

Home Sleeping Conditions and Sleep Quality in Low-Income Preschool Children

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We investigated associations between the home sleeping conditions and sleep quality of low-income preschool children. Parents of preschool children in Head Start programs in Michigan in the United States completed a sleep environment survey, which asked parents about their children's sleep conditions. They also completed the Children's Sleep Habits Questionnaire, on which higher scores reflect worse quality sleep. Among 120 preschoolers, 52% shared a bed and 53% shared a room at least once per week. Poor sleep quality was correlated with the frequency of sharing a room with parents, falling asleep with the TV on, sleeping in a place that was too bright, and inversely with sleeping alone in one's own bed. Stepwise regression analysis revealed sleeping alone in his/her own bed was associated with better sleep quality ($\beta = -0.24$, standard error = 0.47, $p = 0.01$). We found that bed-sharing is associated with poorer sleep quality in low-income families.

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Key Words Co-sleeping, Preschooler, Low-income, Sleeping condition.

INTRODUCTION

Proper sleep is important for children's behavior, development, and optimal health.^{1,2} Environmental conditions, such as household size, socioeconomic status, noise, or brightness of the sleeping area could easily influence children's sleep patterns.^{3,4} Children from low-income, as opposed to higher-income families tend to have shorter sleep duration, later bedtimes, and reduced opportunities for sleep.⁵⁻⁷

The ways in which household conditions in low-income families may be associated with children's sleep are not well known. We recently reported that suboptimal sleep environments (sleeping in a place that is "too loud", "too bright", "too hot", or "too cold") were associated with shorter sleep durations and later times that low-income children fell asleep at night.⁸ However, it remains unknown whether sleep conditions and environments, such as room or bed sharing, sleeping on the floor, couch or chair, or media use in the bedroom among low-income families may be related to children's sleep quality beyond sleep durations and fall-asleep times.

Further understanding of the associations between sleep conditions in the home and sleep quality could contribute to the design of better interventions to improve children's sleep quality and reduce existing sleep disparities.⁹ The aim of this study, therefore, was to test the hypothesis that home sleeping conditions are associated with poor sleep quality among low-income preschool children.

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METHODS

Participants and Study Design

Parents with children enrolled in Head Start Programs (a federally funded preschool program for low-income children) in the areas of Lansing and Detroit, Michigan, provided data for two previous reports and also the current analyses.^{8,10} Questionnaires were sent home in advance of a parent meeting. The surveys were completed, before or during the meeting, for the youngest child in the family who was currently attending Head Start. Foster children for whom the legal signer of consent would be the state were excluded. The questionnaires were sent to 294 families in Detroit and 374 in greater Lansing. In total, 152 families including 87 from Detroit (30%) and 65 from greater Lansing (17%) consented to participate and completed the surveys. For the current analyses, thirty-two families were excluded because of incomplete responses to questionnaires, and data from the remaining 120 families (59 from Detroit and 61 from Lansing), were included for the analysis. This study was approved by the University of Michigan Institutional Review Board, and written informed consent was obtained from the parents.

Questionnaires and Procedures

Parents were asked to complete a sleep environment survey and the Children's Sleep Habits Questionnaire (CSHQ).¹¹ A 16-

item sleep environment survey created for this study asked parents how frequently (i.e., never to always) their child slept in a number of different conditions (Table 1). Parents responded to each item as "Never, 0 nights/week"; "Rarely, 1–2 nights/week"; "Occasionally, 3–4 nights/week"; "Frequently, 5–6 nights/week"; or "Always, 7 nights/week".¹⁰ These items about the sleep environment were selected based in part on clinical recommendations regarding important environmental factors for children's sleep.¹² Several sleep and behavioral experts, community sleep educators, and Head Start staff reviewed this questionnaire for appropriateness.

The CSHQ is a 52-item 3-point Likert scale sleep screening instrument designed to assess children's sleep problems. Parents were asked to respond to each item as 1 ("Rarely, 0–1 time in a week"), 2 ("Sometimes, 2–4 times in a week"), and 3 ("Usually, 5–7 times in a week"). The CSHQ total score was computed as the sum of the item responses, excluding five CSHQ items ("child falls asleep alone in own bed", "child falls asleep in parent's or sibling's bed", "child needs parent in the room to fall asleep", "child is afraid of sleeping alone", and "child moves to someone else's bed during the night") that were directly related to items in the sleep environment survey. The Cronbach's alpha for the CSHQ after excluding those five items was 0.85.

Statistical Analysis

Statistical analyses were performed with Statistical Package for the Social Sciences (SPSS) ver. 19.0 (SPSS Inc., Chicago, IL,

Table 1. Questionnaire for sleep environment, and frequency of each condition according to parents or guardians

How often per week your child	Never	Sometimes (1–4 days/week)	Frequently (5–7 days/week)
1. ...sleeps alone in his/her own bed?*	17 (14.4%)	26 (21.7%)	75 (62.5%)
2. ...shares a bed with other children?*	87 (73.1%)	18 (15.0%)	14 (11.7%)
3. ...shares a bed with a parent or guardian?	58 (48.3%)	36 (30.0%)	26 (21.7%)
4. ...sleeps on the floor with no mattress?*	114 (95.8%)	5 (4.1%)	0 (0.0%)
5. ...sleeps on a mattress on the floor?*	110 (93.2%)	3 (2.5%)	5 (4.2%)
6. ...sleeps on a couch or chair?*	99 (83.2%)	18 (15.0%)	2 (1.7%)
7. ...sleeps alone for most of the night in his/her own room?*	34 (28.6%)	23 (19.3%)	62 (42.1%)
8. ...sleeps for most of the night in a room with other children?	57 (47.5%)	18 (15.0%)	45 (37.5%)
9. ...sleeps for most of the night in a room with parent or guardian?	54 (45.0%)	31 (25.8%)	35 (29.2%)
10. ...sleeps in a place that is loud or noisy?	99 (82.5%)	18 (15.0%)	7 (5.8%)
11. ...sleeps in a place that is too bright?	110 (91.7%)	9 (7.5%)	1 (0.8%)
12. ...sleeps in a place that is too hot during the summer?	104 (86.7%)	16 (13.3%)	0 (0.0%)
13. ...sleeps in a place that is too cold during the winter?*	116 (97.5%)	3 (2.5%)	0 (0.0%)
14. ...watches TV for at least 2 hours per day?*	6 (5.1%)	57 (58.7%)	54 (46.1%)
15. ...has a TV in the room where he/she sleeps?*	46 (39.3%)	10 (8.5%)	61 (52.1%)
16. ...falls asleep with the TV on?	50 (41.7%)	42 (35.0%)	28 (23.4%)

Never = "0 nights/week", Sometimes = "rarely: 1–2 nights/week" or "occasionally: 3–4 nights/week", Frequently = "frequently: 5–6 nights/week" or "always: 7 nights/week".

*There were 1–3 subjects with missing data.

USA) for Windows (IBM software). Data are summarized as means \pm standard deviations. The level of significance was defined as $p < 0.05$ in 2-tailed tests for all analyses. The main outcome variable was the CSHQ total score, with a higher score indicating poorer sleep quality. We calculated Spearman's correlation coefficients to explore which of the 16 sleep environment variables were correlated with CSHQ total score, and significant or nearly significant variables ($p < 0.10$) were then entered into stepwise regression models to predict CSHQ total score.

RESULTS

A total of 120 preschoolers whose parents provided sufficient data were included in the current analyses. About half (53%) were female, 54 (45%) were White, and the same number were Black; their mean age was 4.1 ± 0.6 years. Table 1 lists the questionnaire items about the sleep environment and parents' responses to each item. Just 14% of children used their own bed every day. About 27% of children shared their bed with their siblings and 52% shared with their parents or guardian at least one day per week. The proportion of children who slept

Table 2. Spearman's correlation coefficients between total CSHQ score and questionnaire for sleep environment

How often per week your child	CSHQ total score (rho)
1 ...sleeps alone in his/her own bed?*	-0.23 [†]
2 ...shares a bed with other children?*	0.08
3 ...shares a bed with a parent or guardian?	0.16
4 ...sleeps on the floor with no mattress?*	0.17
5 ...sleeps on a mattress on the floor?*	0.11
6 ...sleeps on a couch or chair?*	0.15
7 ...sleeps alone for most of the night in his/her own room?*	-0.16
8 ...sleeps for most of the night in a room with other children?	-0.01
9 ...sleeps for most of the night in a room with parent or guardian?	0.28 [‡]
10 ...sleeps in a place that is loud or noisy?	0.09
11 ...sleeps in a place that is too bright?	0.21 [†]
12 ...sleeps in a place that is too hot during the summer?	0.16
13 ...sleeps in a place that is too cold during the winter?*	0.06
14 ...watches TV for at least 2 hours per day?*	0.16
15 ...has a TV in the room where he/she sleeps?*	0.08
16 ...falls asleep with the TV on?	0.25 [‡]

*There were 1–3 subjects with missing data. [†] $p < 0.05$. [‡] $p < 0.01$. CSHQ: Children's Sleep Habits Questionnaire.

in his/her own room everyday was just 29%. Slightly more than half (53%) of the children shared their room with their siblings and 55% with their parents or guardian. No significant difference between White and Black preschool children was found in responses to each sleep condition questions.

Mean CSHQ score, excluding the 5 items that were directly related to items in the sleep environment questionnaire, was 39.1 ± 7.6 (range 28.0–79.0). The total CSHQ score was correlated with the frequency of sharing a room with parents during sleep ($\rho = 0.28$, $p < 0.01$), falling asleep with the TV on ($\rho = 0.25$, $p < 0.01$), sleeping alone in his/her own bed ($\rho = -0.23$, $p = 0.01$), and sleeping in a place that was too bright ($\rho = 0.21$, $p = 0.02$) (Table 2). Among 109 participants with complete data for each of these 4 sleep environment items and the CSHQ outcome measure, a stepwise regression of the total CSHQ score on the 4 sleep environment items, only retained the one item about the child sleeping alone in his/her own bed in the final model ($\beta = -0.24$, standard error = 0.47, $R^2 = 0.06$, $p = 0.01$).

DISCUSSION

This study of preschool children from low-income families suggests that sleeping alone in a child's own bed is associated with better sleep quality for the child. Sleeping together and sharing beds are not popular practices in Western countries, unlike Eastern cultures.¹³ However, ethnicity, low household income, having a younger mother, or a low parental educational level can increase the likelihood of co-sleeping in Western cultures.^{14,15} Previous studies have reported that sharing a room or bed with parents or siblings while sleeping is associated with children's sleep problems.^{16,17} In our low-income sample, children's poor sleep quality was correlated with the frequency of sharing a room with parents, and with not sleeping alone in their own bed. Co-sleeping was not the only factor associated with poor sleep quality in these preschool children, and a cross-sectional study cannot prove cause-and-effect relationships, but our results raise the possibility that changes in sleeping arrangements might improve sleep quality.

In addition to sleeping arrangements, other aspects of the sleep environment may also have an influence on children's sleep quality. In this study, falling asleep with the TV on was correlated with poor sleep quality. We also observed that 60% ($n = 71$) of the children had a TV in the room where they slept, and nearly 86% ($n = 61$) of those children fell asleep with the TV on at least 1–2 nights per week (data not shown). Television viewing or use of other media in the evening are known to be associated with sleep problems in children.¹⁸ However, 67% of parents use the TV as a part of the usual sleep routine for children who have difficulty sleeping; and 90% think that the TV does not affect sleep.¹⁹ Recently the National Sleep Foundation Sleep in America poll also showed that 72% of children aged 6

to 17 years have at least one electronic device in the bedroom during sleep, and using electronic devices was associated with decreased sleep duration.²⁰ Removing the TV or other electronic devices from the bedroom may help to improve children's sleep quality in families such as those we evaluated.

Our study does have several limitations that reflect the challenges of community-based research. The limited response (22.8%) and substantial incomplete response rate (21.2%), despite a number of efforts to facilitate participation, are common in this type of research but could have had a significant impact. There are also a number of differences between the study sites in Detroit and Lansing. However, we could not find any differences in sleep conditions and environments between two sites. Despite those limitations, this study provided a unique opportunity to explore potential associations of sleep conditions and environments with low-income preschool children's sleep quality.

In conclusion, we found that several types of sleep conditions at home were associated with poor sleep among preschool children of low-income families. Although causal relationships could not be proven in this observational study, the associations we identified suggest that further research is warranted because efforts to minimize suboptimal sleep conditions could have the potential to improve sleep quality for many children.

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Conflicts of Interest

The authors have no financial conflicts of interest.

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