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A Longitudinal Study of Bed Sharing and Sleep Problems Among Swiss Children in the First 10 Years of Life

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ABSTRACT. *Objective.* To study age trends, long-term course and secular changes of bed-sharing practices, and sleep problems among Swiss families.

Methods. A total of 493 children were longitudinally followed between 1974 and 2001 by using structured sleep-related interviews at 1, 3, 6, 9, 12, 18, and 24 months after birth and at annual intervals thereafter until 10 years of age. Parents were queried about bed sharing, night wakings, bedtime resistance, and sleep-onset difficulties during the 3 months before each follow-up interview.

Results. Although in the first year of life relatively few children slept with their parents (<10%), bed sharing increased with age and reached a maximum at 4 years (≥ 1 times per week: 38%). Bed sharing of at least once per week was noted in 44% of the children between 2 and 7 years old. Nocturnal wakings also increased from 6 months old to a maximum at 4 years, when more than half of all children woke up at least once per week (22% every night at 3 years). Less than 10% of all children demonstrated frequent bedtime resistance and sleep-onset difficulties. Bed sharing and night wakings during early infancy were not predictive for bed sharing or night wakings during childhood, whereas both bed sharing and night wakings during childhood tended to persist over time. In contrast, bedtime resistance and sleep-onset difficulties seemed to be rather transient phenomena across all ages. No consistent cohort trends were found except for bedtime resistance, which decreased significantly between 1974 and 2001.

Conclusions. Bed sharing and nocturnal wakings are common during early childhood. Developmental changes in separation-attachment processes, cognitive capabilities to develop self-recognition and nighttime fears, and motor locomotion may contribute to the particular age trend of night wakings and bed sharing during early childhood. *Pediatrics* 2005;115:233–240; *cosleeping, night wakings, bedtime resistance, sleep disorders.*

ABBREVIATIONS. LS, Second Zurich Longitudinal Study; GS, Zurich Generational Study.

Sleep problems are a frequent behavioral issue in pediatric practice.¹ The most common sleep complaints by parents are difficulties settling their child at bedtime and frequent nocturnal wakings. Sleeping arrangements, particularly parent-child bed sharing, are also a common topic in pediatric practice and recently have generated an intense professional and parental debate about potential positive and negative psychosocial, developmental, and physical effects on the infant and child.^{2–5} Thus, an understanding of developmental trends in sleep habits is important for the health care professional dealing with behavioral sleep difficulties in children.

It is a common perception that night wakings and bed sharing decline with age, whereas difficulties initiating sleep increase. Nocturnal wakings have been reported in ~20% to 30% of 1- to 3-year-olds^{6–8} and 6% of 5- to 12-year-olds.^{9,10} Bedtime resistance has been described to increase in the first 5 years of life from 14% during infancy to 50% at 5 years old.¹¹ Older children are more likely to experience sleep-onset difficulties or delays rather than resistance in going to bed.¹² Nearly 25% of parents reported that their school-aged child had significant difficulties in falling asleep.¹³

The overall prevalence of bed sharing is difficult to determine, because in previous studies bed-sharing rates differed substantially across cultures and at different time periods. The definition of what constitutes bed sharing is also frequently different depending on the studied age cohort. The bed-sharing prevalence in the first 4 years of life has been reported in several studies to be between 6% and 70%^{14–17} and in school-aged children between 4% and 23%.^{18–20}

A tentative conclusion from all these studies may be that children “outgrow” behaviors such as nocturnal wakings and bed sharing as they advance in age, whereas for older children difficulties at sleep onset become the predominant sleep problem.²¹ It is important to know, however, that such a view is solely based on cross-sectional studies in which sampling procedures and age representation differ considerably. The broader picture regarding developmental trends in sleep habits originates from the patchwork of a large number of studies, many of which have been focused exclusively on either preschoolers or school-aged children. The few previous

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studies that have examined long-term continuity of sleep habits were focused primarily on preschool children^{8,22,23} or were performed across 2 or 3 time points over many years.^{24,25}

Longitudinal designs that follow a cohort of children from birth up to school age and beyond allow for the examination of age trends without concerns about sample comparability. The longitudinal approach also addresses the question of whether sleep problems or bed sharing are rather transient in nature or whether they persist over time. In the 1950s, a collaborative network of longitudinal studies about growth and development of the individual child was started in several European cities (European Collaborative Studies²⁶). These studies provided an important resource of information regarding the development of sleep behavior during the 1950s and 1960s.^{20,27,28} The Second Zurich Longitudinal Study (LS) and the Zurich Generational Study (GS) between 1974 and 2001 followed the First Zurich Longitudinal Study of the Collaborative Network and included 493 children.

The aim of the analysis of both studies was to (1) determine the prevalence and age trend of bed sharing and sleep problems in the first 10 years of life, (2) determine if bed sharing and sleep problems show any persistent trend over the long-term course, (3) evaluate the relationship between sleep problems and bed sharing, and (4) identify secular trends between early 1970 and the present.

METHODS

Subjects and Study Design

A total of 493 children from the prospective Zurich Longitudinal Studies (141 preterm and 352 term infants, 261 males and 232 females) were followed with comprehensive neurodevelopmental assessments and structured interviews at 1, 3, 6, 9, 12, 18, and 24 months after birth and at annual intervals thereafter until 10 years of age (time limits: for the age of 3 to 18 months, ± 1 week; for the age of ≥ 2 years, ± 2 weeks). Subject enrollment began in 1974 and continued over a 19-year period. The subjects were born between October 1974 and September 1978 (LS, $n = 226$) and between September 1978 and July 1993 (GS, $n = 267$). The 493 children belonged to 359 different families; 247 families had 1 child, 94 families had 2 children, 14 had 3 children, and 4 families had 4 children in the study. There were 24 pairs of twins. The children, however, were viewed as statistically independent, and no use of the family relationship was made in the analysis.

All children were of Swiss origin (white) and formed a representative selection of the Swiss urban population. Correction of preterm birth was made by calculating the ages of examination from term. Of the maximum number of possible visits, 97% were conducted at appropriate ages. The main characteristics of the Zurich Longitudinal Studies have been described elsewhere.²⁹

Measures

Structured face-to-face interviews with parents (primarily mothers) were performed for various sleep-related habits (see ref 26 for complete questionnaires developed in 1953 for the European Collaborative Studies). The parents were queried with closed-ended, forced-choice questions asking them to recall bed sharing, night wakings, bedtime resistance, and sleep-onset difficulties over the past 3 months preceding the consultation. The questions were phrased as follows:

1. *Does your child sleep in your bed during the night (bed sharing)?* Although it was not specifically differentiated between all-night and part-night bed sharing, the wording "during the night" suggested bed sharing for "most of the night." Body contact during the night was not queried explicitly. Motivation

of bed sharing was not evaluated. Response choices read to mothers included "never," "1 to 3 times every 3 months," "once every 2 weeks," "once per week," "2 to 3 times per week," "4 to 6 times per week," and "every night." The items were categorized on a 4-point scale: "never" (up to 1–3 times every 3 months), "rarely" (up to once per week), "regularly" (up to 6 times per week), and "every night."

2. *Does your child wake up during the night (at a time when parents are also in bed)?* The additional phrasing in parentheses was thought to give an operational definition of night wakings, which indicated parental involvement to some extent. The degree of distress reported by the parents, however, was not evaluated. The items were rated on the same 4-point scale as with bed sharing.
3. *Do you have difficulties settling the child for sleep (bedtime resistance, refusal to sleep)?* The response choices read to mothers were: "never," "rarely," "occasionally," and "regularly."
4. *Does your child have difficulties with falling asleep (sleep-onset difficulties)?* The response choices read to mothers were the same as with bedtime resistance.

For bed sharing, bedtime resistance, and sleep-onset difficulties, no information was available at 1 month of age. During the entire study period (1974–2001), only 2 interviewers using the same interview procedures completed the questionnaires. The structured interviews were part of a half-day neurodevelopmental assessment procedure.

Statistics

Statistical analysis was performed by S-PLUS 2000 for Windows (Insightful Corporation, Seattle, WA). The variables were categorical (in most cases ordinal, but no use was made of the ordinal structure). To study term/preterm, gender, and cohort effects on the categorical dependent variables describing bed sharing, night wakings, bedtime resistance, and sleep-onset difficulties, log-linear models were used.³⁰ Descriptive statistical methods (means, frequencies, histograms, and other graphics) were applied. The association between categorical variables at the same age or at different ages was analyzed by presenting (graphically as a function of age) the odd ratios calculated from 2×2 contingency tables and obtained by dichotomizing the variables (see "Results" for more details).

Term/preterm effects were analyzed in the LS, because only a few preterm subjects participated in the GS; gender differences were analyzed within both the LS and GS. Cohort effects were studied in the term children of both the LS (1974–1978, $n = 110$) and GS (1979–1985, $n = 136$; 1986–1993, $n = 106$).

RESULTS

No differences in bed sharing and sleep problems (night wakings, bedtime resistance, and sleep-onset difficulties) were noted between children born preterm and at term or between boys and girls. Thus, data for boys and girls were always pooled, as were those for term and preterm, with the exception of when studying cohort effects, for which only term children were included. Sibling status had no effect on the prevalence of bed sharing, night wakings, and sleep-onset difficulties. No significant correlation of bed sharing or sleep problems with socioeconomic status was found across age groups.

Prevalence and Persistence

Bed Sharing

Less than 10% of the children shared the bed with their parents at least once per week in the first year of life (Fig 1, left top: 5.9% at 3 months and 6.6% at 9 months). The prevalence of bed sharing ≥ 1 times per week increased with age and reached a maximum between 3 and 5 years (38.1% at 4 years). At 8 years old, 21.2% of all children still slept at least once per week in their parents' bed. The prevalence was

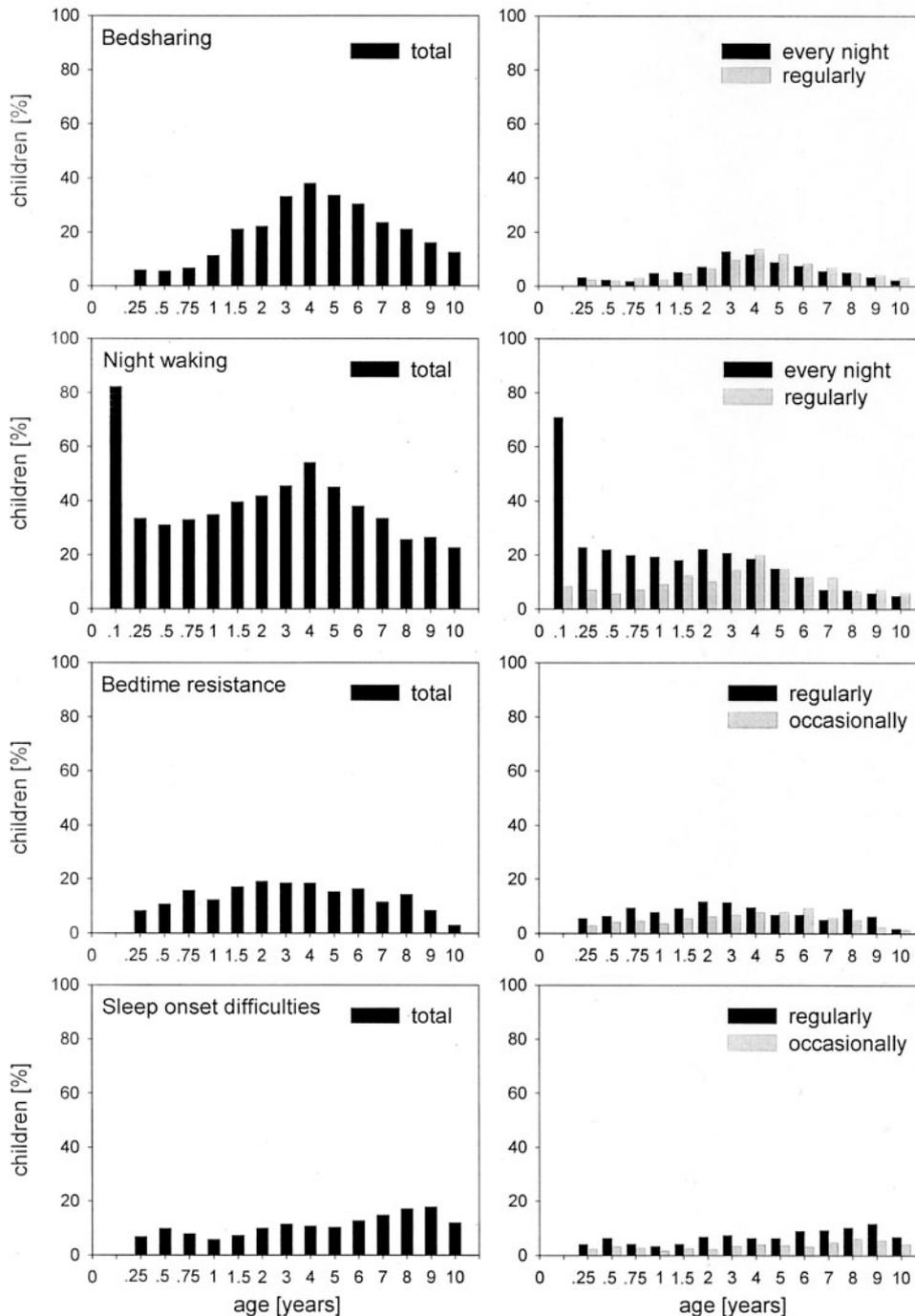


Fig 1. Prevalence for bed sharing and sleep problems in the first 10 years of life (cross-sectional data). For bed sharing, bedtime resistance, and sleep-onset difficulties, data for 1 month were not available. Left, total percentage of children demonstrating the indicated behavior with any frequency. The difference between black bars and 100% represents the category “never” (non-bed sharers or children without sleep problems). Right, prevalence for selected categories (see “Methods” for definition of categories).

higher at ages above the maximum (≥ 5 years) compared with ages below the maximum (≤ 3 years). The age trend did not differ between the total figure and the categories “every night” and “regularly” (Fig 1, right top); at 3 years, 12.8% of all children shared the bed with their parents every night, whereas 5.1% did so at 8 years. Almost half of all parents (44.1%) reported that the child had slept at least once per week in the parents’ bed for a period of ≥ 1 year between 2 and 7 years (Fig 2, black bars). For a substantial percentage of children, bed sharing also

persisted over times; 18.8% of all children shared the bed with the parents ≥ 1 times per week for at least 3 years.

To evaluate the persistence of bed sharing in more detail, 2×2 contingency tables for bed sharing (≥ 1 times per week) versus no bed sharing (never) at specific ages were created. To determine the magnitude of the association between bed sharing at a certain age and bed sharing at another age, odds ratios were calculated and plotted on a logarithmic scale as a function of age (Fig 3). Thus, for example,

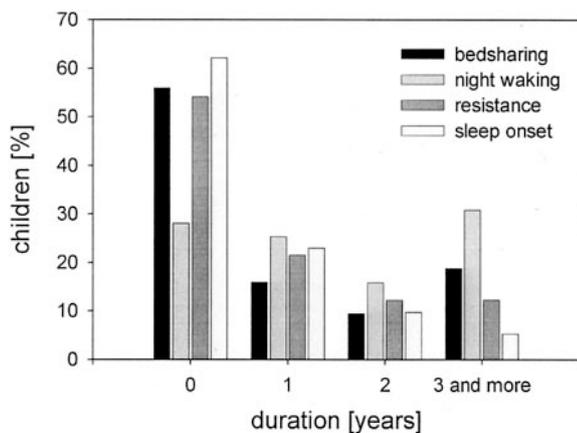


Fig 2. Duration of bed sharing (≥ 1 per week), night wakings (≥ 1 per week), bedtime resistance (occasionally and regularly), and sleep-onset difficulties (occasionally and regularly) between 2 and 7 years of age (longitudinal data).

children sharing a bed with the parents at 6 months old were not more likely to share the parents' bed during childhood than children who did not share the parents' bed at that age. Bed sharing during the second half of the first year (ages 9 and 12 months) persisted up to 3 years old. Children sleeping in the bed of their parents at 4 years old were more likely to share the bed over a broad age range, that is from 2 years up to 10 years old. Thus, bed sharing during infancy was not predictive of bed sharing during childhood, whereas bed sharing during childhood tended to persist over longer periods of time.

Night Wakings

A decrease in nocturnal wakings (from 82.4% at 1 month to 33.6% at 3 months) was seen in the first 3 months after birth (Fig 1, second row). After 3 months, night wakings gradually increased again to a maximum at 4 years, when more than half of all children (54.2%) woke up at least once per week (22.2% every night at 2 years), and then the prevalence of night wakings declined. At 10 years, however, 22.7% of all children continued to wake up at least once per week (4.9% every night). Similar to bed sharing, night wakings tended to persist over time (Fig 2). Between the ages of 2 and 7 years, 30.8% of all children woke up at least once per week over a period of ≥ 3 years.

The calculation of odds ratios for night wakings at a certain age versus night wakings at another age revealed a similar pattern as for bed sharing (Fig 3, lower panels). Night wakings in early infancy seemed to be a rather transient behavior, whereas night wakings during childhood tended to persist over time.

Bedtime Resistance and Sleep-Onset Difficulties

Less than 10% of all children demonstrated regular bedtime resistance or sleep-onset difficulties in the first 10 years of life (Fig 1, lower 2 rows). Bedtime resistance (occasionally and regularly) was more prevalent in toddlers (18.6% at 3 years) than in infants (10.8% at 6 months) or school-aged children (8.3% at 9 years). Sleep-onset difficulties (occasion-

ally and regularly) were more prevalent in older children (6.4% at 3 months, 9.0% at age 2 years, and 17.1% at 9 years). Between years 2 and 7, regular bedtime resistance was never reported in the majority of children (76.2%). Likewise, regular sleep-onset difficulties were never described in most of the children (85.6%). Bedtime resistance and sleep-onset difficulties tended not to persist; 12.2% of all children had occasional bedtime resistance, and only 5.2% of all children had sleep-onset difficulties for a period of ≥ 3 years.

No consistent association between bedtime resistance (sleep-onset difficulties) at a certain age and bedtime resistance (sleep-onset difficulties) at another age could be found (odds ratio calculations, data not shown).

Cohort Effects

The general age trend of bed sharing with a low prevalence during infancy and an increase during preschool years was observed in all 3 cohorts (Fig 4). The bed-sharing maximum, however, occurred in the first 2 cohorts (1974–1978 and 1979–1985) at 3 and 4 years, whereas in the later cohort (1986–1993) it appeared at 5 years. Children of later cohorts were reported to experience considerably less bedtime resistance than those of earlier cohorts. In the first cohort (1974–1978), bedtime resistance exhibited an increase during early childhood (maximum age: 5 years; 29.6% occasionally and regularly), whereas such an increase was not observed in the 2 later cohorts. Bedtime resistance in the first cohort was more prevalent in single children between the ages of 4 and 8 years than in children with siblings. For sleep-onset difficulties and night wakings, no consistent cohort effect was found.

Association Between Bed Sharing and Sleep Problems

Bed sharing was significantly correlated with nocturnal wakings at all ages ($r = 0.28-0.60$; $P < .05$) except for at 3 months old. The relationship between bed sharing and bedtime resistance or sleep-onset difficulties, however, was not consistently observed across all ages. Night wakings were significantly correlated with neither bedtime resistance nor with sleep-onset difficulties.

Association Between Sleep Duration and Bed Sharing or Sleep Problems

Age and secular trends of sleep duration have been reported for the given longitudinal sample.³¹ Sleep duration was calculated from bedtime and wake time. Children sharing the parents' bed tended to sleep significantly less up to 8 years old than non-bed-sharing children (Table 1). The association between shorter sleep duration and night wakings or bedtime resistance was less robust and occurred only during the preschool years. Children with sleep-onset difficulties had a shorter sleep duration than children who did not show sleep-onset problems, particularly early in life and during school age.

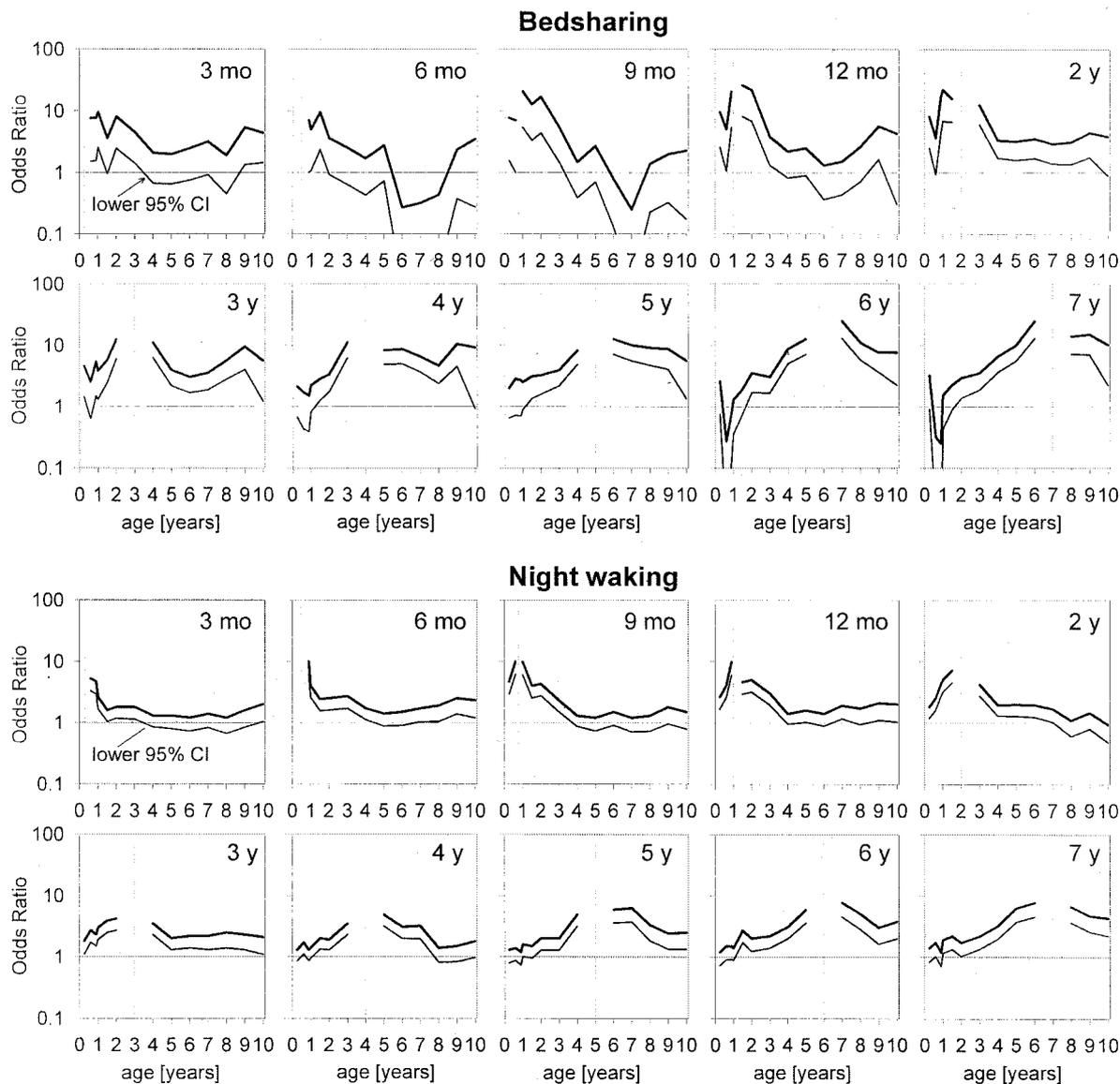


Fig 3. Log odds ratios for bed sharing (night wakings, lower) at a certain age (x-axis) versus bed sharing (night wakings) at another age (indicated in the upper right corner of each panel). The thin line represents the lower boundary of the 95% confidence interval. Bed sharing at a certain age was associated with bed sharing (night wakings) at ages where the lower boundary of the 95% confidence interval exceeded an odds ratio of 1. In other terms, if the thin line is above 1, the positive association between bed sharing at the 2 ages is statistically significant at the 5% level.

DISCUSSION

This study about children's sleep behavior differs from previous studies in one particular respect; children were followed longitudinally in the first 10 years of life, enabling the description of age trends, persistence over time, and secular trends. Our findings challenge the view that bed sharing and night wakings gradually decrease with advancing age. In this population, we found a low prevalence of bed sharing during infancy, an increase during early childhood, and a slow decline during school-age years (Fig 1). We note that, by and large, the following interpretation of our findings is based on current knowledge about child development and parent-child interactions. No key-related behavioral and developmental variables were included in the analysis of this longitudinal study.

Parents commonly choose their sleeping arrange-

ments on the basis of cultural beliefs and professional advice.³² In Switzerland, like most Western cultures, health care providers often advocate against infant-parent bed sharing, which may have contributed to its low prevalence in our infant sample. Concerns commonly include safety risks for sudden infant death and long-term consequences of bed sharing on psychosocial development.⁴ An important finding of our study is the increase in bed sharing after infancy, leading to a peak prevalence of 38% (≥ 1 times per week) at 4 years old. This trend paralleled that of night wakings, which also increased during early childhood and exhibited a peak at 4 years. There are several potential explanations for this association. It is possible that parents who shared their bed with the child may simply be more aware of the child's nocturnal wakings. However, common underlying developmental processes may

Fig 4. Secular trends of bed sharing and sleep problems in the first 10 years of life. Three cohorts of term children were formed (1974–1978, $n = 110$; 1979–1985, $n = 136$; 1986–1993, $n = 106$). “Once per week” to “every night” were considered for bed sharing and night wakings. “Occasionally” and “regularly” were considered for bedtime resistance and sleep-onset difficulties.

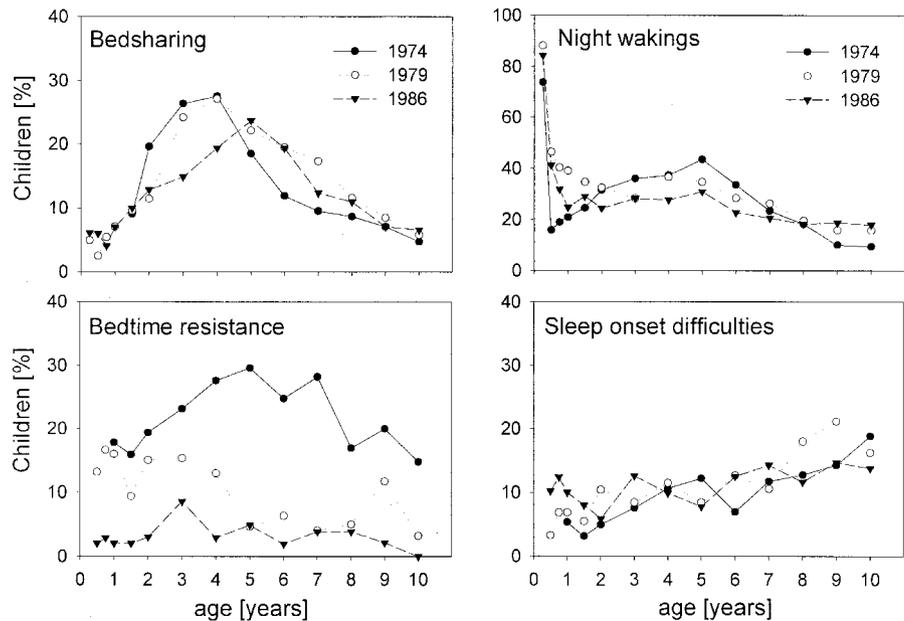


TABLE 1. Differences of SD Scores for Sleep Duration (Time in Bed) Between Children With and Without Bed Sharing (B), Night Wakings (N), Bedtime Resistance (R), and Sleep-Onset Difficulties (O)

Age	B	N	R	O
3 mo	0.26	0.11	0.59*	0.59*
6 mo	0.68†	0.36‡	0.32	0.58‡
9 mo	0.74*	0.36‡	0.35‡	0.45*
1 y	1.04‡	0.40‡	0.01	0.40†
1.5 y	0.88‡	0.22*	0.28*	0.70‡
2 y	0.62‡	0.39‡	0.46‡	0.43‡
3 y	0.67‡	0.56‡	0.37‡	0.17
4 y	0.22†	0.14	0.10	0.09
5 y	0.24*	0.28‡	0.05	0.19
6 y	0.40‡	0.06	0.08	0.51‡
7 y	0.06	-0.09	0.23	0.27*
8 y	0.40‡	0.01	0.03	0.36‡
9 y	-0.18	-0.14	0.06	0.54‡
10 y	0.10	-0.10	0.45	0.76‡

The variables were dichotomized as “never” (ie, non-bed sharers) and “not never” (ie, bed sharers). Positive differences mean that non-bed sharers (and non-N, non-R, and non-O) were sleeping longer.

* $P < .05$.

† $P < .1$.

‡ $P < .01$.

drive the age trend of both bed sharing and nocturnal wakings.

If a young child wakes up during the night and the parents are not present, he or she may signal discomfort and actively seek physical contact (ie, move from his or her bed to the parents’ bed). Toddlers and preschool children frequently display separation anxiety in situations (including bedtime) in which they are separated from primary attachment figures.³³ The degree of separation anxiety depends on the child’s developmental level, individual characteristics, and previous experiences. Attachment processes have been related to childhood sleep problems.^{34,35} An association between insecure attachment during the day and sleep problems during the night has been demonstrated.^{36,37} However, not only may insecurely attached children exhibit distress on

nocturnal separation but so may children with normal behavioral and emotional features.³⁸ The attachment relationship may not be the only process contributing to the unique age pattern of bed sharing and night wakings. The rise in prevalence during early childhood parallels increasing nighttime fears to imaginary stimuli (eg, ghosts, monsters). Nighttime fears follow the cognitive development and are viewed as a normal developmental phase of the young child.³⁹ In addition, the development of self-recognition between 18 and 24 months leads to an awareness of being alone during the night and may contribute to the described temporal pattern of bed sharing and night wakings.

Independent locomotion is an essential condition for the child’s proximity seeking at night. Locomotor abilities show a dramatic progress between ages 1 and 3 years,⁴⁰ concomitant to the increase of bed sharing in our sample. Only after the first year of life do the children become capable of getting out of their bed and going into the parents’ bedroom. Taken together, specific developmental changes in separation-attachment processes, cognitive capabilities to develop self-recognition and nighttime fears, and motor locomotion may contribute to the age trend of night wakings and bed sharing during early childhood. Because these features of child development are universally present, we would expect age trends of bed sharing and night wakings to be similar in other countries and cultures. In fact, Ottaviano et al⁴¹ found an increase in cosleeping prevalence during the preschool years in their cross-sectional study of sleep characteristics in Italian children.

Another important aspect of this study was the analysis of the long-term course of bed sharing and sleep problems. We found that bed sharing and night wakings during childhood persisted longer over time than bedtime resistance and sleep-onset difficulties (Fig 2). As mentioned in the introduction, previous studies about the persistence of specific sleep habits were focused on preschool children^{8,22,23}

or performed across 2 or 3 time points over long intervals.^{24,25} To address these limitations, we calculated odds ratios for bed sharing at a certain age versus bed sharing at another age (Fig 3). One of the most striking findings was that bed sharing and night wakings during infancy were not predictive for bed sharing and night wakings during childhood, whereas bed sharing and night wakings during childhood persisted over time. A tentative interpretation of this finding is that bed sharing and night wakings exhibit different functional mechanisms at different developmental phases. Infant-mother bed sharing may be determined primarily by feeding practices, especially in terms of proximity for breastfeeding. Later during development, bed sharing becomes child-initiated by ambivalent attachment-separation processes and nighttime fears. A similar explanation may hold for night wakings. Early in development, night wakings reflect maturational processes of the sleep/wake system,⁴² whereas at later ages, cognitive and emotional issues may play the principal role. We conclude that sleep habits such as bed sharing and night wakings may underlie different functional processes at different developmental stages, although they exhibit behaviorally equivalent patterns from birth through childhood.

In our study, bedtime resistance and sleep-onset difficulties were relatively infrequent and seemed to be rather transient phenomena, not related to bed sharing and not reflective of the age trend of bed sharing and night wakings. A closer look into secular trends, however, revealed that bedtime resistance increased between 18 months and 5 years, similar to bed sharing and night wakings (Fig 4), but this increase was limited to the first cohort born between 1974 and 1978. In the 2 later cohorts (1979–1985 and 1986–1993), the prevalence of bedtime resistance was substantially lower than in the first one and did not exhibit a particular age trend. We recently showed that sleep duration (time in bed) declines across cohorts because of increasingly delayed bedtime, whereas wake up time remains unchanged.³¹ In recent years, Swiss children have been put to sleep later, at a time when they were really tired and therefore demonstrated less resistance in going to bed. We believe that parents in the 1990s adjust bedtime to their child's actual sleep need more appropriately than parents in the 1970s. Such a conclusion, however, remains tentative, because daytime behavior, daytime sleepiness, or difficulties in waking up in the morning as a consequence of the delayed bedtime and the sleep loss across cohorts were not assessed in the Zurich Longitudinal Studies. We found that sleep duration was significantly shorter in bed sharers, night wakers, and bedtime resisters over a large age range (Table 1). Whether daytime behavior in these children was significantly altered is not known.

There are several limitations that should be considered when interpreting our results. First, the variables of the Zurich Longitudinal Studies were obtained exclusively by parental interview and long-term recall (period of 3 months before each interview), for which rater bias and inaccuracy can-

not be excluded. The findings of this study may reflect more precisely parental perceptions of sleep than sleep of the individual child per se. Second, more precise definitions for bed sharing (eg, all night, part night, body contact), night wakings (eg, duration, need for parental intervention), bedtime resistance (more precise rating scale), and sleep-onset difficulties (parental versus child report) would have been desirable. Third, key-related variables such as parental involvement around bedtime, attachment quality during the day, or daytime sleepiness were not assessed in this study. Thus, additional investigations are required to better understand the particular age trend of bed sharing and night wakings during childhood. Cross-cultural collaborative studies are also needed to confirm that universally present features of child development primarily drive bed-sharing and night-waking behavior during early childhood.

CONCLUSIONS AND CLINICAL IMPLICATIONS

The unique age trend of bed sharing and night wakings must be understood in the context of cognitive, emotional, and physical changes that occur at different developmental stages. Some children may need parental proximity during the night as during the day depending on their developmental level, individual characteristics, and attachment behavior. We believe that it is inappropriate to fundamentally condemn the practice of bed sharing by professional advice. In parental counseling, the individual child's needs, the family context, and cultural background need to be taken into account. This study indicates that the attachment behavior of the child during the day and at night as well as childcare arrangements within and outside the family should be considered.

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