

# Gender differences in the sleep habits of 11-13 year olds

## Diferenças nos hábitos de sono entre gêneros nos escolares de 11 a 13 anos de idade

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### Abstract

**Objective:** Sleep plays an important role in the physical and emotional development of adolescents. The aim of this study was to examine gender differences in sleep habits in a sample of 11-13 year olds. **Method:** The study was carried out in the city of Patos de Minas, Brazil. The study cohort was composed of 200 students (96 boys and 104 girls) attending (in the morning or in the afternoon) the 5th, 6th or 7th grades, with ages ranging from 11 to 13 years. A Sleep Questionnaire developed at the Federal University of São Paulo was used in order to evaluate student sleep habits and schedules, as well as the overall quality of sleep. **Results:** For the period between Friday night and Sunday morning, girls displayed longer sleep duration than did boys. During the week, students attending only afternoon classes woke up later than did students attending only morning classes. In addition, morning-class students showed more adverse effects on sleep, including irregular sleep/wakefulness circadian rhythms, when compared with afternoon-class students. **Conclusion:** Sleep habits are affected by gender and school schedule.

**Descriptors:** Sleep; Sex factors; Habits; Child; Adolescent

### Resumo

**Objetivo:** O sono desempenha um papel fundamental no desenvolvimento físico e emocional de adolescentes. Este estudo teve o objetivo de analisar as diferenças entre gêneros nos hábitos de sono de escolares com idades entre 11 e 13. **Método:** Este estudo foi realizado na cidade de Patos de Minas-MG, Brasil. A amostra foi composta de 200 alunos (96 meninos e 104 meninas) matriculados da 5ª a 7ª séries (ambos os turnos, manhã e tarde) e com idade entre 11 e 13 anos. O Questionário de sono UNIFESP foi utilizado para avaliar a qualidade de sono, hábitos e horários de sono. **Resultados:** As meninas demonstraram maior tempo de sono do que os meninos da sexta-feira à noite para o domingo de manhã. Os alunos que estudavam a tarde acordavam mais tarde que os alunos do turno matutino durante a semana; alunos do turno da manhã são mais afetados negativamente em relação ao sono e podem ter um ciclo vigília/sono irregular quando comparado com os alunos que estudam no turno da tarde. **Conclusão:** Meninos e meninas têm diferentes hábitos de sono, sendo influenciados pelo turno escolar.

**Descritores:** Sono; Fatores sexuais; Hábitos; Criança; Adolescente

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## Introduction

Sleep plays an important role in physical and emotional development, especially for children and adolescents, who are in a period of intense learning and development. Unfortunately, many students have lifestyles that are not conducive to proper sleep. Factors such as puberty,<sup>1</sup> grade level, and reduced parental control over sleep habits<sup>2</sup> all contribute to irregular and unsatisfactory sleep patterns.<sup>3</sup>

Studies of the sleep habits of adolescents have shown that they tend to go to bed later and sleep fewer hours than do children, consequently exhibiting excessive daytime sleepiness. The reduced sleep quantity is compensated for on weekends, when adolescents have no school commitments, allowing them to sleep longer.<sup>4</sup>

In recent years, adolescent sleep has been studied extensively using a variety of approaches, including descriptive and longitudinal perspectives.<sup>5</sup> Studies of sleep quality and quantity using subjective methods (questionnaires) have found that earlier school start times (morning classes) are associated with less nighttime sleep, and consequently morning-class students display greater daytime sleepiness and more attention problems, as well as poor concentration and cognitive function deficits.<sup>6</sup> Fallone et al. reported that children with irregular sleep schedules on weekdays were more likely to be sleep deprived and showed worse academic performance than did those with normal sleep patterns.<sup>7</sup>

Carskadon et al. studied adolescent sleep patterns in relation to physiological development and found that sleep time varied with gender and, in some countries, with the switch from afternoon to morning schedules among older students. Educational policies encouraging the shift from an afternoon schedule to a morning schedule should be reexamined, as they might interfere with the changing sleep-wake cycles that have been described for this puberty-adolescence age group.<sup>8</sup>

Given the importance of adequate sleep to adolescent development, in the present study we administered a questionnaire to examine sleep habits and gender differences in a sample of 11-13 year olds.

## Method

### 1. Subjects

The sample consisted of 200 students (96 boys and 104 girls), aged 11 to 13 years (mean,  $11.8 \pm 0.7$  years), who were enrolled in the 5th 6th or 7th grades (morning or afternoon schedule).

Study subjects were selected from classrooms at random from students in attendance at the time of administration of the sleep questionnaire. Each grade level contributed approximately 20% of the students in the sample. The study was conducted in the city of Patos de Minas, Brazil, during May and June 2006.

### 2. Procedures

Researchers visited four schools (public and private) in Pato de Minas with morning and afternoon schedules. The morning classes run from 7:30 a.m. to 12:00 p.m., and the afternoon classes run from 1:30 p.m. to 5:00 p.m. Students attend class daily, Monday through Friday. These represent the standard academic schedules in Brazil.

The project aims and methods were explained to all relevant authorities, including principals, teachers, and parents. All parents were required to give written informed consent before their children were allowed to participate in the study. Written consent was also obtained from the school principals, after which the process of sampling the schools began with a random drawing. The

significance of the study and the content of the sleep questionnaire was explained to the selected students.<sup>9</sup>

### 3. Sleep questionnaire

A questionnaire developed by Pires et al. at the Universidade Federal de São Paulo (UNIFESP), known as the "UNIFESP Sleep Questionnaire", consists of 34 questions (adapted to 32 items) about sleep patterns to collect subjective reports of sleep quality, sleep habits, and sleep/wake cycles, as well as indicators of the severity of any sleep complaint or problem presented.<sup>9</sup> The questionnaire has previously been adapted to and administered in this type of population.<sup>6</sup> We administered the sleep questionnaires to the sample cohort during class by reading the questions one by one while the room remained silent. The implementation of the protocol took place during the main study hours (from 9 a.m. to 10 a.m. or from 4:00 p.m. to 5:00 p.m.) in three participating schools. At each school, administration of the questionnaire took place for 15 min per day for three consecutive days. Prior to the administration of the questionnaire, the rules and procedures of the study were explained. Students were instructed to pay attention, to be truthful, to provide serious answers, not to speak to other students in the room, and not to copy the answers of others.

### 4. Statistical analyses

Statistical analysis was performed using Statistica for Windows, version 6.0. Descriptive data were expressed as the number (n) of students and the percentage (%) of the total sample. Gender and academic schedule data were compared using the Student's t-test and one-way ANOVA, respectively, whereas binary logistic regression was used for the main sleep complaints. The level of significance was set at  $p \leq 0.05$ .

### 5. Ethics

This study was approved by the Ethics Committee of the Universidade de Patos de Minas (no. 196).

## Results

### 1. Morning-class students and afternoon-class students: sleep habits by gender

Table 1 shows gender differences in sleep habits. There were no gender differences for the time of going to bed, but mean waking times showed significant differences between genders and varied depending on the day of the week (for males and females, respectively: Saturday, 8:20 a.m.  $\pm$  94 min vs. 9:00 a.m.  $\pm$  82 min and Sunday, 8:39 a.m.  $\pm$  94 min vs. 9:10 a.m.  $\pm$  81 min;  $p < 0.05$ ), indicating that girls woke later on Saturdays and Sundays. Consequently, the mean total sleep time (TST) from Friday night to Sunday morning was longer for girls than for boys ( $625.58 \pm 103.34$  min vs.  $595.10 \pm 92.52$  min;  $p < 0.05$ ).

Table 1 also shows schedule-related differences in sleep habits, according to gender. Boys and girls studying during the afternoon woke later on weekdays than did their morning-class counterparts. On Sundays, however, the only significant difference was that morning-class girls reported waking later than did afternoon-class girls ( $p = 0.03$ ).

In terms of TST, both genders enrolled in afternoon classes reported longer periods of sleep on weeknights than did their morning-class counterparts. For TST from Friday night to Sunday morning, we found significant differences only among boys, afternoon-class boys reporting longer TST in comparison with morning-class boys.

**Table 1 - Student sleeping hours and sleep duration by gender and school shift. Data are reported as the upper and lower limits of the 95% confidence interval for the means of all study subgroups. Monday through Thursday data were pooled due to similarity**

Variable	Time frame	All students													
		Boys						Girls							
		All boys n = 96		Morning-class boys n = 48		Afternoon-class boys n = 52		All girls n = 104		Morning-class girls n = 48		Afternoon-class girls n = 52			
Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit				
Time going to bed	Mon-Thu	21:00	21:29	21:12	22:09	21:06	21:49	21:33	22:16	21:54	22:07	21:48	22:19	21:42	22:13
	Fri	22:32	22:56	21:07	21:42	22:21	23:04	21:39	22:32	22:19	22:54	22:17	23:18	22:07	22:46
	Sat	22:39	23:06	22:29	23:12	22:27	23:28	22:12	23:17	22:39	23:10	22:48	23:29	22:18	23:05
	Sun	21:52	22:13	21:44	22:17	21:46	22:25	21:28	22:23	21:52	22:17	22:50	23:27	21:43	22:18
Time waking up	Mon-Thu	6:56	7:17	6:49	7:18	6:03	6:14	7:41	8:16**	6:54	7:23	6:03	6:10	7:54	8:27**
	Fri	6:57	7:18	6:52	7:21	6:04	6:15	7:55	8:28**	6:53	7:22	6:01	6:08	7:56	8:27**
	Sat	8:28	8:53	8:00	8:39	7:50	8:37	8:23	9:22	8:44	9:15*	8:41	9:32	8:32	9:13
	Sun	8:42	9:07	8:19	8:58	8:11	9:10	8:12	9:01	8:54	9:25*	9:01	9:52	8:34	9:11**
Sleep duration (min)	Mon-Fri	535.16	561.40	531.73	569.21	476.70	517.68	580.31	627.19**	529.52	566.82	466.52	500.02	590.86	635.30**
	Fri-Sat	596.15	625.75	573.35	616.85	542.60	599.48	586.69	651.65**	605.49	645.67*	593.12	657.26	600.61	651.31
	Sat-Sun	586.94	616.66	564.91	609.47	550.34	614.24	559.92	624.24	595.46	635.12	569.30	649.54	584.37	637.93

\*  $p < 0.05$  for a gender difference (girls vs. boys).

\*\*  $p < 0.05$  for a schedule-related difference (morning vs. afternoon).

## Discussion

Busse and Baldini stated that sleep is important for physical and psychological recovery in human beings. Knowledge of the features and functions of sleep is essential in order to increase understanding various childhood and adolescent behavioral disorders that result from poor sleep habits, as well as their significance for school performance.<sup>10</sup> Modern living arrangements and lifestyles often fail to ensure proper sleep, particularly in urban environments. School and extracurricular activities often lead to unsatisfactory and uneven sleep occurring in inappropriate conditions and environments.

The data from this study show that girls not only wake later than do boys on weekends but also sleep more from Friday night to Sunday morning. This gender difference in adolescent sleep habits is supported by the literature. For example, a study by Lee et al. showed that girls wake significantly earlier than do boys during the week, but that the inverse was true on weekends, when boys wake earlier than girls. This matches the findings of the present study, in which boys also reported earlier weekend waking than did girls.<sup>11</sup>

Regarding the need for external assistance for awakening of morning-class students, our results showed differences between elementary and high school students similar to those reported previously by Carskadon.<sup>12</sup> Andrade et al. studied 62 adolescents, with a mean age of 13.5 years, on three separate occasions at 6-month intervals. Evening chronotype adolescents reported less TST on school days, but they slept much longer on weekends compared with morning chronotype adolescents.<sup>13</sup> Johnson and Breslau recently studied a group of young people aged 12 to 17 years in the United States reported that nearly 6% experienced frequent sleeping problems over a 6-month period.<sup>14</sup>

Data from a study by Lee et al. concerning weekday and weekend sleep schedules of young adolescent girls and boys support existing findings in the literature describing large differences in weekday and weekend sleep schedules.<sup>11</sup>

A study by Radosevic-Vidacek and Kosce focused on the sleep habits of adolescents as a function of the occupational schedules of their parents. Families in which both parents were day workers, those with one parent working evening, night or rotating shifts, and those with both parents working such shifts were studied.<sup>15</sup> The majority of shift-working parents worked rotating shifts. The school schedules of the adolescents were organized into weekly, rotating morning and afternoon schedules, and their activities outside of school did not include paid jobs.

Based on our results, we conclude that male and female students have different sleep habits and that sleep habits are influenced by school schedule (morning versus afternoon). Notably, the present study showed that students who attend school during the morning are the most negatively affected with respect to sleep and that this schedule might not only deprive students of sleep but possibly impair school performance as well.

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## Disclosures

Writing group member	Employment	Research grant <sup>1</sup>	Other research grant or medical continuous education <sup>2</sup>	Speaker's honoraria	Ownership interest	Consultant/ Advisory board	Other <sup>3</sup>
César L. Natal	Faculdades COC	-	-	-	-	-	-
Tânia J. Lourenço	Faculdades COC	-	-	-	-	-	-
Luana A. Silva	Faculdades COC	-	-	-	-	-	-
Rita A. Boscolo	UNIFESP	AFIP FAPESP	-	-	-	-	-
Andressa Silva	UNIFESP	AFIP FAPESP	-	-	-	-	-
Sergio Tufik	UNIFESP	AFIP FAPESP	CNPq	-	-	-	-
Marco Túlio de Mello	UNIFESP	AFIP FAPESP	CNPq	-	-	-	CEMSA CEPE

\* Modest

\*\* Significant

\*\*\* Significant. Amounts given to the author's institution or to a colleague for research in which the author has participation, not directly to the author.

Note: UNIFESP = Universidade Federal de São Paulo; AFIP = Associação Fundo de Incentivo à Psicofarmacologia; FAPESP = Fundação de Amparo à Pesquisa do Estado de São Paulo; CNPq = Conselho Nacional de Desenvolvimento Científico e Tecnológico; CAPES = Coordenação de Aperfeiçoamento de Pessoal de Nível Superior; CEMSA = Centro de Estudos Multidisciplinar em Sonolência e Acidentes; CEPE = Centro de Estudos em Psicobiologia e Exercício. For more information, see Instructions for authors.

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