ADOLESCENT HEALTH BRIEF

Differences in Reported Sleep Need Among Adolescents

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Increased lifestyle demands and reduced sleep are reported to result in daytime sleepiness and impaired functioning for teenagers. A sample of 612 freshman urban high school students completed a questionnaire describing their sleep patterns and problems, along with sociodemographic information, daily activities, pubertal development, depressive mood, and morning–evening preference. About 63% of the respondents felt they needed more sleep on weeknights (MS group), experienced sleepiness that interfered with their schoolwork, and had problems with sleeping. The other group reported they got sufficient sleep on weeknights (SS group) and did not experience sleepiness problems to the same degree. However, both had similar weeknight sleep and daily activity patterns. The MS group reported an ideal sleep time of 9.2 h, about 2 h more than they were getting and 1 h more than the SS group ideal, and had a higher preference for later bed and waking times. In our sample, individual differences in biologic sleep need and quality of sleep may be emerging as early as 14 years of age. © ***Society for Adolescent Medicine, 1998***

KEY WORDS:
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Sleep is a biologic need that has been shown to vary in quantity and quality across age groups. Sleep laboratory studies have shown that older teenagers have a physiological need for more sleep (1) and experience a delay in the time of sleep onset and awakening (2,3) compared to prepubertal and younger children. While the biologic need for sleep is increasing, psychosocial pressures of homework, sports, jobs, and social activities, and decreases in parental control over bedtime combine to reduce the amount of time adolescents spend sleeping (4,5).

Several investigators have described a typical teenage pattern of declining schoolnight sleep which results in excessive daytime sleepiness, impairment of waking function owing to decreased alertness, poor school performance, as well as mood swings and behavioral difficulties (6–14). Adolescents have frequently reported compensating for decreased weekday sleep by extending their sleep time on weekends.

Purpose

In a longitudinal study to determine the stability of sleep needs during adolescence and into young adulthood, Strauch and Meier (15) administered a sleep questionnaire to the same subjects six times over a period of 10 years. These investigators suggested that difficulty adapting to the frequent sleep time reduction that occurs with adolescence was demonstrated by a subgroup who said they felt they needed more sleep each night and at the same time reported irregular sleep habits, less time in bed, and daytime sleepiness, particularly on arising and during morning hours.

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Adolescents who reported they needed more weeknight sleep (MS) were compared with those who felt they got sufficient weeknight sleep (SS) with respect to schoolnight and weekend night sleep habits, sleep quality, and sleep preferences, mood, perceived ability to function during the day, and daily activities and demands on their time. These data were collected as part of a larger study, reported elsewhere (16,17), which was designed to examine the influence of environmental factors, developmental stage, sleep pattern preferences, mood, risky health behaviors, and sleep disorder symptoms on the self-reported sleep–wake patterns of a multiethnic sample of freshman urban high school students. Procedures and instruments for data collection were approved by the Institutional Review Board at the University of Illinois at Chicago prior to implementation.

Methods

Sample

The convenience sample consisted of 612 respondents drawn from a population of 1457 Grade 9 students enrolled in freshman health education classes in two public high schools in a large Midwestern city. The overall sample consisted of 314 girls (51.3%) and 298 boys (48.7%), who had a mean age of 14.5 years [standard deviation (SD) = 0.57]. About 32% of the respondents were Caucasian, 17% African-American, 30% Hispanic, 14% Asian, 3% American Indian/Eskimo, and 4% other.

Instrument

Students who were present in the health education class on the day of administration (midyear) were asked to voluntarily complete the Sleep Patterns Questionnaire (SPQ). The SPQ is a self-report survey instrument that contains several sections which were compiled on the basis of previous work of several investigators as well as the authors. The majority of the items were multiple choice with five possible responses, balanced from positive to negative or negative to positive. The sections comprising the SPQ were as follows: sleep habits and environment, daytime functioning and sleep disorder symptoms (66 items) (18); sociodemographic information, health history, and risky health behaviors (31 items); the Pubertal Development Scale (six items) (19); the Scale to Measure Depressive Mood (six items) (20); the Morningness/Eveningness Scale (10 items) (21); and daily activities on schooldays and weekends (10 items for each category) (18). Subjects were instructed to choose one answer that best described their usual sleep habits during this school year. They were assured that there were no identifiers on any of the questionnaires and that no one from their school would see the completed questionnaires.

Results

About 63% of the respondents indicated that they would like to get more sleep on schoolnights (MS), and 37% felt they got sufficient sleep on schoolnights (SS). While the sample represented a multicultural background, no statistically significant differences based on ethnicity were found between the MS and SS groups. Between 59% and 65% of the respondents in each ethnic group indicated they would like more sleep on schoolnights. A significantly higher proportion of the females (67%) compared to the males (58%) indicated that they would like more sleep on schoolnights ($\chi^2 = 4.23$; $df = 1$; $p = 0.039$). A higher proportion of the female students (87%) compared to males (50%) indicated that puberty had definitely started or was complete ($\chi^2 = 88.2$; $p = 0.000$).

When compared to the self-reported sufficient sleepers, the MS group got only slightly less sleep on schoolnights (12 min) and reported going to bed about 13 min later (Table 1). Rising time on schooldays was about the same for both groups (6:04 vs 6:05 A.M.). On weekends, the MS group reported getting more sleep; although they went to bed later than the SS group, they reported getting up about 1 h later. The mean weekend sleep time for the MS group was 9.7 h/night; the mean weekend sleep time for the SS group was 9.3 h. The hours spent on activities other than classtime were similar for the two groups, both on schooldays and weekend days. When asked how many hours of sleep they felt they needed to be at their best, the MS group indicated needing about 9.2 h (SD 1.77), about 1 h more than the SS group's estimate of 8.3 h (SD 1.76). The MS group had a significantly lower (toward "eveningness") mean score on the Morningness/Eveningness scale on the SPQ, indicating a preference for later bed and rising times.

The MS group's perceived need for more sleep was supported by their reporting a greater frequency of "tiredness symptoms" such as falling asleep in

Table 1. Sleep and Activity Patterns of a Sample of Urban Adolescents

	Need More Sleep (n = 379) (Mean ± 1 SD)	Get Sufficient Sleep (n = 227) (Mean ± 1 SD)
Weekday		
Sleep on schoolnights	7.4 h (1.03)	7.6 h (1.04)**
Schoolnight bedtime	10:46 P.M. (1.02)	10:33 P.M. (1.02)
Get up schooldays	6:05 A.M. (.559)	6:04 A.M. (.549)
Hours for daily activities (sports, TV, homework, job, music, etc.)	8.4 h/day (4.3)	8.4 h/day (6.4)
Weekends		
Sleep on weekend nights	9.7 h (1.77)	9.3 h (1.34)*
Weekend bedtime	12:49 A.M. (1.57)	12:26 A.M. (1.49)*
Get up on weekend days	10:49 A.M. (1.74)	9:46 A.M. (1.61)***
Hours of daily activities (sports, TV, homework, job, music, etc.)	9.5 (5.4)	8.8 (5.0)**
Sleep preferences		
Ideal sleep to be my best	9.2 h (1.77)	8.3 h (1.77)***
"Morningness"/"eveningness"	25.5 (4.53)	28.2 (4.46)**

Possible range 10–43, >score ≥ morningness preference.
Student's t test: $p^* < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

school one time a week or more, having problems with sleepiness interfering with classwork and homework, and feeling "dragged out" and sleepy through the day (Table 2). A significantly higher proportion of the MS group reported having sleep problems and taking longer than 30 min to fall asleep, and rated their quality of sleep as fair or poor. In terms of mood, a higher proportion of the MS group reported feeling stressed out in school (79% vs. 59%); the MS group had a higher mean score on the depressive mood items of the SPQ compared to the SS group.

Logistic regression was used to determine which of the several significant differences previously presented would be effective predictors of group membership. Those that significantly predicted ($p \leq 0.05$) whether students felt they needed more sleep on school nights or felt they got sufficient sleep were the quality of sleep, sleep problems, a tendency toward "eveningness" on the Morningness/Eveningness Scale, ideal hours of sleep needed to be at their best, and feeling stressed out at school. These variables correctly predicted respondents in the MS group 87% of the time, and respondents in the SS group 60% of

Table 2. Daytime Function, Nighttime Sleep Difficulties, and Mood of a Sample of Urban Adolescents

	Need More Sleep (n = 379) (%)	Get Sufficient Sleep (n = 227) (%)
Daytime functioning		
Trouble staying awake in the morning > once/wk	50	17*
Trouble staying awake in the afternoon > one/wk	43	16*
Actually fall asleep in school > once/wk	31	10*
Sleepiness interferes with schoolwork	43	25*
Sleepiness interferes with homework	66	46*
Feel tired, "dragged out," sleepy during the day because can't sleep at night	78	54*
Nighttime sleep		
Have sleep problems	32	11*
Rate quality of sleep as fair or poor	40	27*
Have hard time falling asleep sometimes or often	84	72*
Take >30 min to fall asleep at night	24	13*
Mood		
Feel stressed out at school sometimes or often	79	58*
Depressive feelings (mean ± 1 SD)	18.99 (4.64)	16.82 (4.25)**

Range 10–30, cutoff score of 23 = severe depressed mood.
* Chi-square, $p < 0.01$; **independent groups t test, $p < 0.000$.

the time, and accounted for about 54% of the variance between groups.

Discussion

These data suggest that the 14-year-old teens in our sample who were getting the same amount of sleep may not have been affected in the same way. Despite their similar sleeping patterns on schoolnights, the MS group and the SS group gave differing pictures of their daytime functioning, the quality of their nighttime sleep, and the time of day at which they felt most awake. In addition, the MS group indicated that they felt they needed almost 2 h more sleep than they were getting on schoolnights to be at their best, whereas the SS group felt they would be at their best with 1 h more sleep.

Strauch and Meier (15) found that at each time of measurement, between 55% and 75% of their subjects felt they needed more sleep, and concluded that the wish for more sleep was frequent in adolescents. At the time of the second measurement when the mean age of their sample was 13.4 years, the MS and SS groups were getting 9.3 h of sleep on weeknights and about 10 h/night on weekends; the quantity of sleep being obtained for both time periods was not significantly different between groups. In their study, being in the group that needed more sleep was not related to any quality of sleep variables such as difficulty falling asleep or frequent awakenings, but was related to irregular sleep habits, sleep reduction episodes, and more frequent napping.

In our study, differences in wish for more sleep do not appear to be the result of just greater reduction in total sleep time or more irregular sleep habits. Individual differences in the need for sleep and differences in the quality of sleep may be emerging as early as age 14 years and may account for some of the variance in the degree to which daytime sleepiness occurred and interfered with daily activities in our adolescent sample.

Another possibility is that the MS group's tendency toward "eveningness," indicating a preference for a later sleep onset and offset than the SS group, may underlie many of the sleep and sleepiness difficulties of the MS group. Carskadon et al. (21) suggested that a delayed sleep phase preference tends to occur during middle adolescence and seems to be associated with biological factors rather than the psychosocial ones that govern sleep and waking times. For the MS group, sleep time and getting-up time may both come too early for their biologic needs, thus resulting in sleep problems with insomnia, frequent awakenings at night, feeling "dragged out" the next day because of not being able to sleep at night, and subsequent daytime sleepiness and mood problems.

Many of the students who felt they got enough sleep on schoolnights still reported instances of sleepiness interfering with their daily functioning (Table 2). Both groups acknowledged that they needed more sleep to be at their best—1 h in the case of the SS group or 2 h for the MS group—so it is not surprising that there are still relatively large numbers of students in both groups who report sleepiness. The longer sleep duration on weekends compared to weeknights also suggests that a substantial portion of the adolescents studied functioned in a sleep-deprived state during at least some of their weekday hours.

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