Sleep problems in the first year of elementary school: The role of sleep hygiene, gender and socioeconomic status

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ARTICLE INFO

ABSTRACT

Objectives: To determine (1) the relationship between sleep hygiene practices and parent-reported child sleep problems in students in the first year of elementary school, (2) whether the relationship differed by (a) gender and (b) SES and (3) in a multivariate explanatory model.

Design: Cross-sectional survey of a population-based sample.

Setting: Forty-five elementary schools in metropolitan Melbourne, Australia.

Participants: Families of children aged 4–6 years in the first year of elementary school in Melbourne, Australia.

Measurements: Exposures: Parent-reported child sleep hygiene, gender and data linkage to community-based disadvantage. Outcome: Parent-reported child sleep problems. Analyses: Logistic regression models were used to examine each aim.

Results: Of 6635 approached parents, 4901 (74.30%) participated. In the final model, using audio devices at bedtime was associated with increased risk of child sleep problems (OR 2.12, 95% CI 1.60, 2.81) as was an inconsistent bedtime routine on school nights (OR 2.52, 95% CI 1.76, 3.60) and non-school nights (OR 1.66, 95% CI 1.09, 2.55). Boys with an inconsistent bedtime routine on non-school nights had a higher risk (OR 2.07, 95% 1.49, 2.88) than girls (OR 1.61, 95% CI 1.15, 2.28). SES was not associated with sleep problems.

Conclusion: Inconsistent bedtime routines and audio device use were each associated with an increased risk of parent-reported sleep problems. Associations did not differ based on SES but did for boys and girls in terms of inconsistent bedtimes on weekends. Behavioral sleep interventions targeting sleep hygiene could have similar benefits for all children, regardless of socio-economic status.

Introduction

Up to 40% of Australian children transitioning from preschool to elementary school experience a parent-reported sleep problems,[1] which can negatively affect their subsequent academic, behavioral and health trajectories.[1–3] Therefore, understanding the etiology of sleep problems during this period could inform whom and what aspects sleep interventions during the early years of school should target.

Research suggests that sleep hygiene practices, such as consistent bedtimes, bedtime routine and use of electronic devices, are associated with sleep problems in school-aged children.[4–9] However, some inconsistencies in findings remain which may be related to small

sample sizes but also studies only focusing on select aspects of sleep hygiene, as opposed to all key components which are often targeted in clinical practice and sleep health messages. For instance, there is limited research, which has been able to concurrently examine whether the presence of electronics in the bedroom or its use before bedtime are associated with increased child sleep problems. In addition, a recent review by Carter et al[10] highlighted that it is not known how different types of media (i.e. TV, video games, audio devices) may be differentially associated with child sleep problems. Furthermore, although it is accepted that sleeproutines and timing may vary between school and non-school nights,[11] little research has examined the extent to which sleep timing on school and non-school nights is associated with increased sleep problems. For instance, parents may be less likely to report a child sleep problem if the child's weekend sleep patterns do not impact on the parent's sleep or the family's planned activity. It could also reflect parental differing expectations between school and non-school nights, with regular bedtime

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routines present on school nights but not on non-school nights. In contrast, parents may be more likely to report their child has a sleep problem if the sleep pattern on school night impacts on the parent's outcomes, such as their ability to arrive at work on time.[12]

Another important consideration when examining aspects of daily habits that may impact on child sleep problems is whether there are any differences by gender or socio-economic status (SES). For instance, boys are more likely to experience sleep problems and poor sleep hygiene practices than girls[13–15] along with poorer sleep hygiene practices and sleep problems being more prevalent in children from lower SES backgrounds.[16–18] However, evidence for the associations between sleep problems and gender and SES are inconclusive due to different measures of sleep problems and sleep hygiene practices and wide age range sampling. There is a paucity of research sampling children in the early years of school when poor sleep may adversely impact on a successful school transition. In particular, how well children transition to school has been shown to be predictive of later school achievement, engagement and well-being outcomes.

Despite research showing associations between different aspects of sleep hygiene and child sleep problems, there are few population level findings that have evaluated the association between gender, SES, and sleep hygiene practices with the sleep problems in a single model. This is despite etiological models suggesting that sleep problems in young children arise due to interactions between multiple factors such as gender, SES, and sleep hygiene. This study addresses this gap using a community-based sample of Melbourne children in their first year of school to examine:

1. The relationship between sleep hygiene practices (consistency of bedtime, consistency of pre-bedtime routine, electronics in the bedroom, and use of electronics at bedtime) and child sleep problems;
2. Whether the relationship between sleep hygiene practices and sleep problems differ by (a) child gender or (b) SES; and
3. The relationship between sleep hygiene practices, gender, SES and child sleep problems in a single explanatory model.

Method

Study design

This study uses baseline data from the Sleep Well - Be Well study conducted at the Murdoch Childrens Research Institute.[19] Participants were recruited from the first year of elementary school in Victoria, Australia during 2013 and 2014. The first year of school is commonly known as Grade Prep. All schools were from the Southern Region of Metropolitan Melbourne, as defined by the Victorian Department of Education and Training. This region is the largest of four in metropolitan Melbourne, servicing more than 14,000 new school entrants annually from diverse socio-economic and cultural backgrounds.

Schools were invited to participate in 2013 using a randomly ordered list generated by an independent statistician in the Clinical Epidemiology and Biostatistics Unit at the Royal Children's Hospital, Melbourne. This list was stratified by school type i.e. Government or Catholic. Parents of each child at the participating schools were approached to complete the study. Overall, 47 primary schools (Government n = 36, Catholic n = 11) agreed to participate, with 32 schools participating in both 2013 and 2014, with one schools only participating in 2013 and 14 in 2014. The schools participating only in 2014 were recruited due to ensure the required sample size for the main trial was still achieved. In 2013, there were 26 Government and 7 Catholic schools whilst there were 36 Government and 10 Catholic schools in 2014.

Research measures

Sleep problem (outcome)

Child sleep problems were defined using the parent-report question: *"How much is your child's sleeping pattern or habits a problem for you? (i.e. problems going to sleep or waking overnight)".*[20] Parents were required to indicate whether their child's sleep was a *large problem*, a *moderate problem*, a *small problem*, *no problem at all* or *not sure/don't know*. Responses were dichotomized with a sleep problem defined as those who had a large/moderate problem, and no sleep problem defined as those who responded small/no. Not sure/don't know responses were coded as missing. This approach aligns with previous longitudinal and intervention research,[1,21,22] which has demonstrated differences in child and parent well-being outcomes based on these categories.

Consistent bedtime routine and bedtimes

Bedtime routine on school nights and non-school nights was assessed using the question: *"On school nights and non-school nights, does your child follow a set routine in the hour before bedtime (e.g., bathe, brush teeth, read/listen to a story, go to bed)?"* Likewise, consistency of bedtime on school nights and non-school nights was assessed using the question: *"On school nights and non-school nights, does your child go to bed around the same time (within 10 minutes each night) each night?"*

For both questions, parents were required to respond using a 5-point Likert Scale from *almost never* to *nearly always* for school nights and non-school nights separately. Responses were dichotomized into "inconsistent routine" (almost never and occasionally) and "consistent routine" (half the time, often, and nearly always). This dichotomy aligns with current research approaches which define a consistent routine as being sleep behaviors as occurring for the majority of the week.

Bedtime electronics to fall asleep

Bedtime electronic use was measured by parent-report, with possible responses being their child falls asleep (i) watching television, (ii) playing a computer game, (iii) playing a game system (i.e., Xbox, Wii, Nintendo DS), (iv) using a mobile phone or (v) listening to an audio device (music or audio book); by marking all that apply or indicating *none of the above* or specifying an alternative activity. In the 2013 screening survey, which applied to 42% of responses, the response to the audio device (music or audio book) category was derived from the free text responses specified in the alternative activity option. Three research assistants independently categorized the free text responses. In 2014, the audio device option (v) was added to the screening survey. Sensitivity analyses found no evidence for a difference in the association between sleep problem and listening to an audio device in each survey year and therefore data from both years were combined.

Presence of electronics in the bedroom

Parents indicated whether their child had a television, computer, game system (i.e., Xbox, Wii, Nintendo DS), mobile phone and/or audio device (radio, CD player, iPod) in the bedroom by marking all that apply or indicating *none of the above* or specifying an alternative activity.[20] Three research assistants independently categorized these alternative activities across the predefined categories where appropriate. The response to the 'audio device in the bedroom' option was derived from free text responses using the same approach as above for "Bedtime electronics to fall asleep". Fifty-eight percent of the data was obtained directly from an item in the survey and 42% was determined from classification of free text.

Socio-economic status

Residential postcode was assigned a score ($M = 1000, SD = 100$) according to the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) from the Australian Bureau of Statistics'