

SLEEP QUALITY DURING EXAMINATIONS IN UNIVERSITY STUDENTS: preliminary results *

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Objectives: to evaluate sleep-wake patterns and difficulties on undergraduates, during end-of-first-semester examinations.

Methods: Participants: 380 third-year undergraduates (64.8% F), mean age 21.7 yr (± 2.6). Data were collected as students left the examination room of a given exam. A self-response questionnaire, covering bed / rise times (open questions), sleep length, sleep quality, insomnia complaints, and daytime functioning (Likert scales) over the last 15 days, was developed.

Results: Mean bedtime = 1:32 (± 1 hr 34 min). Mean rise time = 9:39 (± 1 hr 43 min). Median sleep length was 6-7 hr, the night before the exam, and 7-8 hr in general. Median frequency of enough sleep was 3-4 nights/week; 45% of the students slept enough 1-2 nights/week or less. Sleep-onset insomnia ($\geq 3-4$ nights / week) was reported by 15% of the students. Sleep quality was "moderate" (median) for 53.3%, and "bad" / "very bad" for 16.4% of the students; 29.2% had "light" / "very light" sleep. Fatigue, somnolence, irritability, depressive mood, and anxiety, were significantly higher on students with (vs. without) onset insomnia. Identical results were found between students differing on frequency of enough sleep, and on sleep quality.

Conclusions: Many students experienced insufficient sleep duration and/or quality during examinations. Results suggested these might interfere with daytime well-being. Research about sleep in undergraduates is still reduced, thus further studies are needed.

INTRODUCTION

At the University, examination period is a particularly stressful time in student life. Academic demands and feelings of tension may undermine sleep quality, and poor sleep may negatively influence daytime well-being. Recent studies have stressed the associations between sleep quality, subjective health and well-being in undergraduates (Pilcher et al., 1997; Pilcher & Ott, 1998).

As part of a larger research project on sleep-wake patterns and academic functioning in Portuguese university students, the **aims** of the present study were to evaluate in **undergraduates**, during an **examination period**:

- sleep-wake patterns (e.g., bedtime and rise time, regularity of sleep-wake schedules, sleep duration, sleep quality, insomnia difficulties);
- their associations with **daytime functioning** and well-being.

METHOD**Participants**

- 380 **third-year** undergraduates of the University of Aveiro – Portugal.
- 64.8% F, 35.2% M, mean **age** = 21.7 years (DP = 2.6), 19-45 yrs.
- full-time students, except 12 (3.5%).
- 49.5% sciences, 30.0% engineering, 20.5% arts/languages and education **courses**.

Materials

A self-response questionnaire was developed for the main survey, assessing **the last 15 days of the examination period**. Items of interest for the present study are:

- bedtimes and rise times (open questions);
- sleep duration:
 - the night before that exam (10-point scale: "did not sleep at all, ≤ 3 h, 3-4h, 4-5h, ..., 8-9h, 9-10h, ≥ 10 h");
 - in general (9-point scale: " ≤ 4 h, 4-5h, 5-6h, ..., 9-10h, 10-11h, ≥ 11 h");
- whether sleep length was usually enough to feel well (5-point scale: "never, rarely, 1-2 nights/week; 3-4 nights/week; [almost] always");
- sleep quality (5-point scale: "very bad" ... "very good");
- deepness of sleep (5-point scale: "very light" ... "very deep");
- difficulties initiating and maintaining sleep, and early morning awakenings (5-point scale: "never, rarely, sometimes; 3-4 nights / week; [almost] always");
- daytime somnolence, fatigue, irritability, anxiety, depressive mood (5-point scale: 0 = "not at all" ... 4 = "very much").

Procedures

Data were collected during the **end-of-first-semester examinations**, between the 2nd and 5th week of the examination period, school year of 2001/2002. In order to locate students, the examination timetable of the University was consulted, and selected one date for each particular course, for questionnaire administration. At the date and time chosen, the investigators stayed at the halls next to the examination rooms. As students left the examination rooms, they were individually invited to answer a 5-minutes self-response questionnaire about sleep-wake behaviours during the examination period.

RESULTSTable 1: Self-estimated averages for **bedtimes and rise times** (n = 380)

	Bedtime	Rise time
M	1:32	9:39
DP	1hr 34 min	1 hr 43 min
Min – Max	22:00h – 7:00h	5:00 – 20:00
Range	9 hr	15 hr

► **(Ir)regularities of sleep-wake schedules:** students were asked to indicate which were the earliest and latest hours they usually went to bed and got up. Irregularities of **3 or + hours** were found on:

- 21.2% of the students for **bedtimes**
- 18.3% of the students for **rise times**

► **Sleep duration**

- **Sleep length in general** during the examination period ranged from ≤ 4 hr to 10-11 hr, **Md = 7-8 hr**
- **Frequency of enough sleep:** **Md = 3-4 nights/week** (23.3% students). Only 31.7% reported they were sleeping enough "always / almost always"; 23.3% slept enough 1-2 nights/week; 21.7% "never" or "rarely" slept enough. Thus, 55% of the students usually got sufficient sleep ≥ 3 nights/week, whereas 45% slept enough only ≤ 2 nights/week.
- **The night before the exam** sleep length ranged from 0 hr to ≥ 10 hr, **Md = 6-7 hr**, i.e., about - 1 hr compared with median sleep duration in general.

► **Sleep quality** was rated as "good" / "very good" by 30.2% of the students, "bad" / "very bad" by 16.4%, **median** was "moderate" (53.3% students).

Deepness of sleep: for 25.8% of the students sleep was "deep" / "very deep", whereas for 29.2% was "light" / "very light", and **median** was "fairly deep" (45% students).

► **Insomnia difficulties** (= defined as occurring at least 3-4 nights per week):

- 15.0% of students – **sleep-onset** insomnia
- 6.1% of the students – **insomnia during the night**
- 10.6% of the students – **early morning awakenings**

► Based on "much" + "very much" answers, the following frequencies for **daytime complaints** were found on the sample:

- 31.1% **anxiety**
- 29.0% **fatigue**
- 21.4% **depressive mood**
- 19.6% **irritability**
- 16.9% **somnolence**

► **Sleep-wake patterns and daytime functioning**

Students that had experienced **onset-insomnia difficulties** ("3-4 nights / week" + "almost always/always" answers) during the examination period reported **significantly higher levels** of fatigue, somnolence, irritability, depressive mood and anxiety, than the remainders ("never" + "rarely" + "sometimes" answers) – Table 2. The same pattern of results was found when students with **insufficient sleep** (slept enough only 1-2 nights/week or less) were compared to the remainders (slept enough 3-4 nights/week or more), and when students with **poor sleep quality** ("very bad" + "bad" + "moderate") were compared to their colleagues with "good"/"very good" sleep quality – Tables 3 and 4, respectively (tests U Mann-Whitney).

Table 2: Daytime functioning comparisons between students **with and without onset-insomnia**

	Onset-insomnia (n = 57)		Without insomnia (n = 323)		U	p
	Md	M	Md	M		
Daytime functioning						
Fatigue	3	2.40	2	1.84	6328.50	.00
Irritability	2	1.88	1	1.38	6921.00	.00
Depressive mood	2	2.37	1	1.45	5380.00	.00
Anxiety	2	2.37	2	1.88	6965.50	.00
Somnolence	2	1.88	1	1.47	7475.50	.02

Table 3: Daytime functioning comparisons between students with **sufficient and insufficient sleep duration**

	Insufficient Sleep (n = 170)		Enough sleep (n = 208)		U	p
	Md	M	Md	M		
Daytime functioning						
Fatigue	2	2.25	1	1.65	11418.50	.00
Irritability	1	1.63	1	1.30	14624.50	.01
Depressive mood	2	1.82	1	1.41	14225.50	.00
Anxiety	2	2.23	2	1.74	13128.00	.00
Somnolence	2	1.77	1	1.33	13486.00	.00

Table 4 Daytime functioning comparisons between students with **poor and good sleep quality**

	Poor sleep quality (n = 263)		Good sleep quality (n = 114)		U	p
	Md	M	Md	M		
Daytime functioning						
Fatigue	2	2.08	1	1.53	10147.50	.00
Irritability	1	1.61	1	1.06	10728.00	.00
Depressive mood	2	1.81	1	1.07	9476.00	.00
Anxiety	2	2.15	1	1.50	9935.50	.00
Somnolence	1	1.63	1	1.27	12060.50	.00

DISCUSSION

✓ These preliminary results indicate that, during an examination period, many university students experienced sleep restriction, irregular schedules, poor sleep quality, and insomnia symptoms.

✓ Students with poor sleep-wake patterns during examinations showed decreased daytime well-being.

• Pilcher et al. (1997) conducted a study in undergraduates during a final exam week; questionnaires were completed on the day preceding each subject exam. Using the Pittsburgh Sleep Quality Index, which include questions about normal sleep habits, such as hours of sleep, trouble going to sleep and overall sleep quality, it was found that poor sleep was related with feelings of tension, depression and fatigue, among others. Our results are in close agreement with these findings. With respect to sleep-wake schedules, students usually went to bed about 30 minutes later, and got up about 15 minutes earlier, than our students.

• Further comparisons are difficult because other studies use to collect data over the academic year, when students should attend classes, whereas our study ran during an **exclusively** final exams period, with **no classes**, when students were totally free to manage their time. Since studies about undergraduates sleep during **end-of-semester examinations** seem almost inexistent, further research on the subject would be needed.

Practical implications:

► Health professionals and researchers should consider the importance of sleep for better understand daily health and well-being in non-clinical populations, such as university students (Pilcher et al., 1997; Pilcher & Ott, 1998).

► Preventive and intervention techniques to improve sleep and prevent sleep disturbances, as sleep education and sleep hygiene, might be useful for increasing well-being and quality of life in undergraduates, especially during stressful times like final exams.

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