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Caregivers' Knowledge, Behavior, and Attitudes Regarding Healthy Sleep in Young Children

Judith A. Owens, M.D., M.P.H., F.A.A.S.M.[1]; Caroline Jones, M.Sc., M.A.[2]; Rachel Nash, Sc.B.[1]

[1]*Division of Ambulatory Pediatrics, Department of Pediatrics, Hasbro Children's Hospital, Providence, RI;*
[2]*Department of Anthropology, Durham University, UK*

SCIENTIFIC INVESTIGATIONS

Study Objectives: To examine sleep health knowledge and beliefs and their relationship to sleep practices in a community sample of caregivers of young children.

Methods: A convenience sample of caregivers visiting a museum on one of 2 consecutive weekend days completed a brief parent-report survey on child sleep habits and parental basic sleep knowledge and beliefs and attitudes regarding sleep as a health behavior.

Results: Of the 253 analyzable surveys (response rate 80%; mean age of index child 3.4 ± 2.0 years), 23% of children did not have a consistent bedtime, 25% had a bedtime later than 9 pm, 23% had at least one electronic device in the bedroom, and 56% frequently fell asleep with an adult present. Both positive and negative sleep habits tended to cluster together. Children who had irregular and late bedtimes were more than twice as likely to obtain insufficient sleep that those with regular and early bedtimes (OR 2.30, 2.45). While 25% of children were getting less than the recommended sleep amount for age, just 13% of parents believed that their child was getting insufficient sleep. Lack of knowledge regarding the potential negative impact of specific sleep practices was associated with an increased likelihood of engaging in those practices.

Conclusions: The results of this survey study of a generally well-educated sample of caregivers suggest that there are clear parental knowledge gaps regarding healthy sleep in young children and supports the need for increased sleep health education.

Keywords: Sleep health, sleep education, sleep practices

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Insufficient and poor quality sleep is a significant and growing public health issue among children in America. Poor sleep in children has been associated with a number of adverse outcomes, including mood instability, impairments in attention and memory, behavioral consequences such as poor impulse control, and a negative impact on learning and academic achievement.[1] Moreover, inadequate sleep has been shown to have physical consequences on general health in children, including an increased risk for the development of obesity and diabetes.[2,3] Sleep problems in young children have also been found to be correlated with adverse outcomes in caregivers, such as maternal depression and lower levels of parental well-being.[4]

Healthy sleep practices (sleep hygiene or "sleep health") have been empirically linked to better quality and more adequate sleep in the pediatric population; these include regular sleep schedules, early bedtimes, a regular bedtime routine, the absence of an adult when falling asleep, absence of electronics and particularly a television from the bedroom, and lack of caffeine consumption.[5-7] A 2004 survey of parents of newborn to 10-year-olds found that poor sleep hygiene, particularly a late bedtime (after 9 pm), and having a parent present at bedtime were associated with longer sleep onset latencies and shorter sleep duration in all age groups.[5] Caffeine consumption, having a television set in the child's bedroom, and lack of a bedtime routine were also significantly associated with poor sleep and reduced total sleep amounts. Poor sleep habits may also further exacerbate existing sleep problems; therefore, the failure to recognize and address the contributory role of unhealthy sleep habits may result in an inadequate treatment response.

BRIEF SUMMARY

Current Knowledge/Study Rationale: Previous studies have suggested that unhealthy sleep practices impact the quality and quantity of sleep in young children. This study examined the relationship between caregiver knowledge and attitudes regarding sleep habits and insufficient sleep in a community sample.

Study Impact: The results of this study suggest that parents often lack basic knowledge regarding healthy sleep practices and sleep amounts in children. Educational approaches targeted towards improving caregiver knowledge about sleep in family-oriented venues such as children's museums and community centers are a potentially cost-effective way to reduce these knowledge gaps and improve sleep in young children.

The reasons why healthy sleep practices promote sleep are still not completely understood. Part of the explanation may be biological: they enhance sleep regulation. The appropriate balance between two sleep regulation processes, the circadian system and the "homeostatic" sleep drive, is fundamental to both adequate quality and quantity of sleep and optimal levels of alertness. For example, the human circadian clock has to be synchronised or "entrained" to the 24-h day/night cycle, principally by light-darkness signals, as well as cues in the external environment (for example, consistent timing of daily activities). Behavioral sleep conditioning, which both reinforces the association of certain activities (for example, a regular bedtime routine) and environ-

ments (the bedroom) with sleep, and limits wake-promoting activities such as watching TV while in bed, is also likely to play an important role in healthy sleep promotion. Because increased levels of both physiologic (use of stimulants such as caffeine) and cognitive/emotional arousal (television viewing) can interfere with sleep, healthy sleep practices also promote sleep by reducing environmental stimulation. Finally, good sleep practices allow for adequate sleep quantity and timing, which are based on a child's age and sleep needs.[8-10]

While sleep is clearly important for optimal functioning and good health, caregivers may be unaware of the signs and potential consequences of poor sleep for their children.[11] Caregivers may also lack knowledge regarding basic healthy sleep habits. Furthermore, pediatric healthcare professionals may not recognize the importance of sleep in regards to health, and both screening for sleep problems and sleep health education in primary care settings are often inadequate.[12,13] Because sleep practices are learned behaviors, an understanding of caregivers' beliefs about and attitudes towards healthy sleep practices, as well as identification of knowledge gaps, may facilitate the development of educational materials and strategies to improve sleep health in children.

The purpose of this study was to examine sleep health knowledge and beliefs and their relationship to sleep practices in a community sample of caregivers of young children. Our hypotheses were: (1) children of caregivers reporting unhealthy sleep practices will be less likely to obtain adequate sleep, and (2) decreased levels of parental knowledge regarding healthy sleep will be associated with both insufficient sleep and unhealthy sleep practices in young children.

METHODS

Subjects

The study population consisted of a convenience sample of parents visiting the Children's Museum of Manhattan (CMOM). All participants were parents of at least one child aged 3 months to 12 years. A maximum of one survey was completed per family.

Procedure

Participants completed a survey on site across 2 weekend days in March 2010. The procedure and survey were reviewed and approved by the Institutional Review Board at Hasbro Children's Hospital, Rhode Island and by CMOM. Parents were approached and asked to complete the survey upon entering the museum. Participants could elect to have the survey questions read to them and their answers recorded by the study team.

Measures

The brief 2-page survey was developed by the authors based on principles of healthy sleep practices in children; survey items addressed the following topics: (1) child sleep habits (10 items), (2) basic sleep knowledge (10 items), and (3) beliefs and attitudes regarding sleep as a health behavior (4 items). Parents were also asked to estimate the amount of sleep that their child needs. The section on sleep beliefs asked parents to indicate if their child gets enough sleep and has healthy sleep habits, and if they plan to change their child's sleep habits or would like to talk to their child's doctor about sleep. The survey also included demographic information regarding the parent and focus child: a copy may be found on-line at www.kidzzzsleep.org.

An initial version of the survey was first piloted with 141 parents at CMOM. The survey was modified according to parental verbal feedback and the results of the original survey to improve clarity and resolve any ambiguous items in the final version.

Analysis

Usual bedtime and wake times on week and weekend nights were used to calculate weighted mean nighttime sleep duration: (usual week night sleep duration × 5) + (usual weekend night sleep duration × 2) / 7. Usual daily nap duration was added to estimate usual sleep duration per 24 h. Using this estimate and NSF daily sleep recommendations,[14] children were categorized as obtaining at least sufficient sleep for their age, or too little sleep. Similarly, parents' estimates of sleep need were coded as within or above the recommended range or underestimated. Sleep knowledge responses were coded as incorrect (including do not know) or correct; the number of correct answers was calculated for each parent.

Descriptive statistics and frequencies were calculated. Associations among sleep characteristics and of sleep characteristics with parental knowledge and demographic variables were examined using χ^2, regression, and ANOVA.

RESULTS

Sample Characteristics

Fifty-four caregivers declined to participate (response rate 80%). Nine surveys were excluded from the final sample because they were completed by individuals other than parents, or the child was outside the targeted age range, leaving a total of 253 parents in the final sample.

Mean age of the parents was 35.5 ± 6.1 years, and nearly all (96%) had attended college. The majority (61%) were White or Caucasian; there were 16% Hispanic or Latino, 11% Asian, 7% Black/African American, 1% native Hawaiian/Pacific, and 4% multiracial. Median family income (based on the 2000 Census data) was $79,544 ± 41,084. Children were 46% male, mean age 3.4 ± 2.0 years (52% between 1 and 3 years and 35% between 3 and 5 years), and 54% did not have other children living in their house. Mean total sample week night and weekend night sleep durations were 10:47 ± 0:49 and 10:45 ± 0:54, respectively. Predictably, children 3-12 months of age had the highest reported mean week night sleep duration (11:00 ± 0:55) and weekend night sleep duration (10:56 ± 0:46), followed by children 1-3 years (10:47 ± 0:50; 10:44 ± 0:57), 3-5 years (10:51 ± 0:45; 10:50 ± 0:51), and 6-12 years (10:47 ± 0:49; 10:45 ± 0:54).

Children's Sleep Habits

Table 1 lists the frequencies of sleep practices. There was no significant variability in sleep habits between boys and girls. Children who had other children living in their house were less likely to have late bedtimes (later than 9 pm) (unadjusted OR (95%CI) = 1.96 (1.07-3.60); there were no other significant differences compared to children who did not have other children living in the house. The only age-related difference in sleep habits was that children with electronics in their bedroom were

slightly older than those without (4.14 ± 2.43 versus 3.15 ± 1.86 years, Mann Whitney U = 3695, p = 0.006).

Although the numbers in each group were small, compared to White/Caucasian children (OR 1.0 [reference]), Hispanic, Asian, and Black children were more likely to have irregular bedtimes (defined as the lack of a consistent bedtime 7 nights/week) (OR [95%CI] Hispanic = 2.71 [1.21-6.07]; Asian = 1.57 [0.57-4.32]; Black = 5.87 [2.05-16.80]), more likely to regularly have an adult in the room while falling asleep (Hispanic = 12.56 [4.25-37.14]; Asian = 2.44 [1.05-5.69]; Black = 10.77 [2.38-48.77]), and more likely to have electronics in their bedroom (Hispanic = 9.41 [4.16-21.28]; Asian = 2.24 [0.73-6.86]; Black = 7.17 [2.42-21.21]).

Sleep Habits Associations

Chi-square analysis revealed a trend for both positive and negative sleep habits to cluster together (**Table 2**); most notably, having a consistent bedtime throughout the week was associated with a consistent wake time, an earlier bedtime, the absence of an adult in the room when falling asleep, and the absence of electronics (specifically a TV) in the bedroom.

Sleep Duration

Weighted mean sleep duration at night was 10:46 (± 0:47) hours; combined with naps, weighted mean sleep duration per 24 h was 12:09 (± 1:15). Based on the recommended daily sleep amount for their age group, just 66% of children achieved sufficient sleep, and a quarter slept too little; 10% slept longer than the recommended time. There was no difference in sleep duration between boys and girls, or between children who did or did not have other children living in their house.

Table 3 shows the odds ratios for insufficient sleep for the various sleep habits. There was no significant difference in mean *number* of unhealthy sleep habits between children obtaining adequate versus inadequate sleep (F = 2.82, p = 0.095). Children who had irregular and late bedtimes were over twice as likely to obtain insufficient sleep that those with regular and early bedtimes.

Parental Sleep Knowledge

Based on recommendations for sleep duration by age group, 52% of parents underestimated their child's sleep need, but just 13% of parents believed that their child had insufficient sleep. Not surprisingly, children whose parents underestimated their child's sleep needs were less likely to obtain adequate sleep than those who correctly or overestimated ($\chi^2 = 24.30$, $p < 0.001$).

On the sleep knowledge section of the survey, 35% of parents answered half or fewer of the questions correctly; only 4% of parents correctly answered all 10 questions. Each question was answered incorrectly by at least 12% of parents. The majority

Table 1—Sleep habits of the children

Sleep Habit	Freq (%)
Regular bedtime	
7 nights a week	186 (77%)
Less than 7 nights a week	56 (23%)
Regular wake time	
7 days a week	191 (78%)
Less than 7 nights a week	54 (22%)
Late bedtime	
9 pm or earlier	184 (75%)
Later than 9 pm	61 (25%)
Adult in the room when child falls asleep	
At least a few times a week	141 (56%)
Once a week or less	111 (44%)
Electronics in the bedroom	
None	184 (77%)
At least one	54 (23%)
TV in the bedroom	
Yes	40 (17%)
No	198 (83%)
Has a regular bedtime routine	
Yes	228 (96%)
No	10 (4%)
Reading is part of bedtime routine	
Yes	204 (91%)
No	21(9%)
Watching TV is part of bedtime routine	
Yes	66 (34%)
No	131 (66%)
Drinks caffeine every day	
Yes	11 (5%)
No	223 (95%)

Table 2—Associations of child sleep habits (χ^2)

	Regular Bedtime 7 Nights per Week	Regular Wake Time 7 Days per Week	Bedtime not Late (9 pm or Earlier)	Adult in the Room to Fall Asleep Weekly or Less	No Electronics in the Bedroom	No TV in the Bedroom
Regular bedtime 7 nights per week						
Regular wake time 7 days per week	37.40***					
Bedtime not late (9 pm or earlier)	52.20***	5.82*				
Adult in the room to fall asleep weekly or less	32.77***	4.08	26.32***			
No electronics in the bedroom	12.23**	8.35**	16.67***	5.01*		
No TV in the bedroom	18.10***	9.85**	18.35***	9.52**	163.83***	
No TV as part of bedtime routine	2.95	4.33*	9.25**	0.75	25.93***	16.80***

*P < 0.05; **P < 0.01; ***P < 0.001

Table 3—Variation in child sleep characteristics between children who do and do not have sufficient sleep for their age

Sleep Characteristic	Frequency		Unadjusted Odds Ratio 1.0 (reference) (95% CI)
	At Least Recommended Sleep Duration for Age	Insufficient Sleep Duration for Age	
Regular bedtime			2.30 (1.12-4.73)
7 Nights a week	140	36	
< 7 Nights a week	27	16	
Regular wake time			0.96 (0.44-2.11)
7 Days a week	135	44	
< 7 Days a week	32	10	
Bedtime not late			2.45 (1.26-4.77)
9 pm or earlier	141	36	
After 9 pm	32	20	
Adult in the room to fall asleep weekly or less			1.66 (0.89-3.09)
Once a week or less	83	20	
At least a few times a week	90	36	
No electronics in the bedroom			1.45 (0.71-2.98)
No electronics	134	38	
At least one electronic	34	14	
No TV in the bedroom			1.43 (0.63-3.22)
No TV	144	42	
TV in bedroom	24	10	
No TV as part of bedtime routine			1.00 (0.49-2.04)
No TV in Routine	91	31	
TV in Routine	44	15	
			Mean Difference (95% CI)
Weighted mean bedtime (Mean Hours: Minutes ± SD)	20:15 (0:53)	20.48 (0:53)	0:32 (0:16-0:48)
Number of Correct Answers to T/F Questions (Mean ± SD)	6.55 (2.09)	6.13 (1.42)	0.42 (-0.22-1.06)

of parents incorrectly answered the questions regarding the average sleep needs of preschool (82%) and school-aged children (67%). Children of parents who did not correctly answer that watching a TV in the bedroom makes it more difficult to fall asleep were much more likely to have a TV in their bedroom (unadjusted OR [95%CI] = 6.40 [2.90-14.14]). Children whose parents incorrectly answered that children should have the same bedtime and wake time on week and weekend days were more likely to have irregular bedtimes and wake times (unadjusted OR [95%CI] = 3.25 [1.65-6.42] and 2.96 [1.50-5.85], respectively). Overall, Hispanic parents answered fewer of the sleep knowledge questions correctly compared to White/Caucasian, Asian, and Black parents (4.68 ± 2.11 versus 6.66 ± 1.87, 6.36 ± 1.76, and 6.13 ± 2.26, respectively) (mean difference Hispanic versus other ethnicity [95%CI] = 1.90 [1.19-2.61]).

The number of sleep knowledge questions answered correctly was significantly greater for parents whose children had regular and early bedtimes (mean difference [95%CI] = 0.84 [0.21-1.48] and 0.88 [0.24-1.53], respectively), regular wake times (1.01 [0.37-1.65]), fell asleep without an adult in the room (0.81 [0.29-1.33]), and lacked electronics in the bedroom (1.57 [0.95-2.18]). Parents who underestimated their child's sleep needs answered fewer questions correctly than parents within/above the recommended range (5.64 ± 1.89 versus 6.92 ± 1.96; t = 4.95, mean difference [95%CI] 1.30 [0.78-1.82]); but there was no significant variation in number of correct answers between parents whose children did and did not obtain sufficient sleep.

Parents' Sleep Beliefs

Seventy-four percent of parents reported that their child had healthy sleep habits; 24% planned to change their child's sleep habits; and 14% wanted to talk to their child's doctor about his or her sleep. Parents of children who did not regularly fell asleep with an adult in the room or watch TV as part of their bedtime routine were more likely to agree that their child had healthy sleep habits (unadjusted OR [95%CI] = 6.38 [2.07-19.63] and 2.82 [1.07-7.44], respectively). Parents whose children regularly fell asleep with an adult in the room and who did not had a regular bedtime, were more likely to plan to change their child's sleep habits (unadjusted OR [95%CI] = 10.71 [4.78-24.00] and 6.32 [2.76-14.50], respectively). However, adequate sleep amounts were not correlated with parental perception that their child had healthy sleep habits, or parents' plans to change their child's sleep habits.

DISCUSSION

The results of this survey study of a generally well-educated sample of caregivers suggest that there are clear parental knowledge gaps regarding healthy sleep in young children, and that a decreased level of sleep knowledge in general correlates with

unhealthy sleep practices, such as lack of regular bed and wake times, late bedtimes, and the presence of electronics in the bedroom. In particular, parents appeared inadequately informed regarding appropriate sleep amounts in children of different ages, and were much more likely to underestimate than overestimate sleep needs. Parents who were unaware of recommended sleep amounts were in turn more likely to have children who did not obtain sufficient sleep. Perhaps more concerning was the finding that, while a quarter of children were not getting adequate sleep for age, only 13% of parents reported that their child slept too little. This is similar to the results of the 2006 National Sleep Foundation (NSF) poll in adolescents,[15] which found that while only 20% of adolescents had the recommended sleep duration of 9 hours, 71% of parents reported that their child was getting sufficient sleep.

As hypothesized, unhealthy sleep practices, particularly late and inconsistent bedtimes, were associated with inadequate sleep. Also in support of our hypothesis, lack of knowledge regarding the potential negative impact of specific sleep practices (TV in the bedroom, irregular bed/wake times) was associated with an increased likelihood of engaging in those practices. Furthermore, both healthy and unhealthy sleep habits tended to "cluster" together; for example, regular bedtimes were associated with regular wake times and the absence of electronics in the bedroom, while late bedtimes were associated with irregular bedtimes and wake times, having an adult in the room when falling asleep, and watching TV as part of the bedtime routine.

Compared to the 2004 NSF poll data regarding sleep hygiene in toddlers and preschoolers,[5] the children in our sample overall appeared to have better sleep habits; they were more likely to include reading as part of the bedtime routine (52% to 58% of NSF sample), less likely to have a television in the bedroom (30% of preschool NSF sample), less likely to have a late bedtime than NSF toddlers (49%) or preschoolers (53%), and had a greater mean sleep duration than either the NSF toddler (9.8 [2.1] hours) or preschool sample (9.6 [1.5]). They were, however, more likely to fall asleep with a parent present (56% vs 43% of NSF sample); while this sleep practice was highly predictive of less nighttime sleep in the NSF study toddlers, we did not find a similar association in our sample.

Several issues explored in this study deserve further comment. First, it should be acknowledged that sleep needs may vary somewhat among individuals. However, while there appears to be increased variability in sleep amounts in the first 3 years, the degree of variability seems to be highest in the first 12 months, an age range which comprised only 3% of our sample.[16] Utilizing data from epidemiological studies, average ranges for sleep amounts in different age groups have been generated[14] and provide a reasonable benchmark for assessing whether sleep quantity is adequate. It is our contention that using these age-based sleep duration ranges provides a more valid assessment of "adequate" sleep than choosing a somewhat arbitrary "cut-off" (for example > 10 h or < 10 h) to define "sufficient" versus "insufficient" sleep. It should be noted that the "sleep duration" variable in this study, calculated from the parent-reported average bedtime and wake time, did not account for sleep onset latency time or duration of any night wakings. We also chose to combine sleep durations both within and above the recommended ranges for age, as previous studies have suggested that parents tend to "overestimate" sleep amounts compared with objective measures of sleep.[17]

In addition to the above, several study limitations should be noted. First, this was a self-report study of parenting practices and beliefs and thus subject to a number of potential biases, including the possibility of participants giving socially desirable responses. While we piloted the survey in a sample of 141 parents and made edits according to feedback, it is possible that some of the questions were unclear or ambiguous. The sample size and demographics (largely white, college-educated, higher SES) also potentially limit the ability to generalize the study findings to other populations.

In conclusion, the results of this study document the need for increased targeted caregiver education regarding the importance of healthy sleep practices, particularly instituting regular and earlier bedtimes, and recommended sleep amounts for children of different ages. Family-oriented educational venues such as children's museums potentially provide a unique opportunity to deliver basic information about sleep and sleep health to both children and parents, and to encourage simple sleep-promoting changes in family routines and behaviors in an interactive, creative, and positive way. Given the robust association between insufficient sleep and increased obesity risk, especially in young children,[18-20] the strategy of also incorporating sleep health education into existing childhood obesity prevention programs focused on nutrition, physical activity and healthy lifestyles and targeting the preschool-aged population could potentially both be cost-effective and improve outcomes. Ultimately, raising the awareness of and focusing attention on healthy sleep in the pediatric population can benefit the whole family and if adopted in childhood, may help set the stage for lifelong healthy sleep.[21]

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Address correspondence to: Dr. Judith Owens, Rhode Island Hospital, 593 Eddy Street, Potter 200, Providence, RI 02903; Tel: (401) 444-4239; Fax: (401) 444-6218; E-mail: owensleep@gmail.com

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