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Determinants of sleep behavior in adolescents: A pilot study


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ABSTRACT

Purpose: To identify determinants of sleep behavior in adolescents of middle to high socioeconomic status.

Methods: Eighteen students (9 boys, 9 girls) with a mean age of 14.9 ± 1.5 years were interviewed using a standardized script inspired by the theory of planned behavior. Interviews were audio-recorded and anonymously transcribed verbatim. In addition, participants completed a survey assessing demographic and health characteristics and their sleep duration was measured using actigraphy.

Results: Adolescents listed a few positive benefits of healthy sleep and described a large number of immediate negative consequences caused by sleep deprivation. Strong positive/negative emotions were barriers to healthy sleep. The use of electronic devices at bedtime and sports participation were described as both barriers to and facilitators of healthy sleep. Participants indicated their intention to sleep more and to use relaxing activities at bedtime. Some intended to advance their bedtime, but none intended to stop using electronic devices at bedtime. Most participants stated that it would be easy to turn off phones but difficult to turn off movies at bedtime, and many believed that their parents and peers were against engaging in risky sleep behavior.

Conclusions: Interventions that seek to alter adolescents' ability to regulate affect and address their beliefs regarding the use of electronic devices at bedtime, combined with information regarding the long-term impact of sleep health, may improve the effectiveness of sleep promotion programs for adolescents.

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Determinants of sleep adolescents behavior

The recommended amount of sleep for adolescents is 8 to 10 hours per night.^{1,2} However, population-based studies indicate that approximately one-third to one-fourth of adolescents get insufficient sleep and these estimates are increasing.^{3–5} Sleep deprivation has a negative impact on the mental health and physical health of young people, making it important to intervene and prevent sleep deprivation in adolescents.^{6–13} Adolescence is a period of life in which healthy sleep habits can be cultivated, providing physical and psychological benefits during this period and reducing the likelihood of sleep-related chronic diseases in adulthood.¹⁴ Health habits established during adolescence tend to be maintained during adulthood, and many serious diseases in adulthood are rooted in habits formed in adolescence.¹⁵

It has been proposed that differences in various sleep parameters exist along socioeconomic lines.^{15,16} Short sleep duration is common across all categories of socioeconomic status (SES),¹⁷ but whereas

multiple studies have examined barriers to sleep in low SES children and adolescents,^{18–20} no previous study has examined barriers to sleep that could be particularly relevant for middle/high-SES adolescents. The reasons why youths from different socioeconomic backgrounds have short sleep duration could be different, and we need to identify factors associated with short sleep duration not only in students of low SES but also in middle/high-SES adolescents.

To date, healthy sleep promotion programs designed for adolescents have had limited success in improving sleep behavior. Various reviews have noted the methodological limitations of these programs,^{16,20–23} but researchers have not yet addressed the limitations of these studies by seeking to understand (and account for) the determinants of sleep behavior. This is an important omission, because the effectiveness of an educational intervention aimed at improving health-related behavior depends on that intervention being tailored to the most important determinants of the target behaviors in the target audience.²⁴

Sleep deprivation in adolescents has been attributed to a combination of factors, including the biological changes that lead to an approximately 2-hour shift in circadian phase, the involvement of adolescents

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in social and school activities during the evening, and the early start time of high school.^{25–28} Although these factors have consistently been associated with bedtimes and short sleep durations among adolescents, previous studies provided only relatively crude indications of possible determinants for these behaviors, including social pressure²⁹ or delayed timing of nocturnal melatonin secretion.³⁰

It has been suggested that the tailoring of interventions to the target audience could improve the transfer of evidence-based knowledge into practice.³³ Tailoring is a systematic approach through which researchers improve the design and effectiveness of an intervention by selecting strategies that explicitly address specific, previously identified determinants. There is evidence that the success of a health intervention is increased when the implementation strategies prospectively address specific setting-related barriers or facilitators and are adapted to the local context and the target audience.

This study used the theory of planned behavior (TPB)^{31,32} to prospectively identify determinants of healthy sleep behavior in adolescents of middle/high SES. Healthy sleep was defined as the ability to get the recommended amount of sleep by falling asleep easily and sleeping continuously through the night.

A prospective assessment of determinants of healthy sleep behavior is expected to help us prioritize the most relevant targets for change, select appropriate intervention methods, and tailor the intended program to the reality and needs of the target audience. Although this approach has proven effective and desirable in other health domains, it has not been implemented in any of the previously reported school-based sleep health promotion programs (see Gruber³³).

According to TPB, a person's intention to perform a behavior is a predictor of his/her performance of that behavior. Intention is regarded as a function of attitude toward the behavior (ie, an individual's salient behavioral beliefs concerning the possible personal consequences of the action) and subjective norms (ie, an individual's beliefs that specific persons or groups think that the individual should or should not perform the behavior). In addition, perceived behavioral control—the perceived ease or difficulty of performing the behavior—may be an important determinant of that behavior and is thought to reflect both past experience and anticipated obstacles. These factors are regarded as additively combining to influence the likelihood of the behavior being performed. To our knowledge, no previous study has examined adolescents' sleep behavior using this framework.

The goal of this study was to prospectively identify the determinants of sleep behavior in a target population of adolescents in our community. These determinants included their attitude toward sleep, perception of barriers to obtaining sufficient sleep, intention to change sleep behavior, and perceived behavioral control of sleep behavior. A knowledge of such determinants would be used for the development of a tailored sleep health school-based promotion intervention for the target population. This pilot study adds to the existing literature by (1) focusing on middle/high-SES adolescents, (2) applying TBP for the first time to identify psychological determinants of adolescents' sleep behavior, and (3) seeking to prospectively identify barriers and facilitators to healthy sleep in the target community of adolescents to create a tailored school-based healthy sleep promotion program. This approach is expected to maximize the potential relevance and effectiveness of future interventions for this (and similar) communities of adolescents of middle to high SES.

Methods

This descriptive qualitative study consisted of collecting information using semistructured interviews.

Programmatic context

This study was conducted as part of an effort to adapt “Sleep for Success” (SFS), a sleep health education program developed for elementary school-aged children, to high school students. The details of SFS have been described elsewhere.³⁴ At the time of this study, the SFS program curriculum did not include any educational modules or activities focused on adolescents; however, teachers and staff members were eager to expand this program to adolescents. This research was therefore timely, as it helped to identify specific issues relevant to programs promoting healthy sleep in typically developing adolescents in our schools.

Recruitment

Participants were recruited using a purposeful sampling strategy that reflected typical healthy adolescents. The criterion used to select participants was based on the idea that school-based sleep health promotion programs would be preventive, with the goal of using educational programs to promote the health and well-being of typically developing adolescents. Therefore, this study recruited typically developing students with no medical, psychiatric, or sleep disorders and with actigraphy-measured sleep duration within the average range reported for this age group. Specifically, nighttime sleep was monitored for 5 week nights using a wrist watch-like device (AW-64 series; Mini-Mitter, Sunriver, OR) to measure movement. Actigraphic sleep data were recorded at 1-minute epochs, and the Actiware Sleep 3.4 software (Mini-Mitter) was used to score sleep. The total sum of the activity counts was computed for each 1-minute epoch. If the sum exceeded a threshold sensitivity value of the mean score during the active period /45, then the epoch was considered wake. Otherwise, the epoch was considered sleep. The actigraphic sleep measures used in this study included parameters pertaining to time spent asleep during the night. Actigraphic data were analyzed using sleep software (AW64 series, Mini-Mitter). These measures were averaged over the 5 nights, allowing us to examine the participants' habitual sleep duration.

None of the students in the targeted schools had any previous exposure to sleep education. Teachers invited all students to participate in the study. The first 20 students to provide signed consent forms were included in the study. Two of these students were excluded due to diabetes¹ and an average sleep duration shorter than 7 hours. This was based on The National Sleep Foundation consensus statement¹ indicating that 8 to 10 hours of sleep are recommended, and 7 hours of sleep are possibly acceptable, for adolescents between 14 and 17 years old.

All participants received a \$15 gift card as an incentive. The study was approved by the Research Ethics Board of Douglas Mental Health University Institute (Montreal, Canada) and the Research Ethics Board of the Riverside School Board.

Participants

Eighteen students, 9 boys and 9 girls, with a mean age of 14.9 ± 1.5 years and sleep duration of 7.8 hours ± 46 minutes (range, 7–8.8 hours; see [Table 1](#) for frequencies) from Heritage High School in the Riverside School Board of Quebec were interviewed. Most of the participants were white, with the remainder classified as mixed ethnicity. All participants spoke English as their first language. Annual combined incomes were \$25,000 to \$65,000 in 11%, \$65,000 to \$95,000 in 50%, and >\$95,000 in 39% (see [Table 1](#) for more information).

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