ARTICLE

Longitudinal Study of Preschool Sleep Disturbance

The Predictive Role of Maladaptive Parental Behaviors, Early Sleep Problems, and Child/Mother Psychological Factors

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Objective: To determine if maladaptive parental behaviors (at age 29-41 months) and mother/child psychological characteristics predict future sleep disturbances in 50-month-old to 6-year-old preschoolers, while controlling for early (age 5-17 months) sleep and sociodemographic factors.

Design: Randomized survey; children assessed annually from 5 months to 6 years of age.

Setting: Participants' homes.

Participants: Representative sample of 987 children born in the province of Quebec, Canada, in 1997-1998.

Main Outcome Measures: Questionnaires and interview, including responses from 7 points for 3 key dependent measures: bad dreams (BD), total sleep time (TST) less than 10 hours/night, and sleep-onset latency (SOL) of 15 minutes or more.

Results: Early (age 5-17 months) sleep disturbances predicted maladaptive parental behaviors (eg, mother present at sleep onset, giving food/drink after child awakens) at ages 29 and 41 months. Some parental behaviors in turn predicted future BD, TST less than 10 hours/night, and SOL of 15 minutes or more. However, most relationships did not remain significant in adjusted models that controlled for early sleep problems. Bad dreams were predicted by psychological variables (child's anxiety, mother's feeling of efficacy), as was TST (child's difficult temperament and anxiety, mother's depressive symptoms). However, SOL of 15 minutes or more was predicted by several parental behaviors even in adjusted models; cosleeping after awakenings was a risk factor while mother's presence at sleep onset was a protective factor.

Conclusions: Findings support the hypothesis that maladaptive parental behaviors develop in reaction to preexisting sleep difficulties. Further, early sleep difficulties are more predictive than parental behaviors in explaining BD and foreshortened TST beginning at age 50 months. Results are interpreted in light of early emotive/physiological self-regulation problems.

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EXCEPT FOR COSLEEPING, FEW studies have investigated parental sleep practices and their consequences for children's sleep. Yet the impact of mother-infant cosleeping on infant and child health, sleep, and psychological development remains controversial.[1-28] Contradictory findings about the role cosleeping might play in sudden infant death syndrome have given rise to a worldwide interest in the nature and pathophysiological correlates of this parental sleep practice.[1,2] In accordance with reports of an increased risk of suffocation or unexplained deaths among cosleeping infants in Western societies,[3-7] the US Consumer Product Safety Commission recommends that parents avoid taking babies into the parental bed. However, studies that control for confounding factors have found cosleeping to be protective against sudden infant death syndrome[8,9]; a predominant hypothesis is that cosleeping alters mother and infant sleep patterns such that the infant sleeps less deeply.[8-11] Many studies do, in fact, indicate that cosleeping in Western societies alters the infant's sleep patterns by producing more frequent awakenings[12-15] and a greater proportion of light (stages 1-2) sleep.[11] However, a mother's proximity to the child at sleep onset (SO), ranging from her mere presence in the child's room to outright cosleeping, is related to difficulties falling back to sleep after night awakenings,[16,17] sleep

problems at age 1 year,[18] and the perpetuation of sleep problems through age 2 years.[19]

Similarly, whether cosleeping has a beneficial or detrimental effect on the child's long-term psychological development is still debated. Some studies report no evidence of elevated psychopathology symptoms among cosleeping children.[20-22] However, children having a high level of physical contact with the mother—including cosleeping—were less likely to develop attachment to a transitional object.[23,24] This suggests that cosleeping infants, by having their needs met too quickly, may not develop the ability to comfort themselves when faced with stress. This possibility is also supported by the finding that infants whose parents are present at SO are less likely to self-soothe after night awakenings.[16]

The preceding, apparently discrepant, findings may be due to confounders in the relationship between bedtime parental practices and psychological symptoms and future sleep disturbances. For instance, it has been hypothesized that reactive cosleeping (ie, cosleeping in reaction to a child's sleep difficulties) is more likely to predict future sleep problems than is nonreactive cosleeping.[1,14,20,25] The following variables have also been reported to predict cosleeping: low socioeconomic status (SES),[14,20,21,26] single-parent family,[20,21,26] breastfeeding,[20,21] and female sex.[21] Only 2 studies have considered diverse SO/nighttime parental practices, including cosleeping, in relation to psychological and sleep variables.[27,28] However, neither of these controlled for potential confounders in the relationship between parental behaviors and sleep variables. Thus, the goal of the present study was to determine if cosleeping and a variety of bedtime/nighttime parental behaviors at age 29 to 41 months are predictive of future sleep disturbances at age 50 months to 6 years, while including mother/child psychological symptoms as potential predictors and controlling for a variety of potential confounders.

METHODS

The study is part of the larger Quebec Longitudinal Study of Child Development (1998-2007) conducted by the Quebec Institute of Statistics.[29] Children were recruited from the Quebec Master Birth Registry of the Ministry of Health and Social Services and assessed on an annual basis from 5 months to 6 years of age. The sample is representative of children born in the Province of Quebec in 1997 and 1998 with respect to 3 stratification levels.

SAMPLE

A total of 2120 took part in the initial data collection phase (age 5 months). Of these, 1434 were present at each point until age 6 years. There was a year-to-year dropout rate ranging from 1.56% (age 41-50 months) to 16.24% (age 5-6 years), mainly because of parents refusing consent. Because of partial nonresponse, the number of subjects for whom our main outcome sleep measures were available at each point between ages 29 months and 6 years was slightly reduced (n=1075). The final subsample of children studied (n=987) was identical to that in a previous study.[27] It does not include subjects who answered the English version of the main outcome measure questionnaire (n=88) because of a technical translation error.

Subjects included in the present analyses (n=987) did not differ from those excluded (n=1133) on sex ratio, total sleep time (TST) ($<$ or $\geq$ 10 hours/night) from age 50 months to 6 years, sleep-onset latency (SOL) ($<$ or $\geq$ 15 minutes) at ages 50 months and 5 years, and parental behaviors after nocturnal awakenings. However, subjects from the final sample, on average, had a slightly lower SES at age 5 months ($P<.001$) and were more likely to have bad dreams (BD) from age 50 months to 6 years ($P<.05$), less likely to have a single-parent family from age 5 months to 41 months ($P<.05$), and less likely to have an SOL of 15 minutes or more at age 6 years ($P<.01$). Finally, both groups differed on parental behaviors at SO; compared with excluded subjects, parents of our final sample were less likely to stay near the child until he or she fell asleep at ages 29 and 41 months and were less likely to have the child fall asleep out of bed at age 29 months, as opposed to putting the child to bed and letting him or her fall asleep on his or her own ($P<.05$).

The final sample was constituted primarily of Canadian nonimmigrant (95.4%) and white (96.7%) mothers. It included 48.4% boys and 50.3% girls. (For additional sociodemographic characteristics of the sample, see Simard et al.[27]) All families received detailed information by mail about the study and provided informed consent. The study received approval from a hospital-university review board.

OUTCOME MEASURES

A battery of interviews and questionnaires was completed at home by the mother or father. Questions about the child's sleep were part of the Self-Administered Questionnaire for the Mother (SAQM), which takes about 20 minutes to complete and was completed by the biological mother in most cases (99.5%-99.9%, from age 5 months to 6 years). Sleep questions included items about the 3 dependent measures from age 50 months to 6 years: BD, TST, and SOL. They also included measures of SO and nighttime parental behaviors at ages 29 and 41 months as well as items about early sleep problems at ages 5 and 17 months (sleep fragmentation, SO difficulties). Most were response-choice items. Psychological variables related to mothers' perceptions were also derived from the SAQM: feeling of efficacy as a mother, feeling of parental impact, and positive qualities of the child.

Additional child and mother psychological characteristics/symptoms were taken from the Interviewer-Completed Computerized Questionnaire (ICCQ), which is a 1-hour 45-minute, face-to-face structured interview with the parent who best knows the child (biological mother in 97.9%-99.7% of cases). Three psychological variables were derived from the ICCQ: difficult temperament of the child, level of anxiety of the child, and level of the mother's depressive symptoms. All psychological predictors were standardized Likert-type scales with response choices ranging from 0 to 10. All sociodemographic indicators (eg, SES, type of family) were also obtained from the ICCQ.

Scores from the SAQM and ICCQ were submitted to logical validation, meaning that the consistency of answers was cross-checked against information from other sections of the same questionnaire (intrainstrument validation) or from another questionnaire used in the study (interinstrument validation).[30]

STATISTICAL ANALYSES

Statistical analyses were conducted using SPSS for Windows (version 10; SPSS Inc, Chicago, Illinois). To limit estimate biases, each participant was assigned a longitudinal weight based on sociodemographic indicators that took into account the overall level of nonresponse and the number of participants who quit the study from age 5 months to 6 years.

Table 1. Early Predictors of SO/Nocturnal Parental Behaviors at Age 41 Months

Predictor	Mother Present at SO[a]			Taking Child Out of Bed at Night[b]			Giving Food/Drink at Night[c]		
	% Ref	% Cat	OR (95% CI)	% Ref	% Cat	OR (95% CI)	% Ref	% Cat	OR (95% CI)
Sleep Fragmentation									
Not sleeping through the night									
Age 5 mo	15.0	24.2	1.80[d] (1.22-2.67)	17.4	13.6	0.74 (0.47-1.18)	17.4	28.9	1.93 (0.93-4.02)
Age 17 mo	7.5	20.0	3.06[d] (1.94-4.84)	7.3	12.8	1.85[e] (1.10-3.14)	7.3	26.3	4.53[d] (2.06-9.97)
Sleeping <6 consecutive h									
Age 5 mo	15.9	24.7	1.74[d] (1.18-2.56)	17.4	17.6	1.01 (0.66-1.55)	17.4	17.6	1.58 (0.75-3.34)
Age 17 mo	5.3	12.6	2.57[d] (1.48-4.44)	5.2	8.2	1.63 (0.87-3.07)	5.2	21.1	4.89[d] (2.06-11.62)
SO Difficulties									
SOL ≥15 min									
Age 5 mo	31.3	44.3	1.74[d] (1.26-2.42)	32.5	36.7	1.20 (0.86-1.68)	32.5	47.5	1.88 (0.99-3.58)
Age 17 mo	34.2	55.7	2.42[d] (1.74-3.38)	35.2	46.4	1.59[d] (1.15-2.22)	35.2	61.5	2.94[d] (1.51-5.74)
Difficulty falling asleep, always									
Age 5 mo	9.9	21.9	2.56[e] (1.22-5.35)	3.8	2.0	0.53 (0.17-1.60)	3.8	10.3	2.99 (0.85-10.54)
Age 17 mo	0.9	5.1	7.82[d] (2.78-21.97)	0.7	2.6	3.95[e] (1.03-15.14)	0.7	5.1	10.75[e] (1.76-65.81)
Difficulty falling asleep, often, age 17 mo	1.7	9.1	7.49[d] (3.39-16.52)	2.7	3.1	1.27 (0.47-3.39)	2.7	7.7	4.30[e] (1.07-17.30)
Sociodemographic Variables									
Single-parent family[f]									
Age 17 mo	6.1	7.1	1.18 (0.63-2.23)	4.7	9.5	2.14[e] (1.16-3.94)	4.7	5.0	1.07 (0.25-4.69)
Age 41 mo	9.9	12.6	1.31 (0.80-2.15)	8.3	17.0	2.26[d] (1.41-3.63)	8.3	7.5	0.90 (0.27-3.01)
SES, age 5 mo, mean (SD)[g]	0.17 (0.03)	−0.12 (0.07)	0.71[d] (0.59-0.85)	0.17 (0.94)	0.05 (0.95)	0.88 (0.74-1.04)	0.17 (0.04)	0.05 (0.07)	0.64[e] (0.44-0.92)

Abbreviations: CI, confidence interval; OR, odds ratio; SES, socioeconomic status; SO, sleep onset; SOL, sleep-onset latency; % Cat, percentage of the category described in column heading; % Ref, percentage of the reference category of the dependent variable.

[a] The category "being present at SO" results from the combination of both "lull the child to sleep before putting him or her down" and "put him or her to bed awake and stay with him or her until he or she falls asleep," as opposed to the reference category "putting the child to bed while he or she is awake and let him or her fall asleep on his or her own."

[b] Includes both cosleeping and taking the child out of bed. The reference category is "comfort him or her but leave him or her in his or her own bed."

[c] The reference category was "putting the child to bed while he or she is awake and let him or her fall asleep on his or her own."

[d] $P<.01$.

[e] $P<.05$.

[f] The reference category was "being part of an intact or a blended family."

[g] Continuous variable. Socioeconomic status was computed based on the following variables: (1) education level of the mother, (2) education level of the father, (3) job standing (prestige) of the mother, (4) job standing (prestige) of the spouse/partner, and (5) household income.

Three dichotomous dependent variables were included in the main statistical analyses (at ages 50 months, 5 years, and 6 years): presence/absence of BD, TST of less than/at least 10 hours/night, and SOL of less than/at least 15 minutes. Binary logistic regression analyses were conducted to identify predictors of BD, TST, and SOL at each point, controlling (adjusted models) or not (unadjusted models) for potential confounders (ie, early sleep/sociodemographic factors [ages 5 months and 17 months]) that could better explain future sleep disturbance than could parental behaviors. These confounders were identified through univariate analyses. Because SOL and TST appeared to be highly related from age 50 months to 6 years, longer SOL being associated with shorter TST (n=956-980; $\chi^2=6.23$-42.07; $P<.05$), we controlled for SOL in the models predicting TST and vice versa.

All logistic regression models were built sequentially; the decision to include/exclude a set of predictors was taken at each step through goodness-of-fit assessment using a deviance criterion. A total of 9 unadjusted and 9 adjusted regression models were built; each of the 3 dependant measures (BD, TST, and SOL) was predicted at 3 points (ages 50 months, 5 years, and 6 years) for both types of models. Order of input was the same for each of the 9 unadjusted models: (1) prior occurrence of the disturbance or of concurrent comorbid sleep symptoms,[1] (2) psychological variables for which groups differed significantly using *t* tests, (3) parental behaviors at ages 29 months and 41 months, and (4) interaction effects. In the adjusted logistic regression models, significant confounders were entered first, as a group, in the preceding models. The decision to include/exclude the interaction terms in both the unadjusted and adjusted models was based on the same deviance criterion.

RESULTS

PARENTAL BEHAVIORS

The most frequent parental behavior when putting the child to bed at ages 29 and 41 months was "put him or her to bed awake and let him or her fall asleep on his or her own" (79.7% and 81.1%, respectively), followed by "put him or her to bed awake and stay with him or her until he or she falls asleep" (12.5% and 12.3%) and "lull

Table 2. Significant Predictors of BD at Ages 50 Months, 5 Years, and 6 Years, Controlling for Early Sleep/Sociodemographic Factors (Adjusted Models)

Predictors	Regressor Statistic					
	β	SE	Wald (*df*=1)	Non-BD, %	BD, %	OR (95% CI)
Model 1: BD at Age 50 mo (n=651)						
SOL ≥ 15 min at age 5 mo[a]	−0.93	0.26	13.15	41.0	31.8	0.40 (0.24-0.65)
Single-parent family at age 29 mo[a,b]	2.71	0.89	9.22	5.0	9.6	14.96 (2.61-85.74)
BD at age 29 mo[a]	0.95	0.25	14.38	53.4	83.3	2.59 (1.58-4.24)
BD at age 41 mo[a]	2.28	0.24	89.24	37.3	85.7	9.78 (6.09-15.69)
Giving the child food/drink when he or she awakes at night at age 41 mo[a,c]	2.20	0.73	9.14	1.9	5.9	9.02 (2.17-37.57)
Model 2: BD at Age 5 y (n=889)						
Child not sleeping through the night at age 17 mo[d]	1.14	0.58	3.94	5.2	10.6	3.13 (1.01-9.67)
Difficulty falling asleep, often, at 5 mo[d,e]	0.68	0.35	3.88	6.0	10.1	1.98 (1.00-3.91)
SOL ≥ 15 min at age 5 mo[a]	−0.49	0.18	7.38	35.2	31.5	0.61 (0.43-0.87)
BD at age 29 mo[a]	0.98	0.16	35.33	49.1	74.8	2.66 (1.93-3.67)
Child anxiety at age 41 mo, mean (SD)[a]	0.14	0.05	7.18	2.00 (1.67)	2.61 (1.80)	1.15 (1.04-1.27)
Mother feeling of efficacy at age 29 mo, mean (SD)[a]	−0.18	0.07	6.76	8.54 (1.12)	8.12 (1.47)	0.83 (0.73-0.96)
Model 3: BD at Age 6 y (n=705)						
SES at age 5 mo, mean (SD)[d]	−0.20	0.10	3.91	0.25 (0.96)	0.09 (0.93)	0.82 (0.67-1.00)
Child not sleeping through the night at age 17 mo[a]	1.33	0.49	7.24	6.4	12.0	3.77 (1.43-9.89)
Single-parent family at age 5 mo[b,d]	−1.25	0.56	4.96	5.9	3.7	0.29 (0.10-0.86)
Difficulty falling asleep, often, at age 5 mo[a,e]	1.41	0.54	6.90	7.4	11.2	4.11 (1.43-11.80)
Difficulty falling asleep, sometimes, at age 17 mo[d,e]	0.46	0.21	4.85	52.1	65.2	1.59 (1.05-2.40)
BD at age 29 mo[a]	1.04	0.20	26.73	60.1	80.9	2.83 (1.91-4.19)
Interaction: difficulty falling asleep, often, at age 5 mo[e] × take the child out of bed to provide comfort when he or she awakens at night at age 29 mo[c,d]	−2.34	0.94	6.21	NA	NA	0.10 (0.02-0.61)

Abbreviations: BD, bad dreams; CI, confidence interval; NA, not applicable; OR, odds ratio; SES, socioeconomic status; SOL, sleep-onset latency.
[a] $P < .01$.
[b] The reference category was "being part of a blended or intact family."
[c] The reference category was "comfort him or her but leave him or her in his or her own bed."
[d] $P < .05$.
[e] The reference category was "never."

him or her to sleep before putting him or her down" (7.6% and 6.6%). For parental reactions to a child's nocturnal awakenings, the most frequent behavior at ages 29 and 41 months was "comfort him or her in his or her bed" (64.3% and 69.8%), followed by "let him or her sleep in your bed" (16.6% and 18.2%), "take him or her out of bed to provide comfort" (8.4% and 6.0%), "give him or her something to eat or drink" (8.9% and 4.8%), and "let him or her cry" (1.8% and 1.1%). The most frequent parental behaviors at SO and after night awakenings were used as reference categories for subsequent analyses.

POTENTIAL CONFOUNDERS

Univariate analyses investigated the relations between parental practices and all potentially confounding variables (early sociodemographic/sleep factors). Significant early predictors of maladaptive parental behaviors at age 41 months are displayed in **Table 1**. Sleep fragmentation, SO difficulties, and lower SES at ages 5 and 17 months predicted an increased risk of maladaptive parental behaviors both at SO and after night awakenings at age 41 months. Having a single-parent family was predictive of parental behaviors only after night awakenings.

Neither sex nor breastfeeding were associated with parental behaviors. Although there were slightly fewer significant early predictors of parental practices at age 29 months, these were the same as for parental behaviors at age 41 months. Thus, the following were included in the adjusted models as potential confounders: sleep problems (sleep fragmentation and SO difficulties) at ages 5 and 17 months, single-parent family from age 5 to 41 months, and family SES at age 5 months.

PREDICTING BD FROM AGE 50 MONTHS TO 6 YEARS

Only the following psychological variables for which children with vs without BD differed significantly on *t* tests were included in the regression models: difficult temperament at ages 5 and 17 months, anxiety from age 17 to 41 months (higher scores for BD groups), mother's feeling of efficacy at ages 5 and 29 months, and positive qualities of the child at age 5 months (lower scores for BD groups).

Unadjusted and adjusted models (which controlled for potential confounders) for predicting BD were similar. Adjusted models—one for BD at each point from age 50 months to 6 years—are displayed in **Table 2**. Only 1 parental practice was a significant predictor of BD: giving food/drink after night awakenings at age 41 months predicted increased risk of BD at age 50 months. A significant interaction indicated that frequent difficulty falling asleep

Table 3. Significant Predictors of Sleeping Less Than 10 Hours/Night at Ages 50 Months, 5 Years, and 6 Years, Controlling for Early Sleep/Sociodemographic Factors (Adjusted Models)

Predictors	Regressor Statistic					
	β	SE	Wald (*df*=1)	TST < 10 h/Night, %	TST ≥ 10 h/Night, %	OR (95% CI)
Model 1: TST < 10 h/Night at Age 50 mo (n=620)						
Difficulty falling asleep, always, at age 5 mo[a,b]	1.65	0.62	6.97	3.3	8.0	5.19 (1.53-17.64)
SOL ≥ 30 min at age 50 mo[b]	1.31	0.27	23.10	54.6	76.0	3.69 (2.17-6.29)
Difficult temperament of the child at age 5 mo, mean (SD)[c]	0.17	0.08	4.64	2.65 (1.59)	2.78 (1.60)	1.19 (1.02-1.38)
Interaction: SOL ≥ 15 min at age 5 mo × giving food/drink to the child when he or she awakes at night at age 29 mo, mean (SD)[c,d]	1.23	0.60	4.15	NA	NA	3.40 (1.05-11.07)
Model 2: TST < 10 h/Night at Age 5 y (n=816)						
Mother depressive symptoms at age 41 mo, mean (SD)[b]	0.21	0.06	12.01	1.09 (1.50)	1.83 (2.06)	1.24 (1.10-1.40)
Child not sleeping through the night at age 5 mo[c]	0.91	0.41	4.78	15.7	26.4	2.47 (1.10-5.57)
SOL ≥ 30 min at age 50 mo[c]	0.69	0.29	5.80	56.6	73.6	1.99 (1.14-3.47)
SOL ≥ 30 min at age 5 y[b]	1.31	0.31	17.61	46.6	63.7	3.71 (2.01-6.85)
Model 3: TST < 10 h/Night at Age 6 y (n=887)						
SOL ≥ 15 min at age 17 mo[c]	0.59	0.30	4.03	36.5	54.8	1.81 (1.01-3.23)
SOL ≥ 30 min at age 50 mo[c]	0.79	0.31	6.26	57.0	70.2	2.18 (1.18-4.00)
Difficulty falling asleep, sometimes, at age 5 mo[a,c]	0.70	0.34	4.25	61.3	65.5	2.01 (1.04-3.89)
Difficulty falling asleep, often, at age 5 mo[a,c]	1.15	0.48	5.81	8.3	14.3	3.17 (1.24-8.11)
Child anxiety at age 41 mo, mean (SD)[c]	0.17	0.07	6.20	2.40 (1.76)	3.01 (1.97)	1.18 (1.04-1.35)
Interaction: SOL ≥ 15 min at age 17 mo × SO at age 41 mo: staying near the child until he or she falls asleep, mean (SD)[b,e]	1.19	0.41	8.28	NA	NA	3.27 (1.46-7.33)

Abbreviations: CI, confidence interval; NA, not applicable; OR, odds ratio; SO, sleep onset; SOL, sleep-onset latency; TST, total sleep time.
[a] The reference category was "never."
[b] $P < .01$.
[c] $P < .05$.
[d] The reference category was "providing comfort in the child's own bed."
[e] The reference category was "putting the child to bed awake and let him or her fall asleep on his or her own."

at age 5 months together with comforting the child out of bed after awakening at age 29 months predicted reduced risk of BD at age 6 years. Child and mother psychological variables predicted BD only at age 5 years, the only time at which parental behaviors were not significant predictors. Controlling for confounders (adjusted models) resulted in the loss of 3 significant predictors: (1) comforting the child out of bed after an awakening at age 29 months, (2) child anxiety at age 17 months, and (3) the interaction between the latter 2 variables.

PREDICTING TST LESS THAN 10 HOURS/NIGHT FROM AGE 50 MONTHS TO 6 YEARS

Based on *t* test differences, the following psychological variables were included in the models: mother's feeling of efficacy at age 5 months, perceived positive qualities of the child at age 5 months (lower scores in TST < 10 hours/night groups), mother's depressive symptoms at age 41 months, child's difficult temperament at age 5 months, and level of anxiety at age 41 months (higher scores in TST < 10 hours/night groups).

Again, adjusted and unadjusted models yielded similar results. In the adjusted models (**Table 3**), parental behaviors (giving food/drink after awakening at age 29 months, staying near child while falling asleep at age 41 months) were significant predictors only through their interaction with early SOL of 15 minutes or more and, again, only at ages 50 months and 6 years, but not at age 5 years. These parental behaviors had been exclusively significant predictors in the unadjusted models. Among the child's early sleep symptoms, the most significant predictors were SO difficulties. Longer SOL and difficulty falling asleep from age 17 months to 5 years were associated with an increased risk of TST less than 10 hours/night at each point. Mother's depressive symptoms at age 41 months predicted TST less than 10 hours/night at age 5 years.

PREDICTING SOL OF 15 MINUTES OR MORE FROM AGE 50 MONTHS TO 6 YEARS

The following psychological variables differed significantly between children with SOL less than 15 minutes or 15 minutes or more and were thus included in the models: mother's depressive symptoms from age 17 to 41 months (higher scores in SOL ≥ 15 minutes group), child's difficult temperament at ages 5 and 17 months (higher scores), mother's feeling of efficacy from age 5 to 29 months (lower scores), and feeling of parental impact at ages 5 and 17 months (lower scores).

Several parental behaviors both at SO and after night awakenings were predictive of SOL of 15 minutes or more at ages 50 months and 5 years even in adjusted models (**Table 4**). Mother's presence at SO at age 41 months pre-

Table 4. Significant Predictors of SOL of 15 Minutes or More at Ages 50 Months, 5 Years, and 6 Years, Controlling for Early Sleep/Sociodemographic Factors (Adjusted Models)

Predictors	Regressor Statistic					
	β	SE	Wald (*df*=1)	SOL<15 min, %	SOL≥15 min, %	OR (95% CI)
Model 1: SOL≥15 min at Age 50 mo (n=647)						
Single-parent family at age 5 mo[a,b]	−1.27	0.62	4.14	4.5	2.2	0.28 (0.08-0.95)
SOL≥15 min at age 17 mo[c]	0.70	0.20	12.14	30.1	46.7	2.01 (1.36-2.98)
TST≥10 h/night at age 50 mo[c]	0.85	0.25	11.42	11.0	20.5	2.35 (1.43-3.84)
Let the child sleep in mother's bed when he or she awakes at night at age 41 mo[b,d]	0.66	0.27	5.94	12.9	21.3	1.94 (1.14-3.29)
SO at age 41 mo						
Lull the child to sleep before putting him or her down[c,e]	−1.22	0.38	10.15	9.9	5.6	0.30 (0.14-0.63)
Put the child to bed awake and stay with him or her until he or she falls asleep[b,e]	−0.80	0.32	6.14	14.0	12.8	0.45 (0.24-0.85)
Model 2: SOL≥15 min at Age 5 y (n=641)						
Difficulty falling asleep, often, at age 5 mo[b,f]	−0.70	0.34	4.15	12.9	8.0	0.50 (0.25-0.97)
Difficulty falling asleep, sometimes, at age 17 mo[c,f]	0.59	0.20	8.96	57.7	68.2	1.80 (1.22-2.63)
Take the child out of bed to provide comfort when he or she awakens at night at age 29 mo[c,d]	−1.02	0.33	9.34	12.0	5.2	0.36 (0.19-0.69)
Let the child sleep in mother's bed when he or she awakens at night at age 41 mo[b,d]	0.59	0.26	5.06	14.5	21.0	1.81 (1.08-3.04)
SO at age 41 mo						
Lull the child to sleep before putting him or her down[c,e]	−1.02	0.39	6.94	9.8	5.2	0.36 (0.17-0.77)
Put child to bed awake and stay with him or her until he or she falls asleep[b,e]	−0.64	0.32	4.06	14.2	12.3	0.53 (0.28-0.98)
Model 3: SOL≥15 min at Age 6 y (n=916)						
Difficulty falling asleep, sometimes, at age 5 mo[b,f]	0.39	0.18	4.97	59.0	66.3	1.48 (1.05-2.09)
SOL≥15 min at age 17 mo[c]	0.67	0.16	17.80	31.5	49.0	1.96 (1.43-2.68)
SES at age 5 mo[c]	−0.28	0.08	11.48	0.20 (0.93)	−0.02 (0.92)	0.76 (0.65-0.89)

Abbreviations: CI, confidence interval; OR, odds ratio; SES, socioeconomic status; SO, sleep onset; SOL, sleep-onset latency; TST, total sleep time.
[a] The reference category was "being part of an intact or blended family."
[b] $P<.05$.
[c] $P<.01$.
[d] The reference category was "comfort him or her but leave him or her in his or her own bed."
[e] The reference category was "put him or her to bed awake and let him or her fall asleep on his or her own."
[f] The reference category was "never."

dicted a reduced risk of SOL of 15 minutes or more at ages 50 months and 5 years. However, cosleeping after awakenings predicted higher risk at ages 50 months and 5 years. At age 6 years, only early sleep/sociodemographic factors predicted SOL of 15 minutes or more. Early difficulties at SO were primarily associated with an increased risk of having continuing SO problems from age 50 months to 6 years (Table 4). A greater feeling of efficacy among mothers at ages 5 and 29 months was the only psychological predictor of reduced risk of SOL of 15 minutes or more in unadjusted models but dropped out in adjusted models.

COMMENT

Our prevalence rates of mothers reporting themselves to be usually present at their child's SO at ages 29 months (20.1%) and 41 months (18.9%) are somewhat lower than those previously reported for white American samples: 26% in 18- to 26-month-olds,[31] 33% in 9-month-olds,[12] and 35% in 6-month- to 4-year-olds.[14] This discrepancy could be because previous estimates were inflated because younger infants were included; regular presence of the mother at SO decreases through infancy,[16] preschool,[21] and primary school.[20]

In our sample, postawakening cosleeping in the mother's bed (16.6% at age 29 months; 18.2% at age 41 months) was the most prevalent maladaptive response to night awakenings, although not as typical of mothers' reactions as previously suggested.[31] Our limitation of the night awakening question to "when your child is healthy" might have contributed to the low cosleeping prevalence levels.

Generally, uncommon parental behaviors after night awakenings (eg, giving food/drink, cosleeping in mother's bed, comforting the child out of bed) at ages 29 and 41 months were associated with negative sleep outcomes (BD, shorter TST, longer SOL from age 50 months to 6 years). However, the relation between cosleeping and future SO difficulties was different for cosleeping at SO (lower risk of SO difficulties) and after night awakenings (higher risk). This might explain the discrepancies in findings from previous studies that did not distinguish between SO and nighttime parental behaviors.[8-19]

Although this global pattern of results remains the same in adjusted and unadjusted models, fewer parental behaviors predicted future sleep disturbances when controlling for early (ages 5 and 17 months) sleep/sociodemographic factors. Moreover, maladaptive parental behaviors, such as the mother's presence at SO or giving

food/drink when the child awakens, were more likely to occur subsequent to earlier sleep fragmentation or SO problems at ages 5 and 17 months, thus supporting the suggestion that these behaviors develop in reaction to prior sleep problems.[32] Parental strategies that were effective for early sleep difficulties (eg, giving food or drink) may later become inappropriate to the child's age and needs. Mothers might adopt the inappropriate response of giving food or drink to 29- to 41-month-old children awakening (which is associated with BD and shorter TST at age 50 months) because they commonly attribute infant cries to hunger[33] and come to believe that infants cry only when hungry.[34]

Our results permit an interpretation that goes beyond the view of parental behaviors as reactive. They also suggest that early sleep problems are more predictive of future sleep disturbances than are intervening parental behaviors. When controlling for early sleep factors, most parental behaviors no longer predict future sleep disturbances (BD, TST) or remain predictors only in interaction with prior SO difficulties. This is particularly true for comforting the child out of bed after awakening, which no longer predicts BD after controlling for prior sleep difficulties. This finding clarifies results from a previous study that did not control for early sleep factors but did find that postawakening comforting predicted fewer future BD.[27] Similarly, the mother's presence at SO was no longer a risk factor for shorter TST, as found in a previous study, when early sleep difficulties were held constant.[28] Thus, seemingly discrepant findings from 2 previous studies can be explained by the sleep factors not being controlled, rather than the differential effects of parental behaviors on BD and TST.

Our findings are consistent with the notion that the child's sleep is differentially vulnerable to parental behaviors at different developmental periods. For each sleep problem, models differed from age 50 months to 6 years. For instance, early sleep/sociodemographic factors and parental behaviors predicted longer SOL at ages 50 months and 5 years while only the former type of variables predicted SOL at age 6 years. In the case of BD, some factors were specifically predictive only at age 5 years. In fact, age 5 years was the only time at which BD were not associated with previous parental behaviors and were rather predicted by the psychological variables of child anxiety (age 41 months) and mother's feeling of efficacy (age 29 months). The latter finding supports our previous suggestion[27] that there is an early psychological predisposition for BD that is particularly determinant when the child is faced with a major stress at age 5 years, such as entering kindergarten.

Finally, current and previous findings support the suggestion that difficult temperament is the original context within which sleep disturbances arise. An association between sleep difficulties and a difficult/fussy temperament in infants younger than 12 months has been supported by many studies relying on both parental perceptions[19,34] and physiological measures of the child's sleep.[17,35] In the present study, children having BD, shorter TST, and longer SOL from age 50 months to 6 years had more difficult temperaments at ages 5 and 17 months, compared with well-sleeping children.

However, when controlling for early sleep problems, difficult temperament remained predictive only of shorter TST. This could mean that for other sleep symptoms (BD, SOL) some aspects of difficult temperament (eg, early regulation problems) are more closely related to future sleep difficulties. In fact, the working definition of temperament as a specific pattern of emotive/physiological self-regulation implicating central nervous system activity[36] suggests that sleep difficulties likely are part of the difficult temperament profile. These results, if replicated, have important implications for preventing sleep disorders since temperament can be identified early in development. Studies that include more objective measures of both temperament and sleep of children are needed.

Our findings clarify the long-debated relationship between parental behaviors and childhood sleep disturbances. They suggest that cosleeping and other uncommon parental behaviors have negative consequences for future sleep and are thus maladaptive. The findings also suggest that discrepant results in the literature may be due to both an absence of control over early sleep factors that might give rise to maladaptive parental behaviors and to the fact that cosleeping at SO and after night awakenings have rarely been distinguished. However, there are limits to this study. Although our sample was large, there was a considerable dropout rate that may limit its representatives. Also, our questionnaires reflect respondents' (mostly mothers') perceptions of their children's attributes, perceptions that may be prone to error. Finally, the questionnaires we used were not validated.

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