

Sleep quality and chronotype of nursing students

Qualidade do sono e cronotipo de estudantes de enfermagem

Teresa Celia de Mattos Moraes dos Santos¹

Milva Maria Figueiredo De Martino^{2,3}

Jaqueline Girnos Sonati^{1,3}

Ana Lucia De Faria¹

Eliana Fátima de Almeida Nascimento¹

Keywords

Students nursing; students, health occupations; Sleep; Circadian rhythm/physiology

Descritores

Estudantes de enfermagem; Estudantes de ciências da saúde; Sono; Ritmo circadiano/fisiologia

Submitted

September 23, 2016

Accepted

November 21, 2016

Corresponding author

Jaqueline Girnos Sonati
Tiradentes Avenue, 500, 12030-180,
Taubaté, SP, Brazil.
j.girnos@gmail.com

DOI

<http://dx.doi.org/10.1590/1982-0194201600092>



Abstract

Objective: To verify the quality of sleep, chronotype, and health characteristics associated with the sleep quality of students.

Methods: Descriptive, observational, and cross-sectional study with 204 undergraduate nursing students (age group 18-29 years, 91.6% female). A questionnaire was used for sociodemographic and health characterization. The Pittsburgh Sleep Quality Index Questionnaire and the Morningness-Eveningness Questionnaire were applied to verify the sleep quality and identify the chronotype, respectively. The association between health variables and sleep quality was analyzed.

Results: The majority of students was identified with preference for the indifferent chronotype (56.37%) and poor sleep quality (84.31%). There was an association between being a student and working, with symptoms of poor digestion, headache, daytime sleepiness and insomnia.

Conclusion: Nursing students have poor sleep quality and preference for the indifferent chronotype. Those who accumulate the study/work functions, present more symptoms of poor digestion, headache, daytime sleepiness and insomnia.

Resumo

Objetivo: Verificar a qualidade do sono, o cronotipo e as características de saúde associadas à qualidade de sono de estudantes.

Métodos: Estudo descritivo observacional e transversal com 204 estudantes do curso de graduação em enfermagem (faixa etária de 18 à 29 anos; 91,6% sexo feminino). Foi utilizado um questionário para caracterização sociodemográfica e de saúde. O questionário de Índice de Qualidade de Sono de *Pittsburgh* e o Questionário de Identificação de Indivíduos Matutinos e Vespertinos foram aplicados para a verificação da qualidade do sono e a identificação do cronotipo respectivamente. Foram analisadas a associação entre as variáveis de saúde e a qualidade do sono.

Resultados: A maioria dos estudantes foi identificada com preferência de cronotipo indiferente (56,37%) e com qualidade de sono ruim (84,31%). Houve associação entre ser estudante e trabalhar com os sintomas de má digestão, cefaleia, sonolência diurna e insônia.

Conclusão: Estudantes de enfermagem possuem qualidade de sono ruim e preferência de cronotipo indiferente; aqueles que, acumulam as funções estudo/trabalho, apresentam maior número de sintomas de má digestão, cefaleia, sonolência diurna e insônia.

¹Universidade de Taubaté, Taubaté, São Paulo, SP, Brazil.

²Universidade Federal do Rio Grande do Norte, Natal, RN, Brazil.

³Universidade Estadual de Campinas, Campinas, São Paulo, SP, Brazil.

Conflicts of interest: no conflicts of interest to declare.

Introduction

Important factors have played a role in regulating sleep-wake processes in humans, such as sex, age, chronotype, habitual sleep duration, and genetic variations.⁽¹⁾ The light/dark cycle is considered to be the most important *zeitgeber* of mammalian rhythms. However, with the discovery of electric light, the synchronization patterns have been altered in humans. Exposure to artificial light during the dark phase, in cases of night work and study, transmeridian trips and habits such as television and the internet are associated with the desynchronization of circadian rhythms.⁽²⁾

This desynchronization is maintained throughout life given the profile of contemporary men's rhythm that involves the accumulation of tasks such as work, study and night leisure. These aspects can lead to difficulty in falling asleep and inability to wake up in the morning, reflecting on the quality of studies and work. When it is possible to choose the natural preferential times, the sleep is generally of good quality and follows the natural course. In the attempt to meet school and professional obligations, arises the sleep debt, resulting in partial chronic sleep deprivation and excessive daytime sleepiness.⁽³⁾

There are important individual differences observed according to chronobiological aspects. The consideration of preferences of sleep and wake hours, and phases of greater physical and cognitive disposition allows the classification according to chronotype preference. It respects the individual perception of phase relations that are different from the expression of circadian rhythms and external synchronizers in human beings.^(4,5)

The chronobiology allows to know the individual characteristics that form a phenotype based on behavior. It ensures the identification of individuals among five preferences of chronotype denominated extreme or moderate morning and evening, and indifferent or intermediate.⁽⁶⁾ Morning individuals are those who prefer to sleep early, at around 9:00 p.m. or 10:00 p.m. and wake up early, at around 6:00

p.m., without interference in their physical and mental performance. Evening individuals prefer to sleep after 10 p.m. and feel more relaxed in the afternoon and early evening. Indifferent individuals adapt more easily to the schedules.⁽⁷⁾

Thus, in order to propose a planning regarding the use of time destined to studies, and raise awareness about health care, it is necessary to better understand the students' daily biological cycles, because they develop sleep deprivation behaviors, especially when accumulating study and work tasks.

The aim of this study was to identify the chronotype, quality of sleep, and the presence of symptoms related to sleep quality of nursing students who study and work.

Methods

This is a descriptive, observational, cross-sectional study performed at a university in the region of Vale do Paraíba, countryside of the State of São Paulo, between August 2012 and June 2013. Participants were 204 volunteer students attending between the first and fifth year of the nursing graduation course, of both sexes, and aged over 18 years. The sample included all students enrolled in the morning (7:30 a.m. to 11:10 a.m.) and evening (7:00 p.m. to 10:40 p.m.) periods, considering the entire nursing student population of the university. The recruitment of participants and completion of questionnaires were performed during the class period. For data analysis, students were divided into two groups: the students who work and study, and the students who study only.

The sociodemographic and health characteristics were obtained through a questionnaire with open and closed questions, for information on sex, age, marital status, having children, additional activities, type and schedule of the activity, complaints regarding health status, working hours and health impairment, and study hours. These were all considered as independent variables.

The Pittsburgh Sleep Quality Index instrument was used to assess the quality of sleep. This

instrument quantifies the sleep quality on a scale ranging from 0 to 21 points. The range from 0 to 5 is considered as good sleep quality; between 5 and 10 is considered bad sleep quality; and greater than 10 is considered as presence of sleep disorder.⁽⁸⁾ The instrument version validated in Brazil was used, and its internal consistency was 0.82 (Cronbach's alpha).⁽⁸⁾

The chronotype preference was verified using the Morningness-Eveningness Questionnaire. It has questions about habitual situations of daily life, and people register their preferred times for these situations, assuming they would have total availability to choose. The result is a numeric value ranging from 16 to 86 points. The classification indicates the preference among five chronotypes: extreme evening/definitely evening (16 to 30 points), moderately evening (31 to 41 points), indifferent/neither evening nor morning (42 to 58 points), moderately morning (59 to 69 points), and extreme morning/ definitely morning (70 to 86 points).⁽⁹⁾

The data were analyzed in the Statistical Analysis System (SAS), version 9.2 with the aid of a statistical professional. Descriptive statistics (measures of central tendency and dispersion, frequencies and proportions) was used. The non-parametric chi-square test for independent samples was applied to study possible associations between the variables. The p value was set at 0.05 to consider the analysis results as significant.

The study was approved by the Research Ethics Committee of the Universidade de Taubaté under number CEP/UNITAU: n°014/12.

Results

The sociodemographic results showed a predominance of the female gender (91.67%), with mean age of 24.97 years (\pm 6.82), single (75.98%), without children (79.90%), attending the morning period of study (75%), with work activity (68.62%) in the nursing area (39.39%), and this activity was concentrated on daytime shifts (50.71%) and night shifts (34.29%) (Table 1).

Table 1. Distribution of nursing students according to sociodemographic characteristics

Variables	Study n=64 n(%)	Study and work n=140 n(%)	Total n=204 n(%)
Sex			
Female	61(95.31)	126(90.00)	187(91.67)
Male	3(4.69)	14(10.00)	17(8.33)
Age group, years			
18-29	56(27.45)	105(51.47)	161(78.92)
30-39	4(1.96)	28(13.73)	32(15.69)
40-49	3(1.47)	7(3.43)	10(4.90)
50 or over	1(0.49)	-	1(0.49)
Marital status			
Single	55(26.96)	100(49.02)	155(75.98)
Married	7(3.43)	34(16.67)	41(20.10)
Divorced	2(0.98)	6(2.94)	8(3.92)
Has children			
Yes	9(4.41)	32(15.69)	41(20.10)
No	55(26.96)	108(52.94)	163(79.90)
Study shift			
Morning	53(25.98)	100(49.02)	153(75.00)
Evening	11(5.39)	40(19.61)	51(25.00)
Work shift			
Morning*	-	71(50.71)	71(50.71)
Night†	-	48(34.29)	48(34.29)
Afternoon/evening‡	-	21(15.00)	21(15.00)
Professional category			
Nursing	-	55(39.29)	55(39.29)
Paid internship	-	18(12.86)	18(12.86)
Teaching	-	2(1.43)	2(1.430)
Other activities	-	18(12.86)	18(12.86)
Not informed	-	47(33.57)	47(33.57)

*From 7 am to 7 pm, from 6 am to 6 pm, from noon to 6 pm, from 1 pm to 7 pm; †from 7 pm to 7 am, from 6 pm to 6 am; ‡from 5 pm to 10 pm

The analysis of sleep quality showed that most nursing students surveyed had poor sleep quality; both those who studied only (24.51%) and those who studied and worked (59.80%).

The individual perception in relation to chronotype showed that most students were indifferent (56.38%) regardless of having work activity or not. Regarding the study period and the work shift, there was a predominance of indifferent individuals in the morning period (42.16%) and the day shift (27.86%) (Table 2).

Being a student and working implied a higher frequency of symptoms of poor digestion ($p = 0.0016$), headache ($p = 0.0357$), classroom sleepiness ($p = 0.0395$) and insomnia ($p = 0.0369$) (Table 3).

Table 2. Distribution of nursing students according to chronotype

Chronotype	Total (n=204)			Study and work (n=140)			
	Morning n(%)	Evening n(%)	Total n(%)	Day n(%)	Evening n(%)	Evening/night n(%)	Total n(%)
Definitely morning	5(2.45)	-	5(2.45)	2(1.43)	2(1.43)	-	4(2.86)
Definitely evening	5(2.45)	3(1.47)	8(3.92)	2(1.43)	2(1.43)	1(0.71)	5(3.57)
Moderately morning	32(15.69)	7(3.43)	39(19.12)	16(11.43)	10(7.14)	3(2.14)	29(20.71)
Moderately evening	25(12.25)	12(5.88)	37(18.13)	12(8.57)	11(7.86)	3(2.14)	26(18.57)
Indifferent	86(42.16)	29(14.22)	115(56.38)	39(27.86)	23(16.43)	14(10.00)	76(54.29)

Table 3. Association between the variables of reported symptoms of poor digestion, headache, sleepiness and insomnia, and the school and work shifts of nursing students

Signs and symptoms		Study shift (n=204)			Work shift (n=140)			p-value
		Morning n(%)	Evening n(%)	p-value	Day n(%)	Night n(%)	Evening/night n(%)	
Poor digestion	Yes	37(80.43)	9(19.57)	0.3334*	9(25.00)	19(52.78)	8(22.22)	0.0016*
	No	116(73.42)	42(26.58)		62(59.62)	29(27.88)	13(12.50)	
Headache	Yes	75(78.95)	20(21.05)	0.2242*	30(46.88)	19(29.69)	15(23.44)	0.0357*
	No	78(71.56)	31(28.44)		41(53.95)	29(38.16)	6(7.89)	
Sleepiness in class	Yes	80(76.92)	24(23.08)	0.5177*	29(40.28)	30(41.67)	13(18.06)	0.0395*
	No	73(73.00)	27(27.00)		42(61.76)	18(26.47)	8(11.76)	
Insomnia	Yes	25(71.43)	10(28.57)	0.5919*	8(29.63)	12(44.44)	7(25.93)	0.0369*
	No	128(75.74)	41(24.26)		63(55.75)	36(31.86)	14(12.39)	

*p-value obtained by the chi-square test

Discussion

This study presents the characteristic limitations of cross-sectional studies, i.e., it did not assess cause and effect, but indicated concern about the health and sleep of the studied population.

The results of this study together with the data found in the literature, suggest that nursing undergraduate students are female, predominantly young, in the age group of 18 to 29 years, followed by individuals in the age group of 30 to 39 years, and a lower percentage of subjects aged over 40 years. These characteristics were also found in a study about the quality of life of freshmen students of the nursing course at the Universidade Federal Fluminense.⁽¹⁰⁾ As for marital status, the results of this study were divergent, because some students were married and had children, which may be explained by the inclusion of students from all the course years and not only freshmen students.

Most students were enrolled in the morning course with their work shifts concentrated in the daytime and evening periods. This is a characteristic of nursing professionals, who prioritize the night work because of the higher salary gain, since respondents were also a majority in the nursing area work. The double journey (study-work), especially for night shifts, leads to sleeping difficulties during the day, compromising the health and social relations as family and friends.⁽¹¹⁾ It also affects the academic life, because remaining in graduation depends on the organization of work life, which is always prioritized.⁽¹²⁾

Most students had poor sleep quality, and these data are in agreement with the literature, such as in two studies corroborating the information. A study conducted with 701 students from the Universidade Federal do Ceará found that 95.3% of students had poor sleep quality.⁽¹³⁾ Another study performed at the Universidade Federal de Pernambuco

with 173 students (92 of courses in the area of exact sciences, mathematics, physics and computing, and 81 in the area of biological sciences and physical education) found poor sleep quality and excessive daytime sleepiness in students of health and exact sciences.⁽¹⁴⁾

Regarding students who also work, the data on sleepiness are in agreement with the literature, corroborating the study performed in a private university in the countryside of the state of São Paulo with nursing students who worked on night shifts. This study demonstrated that the subjects' sleepiness scores on the Epworth Sleepiness Scale ranged from 7.2 to 15.9, with a mean of 11.4, characterizing the prevalence of excessive daytime sleepiness. The author concluded the students increase their waking hours because of studies, resulting in a high incidence of daytime sleepiness.⁽¹⁵⁾

The negative impact of the double journey (work-study) in the sleep of young Brazilian students in the city of São Paulo was confirmed by comparing their sleep rates before the start of the double journey and after engaging with study and work commitments, showing a significant difference between the mean values of sleep time.⁽¹⁶⁾

These findings, together with the results found in the present study are disturbing because sleep is associated with different modes of memory processing, favoring its consolidation and the recovery of stimuli required at the moment of wakefulness.⁽¹⁷⁾ The lack of sleep may interfere in the process of consolidating students' knowledge and in the quality of trained professionals.

The consequences of the double journey (work-study) to health were confirmed in the present study when finding associations between the variables of sleepiness in the classroom, insomnia, headache and poor digestion, with the presence of double journey. Shift work, especially the shifts that provide higher lack of sleep, have been associated with fatigue and sleepiness, conditions not expected from individuals who perform activities that require concentration and attention.⁽¹⁸⁾ These findings indicate the need for lifestyle changes to promote healthy habits in-

volving better quality of sleep, food and physical activity.⁽¹⁹⁾

The agreement between chronotype preference and period of work and study is also important in determining the work and study performance, and a better quality of life.⁽¹⁾ The chronobiological profile can minimize or potentiate the negative effects of wake-sleep cycle changes.

The chronotype preference found in this study was of the indifferent type (neither evening nor morning individuals). This profile was similar to that found in a study performed with biological sciences undergraduate students of the Universidade Metodista de Piracicaba, in the interior of the State of São Paulo. Data indicated that indifferent and moderately evening types are seven times larger than the typical morning type, 1.4 times greater than the moderately morning type, and 3.5 times larger than the typical evening type.⁽⁶⁾ These characteristics show an adaptation of the indifferent chronotype to social rhythms. Therefore, understanding issues involving fatigue, excessive sleepiness, and duration and quality of sleep of students is of great interest because these factors are associated with worse school performance.

Conclusion

The study found preference of the predominantly indifferent chronotype with poor sleep quality, and association between insomnia, headache, poor digestion and sleepiness in the classroom for students who work and study. These conclusions show the importance of investing in understanding the changes that may occur between biological rhythms and environmental cycles, especially in relation to adjustments in hours of study and shift work.

Acknowledgements

We thank the Universidade de Taubaté for allowing the project development, especially the director of the Department of Nursing and Nutrition, Professor Maria Angela Petrini.

Collaborations

Santos TCMM, De Martino MMF, Sonati JG, De Faria AL and Nascimento EFA declare to have contributed with the writing of the article, critical review of the intellectual content and final approval of the version to be published. Santos TCMM, De Martino MMF collaborated in the stages of study design, analysis, data interpretation, article writing, critical review of the intellectual content and final approval of the version to be published.

References

- Maire M, Reichert CF, Schmidt C. Sleep-wake rhythms and cognition. *J Cogn Behav Psychother*. 2013; 13(1a):133-70.
- Pereira E, Anacleto TS, Louzada FM. Interação entre sincronizadores fóticos e sociais: repercussões para a saúde humana. *Rev Biol*. 2012; 9(3):68-73.
- Zhu L, Zee PC. Circadian rhythm sleep disorders. *Neurologic Clin*. 2012; 30(4):1167-91.
- Horne JA, Ostberg O. A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. *Int J Chronobiol*. 1976; 4(2):97-110.
- Duarte LL, Menna-Barreto L, Miguel MA, Louzada F, Araújo J, Alam M, et al. Chronotype ontogeny related to gender. *Braz J Med Biol Res*. 2014; 47(4):316-20.
- Duarte M, Silva CA. Identificação do cronotipo e perfil cronobiológico de uma população de acadêmicos de Ciências Biológicas da Unimep. *Saúde Rev*. 2012; 12(31):53-60.
- Andreoli CP, De Martino MM. Academic performance of night-shift students and its relationship with the sleep-wake cycle. *Sleep Sci*. 2012; 5(2):45-8.
- Bertolazi AN, Fagundes SC, Hoff LS, Dartora EG, Miozzo IC, Barba ME, et al. Validation of the Brazilian portuguese version of the Pittsburg Sleep Quality Index. *Sleep Med*. 2011; 12(1):70-5.
- Benedito Silva AA, Menna-Barreto L, Marques N, Tenreiro S. A self-assessment questionnaire for the determination of morningness-eveningness types in Brazil. In: Hayes DK, Pauly JE, Reiter RJ, editors. *Cronobiology: its role in clinical medicine, general biology and agriculture*. Part B. New York: Wiley-Liss; 1990. p.89-98.
- Almeida PF, Espírito Santo FH. Qualidade de vida: um estudo com ingressantes do curso de graduação em enfermagem e licenciatura. *Rev Pesq Cuid Fundam*. 2012; 4(1):2647-53.
- Korompeli A, Muurlink O, Tzavara C, Velonakis E, Lemonidou C, Sourtzi P. Influence of Shiftwork on greek nursing personnel. *Saf Health Work*. 2014; 5(2):73-9.
- Maier SRO, Mattos M. O trabalhar e o estudar no contexto universitário: uma abordagem com trabalhadores-estudantes. *Rev Saúde (Santa Maria)*. 2016; 42(1):179-85.
- Araújo MF, Lima AC, Alencar AM, Araújo TM, Fragoso LV, Damasceno MM. Avaliação da qualidade do sono de estudantes universitários de Fortaleza-CE. *Texto Contexto Enferm*. 2013; 22(2):352-60.
- Carvalho TM, Silva Jr II, Siqueira PP, Almeida JO, Soares AF, Lima AM. Qualidade do sono e sonolência diurna entre estudantes universitários de diferentes áreas. *Rev Neurociênc*. 2013; 21(3):383-7.
- Ferreira LR, De Martino MM. [Sleep patterns and fatigue of nursing students who work]. *Rev Esc Enferm USP*. 2012; 46(5):1176-81. Portuguese.
- Fischer FM, Wey D, Valente D, Luz AA, Pinheiro F, Fonseca BC, Silva-Costa A, Moreno CR, Menna-Barreto L, Teixeira LR. Sleep patterns and sleepiness among Young students: A longitudinal study before and after admission as trainees and apprentices. *Chronobiol Int*. 2015; 32(4): 478-85.
- Rasch B, Born J. About sleep's role in memory. *Physiol Rev*. 2013; 93(2):681-766.
- Sonati JG, De Martino M, Vilarta R, Maciel E, Moreira E, Sanchez F, De Martino G, Sonati R. Quality of life, health, and sleep of air traffic controllers with different shift systems. *Aerosp Med Hum Perform*. 2015; 86(10):895-900.
- Sonati JG, De Martino MMF, Vilarta R, Maciel ES, Sonati RJF, Paduan PC. Quality of life, sleep, and health of air traffic controllers with rapid counterclockwise shift rotation. *Workplace Health Saf*. 2016; 64(8): 377-84.