fathers in predicting child sleep problems, we estimated models in which the paths from mother/father marital hostility and parenting to child sleep problems were constrained and compared the resulting model fit to the model in which those paths were free to vary. Constraining the paths from mother hostile parenting and father hostile parenting to child sleep to be equal resulted in significantly worse model fit ($\Delta \chi^2$ (1) = 6.98, $p < .01$); model fit was marginally worse ($\Delta \chi^2$ (1) = 3.39, $p < .07$) when paths from mother and father marital hostility to child sleep were constrained to be equal. Constraining the paths from marital hostility to hostile parenting to be equal for mothers and fathers also resulted in marginally worse model fit ($\Delta \chi^2$ (1) = 3.29, $p < .07$). These results indicate that the effects of hostile parenting on child sleep are significantly greater for fathers than for mothers, while the effects of marital hostility on child sleep are marginally greater for mothers than for fathers. Also, marital hostility is marginally more strongly associated with hostile parenting for fathers than for mothers. To examine whether the results were influenced by the inclusion of both mothers and fathers in the same model, we ran two separate additional models, one including father marital hostility and father hostile parenting, the other including mother marital hostility and mother hostile parenting. The significance of the path estimates obtained from the mother-only and father-only models were identical to those obtained in the full model.

Supplementary Analyses

To test whether our results were influenced by children's behavior problems and/or by

our choice of sleep variable, we re-analyzed the full model controlling for total CBCL score at 4.5 years and controlling for bedtime resistance at 9 months (instead of our newly-constructed measure of parent-reported sleep problems at 18 months). In both instances, all significant results were retained.

Discussion

Previous results from this sample indicated that marital instability is longitudinally associated with change in child sleep problems from 9 to 18 months (Mannering et al., 2011). The current findings demonstrate that the predictive association between marital hostility and child sleep problems, when examined later in development, is direct for mothers and indirect for fathers via fathers' hostile parenting. Importantly, the direct effect from mothers' marital hostility and the indirect effect from fathers' marital hostility to child sleep problems at 4.5 years via fathers' hostile parenting at age 27 months were significant even after accounting for child sleep problems at 18 months and mother and father overreactive discipline at 18 months. These findings suggest that interventions designed to reduce marital hostility and hostile parenting could result in sleep problem reductions in their children.

Our findings suggest that family processes indicative of low stability or security in the family system are associated with child sleep problems. This is consistent with the emotional security theory (Davies & Cummings, 1994), which posits that children's reactions to marital relations are a function of their perceived implications on the well-being of the family, and that family processes indicative of insecurity in the family subsystem are likely to be associated with child adjustment problems. Theoretically, disturbances in child sleep patterns are a marker of the impact of family stress on neurobiological functioning (El-Sheikh et al., 2007a; Sadeh et al., 2002). As such, the current results suggest that two indicators of family stress, specifically

marital hostility and hostile parenting, may impact child sleep through their influence on children's felt security in the family system, even after controlling for the effects of shared genes and earlier child sleep problems. The current study did not include measures of emotional security and thus, could not directly examine this possibility. However, research in biologically-related families has demonstrated that marital conflict is associated with child sleep via child emotional security in school-age children (El-Sheikh et al., 2007a).

The results for fathers are also consistent with the spillover hypothesis (Erel & Burman, 1995). The significant association between marital hostility and hostile parenting for fathers, but not mothers, is consistent with prior research demonstrating that fathers are more likely to show evidence of spillover of negativity from the marital relationship to the parent-child relationship than mothers (Cummings, Goeke-Morey, & Raymond, 2004; Kerig et al., 1993; Schofield et al., 2009). Other findings using this sample have also found evidence of more robust father effects than are often reported in the early childhood literature regarding biological fathers. For example, Rhoades et al. (2011) found similar effects of mother *and* father overreactive parenting on child anger during toddlerhood. This may be due to adoptive mothers and fathers being more similar in the amount of time they spend interacting with their infants than biological parents, suggesting that adoptive fathers might be more involved in interacting with their young children than biological fathers (Holditch-Davis, Sandelowski, & Harris, 1999). Because most research on marital hostility and conflict uses composite measures of mother and father marital processes, our finding of a direct effect of marital hostility on child sleep problems for only mothers' marital hostility is rather novel and should be replicated before drawing firm conclusions about the differential contribution of mother versus father hostility on child sleep problems. It is possible that because mothers' parenting is less influenced by marital hostility (Cummings et al.,

2004) than fathers' parenting, the influence of marital hostility remains a direct effect in these models for mothers; whereas for fathers, this association is accounted for by hostile parenting.

A key strength of this study is our ability to account for measured genetic influences (i.e., birth parent internalizing disorders). Because there are significant genetic contributions to child sleep and common genetic factors underlie internalizing problems and sleep problems (Gregory, Eley, O'Connor, Rijsdijk, & Plomin, 2005; Gregory et al., 2009; Gregory et al., 2011), our findings that child sleep problems are associated with marital hostility and hostile parenting even after accounting for both birth parent internalizing disorder and passive gene-environment correlation further strengthen the conclusion that these relations are not solely due to genetic factors. Rather, the results suggest that there are identifiable and modifiable family environmental variables that are prospectively associated with child sleep problems and that could be targeted in prevention or intervention programs designed to reduce or prevent sleep problems in early childhood. Evidence-based treatments designed to reduce parental hostility (e.g., The Incredible Years (Webster-Stratton & Reid, 2010), Triple P (Sanders, Prinz, & Shapiro, 2012)) and marital hostility (e.g., Couple Care for Parents (Halford, Petch, & Creedy, 2010), marital-focused couples' groups (Cowan, Cowan, & Barry, 2011)) in parents of young children could thus potentially also reduce child sleep problems in these same populations. In light of the physical health, mental health, and academic consequences of sleep problems in early childhood, these programs could potentially meaningfully impact children's development; additional research should be conducted to directly test the effectiveness and efficacy of these empirically supported programs in reducing and/or preventing child sleep problems. Although the effectiveness of these evidence-based programs in reducing or preventing child sleep problems has not been empirically evaluated to our knowledge, there is some preliminary

evidence suggesting that behavioral family interventions and parenting services can reduce sleep problems in very early childhood (Martin, Barajas, Brooks-Gunn, & Hale, 2011; Selim, France, Blampied, & Liberty, 2006).

There are four limitations of this study worth noting. First, the measures of hostile parenting and child sleep were parent report. Objective and subjective measures of child sleep both contribute important information about overall sleep quantity and quality (Sadeh, 1994, 2004); objective measures, such as actigraphy, convey information about sleep and waking during the night that parents might not detect/notice, whereas subjective measures can assess daytime sleepiness and specific behaviors immediately prior to bed and through the night that cannot be assessed via objective measures. Thus, the generalizability of our results and conclusions could be increased if similar results were found using objective *and* subjective measures of child sleep. Unfortunately, we do not have objective measures of child sleep for this sample. We did, however, use both mother and father reports of child sleep problems to reduce single rater bias. In addition, we used an observational measure of marital hostility to further reduce rater bias. Thus, there are no paths in the model (other than control paths) in which two associated measures were obtained from the same single individual's report. Taking these factors into consideration, our conclusions would be stronger if similar results were found using observed hostile parenting. Second, we did not have the same measures of child sleep or parenting at the 9-, 18-, and 27- month and the 4.5 year assessment periods, mainly due to developmental differences at the various assessment periods. We attempted to use control measures as similar to the later assessment instruments as possible. Thus, although the constructs are similar, paths from overreactive parenting at 18 months to hostile parenting at 27 months and from child sleep problems at 18 months to child sleep problems at 4.5 years should be regarded

as controls and not as true auto-regressive paths. Third, our sample, particularly the sample of adoptive parents, has limited ethnic and sociodemographic diversity. In addition, this sample showed fairly normative and low-moderate amounts of marital hostility and hostile parenting. Although the full range of scores was observed for each construct, this sample was not recruited for and is not characterized by high levels of either marital hostility or hostile parenting (see means in Table 1). Caution should be used in generalizing these results to high risk populations and populations demonstrating high levels of hostility. Fourth, we did not have a reliable and valid measure of birth parent sleep problems and our genetic control measure (i.e., birth parent internalizing disorders) was obtained in adulthood while our measures of child sleep problems were obtained during childhood. These two factors may have attenuated any potential genetic effects on child sleep problems.

In conclusion, our results suggest that fathers' observed marital hostility during infancy was indirectly associated with parent-reported child sleep problems at 4.5 years of age via fathers' hostile parenting during toddlerhood, whereas mothers' observed marital hostility during infancy had direct effects on child sleep problems at 4.5 years. Our findings identify targets for sleep problem prevention and intervention programs that are potentially modifiable, such as hostile parenting practices and marital hostility, and inform theory by demonstrating that relations among mothers' marital hostility, fathers' marital hostility, fathers' hostile parenting, and parent-reported child sleep problems are significant even after controlling for the effects of shared genes among family members.

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Table 1

Bivariate Correlations, Means, and Standard Deviations

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1. AM Marital Negative Mood	--																	
2. AM Marital Hostility	.45***	--																
3. AM Marital Antisocial	.49***	.83***	--															
4. AF Marital Negative Mood	.23***	.21***	.19***	--														
5. AF Marital Hostility	.20***	.34***	.33***	.43***	--													
6. AF Marital Antisocial	.17**	.34***	.31***	.46***	.72***	--												
7. AM Overreactive Parenting	.14	.05	.03	.06	.07	.07	--											
8. AF Overreactive Parenting	.09	.07	.08	.14*	.13*	.12*	.23***	--										
9. AP 18 month Child Sleep	.04	.08	.03	.17**	.03	.08	-.07	.02	--									
10. AM Hostile Parenting	-.02	-.05	-.01	-.01	.03	.01	.46***	.11	-.04	--								

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
11. AF Hostile Parenting	.12*	.11	.10	.11	.15**	.18**	.21***	.48***	.02	.25***	--							
12. AM 4.5 year Child Sleep	.08	.14*	.11	.1	.03	.11	-.01	.05	.38***	.02	.11	--						
13. AF 4.5 year Child Sleep	.14*	.09	.10	.16*	-.06	.04	.05	.05	.38***	.05	.17*	.67***	--					
14. BP Internalizing Diagnosis	-.04	.02	.01	.06	.09	.05	-.09	-.04	-.01	-.06	.07	.01	.01	--				
15. Adoption Openness	-.06	.02	-.01	.06	-.07	-.04	-.09	-.05	.05	-.05	-.08	.06	.03	.15**	--			
16. Obstetric Comp.	.03	.01	.01	-.07	-.03	-.01	-.10	-.07	-.03	-.06	.02	-.08	-.07	.05	.02	--		
17. AP Family Income	-.09	.03	.06	-.04	.04	.00	-.01	-.15**	.02	-.06	-.06	.11	.12	.05-	.01	-.04	--	
18. Child Gender	-.02	.03	.05	.01	.02	.04	-.01	-.02	-.08	.05	-.14*	-.16**	-.08	-.01	-.08	-.02	.03	--
Mean	2.21	1.57	1.68	2.02	1.36	1.66	2.14	2.12	1.31	9.05	8.90	9.20	8.98	na	.03	2.21	7.07	na
Standard Deviation	1.32	1.13	1.16	1.15	.79	1.15	.77	.73	.36	2.59	2.47	5.74	5.25	na	.93	1.28	1.93	na

Note. AP = adoptive parents; AM = adoptive mother; AF = adoptive father; BP = birth parent.

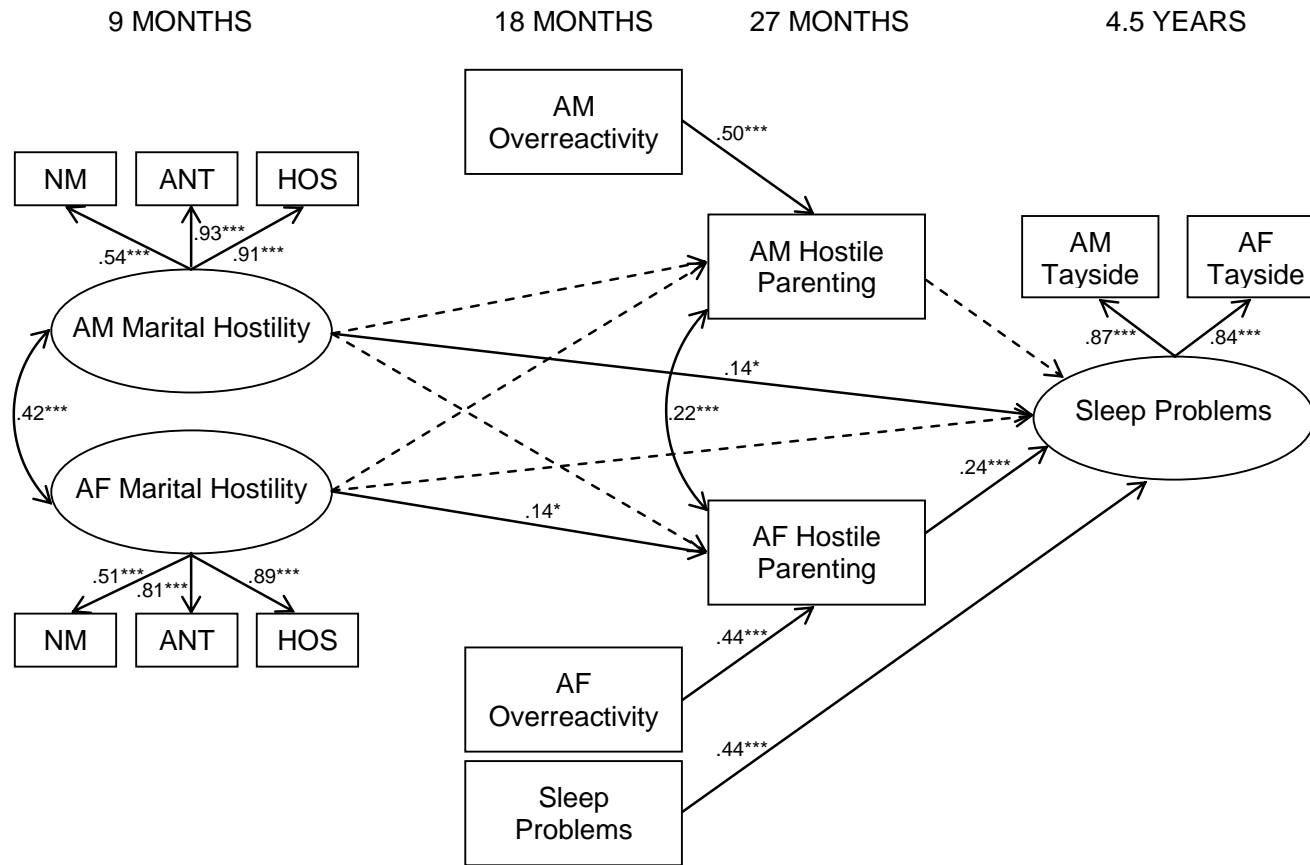*p* < .05; **p* < .01; ***p* < .001

Figure 1. Structural equation model predicting child sleep problems from marital hostility and hostile parenting.

Note: χ^2 (103) = 124.54, *p* = *ns*; CFI = .98; RMSEA = .03; NM = negative mood, ANT = antisocial, HOS = hostility, AM = adoptive

mother, AF = adoptive father; all path estimates are standardized; control paths are not shown for clarity.

*p < .05; **p < .01; ***p < .001