Factors associated to the sleep quality of medical students

Fatores associados a qualidade do sono de estudantes de medicina

Factores asociados a la calidad del sueño de estudiantes de medicina

Solange Campos Vicentini[1], Eliane Dantas Rocha[2], Andrea dos Santos Garcia[3], André Luis do Nascimento Ferreira[4], Hugo Macedo Ramos[5], Thiago Louro Quinellato[6], Marcus Vinicius Gemelli Minucci[7], Luiz Carlos Santiago[8], Maria Tereza Serrano Barbosa[9], Carlos Roberto Lyra da Silva[10]

1.Doutoranda, Programa de Pós Graduação em Enfermagem e Biociências (PPGENFBIO). Docente no Departamento de Ciências Fisiológicas (DCF), Universidade Federal do Estado do Rio de Janeiro (UNIRIO). Rio de Janeiro-RJ, Brasil. ORCID: https://orcid.org/0000-0002-4202-7514
2.Doutora, Departamento de Ciências Fisiológicas (DCF), Universidade Federal do Estado do Rio de Janeiro (UNIRIO). Rio de Janeiro-RJ, Brasil. ORCID: https://orcid.org/0000-0002-6371-3409
3.Doutoranda, Programa de Pós Graduação em Enfermagem e Biociências (PPGENFBIO). Universidade Federal do Estados do Rio de Janeiro (UNIRIO). Rio de Janeiro-RJ, Brasil. ORCID: https://orcid.org/0000-0002-2125-1437
4.Graduando da Escola de Medicina e Cirurgia (EMC), Universidade Federal do Estado do Rio de Janeiro (UNIRIO). Rio de Janeiro-RJ, Brasil. ORCID: https://orcid.org/0000-0002-6979-3075
5.Doutor, Laboratório de Fisiologia e Fisiopatologia Translacional, Faculdade de Medicina de Teresópolis, Centro Universitário Serra dos Órgãos (UNIFESO). Departamento de Fisiologia e Fisiopatologia, Faculdade de Medicina de Petrópolis (UNIFASE). Petrópolis-RJ, Brasil. ORCID: https://orcid.org/0000-0001-9098-8005
6.Doutor,Universidade Federal Fluminense (UFF). Rio das Ostras-RJ, Brasil. ORCID: https://orcid.org/0000-0001-8371-628X
7.Doutor, Departamento de Ciências Fisiológicas (DCF), Universidade Federal do Estado do Rio de Janeiro (UNIRIO), Rio de Janeiro-RJ, Brasil. ORCID: https://orcid.org/0000-0002-9462-4564
8.Doutor, Escola de Enfermagem Alfredo Pinto (EEAP). Universidade Federal do Estado do Rio de Janeiro (UNIRIO). Rio de Janeiro-RJ, Brasil. ORCID: https://orcid.org/0000-0002-9725-4626
9.Doutora, Departamento de Matemática Universidade Federal do Estado do Rio de Janeiro (UNIRIO). Rio de Janeiro-RJ, Brasil. ORCID: https://orcid.org/0000-0003-0977-5921
10.Doutor, Departamento de Enfermagem Fundamental, Escola de Enfermagem Alfredo Pinto (EEAP), Universidade Federal do Estado do Rio de Janeiro (UNIRIO). Rio de Janeiro-RJ, Brasil. ORCID: https://orcid.org/0000-0002-4327-6272

Resumo
Objetivo. Identificar os fatores associados a qualidade do sono dos estudantes de medicina a partir dos índices subjetivos de Pittsburgh e Epworth. **Método**. Estudo de natureza observacional e analítica, **amostra** constituída por 131 estudantes que preencheram o formulário, o questionário índice de Qualidade do Sono de Pittsburgh (PSQI) e a escala de Sonolência de Epworth (ESE). As associações entre a qualidade do sono e as variáveis qualitativas foram analisadas a partir do teste Qui-quadrado. **Resultados.** Verificou-se que 60,31% (ESE) dos participantes exibiram distúrbios de sonolência diurna e 73,28% (PSQI) má qualidade. **Conclusão**. Os resultados demonstraram a necessidade da realização de um programa educativo entre os estudantes com vistas a melhoria da qualidade do sono e prevenção de agravos à saúde.
Unitermos. Sono; Estudantes de medicina; Transtornos do sono-vigília

Abstract

Objective. To identify the factors associated with the sleep quality of medical students through the subjective indices of Pittsburg and Epworth. **Method.** It is an observational and analytical study, a sample consisting of 131 students who completed the form, the Pittsburgh Sleep Quality Index questionnaire (PSQI), and the Epworth Sleepiness Scale (ESS). Chi-square test to analyze possible associations between sleep quality and qualitative variables. **Results.** It found that 60.31% (ESS) of the participants presented daytime sleepiness disorders and 73.28% (PSQI) poor quality disorders. **Conclusions.** The results demonstrated the need to carry out an educational program among students to improve sleep quality and prevent health issues.

Keywords. Sleep; Medical Students; Sleep Wake Disorders

Resumen

Objetivo. Identificar los factores asociados con la calidad del sueño de los estudiantes de medicina a partir de los índices subjetivos de Pittsburgh y Epworth. **Método.** estudio observacional y analítico, muestra compuesta por 131 estudiantes que completaron el formulario, el cuestionario Pittsburgh Sleep Quality Index (PSQI) y la Epworth Sleepiness Scale (ESE). Las asociaciones entre la calidad del sueño y las variables cualitativas se analizaron mediante la prueba de chi-cuadrado. **Resultados.** Se encontró que el 60,31% (ESS) de los participantes presentaba trastornos de somnolencia diurna y el 73,28% (PSQI) presentaba mala calidad. **Conclusión**. Los resultados demuestran la necesidad de realizar un programa educativo entre los estudiantes con miras a mejorar la calidad del sueño y prevenir problemas de salud.

Palabras clave. Sueño; Estudiantes de medicina; Trastornos del sueño-vigilia

Corresponding address: Solange Campos Vicentini. Rua Frei Caneca 94 SI A-301. Centro. Rio de Janeiro-RJ, Brasil. Cep 20.211-040. Tel: 55-21- 98668-3225. Email: solange.vicentini@unirio.br

INTRODUCTION

Sleep is a fundamental biological function for the well-being and good functioning of the human organism[1]. Changes in sleep stages can trigger significant disturbances in body metabolism, unpredictable lapses in attention, and decreased performance in daily activities[2,3].

Sociodemographic and pathophysiological factors, such as age, sex, smoking, excessive alcohol consumption, use of drugs, irregular lifestyle, as well as a reduction in the number of sleep hours, can cause stress and sleep deprivation, in

addition to excessive daytime sleepiness, significantly compromising the quality of life of individuals[3].

Studies have shown that the behavior adopted by Brazilian university students, such as irregular sleep time, prolonged naps during daytime, use of alcohol before bed, studying or accessing the internet in bed, everyday habits in this population, classified them as bad sleepers, making them prone to disruption of the circadian cycle and deterioration of sleep quality[3-5].

Among medical students, it has been found that they often consider sleep quality being secondary in the context of fulfilling their academic activities, which do not allow them to sleep properly[6,7]. One study identified insufficient sleep and sleep disorders as complaints common among these undergraduates, which can result in negative impacts on their cognitive, physical, and mental performance[8]. The analysis of the sleep of medical students from Saudi Arabia showed a close relationship between insufficient sleep of these individuals and high scores for depression, anxiety, and stress[9]. Thus, both studies emphasized the close relationship between quality sleep and the well-being of these students.

Medical students have a rigorous demand for studies, a full-time curricular load, extracurricular activities that, added to the lack of time for family and social activities and the stress of good academic performance, make them vulnerable to sleep disorders[10,11].

Hence, medical students' sleep has been subjectively assessed through standardized research instruments developed to analyze the quality of sleep (the Pittsburgh Sleep Quality Index - PSQI) and daytime sleepiness (the Epworth Sleepiness Scale - ESS)[12,13].

For these reasons, it is important that more studies address adequate sleep-wake patterns aiming at the well-being, comfort, healthy academic performance, and quality of life of these future health professionals.

The objective was to identify the factors associated with the sleep quality of medical students from the subjective indices of PSQI and ESS.

METHOD
Sample

Here is an observational and analytical study with a quantitative approach. The target population of this research consisted of 813 medical students between the first and the tenth semesters in 2019. As inclusion criteria, all students regularly enrolled, from the first to the tenth semesters in the medical course of a public university in Rio de Janeiro, aged 18 years or over, who signed the free and informed consent form. Students from the last two semesters were excluded due to anticipation of graduation. Thus, 131 participants were eligible for the study.

The Research Ethics Committee of the Federal University of the State of Rio de Janeiro approved the study

(CAAE: 04956818.0.0000.5285. Opinion: 3,168,630), meeting the requirements of resolution 466/2012.

Procedure

Data collection befell from May to November 2019. The instruments used for data collection were:

1. Individual identification form with demographic and behavioral information: gender, age group, semester enrolled, means of transport from university to home, time to return home from university, practice of physical exercise, smoking, alcoholism, if they had a chronic disease, use of pharmacological therapy or not for sleep disorders, use of medication that interferes with sleep.

2. Pittsburgh Sleep Quality Index (PSQI) - evaluates the subjective quality of sleep in the last 30 days. Validated and tested in Brazil, it consists of 19 self-filling questions about sleep habits. The questions are clustered into seven components with equal weighting and a scale ranging from 0, indicating no occurrences, to 3, indicating many. The final score ranges from 0 to 21 points. Scores ≤ 4 indicate good sleep quality, 5 to 10 poor quality of sleep, and >10 presence of sleep disorder[9-11].

3. Epworth Sleepiness Scale (ESS) - the scale assesses excessive daytime sleepiness (EDS). Translated and validated for use in Brazil, the questions evaluate the possibility of sleeping in eight everyday situations that vary according to the activity and the environment. The score is the sum of the eight items and varies from 0 to 24. A score

below 10 means no sleepiness, and above 10 is considered pathological[4].

The questionnaires and the individual identification form were entered on tablets (Samsung Galaxy Tab E SM-T113NU TAE 7PR, www.samsung.com.br wi-fi 8GB), and the answers were accessed through the Kobotoolbox software[14].

A mechanical scale with an anthropometric ruler (Classic Mechanical Scale 150kg-Welmy-110CH, SP, 100g divisions) was used to obtain the weight and height of students to calculate the body mass index (BMI) and an anthropometric tape (TR4013-SANNY®) with a precision of 0.1cm and a maximum field of 150cm for the measurements of the abdominal and neck circumferences.

Statistical analysis

The data collected by the different instruments were organized in a MS Excel spreadsheet and the analysis was carried out online using the open access statistical program R version 64.4.0.3, using the Rcommander version 2.7.0 package.

In the statistical analysis, the chi-square test evaluated the associations between sociodemographic and anthropometric variables with the classification of the ESS and PSQI. The level of significance chosen was 5% ($p < 0.05$).

RESULTS

The sample consisted of 131 students (16.11% of the target population) who agreed to participate in the study.

The data presented in Table 1 show that 79 (60.31%) were female, 119 (90.84%) were in the age group of 18-25 and 102 (77.8%) were between the first and the fourth semesters.

It was found that 68 (51.91%) practiced physical exercise regularly, 99 (75.57%) used public transportation, and 80 (61.07%) spent more than 30 minutes getting home. It was noticed that 126 (96.18%) were not smokers, 75 (57.25%) consumed alcohol. Only 10 (7.63%) reported resorting to any sleep treatment, 56 (42.75%) used some medication that could interfere with sleep, and 40 (30, 53%) reported having a chronic disease.

Table 2 represents the anthropometric characteristics regarding the physical conditions associated with risks for the development of health problems among students. The BMI of 42 (32.06%) students presented values that classified them as obese. The neck circumference of 37 (28.24) and the abdominal circumference of 24 (18.32%) had increased values.

The results of the subjective sleep assessment analyzed using the ESS and PSQI scales are shown in Table 3. On the ESS 79 (60.31%) students had EDS and on the PSQI 96 (73.28%) were classified as having poor sleep quality.

Among EDS patients (60.31%), most students were female (69.6%) and 46.2% male.

Table 1. Profile of medical students.

CATEGORIES	PARTICIPANTS	%
Gender		
Female	79	61.31
Male	52	39.69
Semester		
First	44	33.59
Second	26	19.85
Third	16	12.21
Fourth	16	12.21
Ninth	12	9.16
Tenth	17	12.98
Age range		
18-25	119	90.84
26-45	12	9.16
Physical Exercise		
Yes	68	51.91
No	63	48.09
Transportation		
Public	99	75.57
Private	32	24.43
Time spent		
<30	51	38.93
>30	80	61.07
Smoking		
Yes	5	3.82
No	126	96.18
Alcohol consumption		
Yes	75	57.25
No	56	42.75
Medication		
Yes	56	42.75
No	75	57.25
Chronic disease		
Yes	40	30.53
No	91	69.47
Sleep treatment		
Yes	10	7.63
No	121	92.37
Total	131	100

Table 2. Anthropometric profile of medical students.

Categories	N	%
Body Mass Index (BMI)		
*Normal	89	67.94
**Obese	42	32.06
Neck Circumference (NC)		
*Normal	94	71.76
**Elevated	37	28.24
Abdominal **Circumference (AC)**		
*Normal	107	81.68
** Elevated	24	18.32
Total	131	100

Scores: BMI: * < 26 / ** ≥ 26
NC: *Female ≤ 34cm /**Female > 34cm and *Male ≤ 37cm /**Male > 37cm
AC: *Female ≤ 80cm /**Female > 80cm and *Male ≤ 94cm /**Male > 94cm

Table 3. Epworth Sleepiness Scale and Pittsburgh Sleep Quality Index of medical students.

Categories	Participants	%
Epworth Sleepiness Scale (ESS)		
*Yes	79	60.31
**No	52	39.69
Pittsburgh Sleep Quality Index (PSQI)		
*Poor quality	96	73.28
**Good quality	35	26.72
Total	131	100

Scores: ESS: * ≥ 10 / ** < 10   PSQI: * ≥ 5 /** ≤ 4

In students with chronic diseases 67.5% had this sleep disorder, while in those without illnesses, only 42.9% had EDS. Both among genders and in patients with chronic disease, these differences were significant.

On returning home, 66.2% of students who spent more than 30 minutes and 51% of those who took less time to arrive had EDS. Among students aged 26-45, 83.3% had EDS. The same was true for only 58% among those aged 18-25. Regarding neck circumference, 75% of students who had increased values and 57% of those who had normal measures exhibited EDS. The differences found were not significant (Table 4).

In the assessment of sleep quality through the PSQI, 73.28% of the participants had a poor-quality classification. Regarding the use of alcoholic beverages, 80% of students who reported consuming alcohol and 64.3% of those who did not consume it slept with poor quality.

Table 4. Association between sociodemographic and anthropometric categories with the Epworth Excessive Daytime Sleepiness scale.

Categories	YES	%	NO	%	* P-value
EXCESSIVE DAYTIME SLEEPINESS					
Gender					**0.01**
Female	55	69.6	24	30.4	
Male	24	46.2	28	53.8	
Semester					0.72
First	27	61.4	17	38.6	
Second	13	50.0	13	50.0	
Third	9	56.2	7	43.8	
Fourth	12	75.0	4	25.0	
Ninth	7	58.3	5	41.7	
Tenth	11	64.7	6	35.3	
Age range					**0.09**
18-25	69	58.0	50	42.0	
26-45	10	83.3	2	16.7	
Physical exercise					0.15
Yes	37	54.4	31	45.6	
No	42	66.7	21	33.3	
Transport					0.77
Public	59	59.6	40	40.4	
Private	20	62.5	12	37.5	
Time spent					**0.08**
<30	26	51.0	25	49.0	
>30	53	66.2	27	33.8	
Smoking					0.34
Yes	2	40	3	60	
No	77	61.1	49	38.9	
Alcohol consumption					0.66
Yes	44	58.7	31	41.3	
No	35	62.5	21	37.5	
Medication					0.13
Yes	38	67.9	18	32.1	
No	41	54.7	34	55.3	
Chronic disease					**0.01**
Yes	27	67.5	13	32.5	
No	52	42.9	52	57.1	
Sleep treatment					0.51
Yes	7	70.0	3	30.0	
No	72	59.5	49	40.5	
Bmi class					0.79
Normal	53	59.6	36	40.4	
Obese	26	61.9	16	38.1	
Nc class					0.36
Normal	59	62.8	35	37.2	
Elevated	20	54.1	17	45.9	
Ac class					0.10
Normal	61	57.0	46	43.0	
Elevated	18	75.0	6	25.0	
Total	79		52		

*Chi-square test

Regarding the use of medication that could interfere with sleep, 78.6% of the students who reported using some medication and 48.9% of those who did not use these drugs presented poor sleep quality. In both cases, the differences were significant.

Table 5 shows that 82.4% of students who took less than 30 minutes and 67.5% of those who spent more time getting home had poor sleep quality. In the analysis of the body mass index, 81% of students classified as obese and 67.5% of students with a normal index exhibited poor sleep quality. There were no significant differences.

DISCUSSION

For some years, excessive daytime sleepiness and poor sleep quality have been increasingly reported in the university population due to its high prevalence[15]. In this study, most participants (60.31%) had scores considered pathological for daytime sleepiness, with a predominance of females (69.6%), corroborating the study of EDS in university students, with prevalence ranging between 24% and 39%. In the sample, 36.3% had EDS, the majority being women[15]. Although the results can be alarming, it is noteworthy that they are inferior to other studies.

Another study points out that these students represent a population prone to sleep-related issues because they have inadequate sleep habits, as a rule, caused by excessive activities[16].

Table 5. Association between sociodemographic and anthropometric categories with the Pittsburgh Sleep Quality Index.

	PITTSBURGH SLEEP QUALITY INDEX				
Categories	**POOR**	**%**	**GOOD**	**%**	***P-value**
Gender					0.20
Female	61	77.2	18	22.8	
Male	35	67.3	17	32.7	
Semester					0.78
First	32	72.7	12	27.3	
Second	19	73.1	7	26.9	
Third	10	62.5	6	37.5	
Fourth	13	81.2	3	18.8	
Ninth	8	66.7	4	33.3	
Tenth	14	82.4	3	17.6	
Age range					0.88
18-25	87	73.1	32	36.9	
26-45	9	75.0	3	25.0	
Physical exercise					0.94
Yes	50	73.5	18	26.5	
No	46	73.0	17	27.0	
Transport					0.47
Public	71	71.7	28	29.3	
Private	25	78.1	7	21.9	
Time spent					**0.06**
<30	42	82.4	9	17.6	
>30	54	67.5	26	32.5	
Smoking					0.72
Yes	4	80.0	1	20.0	
No	92	73.0	34	27.0	
Alcohol consumption					**0.04**
Yes	60	80.0	27	20.0	
No	36	64.3	8	35.7	
Medication					**0.02**
Yes	44	78.6	12	21.4	
No	52	48.9	23	51.1	
Chronic disease					0.89
Yes	29	72.5	11	37.5	
No	67	73.6	24	26.4	
Sleep treatment					0.21
Yes	9	90.0	1	10.0	
No	87	71.9	34	28.1	
Bmi class					0.17
Normal	62	69.7	27	30.3	
Obese	34	81.0	8	19.0	
Nc class					0.96
Normal	69	73.4	25	26.6	
Elevated	27	73.0	10	27.0	
Ac class					0.47
Normal	77	72.0	30	28.0	
Elevated	19	79.2	5	20.8	
Total	96		35		

*Chi-square test

A study conducted with 800 medical students from various institutions in Brazil, 48.1% had scores considered pathological, and 10.3% considered severe for daytime sleepiness[17]. Results of a meta-analysis showed the prevalence of EDS in 46.1% of medical students and poor sleep quality in 51.5% of students[18].

Exogenous and/or endogenous factors can cause EDS and, in this study, 66.2% of the students who spent more time returning home from the university and 59.6% who used public transport had high scores for the EDS, which could lead to a reduction in nighttime sleep so they could attend academic classes, extracurricular and family demands.

In Taiwan, 35% of people who entered nursing school had EDS. The author attributed latency and subjective sleep quality, assessed in the study, as possible causes. For the author, the short duration of nocturnal sleep and irregularities in the sleep-wake cycle increase the vulnerability of these students to develop EDS[19].

In this research, 61.9% of students classified as obese and 75% of those who had increased waist circumference measurements exhibited EDS, confirmed by results found in Nutrition students in Chile in a study whose author established an association between fewer hours of sleep and risk of obesity. The author warns of short sleep duration, increased intake of carbohydrates and fats, and little protein[20].

Sleep duration was associated with increased body fat, waist circumference, and BMI in graduate nursing students, and the author warns of overweight and obesity[21].

It is noteworthy that many students live alone, and the natural tendency is to consume food of quicker preparation or easy access, which is not always healthy. In addition, many reported not practicing physical exercise or doing it without regularity. The association between obesity and EDS may be indicative of inadequate quantity and quality of sleep[22].

Concerning chronic non-communicable diseases, 30.53% of those assessed had some condition, among which 67.5% have EDS. Although an ordination was not carried out, the prevalence was higher than the findings of an author who distributed them among patients with diabetes (2%), hypertension (1%), cholesterolemia (1%), and heart disease (1%), justifying the results due to the low age of most participants, in which a high prevalence of these diseases is unexpected[23]. The other demographic and behavioral factors assessed in this study did not have significant associations with EDS.

The sleep quality of 73.28% of the students appraised over the PSQI had high scores, indicating poor quality. In this investigation, most students (80%) who reported drinking alcohol showed reduced sleep quality. This association was statistically significant. These findings are substantiated by a study in which 20.1% of the participants who consumed alcohol had poor sleep quality[24]. The

association was not established in another study since changes in sleep quality caused by alcohol usually occur long-term, even if the individual has already stopped consumption for prolonged periods[23].

The excessive consumption of alcohol and the poor quality of sleep of university students has been the scope of studies for many ingest alcoholic beverages as a strategy to relieve stress and anxiety[13,25]. Although alcohol is seen as a sleep-inducing substance, its excessive intake is related to insufficient or reduced sleep quality[23,24,26], which can result in drowsiness during academic activities in addition to emotional and motor impacts[24].

Regarding the use of any medication that interferes with sleep, the majority (78.6%) of consumer students had poor sleep quality. In some studies, the prevalence of consumption of sleep-inducing drugs among medical students was considered high (11%)[27]. These are results above those found in other populations (6.9% and 7.1%). The authors attributed the excessive use of sedative drugs to the need for the student to replace the sleeping period with study or other activities[27,28].

The time spent by students in their return home from college, as well as the need to fulfill their tasks, could delay their retreat to bed, thus leading to sleep deprivation. There was no statistically significant difference between students who spent more or less time getting home, but the majority (82.4%) of those who took more than thirty minutes to arrive exhibited worse sleep quality.

The anthropometric analysis of this research revealed that the studied population was healthy, an expected occurrence since most participants were aged between 18-25 years, however, more than half of students with normal metabolic parameters were classified by the PSQI as having poor sleep quality.

In a study carried out with medical students with a mean age of 22 years, there was no relationship between metabolic data and sleep variables in this population. The author attributes this to the effects of poor sleep quality on the metabolic profile occurring in the long term[24].

Although the media, in its most diverse modalities, draws society's attention to the importance of good sleep quality for human health, it is essential to highlight that some medical students will not be able to meet the recommendations for a healthy life, considering the number of commitments and responsibilities that they assume throughout their lives[25].

Medical students become exposed to intense and varied levels of stress during their academic course since their entry into an environment different from that experienced in high school, often associated with family separation due to approval in universities far from their home, and, in the final stage, the prospect of entering the professional field[26,29]. These situations can generate irritability, anxiety, and, consequently, EDS and poor sleep quality[22,23].

This research addressed important aspects of sleep quality and excessive daytime sleepiness and their

connection with factors that can interfere with sleep, with likely harmful effects on the health of medical students during the academic period.

CONCLUSIONS

The present study concludes that the high prevalence of excessive daytime sleepiness found in most medical students is predominant in females and in those with non-communicable chronic diseases. In addition, the poor sleep quality observed among the students can be associated with demographic and behavioral factors, such as drinking alcohol and medications that interfere with sleep.

The present study has several strengths, including the sample being composed of medical students who will be future health professionals. Another strength is its longitudinal design, which allows determining the action of time on the studied variables. As a limitation of the present study, there is a lack of discrimination against non-communicable chronic diseases and medications that, when consumed by students, can interfere with sleep. The analysis carried out in this research did not make comparisons in relation to marital status, cohabitation, education, work, among other sociodemographic aspects. The physical, mental, and mental health status, as well as other possible mediators in the relationship between sleep and wakefulness, were also not examined.

Considering that these students may present risk factors for developing an irregular sleep-wake cycle, it is

suggested to expand studies on other factors associated with excessive daytime sleepiness and poor sleep quality. A future study may contemplate other aspects related to total sleep time, sleep latency and sleep efficiency, including the consumption of other stimulant drinks, evaluating parameters such as exposure to light emitted by electronic devices (mobile phones, computers, tablets...) used by university students before bedtime.

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