



A Longitudinal Study of the Effects of Bed-Sharing Experience in Infancy on Sleep Outcomes at 2 Years Old

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Objective To assess the effects of bed-sharing experiences in infancy on sleep patterns and sleep problems at 2 years of age.

Study design A total of 1564 children from an ongoing Shanghai Maternal-Child Pairs Cohort were included. Bed-sharing experiences were collected when children were 2, 6, and 24 months old via caregiver-completed questionnaires (whether caregivers shared a bed with children during the night), and children's bed-sharing experiences were classified as follows: no bed-sharing, early-only bed-sharing, late-onset bed-sharing, and persistent bed-sharing. Sleep outcomes at month 24 were assessed using the Brief Infant Sleep Questionnaire. Sleep patterns and problems were compared among the 4 types of bed-sharing experiences.

Results Of the 1564 infants, 10.10% had no bed-sharing, 18.35% had early-only, 27.94% had late-onset, and 43.61% had persistent bed-sharing. Compared with children with no bed-sharing, children with late-onset and persistent bed-sharing had shorter nighttime sleep durations and longer daytime sleep durations ($P < .05$) and were more likely to snore (aOR 1.87 [95% CI 1.25-2.79]; aOR 1.68 [95% CI 1.14-2.47]) and have sleep onset difficulty (aOR 2.06 [95% CI 1.37-3.09]; aOR 2.07 [95% CI 1.41-3.05]). However, caregivers of infants in the late-onset and persistent bed-sharing groups perceived less problematic sleep (aOR 0.38 [95% CI 0.26-0.56] and aOR 0.40 [95% CI 0.28-0.58]).

Conclusions Bed-sharing is a common experience among Chinese children. Although bed-sharing may reduce caregivers' perception of children's problematic sleep, late-onset or persistent bed-sharing in infancy is associated with sleep problems at 2 years of age. (*J Pediatr* 2022;245:142-8).

Sleep patterns evolve rapidly during the first year of life and mature throughout childhood.¹ Many sleep problems in childhood and adults can be traced back to sleep patterns in infancy,² emphasizing the importance of developing healthy sleep patterns and sleep-related behaviors during infancy. Factors such as bedtime feedings, close contact, arousing activities at bedtime, and co-sleeping (bed-sharing) influence infant sleep patterns and affect the occurrence of sleep problems.³ All of these factors involve parental management of bedtime activities and lifestyle choices. Cross-cultural differences have been reported for multiple risk factors.⁴ Bed-sharing, one of the experiences that is most influenced by parents' cultural beliefs,⁵ is a customary sleeping arrangement for infants in many countries and has generated a debate about potential positive and negative effects on infant sleep behaviors.⁶

Parents may intentionally share a bed with a child because of cultural beliefs, breastfeeding facilitation, the parents' own sleep experiences, emotional needs, better caregiving,^{7,8} or socioeconomic factors.⁹ However, the American Academy of Pediatrics recommends against bed-sharing during infancy, citing epidemiologic evidence that bed-sharing increases the risk of sudden infant death syndrome under certain conditions.¹⁰

The literature on sleep problems and sleep arrangements has not resolved the underlying associations between bed-sharing experience in infancy and sleep problems in children. A Norwegian study ($n = 55\,831$) indicated that in infants at 6-18 months of age, bed-sharing was an independent and graded predictor of both nighttime awakenings and short sleep duration.¹¹ Among a community sample of preschool-aged children from Canada, bed-sharing was widely associated with frequent nighttime waking.¹² A study of 2-week-olds to 1-year-olds in Wisconsin found that bed-sharing was associated with a higher rate of infant night waking.¹³ Most previous studies come from western nations where bed-sharing is not the norm.¹⁴ Moreover, most studies have focused on children who are ≥ 3 years old and bed-sharing among infants has not been thoroughly studied. In addition, previous studies have mostly been single-point-in-time or short-term longitudinal studies involving small samples.

Therefore, the purpose of this longitudinal study was to assess the prevalence of bed-sharing in 2 years after birth and to prospectively investigate the impacts

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This study was supported by the Key Discipline Program of the Fifth Round of the Three-Year Public Health Action Plan (2020-2022 Year) of Shanghai (GWV-10.1-XK08).

The funder/sponsor did not participate in the work. The content is solely the responsibility of the authors and does not necessarily represent the official views of Shanghai Health Commission. The authors declare no conflicts of interest.

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<https://doi.org/10.1016/j.jpeds.2022.01.045>

BISQ Brief Infant Sleep Questionnaire
RMB Renminbi [yuan]

of bed-sharing experiences in infancy on sleep patterns and problems when children were 24 months old in a population-based birth cohort in Shanghai. We hypothesized that bed-sharing experience in infancy might be associated with increased risk of adverse sleep patterns and sleep-related problems in childhood.

Methods

Participants and Procedure

The study participants were from an ongoing population-based birth cohort in Shanghai, China (Shanghai Maternal-Child Pairs Cohort), which was the first prospective birth cohort study in China since the implementation of the comprehensive 2-child policy in 2016. The study protocol has been described extensively.¹⁵ In the 2 regional maternity hospitals in Pudong and Songjiang Districts in Shanghai, registered pregnant women were continuously recruited with informed consent on their first prenatal visit. The inclusion criteria were currently living in Shanghai, being able to read Chinese, and willing to participate in the cohort study. Pregnant women with syphilis or HIV were excluded. A total of 6714 pregnant women were included in this cohort. After exclusion of hospital transfer, physical condition, loss to follow-up, stillbirth, spontaneous abortion, therapeutically induced labor, and twin pregnancy, there were 5558 live births between April 2016 and November 2018. The follow-up visits were conducted at 2, 6, and 24 months after birth, and the information about children was collected by questionnaires completed by parents (usually mothers) or primary caregivers. Up to July 2020, 4246, 3468, and 2212 children were followed up at 2-, 6-, and 24-month visits, respectively. The flowchart of participation across follow-up points is shown in the [Figure](#). After deleting the missing data (core information, such as infant sex or sleep arrangements at months 2, 6, and 24, or sleep outcomes at months 24), we analyzed 1564 participants age 2 years old. All participants provided written informed consent. The research described met the ethical guidelines of the 2 participating hospitals and was approved by the Ethics Committee of the School of Public Health, Fudan University (IRB number 2016-04-0587).

Bed-Sharing Experience during the First 2 Years Postpartum

Bed-sharing was defined as children and caregivers sharing the same bed during the night, and information on bed-sharing was obtained using questionnaires completed by caregivers during routine physical examinations of infants at 2, 6, and 24 months of age. The questionnaire was completed under the guidance of a community pediatrician. The caregivers were asked about where their infants had slept at night over the past 2 weeks. The 5 possible answers included (1) a crib in the parents' room; (2) the parents' bed; (3) the crib in the other caregiver's room; (4) other caregiver's bed; and (5) the bed alone in their own room. When

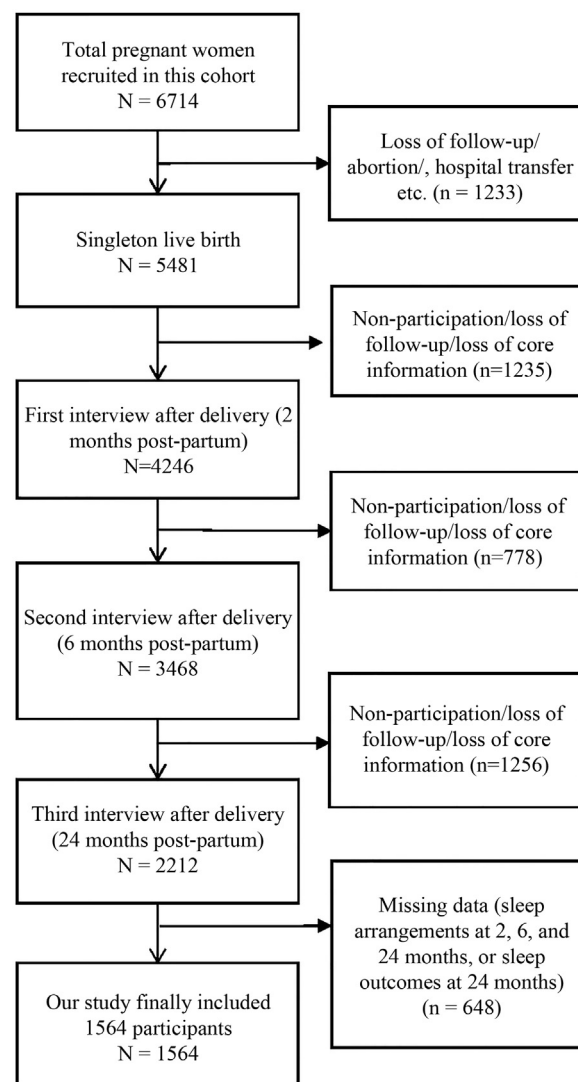


Figure. Flowchart describing the selection process for the final included children.

caregivers chose options (2) or (4), the sleep arrangement was defined as “bed-sharing.” Bed-sharing experiences were classified into 4 types based on the timing of 3 sleep arrangements at 2, 6, and 24 months: no bed-sharing (sleep independently without bed-sharing at the 3 time points); early-only bed-sharing (share bed with caregivers at 2 or 6 months and sleep independently at 24 months of age); late-onset bed-sharing (sleep independently at 2 or 6 months and share bed with caregivers at 24 months of age); and persistent bed-sharing (bed-sharing at all of the 3 time points).

Sleep Outcomes at 2 Years of Age

The sleep outcomes included sleep patterns and problems when children were 24 months old. Sleep patterns and problems were assessed using the Brief Infant Sleep Questionnaire (BISQ), which was developed for screening infant sleep problems and used widely in pediatric settings.¹⁶

The BISQ has been validated against objective measurement tool actigraphy and subjective measurement tool daily-logs, and the test-retest reliability of BISQ on individual sleep measures was high (>0.82).¹⁷ The BISQ has good psychometric properties as a brief sleep screening tool for clinical and research purposes in infants and toddlers (0-30 months). The BISQ assesses a range of domains of infant sleep, and the following were included in the current study: (1) nighttime sleep duration (between 7 PM and 7 AM); (2) daytime sleep duration (between 7 AM and 7 PM); (3) total sleep duration; (4) sleep onset latency (latency to falling asleep for the night); (5) number of night wakings; (6) Do you consider your child's sleep as a problem? (response options: "a serious problem," "a moderate problem," "a small problem," "not a problem at all"); (7) Does your child snore during sleep? (response options: "never," "only when sick or has a cold," "sometimes," "always"); and (8) bedtime. The BISQ was completed by the main caregivers who are most familiar with the sleep status of the children at 2 years of age; the caregivers were instructed to report on the children's sleep over the past week. In this study, sleep patterns included bedtime (time), sleep onset latency (minutes), number of night wakings, nighttime sleep duration (hours), daytime sleep duration (hours), and total sleep duration (hours). We defined sleep problems as snoring (when caregiver chose "sometimes" or "always"), perceived problematic sleep (when caregivers chose "a serious problem" or "a moderate problem"), sleep onset difficulty (latency to falling asleep at night more than 20 minutes), bedtime difficulty (sleep after 9 PM), and night waking (number of night wakings ≥ 2 per night).¹⁸

Covariates

The factors related to infant sleep, such as maternal age, infant sex, mother's education, household income, number of children, feeding, screen time, and outdoor activity¹⁹ were obtained from questionnaires completed by the participants. Maternal education was categorized into 3 groups: high school and below, professional college, college and above. Household income (Renminbi, RMB [yuan]/person/month) was divided into <7500 RMB/month, 7500-12 500 RMB/month, and $>12\ 500$ RMB/month (1 RMB is equal to 0.16 USD or 0.15 Euro). The number of children was divided into 2 groups: 1 child and ≥ 2 children. Information on breastfeeding was collected using a child checklist by doctors when children turned 1 and 6 months old and was divided into exclusive breastfeeding, mixed feeding, and formula feeding. Children's screen time (total in a day) and outdoor activity at the age of 24 months (total in a day) were reported by the caregivers.

Statistical Analyses

Descriptive statistics were calculated for the demographic characteristics of mothers and their children. Normally distributed continuous variables were expressed as the means and 1 SD, and categorical variables were expressed as frequencies with percentages. χ^2 analyses were conducted for

categorical variables. ANCOVAs (controlling for infant sex) were used to compare the sleep patterns among the 4 types of bed-sharing experiences in infancy, followed by Fisher least significant difference post hoc analyses. Multiple linear regression models were used to evaluate the associations between bed-sharing experiences and sleep patterns at 2 years of age. The estimate (β coefficient) and 95% CI described the associations and adjusted for covariates that affected the estimate for the main effects in the regression model, including infant sex, maternal age, mother's educational levels, household income, number of children, breastfeeding at 6 months of age, and outdoor activity. We applied the multiple logistic regression model to calculate the aORs and 95% CIs to assess the effect of bed-sharing experience on sleep problems by adjusting the covariates. All analyses were performed using IBM SPSS Statistics 20 for Windows (version 20.0; IBM SPSS, Inc). In the presentation of the results, statistical significance was set at $P < .05$ (2-tailed).

Results

The characteristics of participants according to the 4 bed-sharing experience types are presented in [Table I](#). It was found that 10.10% of the children had no bed-sharing, 18.35% had early-only bed-sharing, 27.94% had late-onset bed-sharing, and 43.61% had persistent bed-sharing. Among the 1564 participants, the proportion of bed-sharing increased from 60.74% at the age of 2 months to 71.99% at the age of 6 months, and it was maintained at 71.55% at month 24. Children with bed-sharing experiences had longer outdoor activity time, and the mothers tended to be younger, had lower household income, and were less educated ($P < .05$). There was no significant difference in characteristics between the 1564 infants enrolled in this study and the 2212 children who had been followed up at the age of 24 months ($P^{1-3} < .05$, [Table II](#); available at www.jpeds.com).

The average bedtime of infants at the age of 24 months was 9:29 PM, and the bedtime of girls (9:31 PM) was later than boys (9:27 PM). The average nighttime sleep duration and daytime sleep duration were 9.41 hours and 2.40 hours, respectively, and the average daytime sleep duration of boys (2.48 ± 1.15 hours) was higher than that of girls (2.32 ± 0.94 hours). The average time of night awakenings for infants was 0.83, and the average sleep onset latency was 36.53 minutes ([Tables III and IV](#); available at www.jpeds.com). At the 24-month follow-up visit, 38.49% of caregivers reported snoring, and the rate was higher in boys (41.41%) than in girls (35.49%). The rate of night waking and sleep onset difficulty reported by caregivers was 16.62% and 71.99%, respectively. The rate of night waking in boys was higher than that in girls, and the rate of bedtime difficulty in girls was later than boys. In addition, 60.49% of caregivers reported bedtime difficulty and 30.82% reported sleep problems when children were 24 months old ([Tables V and VI](#); available at www.jpeds.com).

Table 1. Characteristics of participants by bed-sharing experience type

Variables	No bed-sharing n = 158	Early-only sharing n = 287	Late-onset sharing n = 437	Persistent bed-sharing n = 682	χ^2	P
Maternal characteristics						
Maternal age (y)					17.00	.001
≤35	137 (86.71)	236 (82.23)	402 (91.99)	608 (89.15)		
>35	21 (13.29)	51 (17.77)	35 (8.01)	74 (10.85)		
Education					19.55	.003
High school and below	24 (15.19)	54 (18.82)	80 (18.31)	173 (25.37)		
Professional college	50 (31.65)	110 (38.33)	175 (40.05)	235 (34.46)		
College and above	84 (53.16)	123 (42.86)	182 (41.65)	274 (40.18)		
Household income (RMB/y)					40.43	<.001
<100 000	29 (18.35)	53 (18.47)	89 (20.37)	203 (29.77)		
100 000-200 000	78 (49.37)	136 (47.39)	231 (52.86)	347 (50.88)		
>200 000	51 (32.28)	98 (34.15)	117 (26.77)	132 (19.35)		
Number of children in family					3.55	.332
1	96 (60.76)	154 (53.66)	235 (53.78)	391 (57.33)		
≥2	62 (39.24)	133 (46.34)	202 (46.22)	291 (42.67)		
Children's characteristics						
Infants sex					6.55	.089
Male	69 (43.67)	139 (48.43)	217 (49.66)	367 (53.81)		
Female	89 (56.33)	148 (51.57)	220 (50.34)	315 (46.19)		
Exclusive breastfeeding						
At 1 mo	79 (50.00)	171 (59.58)	240 (54.92)	383 (56.16)	3.99	.262
At 4 mo	59 (37.34)	144 (50.17)	199 (45.54)	310 (45.45)	6.77	.082
Screen time (min/d)					2.98	.403
≤60	139 (87.97)	245 (85.37)	385 (88.10)	609 (89.30)		
>60	19 (12.03)	42 (14.63)	52 (11.90)	73 (10.70)		
Outdoor activity (min/d)					31.91	<.001
≤60	67 (42.41)	84 (29.27)	133 (30.43)	185 (27.13)		
61-120	68 (43.04)	167 (58.19)	209 (47.83)	334 (48.97)		
>120	23 (14.55)	36 (12.54)	95 (21.74)	163 (23.90)		

As shown in **Table VII**, there were significant differences in sleep onset latency, nighttime sleep duration, and daytime sleep duration among the 4 types of bed-sharing experiences. Compared with children in the early-only bed-sharing group, children in the late-onset and persistent bed-sharing groups fell asleep significantly more slowly ($P < .05$). In addition, compared with children in the no bed-sharing group, children with late-onset and persistent bed-sharing were more likely to have shorter nighttime sleep durations. Children with late-onset and persistent bed-sharing were more likely to have longer daytime sleep durations than children with no and early-only bed-sharing ($P < .001$). After adjusting for infant sex, maternal age, maternal educational levels, household income, breastfeeding at 6 months of age, and outdoor activity, the results of the multiple linear regression analyses (**Table VII**) showed that bed-sharing experiences were significantly associated with sleep patterns. Specifically, children with late-onset and persistent bed-sharing were more likely to have shorter nighttime sleep durations and longer daytime sleep durations than children with no bed-sharing.

Controlling for confounding factors, the results of the multivariate regression analyses (**Table VIII**) showed that bed-sharing experiences were significantly associated with sleep problems when children were 24 months old. Compared with children with no bed-sharing, children with late-onset and persistent bed-sharing were more likely

to snore (aOR 1.87 [95% CI 1.25-2.79]; aOR 1.68 [95% CI 1.14-2.47]) and have sleep onset difficulty (aOR 2.06 [95% CI 1.37-3.09]; aOR 2.07 [95% CI 1.41-3.05]). However, a decreased risk of caregivers perceived problematic sleep was observed among infants in the late-onset sharing and persistent bed-sharing groups (aOR 0.38 [95% CI 0.26-0.56] and aOR 0.40 [95% CI 0.28-0.58]). No significant differences in bedtime difficulty were observed among the 4 bed-sharing experiences.

Discussion

In this longitudinal study, we found that bed-sharing is common among Chinese infants. Late-onset and persistent bed-sharing experiences of infants were associated with shorter nighttime sleep durations, longer daytime sleep durations, and increased risk of sleep onset difficulty compared with infants with no bed-sharing experience. However, bed-sharing experience influenced caregivers' perception of children's sleep. Caregivers of late-onset and persistent bed-sharing did not perceive their children's sleep as problematic.

There is a great diversity in the frequency of bed-sharing experiences worldwide. In our study, more than 60% of caregivers shared beds with their children, which is higher than that reported in Western countries. Our findings are consistent with those of other studies in China, namely that the prevalence of bed-sharing experience increases from 30.5% at 0-2 months to 61.6% at 24-36 months of age,²⁰ although

Table VII. Sleep patterns in different bed-sharing types

Sleep patterns	Mean (SD)			Beta coefficient (95% CI) [†]		
	No bed-sharing	Early-only bed-sharing	Late-onset bed-sharing	Early-only bed-sharing	Late-onset bed-sharing	Persistent bed-sharing
						No bed-sharing
Bedtime (time)	9:28 PM (0.76)	9:25 PM (0.72)	9:34 PM (0.76)			
Sleep onset latency (mins)	33.71 (22.30)	31.66 [‡] (20.65)	38.18 [§] (25.52)	-0.01 (-0.18, 0.13)	0.06 (-0.03, 0.25)	0.02 (-0.11, 0.16)
Number of night wakings	0.92 (0.80)	0.87 (0.92)	0.78 (0.79)	-0.03 (-6.58, 3.22)	0.08 (-0.08, 9.09)	0.09 (-0.11, 8.69)
Nighttime sleep (hours)	9.70 [‡] (1.15)	9.54 [‡] (1.13)	9.33 [§] (0.99)	-0.02 (-0.20, 0.12)	-0.07 (-0.28, 0.02)	-0.06 (-0.24, 0.05)
Daytime sleep (hours)	2.19 [‡] (0.91)	2.22 [‡] (0.94)	2.41 [§] (0.89)	-0.06 (-0.40, 0.03)	-0.16 (-0.59, -0.19) ^{**}	-0.17 (-0.58, -0.19) ^{**}
Total sleep duration (hours)	11.61 (1.87)	11.77 (1.26)	11.74 (1.23)	0.02 (-0.20, 0.21)	0.08 (-0.01, 0.38)	0.13 (0.09, 0.46) [*]
				0.03 (-0.19, 0.45)	0.03 (-0.20, 0.39)	0.04 (-0.16, 0.40)

ANCOVA adjusted for infant sex.

Post hoc analyses: Columns with different superscripts symbols are significantly different from one another, $P < .05$.^{*} $P < .05$, ^{**} $P < .01$.[†]Adjusted for infants sex, maternal age, mother's education, household income, number of children in a family, breast feeding at 6 months old, and outdoor activity.

in a survey ($n = 18\,945$) in the US, this rate is only 13.5%.²¹ In Chinese tradition, family intimacy is especially emphasized; therefore, children sharing beds with caregivers is an accepted and natural sleep arrangement by caregivers. Similar findings were also found in Korean children.²² In Western countries, children's development of sleep independence and hazards of bed sharing are emphasized by pediatricians.²³ This cultural difference may partly account for the difference in the prevalence of bed-sharing experience. In addition, methodological issues, such as divergent methods used in collecting data, different definitions of bed-sharing experience, and ages of infants being studied, may also lead to differences in bed-sharing prevalence worldwide. Our results reveal that bed-sharing was influenced by maternal sociodemographic variables. A lower education level of the mother and a lower family income were risk factors for a high prevalence of bed-sharing, which has been shown in several studies.^{24,25} Crowded housing is common in families with a lower economic status in Shanghai, which may explain the high prevalence of bed-sharing. Similarly, bed-sharing experience is slightly more common among mothers age ≤ 35 years.

Bed-sharing is associated with sleep patterns in infants. In this study, bed-sharing experience had no significant influence on total sleep duration, which was in agreement with the results of a study in 4- to 11-year-old children in India.²⁶ However, we found that children with late-onset and persistent bed-sharing had longer daytime sleep durations and shorter nighttime sleep durations than those with no bed-sharing. Previous studies have shown that nighttime sleep duration is important for infant development and should not be replaced by longer daytime sleep duration.²⁷ Hence, future epidemiologic and cohort studies should focus on the effects of bed-sharing during infancy on sleep patterns at various ages.

In this prospective study, we found that compared with children without bed-sharing, those with late-onset and persistent bed-sharing were significantly more likely to have snoring and sleep onset difficulty, which is similar to the findings in older children.²⁸ In a large international online survey ($n = 29\,287$), solitary sleeping children had fewer difficulties at bedtime, and fell asleep faster than bed-sharing children.²⁹ Caregivers who share beds with children might better recognize sleep onset latency, simply because of their nighttime proximity to their children,³⁰ leading to higher reported occurrence of sleep onset difficulty. Children with bed-sharing are more likely to be affected by their caregivers' sleep habits, and studies have shown that the presence of caregivers increases the risk of sleep onset difficulties.³¹ In addition, there is a possibility that some caregivers engage in reactive bed-sharing experience: they have their infants in bed with them in response to a sleep problem. In our research, caregivers of late-onset and persistent bed-sharing were unlikely to think that their children had problematic sleep. Our study was based on subjective reports without an objective measure of infant and toddler sleep. Caregivers' thoughts and perceptions regarding infants' and toddlers'

Table VIII. Multivariate logistic regression of bed-sharing experiences toward sleep problems

	Snoring	Sleep onset difficulty	Bedtime difficulty	Night wakings	Perceived problematic sleep
	aOR [†] (95% CI)	aOR [†] (95% CI)	aOR [†] (95% CI)	aOR [†] (95% CI)	aOR [†] (95% CI)
No bed-sharing	1.00	1.00	1.00	1.00	1.00
Early-only bed-sharing	0.96 (0.62-1.49)	0.83 (0.55-1.26)	0.79 (0.52-1.20)	1.08 (0.66-1.77)	0.90 (0.61-1.34)
Late-onset bed-sharing	1.87 (1.25-2.79)**	2.06 (1.37-3.09)**	0.95 (0.64-1.41)	0.66 (0.41-1.07)	0.38 (0.26-0.56)**
Persistent bed-sharing	1.68 (1.14-2.47)**	2.07 (1.41-3.05)**	0.76 (0.53-1.11)	0.72 (0.45-1.13)	0.40 (0.28-0.58)**

* $P < .05$, ** $P < .01$

†Adjusted for infants sex, maternal age, mother's education, household income, number of children in a family, breast feeding at 6 months old, and outdoor activity.

sleep are shaped by their own childhood narratives and actual experience with their own child.³² Previous studies have shown that parents who bed-share were content because their children's sleeping arrangements met their expectations of what should be happening during the night.³³ However, they may discount sleep problems and not consider children's sleep behavior as problematic. Further studies are needed to replicate our findings using actigraphy or other instruments to collect objective sleep information.

This study was strengthened by a prospective cohort design and repeated measurements of bed-sharing experience during the first 2 years of life. In addition, we capitalized on the fluidity of bed-sharing to identify subgroups of families with different patterns of bed-sharing used across the first 2 years, and examined the linkages between bed-sharing and sleep outcomes across 3 age time points. Our study investigated the effect of bed-sharing experience in infancy on sleep patterns and problems, providing new information about the role of parent-child bed-sharing experience. However, several limitations of the current study should be considered. First, the survey was conducted in Shanghai, therefore, caution in generalizing our findings toward bed-sharing experiences in infants throughout China or other countries is warranted. Second, we did not ask caregivers about their reasons for bed-sharing. The outcomes of bed-sharing experience may depend on whether caregivers choose to bed-share or whether bed-sharing experience occurs in reaction to a child's sleep problems. Third, the causal relationship between bed sharing and sleep problems was not determined: this could be an area for further exploration using qualitative methods. Future longitudinal research is needed to test whether associations between bed-sharing experience in infancy and sleep outcomes later vary according to the reason for bed-sharing experience.

Bed-sharing experience between the ages of 2 and 24 months of age was associated with sleep patterns and problems at 24 months. However, it is worth noting that caregivers who share beds with children do not perceive child sleep problems. Our findings suggest that pediatricians and caregivers should be aware of differences in ideas and beliefs on bed-sharing and pay attention to the consequences related to sleep patterns and problems in the family. Future studies must focus on the long-term effects of bed-sharing experience on children's mental and physical health. ■

We are extremely grateful to all of the families that took part in this study and the entire Shanghai Maternal-Child Pairs Cohort team.

Submitted for publication May 18, 2021; last revision received Dec 29, 2021; accepted Jan 26, 2022.

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Table II. The main characteristics of infants in different groups

Variables	Group 1: infants follow-up at 24 months n (%)	Group 2: infants not follow-up at 24 months n (%)	Group 3: infants included in this analysis n (%)	<i>p</i> ¹⁻²	<i>p</i> ¹⁻³
Total number (N)	2212	2034	1564		
Maternal age				.173	.383
≤35 y	1976 (89.33)	1790 (88.00)	1383 (88.43)		
>35 y	236 (10.67)	244 (12.00)	181 (11.57)		
Educational level				.585	.713
High school and below	492 (22.24)	441 (21.68)	331 (21.16)		
Professional college	788 (35.62)	704 (34.61)	570 (36.45)		
College and above	932 (42.13)	889 (43.71)	663 (42.39)		
Household income (RMB/y)				<.001	.536
<100 000	564 (25.50)	491 (24.14)	374 (23.91)		
100 000-200 000	1093 (49.41)	913 (44.89)	792 (50.64)		
>200 000	555 (25.09)	630 (30.97)	398 (25.45)		
Infants sex				.173	.429
Male	1149 (51.94)	1014 (49.85)	792 (50.64)		
Female	1063 (48.06)	1020 (50.15)	772 (49.36)		

Data with *P* value less than .05 in bold indicates statistical significance.

Table III. Sleep patterns between total and included infants at 24 months of age, mean (SD)

Sleep patterns	Total (N = 2212)	Included (n = 1564)	<i>P</i>
Bedtime	9:27 PM	9:29 PM	.692
Nighttime sleep (h)	9.44 (1.10)	9.41 (1.10)	.913
Daytime sleep (h)	2.39 (1.00)	2.33 (1.01)	.410
Number of night wakings	0.84 (0.84)	0.83 (0.82)	.511
Sleep onset latency (min)	36.95 (25.88)	36.53 (25.02)	.374

Table IV. Sleep patterns between each sex group in included infants at 24 months of age, mean (SD)

Sleep patterns	Total (N = 1564)	Boys (n = 792)	Girls (n = 772)	<i>P</i>
Bedtime	9:29 PM	9:27 PM	9:31 PM	.047
Nighttime sleep (h)	9.41 (1.10)	9.42 (1.09)	9.40 (1.12)	.422
Daytime sleep (h)	2.40 (1.06)	2.48 (1.15)	2.32 (0.94)	.005
Number of night wakings	0.83 (0.82)	0.86 (0.81)	0.81 (0.83)	.271
Sleep onset latency (min)	36.53 (25.02)	36.21 (25.38)	37.78 (26.39)	.674

Data with *P* value less than .05 in bold indicates statistical significance.

Table V. Sleep problems between total and included infants at 24 months of age, n (%)

Sleep problems	Total (N = 2212)	Included (n = 1564)	P
Snoring	839 (37.93)	602 (38.49)	.751
Night wakings	370 (16.73)	260 (16.62)	.919
Sleep onset difficulty	1608 (72.69)	1126 (71.99)	.691
Bedtime difficulty	1297 (58.63)	946 (60.49)	.317
Perceived problematic sleep	677 (30.61)	482 (30.82)	.891

Table VI. The report rate of sleep problems between each sex group in included infants at 24 months of age, n (%)

Sleep problems	Total (N = 1564)	Boys (n = 792)	Girls (n = 772)	P
Snoring	602 (38.49)	328 (41.41)	274 (35.49)	.016
Night wakings	260 (16.62)	150 (18.94)	110 (14.25)	.014
Sleep onset difficulty	1126 (71.99)	578 (72.98)	548 (70.98)	.424
Bedtime difficulty	946 (60.49)	456 (57.58)	490 (63.47)	.012
Perceived problematic sleep	482 (30.82)	246 (31.06)	236 (30.57)	.875

Data with *P* value less than .05 in bold indicates statistical significance.