

Adolescent sleep quality measured during leisure activities

Kathy Sexton-Radek

Department of Psychology, Elmhurst College, IL, USA

Abstract

A one-week sleep monitoring by logs and actigraphs in preteens during summer camp was conducted. Campers aged 11-16 attended a two-week day camp that focused on the learning about science. Nine campers agreed to monitor their sleep and have their patterns explained (anonymously) to other campers during the expert lecture by the author. The aim of the study was to identify the sleep quality in an adolescent group. All nine of the sleep logs and actigraphs denoted severe sleep deprivation. The findings from the logs and actigraphs denoted severe sleep deprivation. The expert lecturer provided basic information about sleep per the science designation of the day camp. A follow up session provided strategies to address sleep deprivation.

Introduction

Factors that determine sleep, sleep propensity and circadian rhythm are altered by behaviors of the sleeper.¹ In effect, during our wake day, the need for sleep accrues; with this, the expected timing of the sleep interval is anticipated. However, behaviors of the sleeper, such as extending wakefulness to play video games all night or phone/computer chatting leads to a protuberance in the two driving factors of sleep (*i.e.*, sleep propensity, circadian rhythm). In addition to being essential to good health, the physiological states during sleep are thought to serve functions such as metabolic restoration and memory/learning consolidation.²⁻⁴ As a group, adolescents have poor sleep quality as evidenced by short sleep durations, self-reported sleep disturbances of insomnia and daytime sleepiness (Carskadon, 1999; *data not cited*). The timing and interval of sleep, per one's circadian rhythm, is physiologically driven, affected by behaviors, and has been described as varying over the lifespan.⁵ The sleep interval or phase has been measured in numerous investigations using the characteristic melatonin release as a marker. Findings from this rich area of sleep research investigations have identified a stable start point of sleep in early and middle childhood with a measured shift

in pre-adolescence.⁶ It is here that the complication becomes more intricate. At pre-adolescence, in Western cultures, increased behavior of late night schedules, that is engagement in activities instead of sleep ensue.⁷ Social constraints of a school schedule impose a weekday early morning waking. The next result is current and accumulated sleep deprivation effects in adolescence, a later readiness for sleep (*i.e.* delayed bedtime).⁸ While the results from studies documenting the association between poor sleep and health have become more visible, sleep quality in unstructured times needs to be addressed for school aged children. It is possible that this time was used to *catch up* on sleep or to perhaps enjoy *good sleep* when the homework, practice schedule and commute to school is abated. However, in this small-scale study, school aged children reported poor sleep quality in this absence of societal/academic pressures. The concerns with regard to sleep and health status in school-aged children are increasing and given these results, with good reason. Specifically, this data is evidence to the experiences of increased sleepiness in the day, and a shift in sleep pattern to later bedtimes. These are teenager changes in sleep, and these data represent a migration downward to younger ages. Some limitations of this study include the short data collection period and the use of subjective measures of sleep-both indices that may have reduced sensitivity to sleep.

Adolescent sleep quality

Studies of sleep patterns and sleep needs in adolescents have resulted in findings that document information processing, memory deficits, increased moodiness, depression, decreased creativity and reduced ability to handle complex tasks.⁹ Compensatory measures such as naps and excessive sleep on the weekends did not alleviate sleep deprivation has been concluded.⁹

Health implications and adolescent sleep

It has been identified that sleep deprived adolescents are at greater risks for mood and behavior problems. The risk increases for possible drug and alcohol use and vulnerability to accidents in sleep deprived adolescents.⁹ Adolescents at or near the optimal nine hours per night of sleep more often rated their health as good as compared to sleep deprived peers. Sleep deprived adolescents more often use substances and caffeine as compared to same-aged peers.⁸⁻¹⁰

The current investigation sought to examine sleep quality in adolescents that were unencumbered by school schedule constraints. The research question focused on

Correspondence: Kathy Sexton-Radek, Department of Psychology, Elmhurst College, 190 Prospect Avenue, Elmhurst, IL 60106 USA. Tel. +1.630.617.3587 - Fax: +1.630.617.3587 E-mail: kathysr@elmhurst.edu

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the self-reported and measured sleep quality in adolescents during a summer vacation schedule. It was hypothesized that abbreviated sleep intervals that result in sleep deprivation would not be seen. By contrast, school aged children would be expected to sleep longer and with perhaps increased quality of sleep in the non-academic time of the year (*i.e.*, summer vacation).^{11,12} The absence of the necessitated early morning wake time and period of concerted attention and focus during the day at school and in the afternoon at sports/homework and evening at homework would provide increased opportunity to sleep. With chronic sleep deprivation often times beginning during school age/pre teen years, exploration of experience of sleep opportunities in this age are necessary. Reports from the recent National Sleep Foundation Census indicated that 7.4 hours of sleep is obtained on a school day and 9.7 hours of sleep is achieved, on average, for preteens, on weekends. Daytime sleepiness was reported across both times.

Materials and Methods

Participants

37 school aged children attending a science awareness oriented summer camp were invited to track their sleep and complete self-report scales about their sleep quality. The ages ranged from 11 years 8 months to 16 years 2 months with 52% of the group being

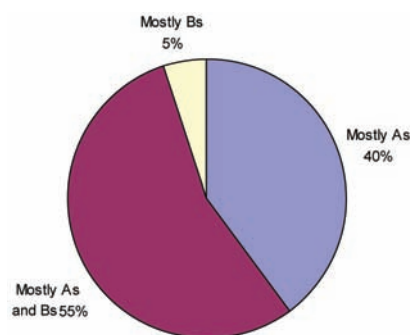


Figure 1. Self-reported grades in school.

female. Each participant received an overview of the measurement procedure gave their assent and consent forms for participation in all activities of the Health camp including the sleep measurement was included on the parent consent form. Nine individuals agreed to measurement of their sleep.

Instruments

A standard sleep log and sleep history structured interview form were used to measure sleep. Participants wore actiwatches, which measure the timing of a sleep period, after completing the interview materials.

Results and Discussion

Nine participants of the 37 attending the camp agreed to track their sleep with a sleep log and wear an Actiwatch. The seven female (aged 14,14,14,15,15,15,16) and two male (aged 12, 17) campers completed the standard interview form. The reported themselves to be high achieving students with 95% of the sample receiving grades of As and Bs (Figure 1). The median number of minutes of sleep across the seven days logged varied from 426 as a minimum and 547 as the maximum. All partic-

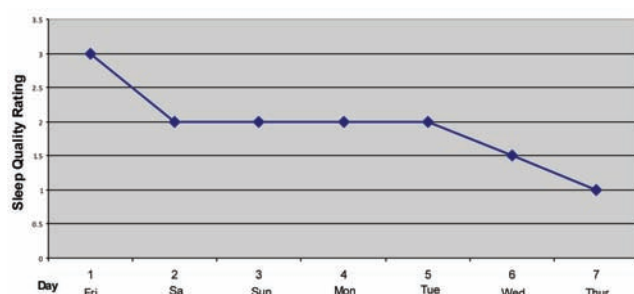


Figure 2. Median rating of sleep quality.

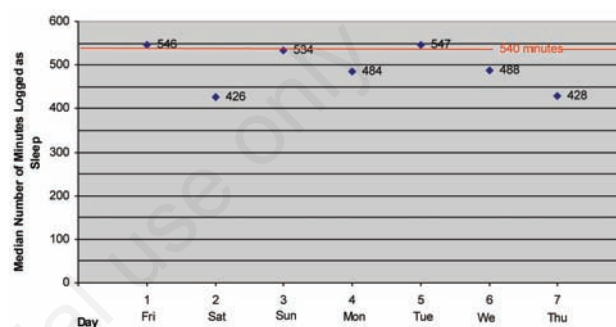


Figure 3. Median sleep interval logged.

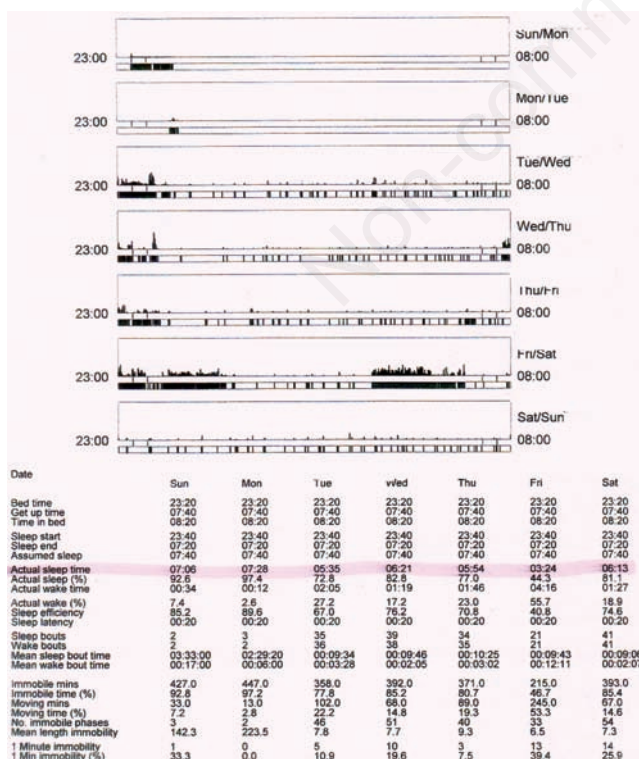


Figure 4. Actigraphic results for representative participant.

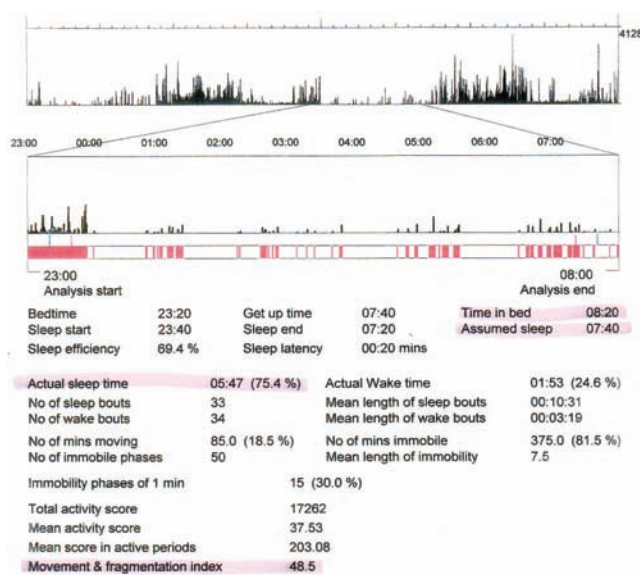


Figure 5. Other actigraphic results for representative participant.

ipants rated their sleep in general using a standard scale of 1 is poor and 5 is very good. The median ratings ranged from 1 to 3 for the aggregate sample. The median ratings of sleep quality are plotted in Figure 2 to illustrate the declining slope in values.

The participants sleep logs indicated their experiencing insufficient sleep 5 of the 7 logged nights. The median number of minutes is depicted in Figure 3. It is significant to note that the two nights considered to be over the optimal number of hours threshold of nine hours were by six and seven minutes only.

Figure 4 presents the computer summary of two representative Actiwatch collections. In Figure 4, the participant is spending a reasonable amount of time in bed but not sleeping during all of that time. The highlighted summary score indicated 5 hours 47 minutes or, time sleeping in proportion to time in bed as 75.4%. The movement and fragmentation index value is six times the expected result at 48.5; thus this participant is *tossing and turning* a considerable portion of their sleep night measured. In Figure 5, the representative participants' sleep times ranged from 3 hours 24 minutes to 7 hours 28 minutes. These values are all considerably lower than the 9 hours of sleep needed at the developmental level.

In conclusion, self-reported sleep was lower than what was expected. Participants reported low levels of sleep quality overall. The objective measurement of sleep using an Actiwatch provided a more severely impoverished sleep quality with measured values ranging from 3 hours to 7 hours. The saliency of these findings is the environment from which the meas-

urement was taken – summer camp. The late start and low intensity experience of science camp, while not a leisure oriented summer experience was substantially different than restrictive school and homework schedules. The social agenda, low importance to sleep and other behavioral factors prevailed in compromising sleep quality despite the low social demand on their schedules. Following lectures describing the scientific aspect of sleep, the campers were given resource materials to the National Sleep Foundation and instructions by this author on the need to modify their sleep to approach the developmentally indicated level of nine hours. Some of these materials appear in Appendices 1 and 2. The participants were receptive to the instruction and it is likely that more intense, ongoing educative intervention about sleep is necessary to preserve sleep quality.

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