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Complex childcare experiences and sleep outcomes in young children



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ABSTRACT

Objectives: Attending center-based childcare has been linked to shorter nighttime sleep in children. However, relatively little attention has been paid to the role of complexity and transition of childcare arrangements on children's sleep. This study used prospective, nationally representative data to estimate the associations between complex childcare experiences and sleep outcomes during infancy and toddlerhood.

Design: Prospective longitudinal study.

Setting: This study used 9-month ($n = 3921$) and 2.5-year-old ($n = 3412$) data from the Longitudinal Study of Australian Children. The 2-wave longitudinal sample included 3046 children.

Intervention: Not applicable.

Measurements: Complex childcare experiences were measured by time spent in center, relative, and nonrelative childcare; use of multiple childcare arrangements; and patterns of childcare use over the 2-wave period. Sleep outcomes included maternal reports of weekday and weekend nighttime sleep duration, difficulty falling asleep, waking up during the night, and restless sleeping of the child.

Results: Cross-sectional analysis showed that, in addition to center childcare, hours spent in relative and nonrelative childcare were negatively associated with weekday nighttime sleep duration but not weekend nighttime sleep duration. Multiple childcare arrangements were not associated with worse sleep outcomes. Longitudinal analysis showed that the association between child age and nighttime sleep duration was moderated by patterns of childcare use. Late attenders and children who used childcare for 2 waves but changed configuration had smaller increase of nighttime sleep duration.

Conclusions: In addition to center childcare, noncenter childcare may be an influential factor for children's nighttime sleep. Longitudinal patterns of childcare use can moderate children's developmental trajectories of nighttime sleep.

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Introduction

In recent decades, dramatically increased maternal labor force participation in developed countries has led to a corresponding increase in the demand for and use of childcare. This shift from home environment to out-of-home care can challenge a child's development and health.^{1–4} Although a child's subjective experiences with childcare can vary, the objective characteristics of and practices within childcare settings can powerfully shape a young child's health and well-being. Childcare settings can provide a set of unique socialization experiences and learning opportunities to children⁵ while concurrently posing different challenges for health and well-being.^{6,7}

Sleep is a critical developmental outcome that is particularly affected by childcare context. For young children, a good night's sleep is critical for healthy development, and it promotes the neurosensory

system development in early childhood.⁸ Thus, poor sleep in early childhood may lead to various health-related problems, including behavioral problems,^{9–11} obesity,^{6,12,13} and unintentional injury¹⁴; it can also negatively impact children's learning and result in poor academic performance in preschool or kindergarten.¹¹ The normative developmental trajectory of sleep characterizes a transition from polyphasic sleep to monophasic sleep by gradual reduction in daytime sleep.^{15,16} During early infancy, children sleep multiple times a day.¹⁶ As children reach 3 to 5 years old, their sleep patterns become monophasic by consolidating sleep time into the nighttime.¹⁶ As childcare use is the most common during this developmental period, understanding whether and how patterns of childcare use influence children's development of habitual sleep is crucial.

Scheduled naptime is a common practice for center childcare.¹⁷ This makes center-based childcare the focus of childcare and sleep literature. From the developmental perspective, scheduled naptime poses opportunities and challenges for children's development of habitual sleep. On one hand, scheduled naptime can respond to young children's sleep needs which can be important and beneficial

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for children's learning and brain development in early stage.^{17,18} On the other hand, after children develop the monophasic sleep patterns with a single consolidated nighttime sleep, napping can cause disruption to nighttime sleep which in turn affects health and development.¹⁷ Empirical studies consistently find that center childcare attendance is associated with shorter nighttime sleep duration.^{19–24} The association is stronger with the increase of naptime and when scheduled naptime is mandatory.²⁴

Although informative, these studies offer a partial view of the role of childcare attendance on sleep for several reasons. First, the literature has paid relative little attention to alternative types of childcare arrangements. In addition to center-based childcare, other childcare settings such as relative care and other nonrelative family day care² may also affect children's sleep.²³ Second, the literature also ignores the increasing complexity of childcare arrangements. For example, the rapid growing of the 24/7 economy²⁵ worldwide and the growth of single-parent households have led many parents to rely on *multiple childcare arrangements* (defined as more than 1 childcare provider or setting that a child experiences at the same time) to accommodate their daily schedules.²⁶ In the United States, recent estimates indicate that approximately 15% of children younger than 5 years of age regularly participate in more than 1 childcare arrangement that usually involves a combination of formal and informal care.²⁷ In Australia, approximately one-quarter of children under age 5 experience multiple childcare arrangements.²⁸ Concurrent multiple arrangements introduce instability by requiring children to travel between different childcare settings, inhibiting the development of stable relationships with caregivers, and requiring adjustments to different naptime schedules and practices in different settings, thereby potentially leading to sleep problems.^{26,29}

Third, relatively few studies have investigated whether and how longitudinal patterns of childcare use in early life relate to children's sleep. Most of existing studies are based on cross-sectional data. As parents may use multiple arrangements to meet their needs, they may also change childcare use over time to accommodate their changing work schedules. Thus, to consider complexity of childcare arrangements on child sleep, it is also essential to take longitudinal patterns of childcare use into account. Transition into and out of childcare settings and changes of childcare configuration over time may affect children's sleep as well.

Finally, most of prior studies have used small convenience samples to examine childhood sleep patterns within specific childcare settings.^{23,30,31} However, by only focusing on children in a specific childcare setting, these studies did not specifically investigate different childcare characteristics and their effects on sleep. Furthermore, these studies were based on small, nonrepresentative samples. Thus, the findings cannot be generalized to the general population of young children, which limited the public health and policy implications of the studies. The only exception is a recent study by Ikeda and colleagues.³² Using a national survey of approximately 40,000 Japanese children, the study found that preschool or childcare attendance was associated with shorter maternally reported sleep durations.³² However, this study only investigated childcare attendance, and it failed to consider the effects of different childcare characteristics on childhood sleep patterns. Thus, it remains unknown whether complex characteristics of early childcare arrangements affect sleep patterns in the general population of young children.

Using a nationally representative sample from the Longitudinal Study of Australian Children (LSAC), this study aims to fill these gaps in the literature. The LSAC data provide a wealth of information about children and their families, as well as detailed childcare history and childhood sleep in early life. The prospective, longitudinal study design allows for the examination of the relationship between complex early childcare experiences and sleep problems at different time points and over time. The study results provide national-level

evidence indicating a relationship between complex childcare arrangements and sleep outcomes. The findings may provide insights into the screening of children at higher risks of sleep problems in early childhood in Australia and other developed countries.

Methods

Data

The data used in this analysis were obtained from LSAC, which is a nationally representative sample of Australian children that is designed to focus on family and social environments and captures information about health and development. LSAC follows 2 cohorts of Australian children. The birth cohort data were used in this analysis. The initial recruitment took place between March and November of 2004, and families were interviewed every 2 years. The present study relies on the first 2 waves of data collection: 9 months (wave 1) and 2.5 years (wave 2). The LSAC sample, when properly weighted, is representative of a recent cohort of Australian children who were born in 2003–2004.

The first wave of data collection started with 5102 children. Approximately 500 cases were lost due to attrition, resulting in a sample size of 4586 in the second wave. In addition to the core survey questionnaire, the mothers were asked to complete a leave-behind time-use questionnaire that documented the child's time use for 2 full days (1 randomly selected weekday and 1 randomly selected weekend day). Because variables of sleep duration were constructed using time-use data (please see below for details), the analysis of the relationship between early childcare experiences and sleep outcomes was limited to cases with completed time-use data. In total, 3921 mothers completed the time-use survey in the first wave, and 3412 mothers completed the time-use survey in the second wave. A longitudinal sample of 3046 children was obtained by using 2 waves of data.

Measures

Complex childcare experiences

During the respective interviews, mothers reported the type of each arrangement, hours per week, and total number of regular childcare arrangements that they used at the time of the interview. In this study, I differentiated between 3 aspects of complex childcare experiences. First, I calculated hours of use for 3 types of childcare arrangement: center-based care, relative care, and nonrelative care. Second, at each time point, the number of childcare arrangements was recoded as a 3-categorical variable that differentiated between no childcare, single arrangement, and multiple arrangements. Finally, a categorical indicator was created to reflect children's childcare experiences over time: (1) nonattenders; (2) wave 2 childcare only (ie, late attenders); (3) wave 1 childcare only (ie, early attenders); (4) consistent attenders, no change in configuration; and (5) inconsistent attenders, change in configuration (ie, from single arrangement to multiple arrangements or vice versa).

Sleep outcomes

Weekday and weekend nighttime sleep durations were calculated in each wave by excluding sleep and nap during the period from 8:00 AM to 6:00 PM. Although time diaries offered detailed information of young children's time use for 2 full days, mothers might not be able to accurately report children's sleep and napping activities when children were in childcare settings. Thus, this study focused on nighttime sleep duration. Mothers also reported the existence of their children's sleep problems during each wave of interviews. The interviewers asked the mothers whether their children had the following sleep problems on 4 or more nights per week: "difficulty

getting off to sleep at night,” “waking during the night,” and “restless sleep.” Thus, together, this study examined 5 sleep outcomes in early childhood: weekday nighttime sleep duration, weekend nighttime sleep duration, difficulty sleeping, restless sleep, and waking during the night. Except for sleep duration variables, all other outcome variables were coded dichotomously.

Covariates

Because certain characteristics of the children were associated with childhood sleep and maternal characteristics might affect mothers' reports of children's sleep, the analysis included several potential confounding variables. This study controlled for child's age, sex, global rating of the child's health by the mothers, aboriginal status, maternal immigration status, not speaking English at home, maternal education, maternal employment status, breastfeeding, maternal depression scale (as measured by the Kessler-6 Psychological Distress Scale), status of living in a single-parent household, and household income. Although the time diaries did not provide accurate estimates of children's naptime in childcare settings, this study controlled for average childcare hours per day in regressions. Finally, parent-child relationship may affect mothers' report of child sleep outcomes. Hence, this study controlled for 2 proxies of parent-child relationships available in LSAC: parenting warmth scale and parenting hostile scale.

Statistical methods

This study started with weighted descriptive statistics of childcare arrangements and sleep outcomes during infancy and toddlerhood. Next, this study conducted cross-sectional analysis using ordinary least square regression and logistic regression to link different aspects of early childcare experience to child sleep outcomes in each wave of the survey. Next, random-effects model was used for longitudinal analysis. Regression analyses controlled for aforementioned covariates and were weighted using population weights. Multiple imputation was used to account for potential biases resulting from missing data in all missing variables. MI involves replacing the missing values with predictions based on other observed variables using the Monte Carlo technique. In contrast to single imputation, which replaces each missing value with 1 predicted value, MI replaces several missing values with repeated imputation inference, creating several complete data sets. The results are combined to produce better estimates of the missing value that incorporate uncertainty in missing data. I performed 10 imputations. Stata 13 was used for all statistical analyses.

Results

Summary statistics

Table 1 provides descriptive statistics of the sample. During the 9-month survey, approximately 35% of the children had regular childcare arrangements. On average, the children spent approximately 21 hours per week in center-based childcare at this stage. Although the majority of the children had only 1 regular childcare arrangement, multiple arrangements were not uncommon (8%). Sleep problems were commonly reported by the mothers, with 10% reporting difficulty falling sleeping, 40% reporting waking during the night, and 12% reporting restless sleep. At 2.5 years, the majority of children (69%) had regular childcare arrangements at this age. On average, the children spent approximately 20 hours per week in center-based childcare. Furthermore, the use of multiple arrangements increased to 18%. Maternal reports of their children's sleep problems remained common: 16% reported difficulty falling asleep, 29% reported waking during the night, and 10% reported restless

Table 1
Weighted descriptive statistics in the LSAC

	9 mo	2.5 y
	Mean or % (SD)	Mean or % (SD)
Early childcare experience		
Average hours of primary arrangement per week	45	39
Center	21	20
Relative care	15	22
Nonrelative care	19	19
Number of arrangement		
No childcare arrangement	65	31
Single arrangement	27	50
Multiple arrangement	8	18
Sleep outcomes ^a		
Weekday nighttime sleep duration (min)	627 (195)	601 (211)
Weekend nighttime sleep duration (min)	601 (192)	590 (199)
Difficulty getting off sleep	10	16
Waking during the night	40	29
Restless sleep	12	10
Sample size	3921	3412

^a Weekday and weekend nighttime sleep durations were calculated based on maternal report of sleep episodes in time diaries excluding the periods from 8:00 AM to 6:00 PM. Difficulty getting off sleep, waking during the night, and restless sleep were based on maternal reports of having the sleep problems 4 or more nights per week. Standard deviations were reported for continuous variables.

sleep. As expected, children during infancy and toddlerhood spent substantial amount of time sleep, whereas toddlers slept slightly less than infants (ie, 627 vs 601 minutes for weekdays and 601 vs 590 minutes for weekend days).

Regression results

Table 2 shows the hours spent in each type of primary arrangement and the associated sleep problems. As expected, increased time spent in center childcare was associated with less weekday nighttime sleep but not weekend nighttime sleep compared with children without childcare. However, increased time spent in relative and nonrelative childcare was also associated with shorter weekday nighttime sleep duration compared with children without childcare. Panel A and Panel B show similar patterns. Other indicators of sleep problems were not affected by the amount of time spent in childcare arrangement.

Table 3 provides results linking multiple arrangements to childhood sleep outcomes. To assess the association between childcare configuration and sleep, regressions included average hours of childcare per day as an additional control. Because prior studies have found that multiple arrangements negatively affect a child's physical and mental health compared with single arrangement,³⁰ it was expected that multiple arrangements would increase the risk of sleep problems. However, contrary to this expectation, this study found no evidence that children in multiple arrangements had higher risks of shorter nighttime sleep duration, difficulty falling sleep, restless sleep, and waking up during the night compared with children with single arrangements during infancy and toddlerhood.

Table 4 provides results for longitudinal analysis that considers the relationship between longitudinal patterns of childcare use and changes in nighttime sleep duration. Children who had no childcare arrangement were the reference group. The table shows several interesting patterns. First, the coefficient of child age suggests that nighttime sleep duration increased with age. This may indicate that children gradually consolidate their sleep time into a single nighttime sleep. Second, the table also shows moderation effects by childcare arrangements during early years. The negative coefficient of late

Table 2
Associations between the amount and type of childcare arrangement and maternal reported sleep outcomes during infancy and toddlerhood

	Weekday nighttime sleep duration (min)	Weekend nighttime sleep duration (min)	Difficult getting sleep	Waking during the night	Restless sleep
	Coefficient [SE]	Coefficient [SE]	Odds ratio [95% CI]	Odds ratio [95% CI]	Odds ratio [95% CI]
A: 9 mo					
Hours in childcare center	−.99 [.56]	−.16 [.44]	1.00 [.99 1.02]	1.00 [.99 1.01]	1.00 [.99 1.02]
Hours in relative care	−.98* [.46]	−.87 [.60]	1.00 [.99 1.02]	1.00 [.99 1.01]	1.01 [.99 1.02]
Hours in nonrelative care	−1.80* [.71]	−1.40* [.67]	.98 [.96 1.01]	.99 [.98 1.00]	1.00 [.99 1.02]
Sample size	3921	3921	3921	3921	3921
B: 2.5 y					
Hours in childcare center	−1.35*** [.34]	−.52 [.38]	1.00 [.99 1.01]	.99 [.98 1.00]	.98 [.98 1.00]
Hours in relative care	−.95* [.45]	.18 [.53]	1.01 [.99 1.02]	1.00 [.99 1.01]	1.00 [.99 1.01]
Hours in nonrelative care	−2.78*** [.65]	.01 [.46]	1.01 [.99 1.02]	1.01 [.99 1.02]	.99 [.96 1.01]
Sample size	3412	3412	3412	3412	3412

The table reports coefficient and odds ratio. Standard error and 95% confidence interval are in brackets. All regressions controlled for breastfeeding, maternal employment status, single-parent family, child age, child sex, child global health rating, maternal aboriginal status, maternal immigration status, not speaking English at home, maternal education, weekly household income, parenting warmth scale, and parenting hostile scale. All regressions were properly weighted to account for the complex survey design.

[†] $P < .1$, * $P < .05$, ** $P < .01$, and *** $P < .001$ for 2-tailed test.

attenders (ie, children with childcare in second wave but without childcare in the first wave) suggests that these children's nighttime sleep duration increased in a slower rate compared with nonattenders. Inconsistent attenders who changed childcare configuration also had a slower rate of increase in nighttime sleep duration. Nevertheless, this study found no difference in terms of rate of changes in nighttime sleep duration between nonattenders and early attenders. Results for weekday and weekend nighttime sleep durations were similar. Finally, the author performed sensitivity analysis to examine whether childcare attendance was associated with children's bedtime. Results (not showed) suggested that childcare attendance was not associated with later bedtime.

Discussion

Sleep is critical for children's healthy development. However, although prior studies have identified center childcare attendance as an influential factor of children's sleep, the complexity of childcare arrangements that may affect childhood sleep in early life remained an understudied topic in population health research. This study used nationally representative data to identify childcare multiplicity and patterns of longitudinal use that were associated with nighttime sleep and sleep problems in early childhood. Results found that, in addition to center childcare, relative care and nonrelative care during

infancy and toddlerhood were related to shorter weekday nighttime sleep duration. Results also found that longitudinal patterns of childcare use moderated the association between child age and nighttime sleep duration. Late attenders and inconsistent attenders with configuration change had a slower rate of increase in nighttime sleep duration from infancy to toddlerhood. Clinical and neurological research suggests that infancy is the period in which rapid brain development occurs³³ and the period in which dramatic changes in sleep patterns and sleep architecture occur.³⁴ Although the rapid developing brain of infant is governed by biological processes, it may be also susceptible to the influence of environment.³³ Prior studies have demonstrated that the negative developmental consequences of unfavorable social and familial environment are greater for very young children.³⁵ Findings from this study may add to this literature by showing how complex use of childcare in early life can influence children's nighttime sleep and potentially the transition from polyphasic sleep to monophasic sleep.

Second, cross-sectional results suggest that the associations between childcare experiences and nighttime sleep duration were significant for weekdays but not for weekend days. However, longitudinal results show significant associations for both weekdays and weekend days. These patterns suggest that long-term patterns of childcare attendance appears to have a lasting influence on children's sleep that extended to the weekend (ie, nonchildcare)

Table 3
Associations between the multiple childcare arrangements and maternal reported sleep outcomes during infancy and toddlerhood

	Weekday nighttime sleep duration (min)	Weekend nighttime sleep duration (min)	Difficult getting sleep	Waking during the night	Restless sleep
	Coefficient [SE]	Coefficient [SE]	Odds ratio [95% CI]	Odds ratio [95% CI]	Odds ratio [95% CI]
A: 9 mo					
(Ref: single arrangement)					
No arrangement	−25.49* [10.28]	7.91 [11.58]	1.06 [.74 1.52]	1.11 [.89 1.37]	1.23 [.87 1.72]
Multiple arrangements	13.29 [14.67]	10.95 [14.60]	.99 [.62 1.60]	1.01 [.78 1.32]	.97 [.63 1.49]
Sample size	3921	3921	3921	3921	3921
B: 2.5 y					
(Ref: single arrangement)					
No arrangement	−5.23 [9.82]	6.87 [10.35]	.92 [.67 1.24]	1.01 [.81 1.27]	1.20 [.83 1.74]
Multiple arrangements	17.11 [9.83]	−12.81 [11.32]	.91 [.69 1.19]	1.07 [.87 1.33]	.85 [.57 1.27]
Sample size	3412	3412	3412	3412	3412

The table reports coefficient and odds ratio. Standard error and 95% confidence interval are in brackets. All regressions controlled for breastfeeding, maternal employment status, single-parent family, child age, child sex, child global health rating, maternal aboriginal status, maternal immigration status, not speaking English at home, maternal education, weekly household income, average hours of childcare use per week, parenting warmth scale, and parenting hostile scale. All regressions were properly weighted to account for the complex survey design.

[†] $P < .1$, * $P < .05$, ** $P < .01$, and *** $P < .001$ for 2-tailed test.

Table 4

Associations between childcare use over time and changes in nighttime sleep duration

	Weekday nighttime sleep duration (min)		Weekend nighttime sleep duration (min)	
	Coefficient [SE]		Coefficient [SE]	
Child age (mo)	3.31*	[1.48]	1.64	[1.55]
Child age × wave 2 use only	−1.32**	[.46]	−1.15*	[.49]
Child age × wave 1 use only	.84	[.96]	−.58	[1.01]
Child age × 2-wave use, no configuration change	−.95	[.54]	−1.05	[.57]
Child age × 2-wave use, configuration change	−1.12*	[.53]	−1.17*	[.57]
Sample size	3046		3046	

The table reports coefficient, and standard errors are in brackets. All regressions controlled for breastfeeding, maternal employment status, single-parent family, child age, child sex, child global health rating, maternal aboriginal status, maternal immigration status, not speaking English at home, maternal education, weekly household income, parenting warmth scale, and parenting hostile scale.

† $P < .1$, * $P < .05$, ** $P < .01$, and **** $P < .001$ for 2-tailed test.

days. This finding also implies that longitudinal studies are better to capture the impact of childcare attendance on children's sleep development. Future studies that use longitudinal data can provide additional insights into the complex patterns of childcare attendance and sleep development from infancy to early childhood.

Third, multiple arrangements are no more harmful than single arrangements to young children's sleep, a result that is contrary to the predictions from existing multiple arrangements and child health literature.^{26,29,36} Multiple arrangements influence mental health by creating instabilities and increasing contact with pathogens. Such increasing instabilities in environment (ie, adjusting to different rules, peers, and adult caregivers in different settings) may be more likely to manifest in behavioral problems and physical illness but not sleep problems. This may explain why multiple arrangements were more harmful than single arrangements.

In addition, the negative and significant coefficient of no arrangement in the first wave for weekday nighttime sleep duration is unexpected. Additional statistical analysis suggests that the negative association may be due to the inclusion of suppression variables as covariates. The association was in the expected direction (ie, positive) without covariates. However, the association turned negative after adding covariates. Since the suppression effect was only observed in the first wave and for one sleep outcome and the association was not the focus of Table 3, this study did not further identify specific suppressor variables and investigate their influence on the association between single arrangements and weekday nighttime sleep duration. Thus, interpretation of this coefficient should be made with caution.

Finally, this study found no effect of early childcare experience on difficulty falling to sleep, waking up during the night, and sleeping restlessly. Sleep is a complex behavior and health outcome.²⁴ Childcare arrangement may influence different aspects of sleep in different manners. A recent study of the social determinants of sleep has demonstrated the differential effects of social processes on sleep in a nationally representative sample of older adults.³⁷ As such, it is possible that children's sleep duration is more susceptible to the influence of childcare arrangement than other aspects of sleep.

Despite this study's strength of population data, controlling for a wide range of covariates and rigorous statistical analysis, this study still has several limitations. First, this study only relied on maternal reports of the children's time use and sleep outcomes. Although time diaries produced good estimates of children's nighttime sleep duration, it did not generate equally good estimates of children's daytime sleep. This is particularly the case for children who attend childcare during the daytime. Mothers often did not report children's naptime in childcare settings. Thus, although naptime still could be calculated from time diaries, daytime sleep for children who attended childcare was seriously underestimated because of missing data and underreport. Because of this reason, this study was not able to explore the relationship between complex childcare experiences and children's daytime sleep.

Second, LSAC data did not include information if the selected time-diary day was a childcare day. As such, this study was not able to control for the exact time children spent in childcare. However, the LSAC questionnaire asked mothers to report average hours of childcare for each arrangement. Thus, this study controlled for average childcare hours obtained from the main survey.

Third, this study was unable to examine the relationship between the early childcare experiences and the children's sleep states and sleep architecture. However, even with maternal reports (ie, sleep measurements with the potential issue of measurement errors), I still found significant associations. Using improved sleep measures in future national surveys of children, it will be possible to better identify the impact of early childcare experiences on sleep architecture. Finally, this study used nonexperimental data, and therefore, causal inference is not likely. Even with the inclusion of a large set of potential confounding and the use of longitudinal data, the results still cannot be interpreted as causal. However, the results do suggest that children who were exposed to different arrangements of childcare had different sleep outcomes. These children should be the target populations for future research and, potentially, future interventions.

To conclude, this study offers systematic analyses of complex childcare experience and sleep using longitudinal data from a nationally representative sample of young children. The results suggest that relative and nonrelative childcare can be risk factors for sleep development in early childhood. In addition, longitudinal patterns of childcare use may influence children's developmental trajectory of sleep. Using large-scale and nationally representative data, this study also demonstrated the usefulness of a population health approach to illuminate childcare experiences and sleep in early years. Furthermore, the results also send a message that researchers should pay more attention to the increasing complexity of childcare use among parents with young children and its impacts on child health and development; therefore, more research is needed to identify specific childcare characteristics and transitions that promote or deter sleep to provide a good recommendation for parents and policy makers. This study provides the first such evidence and serves as a good example for future studies.

Disclosure

The author has no conflict of interest to disclose.

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