

# Sleepiness in working teens attending evening classes

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## Abstract

The aim of this study was to evaluate patterns of sleepiness, comparing working and non-working students. A field study was carried out among high school students, attending evening classes (19:00-22:30h), of a public school of São Paulo, Brazil. Workers (n=51) and non-workers (n=41), age 14-21 years old participated in this study. A comprehensive questionnaire about working and living conditions was answered. Activity-rest measurements were continuously recorded with Actigraph. Activities, sleep dairies and the Karolinska Sleepiness Scale - KSS were also reported during 7 consecutive days, six times per day, including at time of waking and before going to bed. Main variables were tested using ANOVA test for repeated measures with two factors (time and work). The sleepiness pattern of working students is different from the non-working ones, as results from the self-evaluation of sleepiness during the week. This is revealed by significant interactions of day, time and work. Working students were sleepier than non-workers on: Mondays after lunch (13:00-15:00 hrs) and Wednesdays during classes (19:00-21:59h). The patterns of sleepiness were different between working and non-working students. In working students daytime sleepiness is moderately higher during the evening. Teen work can have negative effects on quality of life, and school development.

*Keywords: teen workers; sleepiness; sleep duration.*

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## 1. Introduction

Changes in biological components of the sleep-wake cycle occur during puberty years [1]. Changes might also be associated with several factors, such as school hours [2], duration and type of activities during free time and working hours [3]. A former research conducted among students who work and don't work in São Paulo, showed different patterns of sleep between the two groups [4,5].

## 2. Objective

The aim of this study was to evaluate patterns of sleepiness between working and non-working students, either in paid and unpaid jobs, living in the metropolitan area of São Paulo, Brazil.

## 3. Methods

A field study was carried out among high school students, attending evening classes (19:00-22:30h), of a public school of São Paulo, Brazil. Student's workers (n=51) and non-workers (n=41),

ages 14-21 years old participated. Mean weekly working hours were 45,0 (SD= 2.0h). A comprehensive questionnaire about working and living conditions, as well as reported health symptoms and diseases was answered. Activity-rest measurements were continuously recorded with Actigraph [6]. Activities, sleep dairies and Karolinska Sleepiness Scale [7] KSS were also reported during 7 consecutive days, 6 times per day,

including at waking time and before going to bed. Main variables were tested using ANOVA test for repeated measures with two factors (time and work) [8].

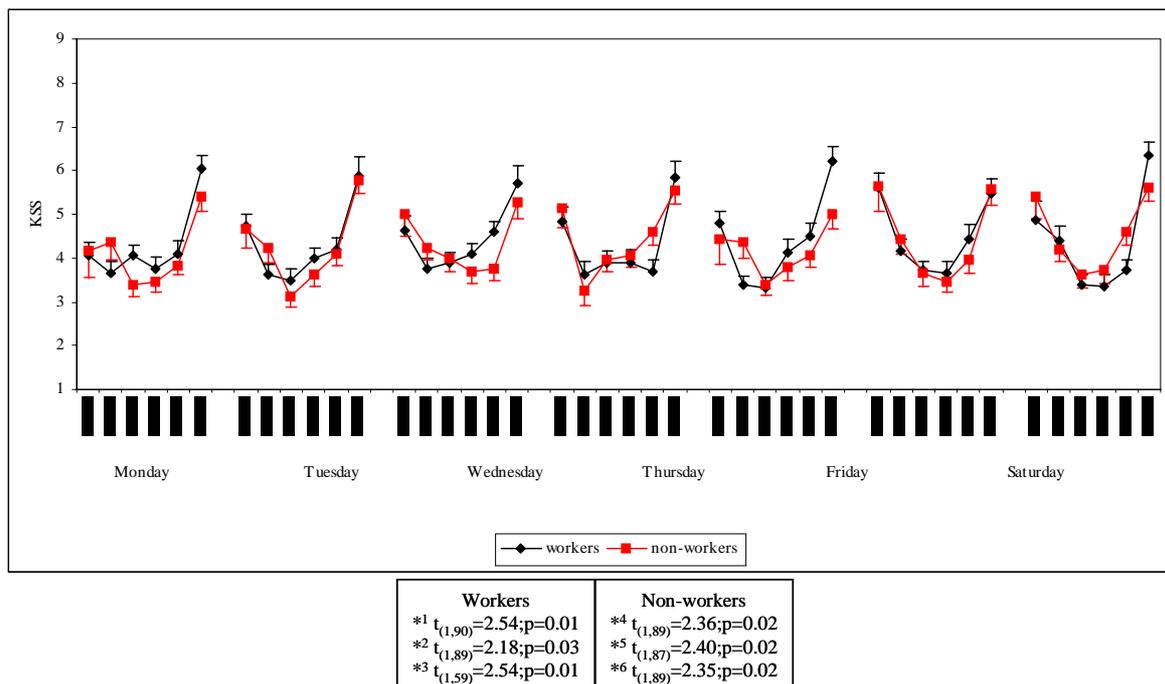


Fig. 1: Means and standard error of the Karolinska Sleepiness Scale, for working and non-working high school students.

## 4. Results

### 4.1. Characteristics of the studied population

Forty three males and 49 females participated in the study. Mean age was 17.4 (SE=0.15) yrs. All subjects were single, and none had children. Twenty-six percent (n=24) were smokers. They smoked an average of 9.4 (SE=1.3) cigarettes per day; mean time when started smoking were 39.1 months (SE=5.7). No significant differences between working and nonworking students were observed in smoke habits and age.

5.4% (n=5) of the students drank alcoholic beverages more than 4 times per week. The average of alcohol consumption per day was 0.42g/kg

(SE=0.09g/kg). The mean caffeine consumption per day was 265.6mg (SE=29.68mg) and teobromine was

83.4mg (SE=9.8mg). No significant differences between working and nonworking students were observed in caffeine and teobromine consumption, but in alcohol consumption.

59.8% (n=55) of the students performed regularly physical activity (56.4% played soccer and 23.6% danced); the students exercised an average of 9.6hs (SD=1.7hs) per week. No significant differences between working and nonworking students were observed in weekly duration of physical activity.

#### 4.2. Characteristics of working conditions

Fifty-two (56.5%) of the 92 participants reported work during the data collection. Reported workplaces were: offices and banks (67.3%), commerce (21.2%), industry (5.8%) and other (5.8%). Main reported job titles were: office jobs as secretary (49.0%), sale persons (11.8%), office boy (15.7%), general helpers (13.7%), clerks (3.9%), telemarketing (3.9%) and other (2.0%). The average monthly wages were US \$130.00. Working hours were Monday to Friday between 08:00 and 18:00 h, mean working time per week were 40.5 h (SE=1.5h).

#### 4.3. Sleepiness

The sleepiness trend of working students is different from non-working students. Self-evaluation of sleepiness during the week is presented in Figure 1. There are significant interactions of day, time and work status. Working students were sleepier than non-workers on: Mondays after lunch (13:00-15:00 h; post-hoc t-test  $p < 0.05$ ) and Wednesdays during classes (19:00-21:59h). Workers reported being sleepier than non-workers, as per time bracket analysis, on Mondays after lunch (13:00-15:00h) and on Fridays before going to bed (22:00-00:59h). No significant differences between groups ( $p > 0.05$ ) were found on weekends. The same results were observed using sex as second group factor.

#### 5. Discussion

Sleepiness alike sleep, is regulated, to a large extent by sleep/wake homeostasis and the circadian system [9]. The homeostatic effect on sleepiness is a result of prior sleep length and quality. Disturbed (or restricted) sleep results in increased sleepiness [10]. Working teens have to follow a stricter routine of their sleep-wake cycle during working days than non-workers, due to their school- work duties. In spite of that, working adolescents had shorter sleep periods during all school days (about 2 hours/day) than the non-working ones. During the weekends, working students fell asleep earlier than nonworking students, advancing their waking time. Therefore, working students slept more on weekends (Saturday and Sunday) compared to other week day.

Particularly on Sundays the sleep duration of working students (compared to nonworking students) is shorter by 1 h 20 min [4].

#### 6. Conclusion

The patterns of reported sleepiness using a standardized scale – KSS were different between working and non-working students. In working students daytime sleepiness is moderately higher during the evening compared to non-working students. This can have negative effects on quality of life, and school development. Further research that employs longitudinal assessment is suggested.

#### Acknowledgments

Financial support from CAPES, Grant n: BEX3202/04-6, PIBIC - CNPq scholarship; FAPESP (Grant n°. 02/04079-6); CNPq (Grants: n°. 470917/2003-2 and 140846/2003-4); Karolinska Institute, Stockholm

#### 7. References

- [1] Andrade MMM, Benedito-Silva AA, Sorahia-Domenice EE, Arnhold IJP e Menna-Barreto L. Sleep characteristics of adolescents: a longitudinal study. **J Adolesc Health.** (1993);14:1-6.
- [2] Carskadon MA, Mancuso J, Rosekind M. Impact of part-time employment on adolescent sleep patterns. **Sleep Res.** (1989); 18: 114
- [3] Dahl RE & Carskadon MA. Sleep and its disorders in adolescence. In: Ferber R & Krieger MH. **Principles and Practice of sleep medicine in the child.** W. B. Saunders Co; (1995). p.19-27.
- [4] Teixeira LR, Fischer FM, Andrade MMM, Louzada FM, Nagai R. Sleep patterns of day-working, evening high-schooled adolescents of São Paulo, Brazil. **Chronobiol Int.**(2004); 21:239-52.
- [5] Teixeira LR, Fischer FM, Nagai R, Turte SL. Teen at work: the burden of a double shift on daily activities. **Chronobiol Int.**(2004);21: 845-858.
- [6] Ambulatory Monitoring, Inc. 1996-2000. **ACT Millennium [Computer program manual]**. Ardsley, NY USA: Ambulatory Monitoring, Inc.
- [7] Åkerstedt T & Gillberg M. Subjective and objective sleepiness in the active individual. **Intern. J. Neurosci.** (1990); 52: 29-37.
- [8] Hullely SB & Cummings SR. **Designing Clinical Research.** Williams & Wilkins. Baltimore. 1988.

- [9] Carskadon MA, and Dement WC. Nocturnal determinants of daytime sleepiness. **Sleep**. 1982;5(suppl):S67-72.
- [10] Carskadon MA and Roth T. Sleep restriction. In: Monk TH (ed). **Sleep, sleepiness and performance**. New York, John Wiley & Sons, 1991;155-67.

