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Associations between lifestyle behaviors and sleep problems in university students: a cross-sectional analysis

Associações entre comportamentos de estilo de vida e problemas de sono em estudantes universitários: uma análise transversal

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ABSTRACT

Introduction: Lifestyle behaviors such as nutrition, substance use, physical activity and stress management are independently associated with less risk of sleep problems, but there few evidence evaluating whether the combination of lifestyle behaviors associates with sleep problems. The aim of this study was to evaluate the associations between lifestyle behaviors and sleep problems in university students. **Methods:** The study had cross-sectional design. Data was gathered using an online survey (RedCap) enrolling university student from 11 universities in Brazil. The Short Multidimensional Inventory Lifestyle Evaluation (U-SMILE) was used to assess six lifestyle behaviors (diet, substance use, physical activity, stress management, social relationships, and environment exposure), while the DSM-5-TR self-rated level 1 cross-cutting symptom measure and the Pittsburgh Sleep Quality Index (PSQI) were used to assess sleep problems. Poisson regression was used to assess the associations between lifestyle and sleep problems. **Results:** A total of 747 participants (56.1% women, 42.6% ≤20 years old) participated the study. Participants with an overall healthier lifestyle, accounting six behaviors, had a lower prevalence of sleep problems compared to those with an unhealthier lifestyle (RP=0.59; 95%CI=0.48–0.72; p<0.001). Diet (RP=0.74; 95%CI=0.60–0.92; p=0.006), social support (RP=0.71; 95%CI=0.57–0.88; p=0.002), and environmental exposure (RP=0.80; 95%CI=0.64–0.99; p=0.044) were independently associated with a higher prevalence of sleep problems. **Conclusion:** A healthy lifestyle was associated with a lower prevalence of sleep problems, with diet, social support, and environmental exposure being the key contributing factors.

KEYWORDS
Sleep problems; Lifestyle; Students; Sleep; Behaviors.

RESUMO

Introdução: Comportamentos relacionados ao estilo de vida, como alimentação, uso de substâncias, atividade física e manejo do estresse, estão independentemente associados a menor risco de problemas de sono. No entanto, há poucas evidências que avaliem se a combinação desses comportamentos está associada a problemas de sono. O objetivo deste estudo foi avaliar as associações entre comportamentos de estilo de vida e problemas de sono em estudantes universitários. **Métodos:** O estudo possui delineamento transversal. Os dados foram coletados por meio de um questionário online (RedCap), com a participação de estudantes de 11 universidades do Brasil. O *Short Multidimensional Inventory Lifestyle Evaluation* (U-SMILE) foi utilizado para avaliar seis comportamentos de estilo de vida (alimentação, uso de substâncias, atividade física, manejo do estresse, relacionamentos sociais e exposição ambiental). Para avaliar os problemas de sono, foram utilizados o *DSM-5-TR Self-Rated Level 1 Cross-Cutting Symptom Measure* e o *Pittsburgh Sleep Quality Index* (PSQI). As associações entre estilo de vida e problemas de sono foram analisadas por meio de regressão de Poisson. **Resultados:** Participaram do estudo 747 estudantes (56,1% mulheres, 42,6% com ≤20 anos). Os participantes com um estilo de vida geral mais saudável, considerando os seis comportamentos, apresentaram menor prevalência de problemas de sono em comparação àqueles com estilo de vida menos saudável (RP=0,59; IC95%=0,48–0,72; p<0,001). Alimentação (RP=0,74; IC95%=0,60–0,92; p=0,006), suporte social (RP=0,71; IC95%=0,57–0,88; p=0,002) e exposição ambiental (RP=0,80; IC95%=0,64–0,99; p=0,044) foram independentemente associados a maior prevalência de problemas de sono. **Conclusão:** Um estilo de vida saudável esteve associado a menor prevalência de problemas de sono, sendo a alimentação, o suporte social e a exposição ambiental os principais fatores contribuintes.

PALAVRAS-CHAVE
Problemas de sono; Estilo de vida; Estudantes; Sono; Comportamentos.

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INTRODUCTION

Sleep problems refers to difficulties in falling or remaining asleep, experiencing low-quality sleep, and daytime sleepiness.[1] They are associated with irritability, agitation, and incapacity to process information[2] and to an increased risk of developing other mental health problems and cognitive deficits.[3] Further, sleep problems often result in lower performance in daily life tasks[4] and are common among university students.[5] Previous studies reported prevalence of sleep problems in university students ranging from 27% to 93[6], including insomnia (36.4%) and obstructive sleep apnea (21.5%).[7]

Sleep problems are multifactorial[8], and some evidence supports the notion that lifestyle behaviors are associated with their emergence.[9–11] These factors constitute multidimensional construct, which encompasses life habits and such as physical activity, diet, sleep, smoking, substance abuse, stress management, social support, and environmental exposure.[12]

During higher education years, students are at a high risk of adopting unhealthy lifestyle behaviors such as lower physical activity levels, poor dietetic habits, sleep irregularly and high consumption of alcohol and other substances.[13,14] Accordingly, evidence suggests that students with these unhealthy lifestyle conducts tend to experience worse sleep outcomes.[9] For instance, higher leisure time physical activity associates with 29% lesser risk of poor sleep quality.[15] Further, long periods of screen time, including the use of computers, cellphones and the internet, for example, is associated with shorter and lower-quality sleep.[16] A significant negative correlation between social media use and sleep health (r=−0.131) was found in students.[17]

On the other hand, effective stress management and a solid social support system are individually related to better sleep.[18] Moreover, studies indicate an increase of smoking and alcohol consumption are associated with poor sleep quality among adolescents.[19] Lastly, Wang et al. (2023)[20], found that bedtime habits and neighborhood environment combined with stress and self-control, increase the risk of having sleep problems.

Besides that, as sleep issues are multifaceted, it is important to understand not just how these factors interact independently but also how they collectively influence sleep. Although there is evidence that lifestyle is associated with sleep within students, most of them explore just the independent association between lifestyle behaviors and sleep. However, it is well known that lifestyle behaviors do not occur in isolation, and have a strong relationship among them.[21,22] Therefore, studies investigating the combination of multiple lifestyle behaviors with sleep problems are more likely to better explain how they associate.

Given the aforementioned, our study aimed to evaluate the associations between lifestyle behaviors (combined and independently) and sleep problems in a sample of undergraduate and postgraduate students from Brazil.

METHODS

Study design

This cross-sectional study was developed with data from the MENTAL-UNI study. The MENTAL-UNI was a pilot study for The UNIversity Student's LIFEstyle and Mental Health Study (UNILIFE-M) cohort.[23] This study was approved by the Ethics and Research Committee (CAAE 55481422.5.1001.5346). This study was conducted following the STROBE guidelines for cross-sectional studies.[24]

Sample

The study sample was conveniently selected and included students from 11 Brazilian universities, covering all macroregions of the country. Participants were recruited through researchers' and the institution's social media platforms (WhatsApp, Facebook, Instagram, and Twitter), general media, university networks, and emails sent to students. Furthermore, recruitment was done via face-to-face visits to lectures, flyers and advertising through the campus.

The universities participating in this study were: Federal University of Santa Maria (UFSM), Pontifical Catholic University of Rio Grande do Sul (PUCRS), Federal University of Santa Catarina (UFSC), Federal University of Sergipe (UFS), State University of Montes Claros (UNIMONTES), Federal University of Pará (UFPA), Federal University of Rio Grande do Norte (UFRN), Federal University of Rio de Janeiro (UFRJ), University of Brasília (UnB), University of São Paulo (USP), and Federal University of Ceará (UFC).

Inclusion criteria

University students aged ≥18 who were enrolled in undergraduate or postgraduate programs at the participating universities were included in this study. Individuals who did not fully complete the sleep assessment instrument were excluded from our analytical sample.

Procedures

The study was conducted through an online survey using the Research Electronic Data Capture (RedCap) platform (The model that demonstrates how the survey is inserted into

the platform can be found at the link: https://redcap.huwc.ufc.br/surveys/?s=YF8H3WWCW7D4R8WC). After reading and agreeing to the Informed Consent Form, participants answered a questionnaire, which covered sociodemographic and academic aspects, further, lifestyle behaviors and sleep problems were assessed. Data collection took place from June to November 2022.

Lifestyle Assessment

The Short Multidimensional Inventory Lifestyle Evaluation (SMILE-C) (25) instrument assessed students' lifestyles. This instrument allows a multidimensional lifestyle assessment, providing scores for each of its seven domains: diet, substance use, physical activity, stress management, social support, sleep and environment exposure, as well as an overall lifestyle score. There were 27 questions to assess the frequency of behaviors considered healthy, with a response scale ranging from 1 to 4, where a higher score is indicative of a healthier lifestyle.[25] Since this study's outcome is sleep problems, the sleep domain was excluded from the general score, resulting in a total of six domains used.

Lifestyle scores were calculated as follows: the diet domain consists of five items (score range: 1–20), assessing eating habits and meal patterns; substance use includes four items (1–16), evaluating alcohol, tobacco, and other drug use; physical activity consists of one item (1–4), assessing engagement in regular physical exercise; stress management comprises six items (1–24), covering psychological, behavioral, and meaning-related coping strategies; social support includes six items (1–24), assessing social relations and interpersonal interactions; and environmental exposure consists of one item (1–4), reflecting screen use close to bedtime.[25]

The SMILE-C generates continuous scores for each lifestyle domain and for overall lifestyle, reflecting the frequency of behaviors considered healthy according to the instrument. Higher scores indicate a greater frequency of healthier behaviors, whereas lower scores reflect unlifestyle patterns. As the instrument does not provide established clinical or guideline-based cutoff points, lifestyle classifications in this study were based on relative distinctions within the sample, ensuring internal consistency while preserving the behavioral meaning of each domain.[25]

Sleep Problems

The presence of sleep problems was assessed at two levels. First, all participants answered the DSM-5-TR self-rated level 1 cross-cutting symptom measure.[26] Second, only those with a positive screening at the DSM-5-TR self-rated level 1 cross-cutting symptom measure answered the Pittsburgh Sleep Quality Index (PSQI). The DSM-5-TR self-rated level 1 cross-cutting symptom measure was used as a tracking instrument for symptoms that can be related to any mental disorder.[26] The instrument consists of 13 domains that cover depression, anger, mania, anxiety, somatic symptoms, suicidal ideation, psychosis, sleep problems, memory, repetitive thoughts and behaviors, dissociation, personality functioning, and substance use.[26] The scale consists of 23 questions that are answered by the participant using a scale of 0 to 4 points (0= Not at all. 1= A little bit, rarely, less than one or two days. 2= Mild, several days. 3= Moderate, more than half the days. 4= Severe, nearly every day), considering the experiences of the past two weeks.[26] In our study, we utilized only the sleep domain to screen for potential cases of sleep problems. Scores above two points in each domain require an additional assessment.[26] Therefore, this instrument served as the indicator for symptoms of sleep problems, and if participants reached the mild cutoff (≥ 2), the participant responded to the sleep problems instrument.[26] Participants who scored <2 on the sleep domain were retained in the sample and classified as non-cases (i.e., without sleep problems).

To assess sleep, the Pittsburgh Sleep Quality Index (PSQI) instrument was employed[27]. It consists of seven components of sleep: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction.[27,28] In the present study, only the sleep disturbance component (Component 5) was used to assess sleep problems. The sleep disturbance component is derived from item 5 (Items 5b to 5j), which assess different reasons for sleep disturbance. Each item is scored on a scale ranging from 0 (no difficulty) to 3 (severe difficulty). The sum of the item scores results in a total sleep disturbance score ranging from 0 to 27 points, with higher scores indicating more severe sleep problems.[29] According to the PSQI scoring guidelines, each component score ranges from 0 to 3 and is derived from the summed item scores. For Component 5, scores are classified as follows: 0 = 0 (no difficulty); 1–9 = 1; 10–18 = 2; and 19–27 = 3 (severe difficulty). Based on this classification, we assume a cutoff point of ≥10 points on the sleep disturbance score (moderate difficulty) as to indicate the presence of sleep problems[28,29]

Sociodemographics

Sociodemographic information was used to characterize the sample. This information included sex, age, ethnic group, previous diagnosis of mental disorders, family history of mental disorders, and university affiliation.

Statistical analysis

Data distribution was tested using the Shapiro-Wilk test. Descriptive analyses were performed utilizing relative and absolute frequencies for categorical variables, and medians with interquartile intervals for continuous data with non-parametric distribution (total and each domain).

Lifestyle variables were categorized for analytical purposes using the sample median. This approach was adopted because the lifestyle domain scores showed non-parametric distribution, for which the median represents a robust and appropriate measure of central tendency, minimizing the influence of extreme values. Moreover, this classification reflects the structure of the SMILE-C instrument, which yields continuous scores without predefined clinical cutoffs.

Crude and adjusted associations between lifestyle (combined and independently) and sleep problems were tested by Poisson regression with robust variance models with the reference group being unhealthy lifestyle. The results expressed in Prevalence Ratio (PR) and its respective 95% confidence intervals (95%CI) and significance levels. Following previous literature, it was tested sex, age, ethnic group, family history of mental disorders, income, work, and level of education[30,31], as potential covariates. Those with values p<0,20 were incorporated into the adjusted models. All variables were included simultaneously in the models. Analyzes were performed with an alpha of 5%, using STATA version 15.

As this is a pilot study of the survey, post hoc sample size analyzes were conducted to test the statistical power of the analysis, using the GPower software version 3.1.9.7. Using an alpha of 0.05, odds ratio of 0.30 and coefficient of determination (R^2) of 0.92, the power found was 0.94.

RESULTS

A total of 918 participants were involved in the study, with 171 excluded due to incomplete data in the lifestyle or sleep assessment instrument. The analytical sample consisted a total of 747 individuals, predominantly women (56.1%), students aged ≤20 years (42.0%), and mostly non-white (55.9%). Additionally, 109 students (14.6%) had a prior diagnosis of a mental disorder. The majority of the sample consisted of students from the Federal University of Pará (UFPA) - 130 (17.7%). The prevalence of sleep problems within our sample was 39.4%. This information is available in table 1.

Table 2 presents the medians of each lifestyle domain and general scores and table 3, the association's analyses. In the crude analysis, participants with a healthier overall lifestyle had a lower prevalence of sleep problems (RP=0.56;

Table 1. Sociodemographic characteristics of participants in the MENTAL-UNI study (n=747)

Characteristic	n (%)[#]
Women	419 (56.1)
Age (Age group)	
≤20	311 (42.0)
21-25	275 (37.2)
≥26	154 (21.0)
Ethnicity	
White	327 (44.1)
Not White	414 (55.9)
Previous self-reported diagnosis of mental disorder	109 (14.6)
Family history of mental disorders	362 (50.2)
Graduate	677 (91.2)
Undergraduate	65 (8.8)
University	
Federal University of Santa Maria	51 (7.0)
Pontifical Catholic University of Rio Grande do Sul	5 (0.7)
Federal University of Santa Catarina	66 (9.0)
Federal University of Sergipe	58 (8.0)
State University of Montes Claros	79 (10.8)
Federal University of Pará	130 (17.7)
Federal University of Rio Grande do Norte	128 (17.5)
Federal University of Rio de Janeiro	83 (11.3)
University of Brasília	55 (7.5)
University of São Paulo	22 (3.0)
Federal University of Ceará	56 (7.6)

[#]Number of observations varies due to missing values.

95%CI=0.46–0.68; p<0.001). A healthy diet (RP=0.60; 95%CI=0.49–0.73; p<0.001), higher physical activity frequency (RP=0.73; 95%CI=0.60–0.89; p=0.002), better social support (RP=0.60; 95%CI=0.49–0.72; p<0.001), better stress management (RP=0.70; 95%CI=0.58–0.84; p<0.001), and healthier environmental exposure (RP=0.72; 95%CI=0.58–0.88; p=0.002) were associated with a reduced prevalence of sleep problems. In the adjusted analysis, these associations remained significant for a healthy diet (RP=0.74; 95%CI=0.60–0.92; p=0.006), better social support (RP=0.71; 95%CI=0.57–0.88; p=0.002), healthier environmental exposure (RP=0.80; 95%CI=0.64–0.99; p=0.044), and an overall healthy lifestyle (RP=0.59; 95%CI=0.48–0.72; p<0.001).

Table 2. Average lifestyle scores (overall and domains) of participants in the MENTAL-UNI study (n=747)

Domains	Median (IR)
Diet	14 [12-16]
Substance use	15 [14-16]
Physical activity	3 [2-4]
Social support	19 [16-21]
Environmental exposure	1 [1-2]
Stress management	15 [13-18]
Overall lifestyle	67 [60-73]

IR: interquartile range.

Table 3. Crude and adjusted associations of lifestyle behavior (subdomains and overall) and sleep problems in participants of the MENTAL-UNI study.

	N (%)	Crude OR (95%CI)	p-value	Adjusted OR (95%CI)	p-value*
Diet			<0.001		0.006
Unhealthy lifestyle	373 (54.53)	1		1	
Healthy lifestyle	311 (45.47)	0.60 (0.49; 0.73)		0.74 (0.60; 0.92)	
Substance use			0.544		0.631
Unhealthy lifestyle	378 (55.18)	1		1	
Healthy lifestyle	307 (44.82)	0.95 (0.79; 1.13)		0.96 (0.80; 1.14)	
Physical activity			0.002		0.169
Unhealthy lifestyle	417 (60.70)	1		1	
Healthy lifestyle	270 (39.30)	0.73 (0.60; 0.89)		0.86 (0.70; 1.07)	
Social support			<0.001		0.002
Unhealthy lifestyle	395 (57.75)	1		1	
Healthy lifestyle	289 (42.25)	0.60 (0.49; 0.72)		0.71 (0.57; 0.88)	
Stress management			<0.001		0.656
Unhealthy lifestyle	345 (50.74)	1		1	
Healthy lifestyle	335 (49.26)	0.70 (0.58; 0.84)		0.95 (0.77; 1.17)	
Environmental exposure			0.002		0.044
Unhealthy lifestyle	455 (66.13)	1		1	
Healthy lifestyle	233 (33.87)	0.72 (0.58; 0.88)		0.80 (0.64; 0.99)	
Overall lifestyle			<0.001		<0.001**
Unhealthy lifestyle	354 (53.23)	1		1	
Healthy lifestyle	311 (46.77)	0.56 (0.46; 0.68)		0.59 (0.48; 0.72)	

PR (95%CI): Prevalence Ratio (95% Confidence Interval) - Poisson regression with robust variance.
Unhealthy lifestyle: 1° quantile; Healthier lifestyle: 2° quantile.
* Adjusted for other subdomains, sex, level of education, and family history of mental disorder.
** Adjusted for sex, level of education, and family history of mental disorder.

DISCUSSION

The results suggest that a healthier lifestyle, combining six lifestyle behaviors, is associated with a 41% lower prevalence of sleep problems in a sample of university students from different macroregions in Brazil. Furthermore, our results suggest that a healthier diet, greater social support and healthier environmental exposure are associated with a lower prevalence of sleep problems, after adjusting for relevant covariates. To our knowledge, this is the first study to examine the correlations between comprehensive lifestyle factors, encompassing various domains, and sleep issues among Brazilian university students across diverse fields of study.

There is limited evidence investigating the combination of multiple lifestyle behaviors with sleep problems in the Brazilian population, in particular, among students. A study carried out with the Brazilian adult and older adult population observed that individuals with lifestyle-related risk behaviors, including smoking, excessive alcohol consumption, sedentary lifestyle, and sedentary behavior were at greater risk of experiencing sleep problems.[10] Among students, a study in Malasya found

that those with unhealthier lifestyle behaviors were more likely to experience poor sleep quality compared to those with healthier lifestyles[32] and that the lifestyle can play a mediating role between circadian rhythm and sleep quality among students.[33] These findings align with our study and suggest that sleep problems and lifestyle behaviors are intrinsically associated in people from different ages and cultures.

It was found that particularly a healthier diet, greater social support and environmental exposure are associated with a lower risk of sleep problems. An unhealthy dietary pattern, involving an excessive consumption of sugar and a low intake of dairy products, is associated with a higher prevalence of sleep problems in university students.[34] Therefore, students with an unhealthy diet were more likely to experience poor sleep quality.[35] It is possible that diet may interfere with hormonal release, promoting abnormal levels of glucocorticoids and cortisol, which could lead to an increased desire to consume unhealthy foods, rich in calories, fats, and free sugars.[36] However, the mechanisms of this association seem to exists bidirectionality, where irregular sleep may also trigger alterations in dietary intake and stress, leading to alterations in decision-making and influencing the need for instant rewards provided by unhealthy foods.[37]

Our results indicate that higher levels of social support are associated with lower odds of sleep problems among students. There is evidence suggesting that university students with higher levels of social support have a reduced probability of experiencing poor sleep quality.[38] Additionally, students with good social support are also more likely to have greater sleep duration, enhanced sleep efficiency, favorable subjective sleep quality, and less sleep latency.[18] It is well established that social support is associated with positive mental and emotional health outcomes, including lower levels of rumination and fewer depressive symptoms.[39] These factors may represent a plausible explanatory pathway for the observed association between social support and sleep problems, as both rumination and depressive symptoms have been consistently linked to poorer sleep quality and sleep disturbances.[40]

Besides that, our study also found an inverse association between environmental exposure and sleep problems. In note, it is important to highlight that the questions used in this domain of the SMILE questionnaire are mainly focused on exposure to screen time. The negative impact of screen time on sleep is well documented in the literature[41] with high levels of it being associated with poor sleep quality and shorter sleep duration, fatigue, daytime sleepiness, and lack of concentration in adolescents and college students.[42] A possible explanation for this factor may be the negative effect of short-wavelength blue light on melatonin production[43], which is an important hormone in the regulation of the circadian cycle and sleep onset.[44]

This study has some limitations. Due to its cross-sectional nature, it is not possible to infer causality from the observed associations or assess the potential bidirectionality between the associations, and reverse causality cannot be ruled out. Moreover, data used is self-reported, therefore, susceptible to memory bias and social desirability bias. Also, as all the mostly self-report on-line surveys, the sample was convenience-selected and may not accurately reflect the Brazilian university student's population, thus, it requires caution in extrapolations. Furthermore, although the study included several universities, it is a pilot study, so the sample was unevenly distributed among the institutions, which may further limit the generalizability of the results. The absence of established cut-off points for classifying lifestyle domains assessed by the SMILE led to the use of the sample median as a classification criterion. However, this approach does not ensure the identification of genuinely healthy habits, as scores above the median may still reflect unfavorable behavioral patterns when the overall sample presents inadequate lifestyles, without alignment with established health guidelines. Lastly, sleep problems were initially identified using the DSM-5 Level 1 Cross-Cutting Symptom Measure as a screening tool, which does not have perfect sensitivity and may have resulted in false negatives, potentially leading to an underestimation of the prevalence of sleep problems. In the second stage of the assessment, sleep problems were assessed exclusively through the domain of sleep disorders, without considering the overall score of the instrument, which may result in a lack of relevant issues related to sleep.

It is important to mention that this study has strengths, such as the use of validated instruments to assess sleep problems and overall lifestyle, including different lifestyle-related domains, diverging from the majority of the current evidence in the literature, focusing on assessing the specific domains. In addition, it is a multicenter study, including participants from different regions of the country and various study fields. As this study should be considered a pilot investigation, it provided an opportunity to test analytical procedures and explore potential association patterns. In this context, the broader UNILIFE-M Cohort[23] represents a valuable opportunity to replicate and extend the present findings using longitudinal and cross-national data, allowing future studies to more robustly examine the temporal and potentially bidirectional relationships between lifestyle behaviors and mental health outcomes among university students.

CONCLUSIONS

Our findings demonstrate that university students with a healthy lifestyle had a lower prevalence of sleep problems.

Diet, social support, and environmental exposure were the only independent lifestyle behaviors associated with the prevalence of sleep problems.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are not publicly available due to ethical and privacy restrictions.

AUTHOR CONTRIBUTIONS

EB: design, data collection, data analysis and writing; AJW: design, data collection, data analysis and writing; **JAT:** design, data collection, data analysis and writing; **MEG:** design, data collection, data analysis and writing; **LW:** data collection; **TM:** design, data collection and review; **DS:** design, data collection and review; **RS:** design, data collection and review; **DP:** design, data collection and review; **NL:** design, data collection and review; **HF:** design, data collection and review; **FR:** design, data collection and review; **DT:** design, data collection, data analysis and writing; **AD:** design, data collection and review; **FB:** design, data collection, data analysis, writing and review.

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REFERENCES

1. Nyer M, Farabaugh A, Fehling K, Soskin D, Holt D, Papakostas GI, et al. Relationship between sleep disturbance and depression, anxiety, and functioning in college students. Depress Anxiety. setembro de 2013;30(9):873–80.
2. Maheshwari G, Shaukat F, Maheshwari G, Shaukat F. Impact of Poor Sleep Quality on the Academic Performance of Medical Students. Cureus [Internet]. 1º de abril de 2019 [citado 16 de outubro de 2023];11(4). Disponível em: https://www.cureus.com/articles/19016-impact-of-poor-sleep-quality-on-the-academic-performance-of-medical-students
3. Hershner SD, Chervin RD. Causes and consequences of sleepiness among college students. Nat Sci Sleep. 23 de junho de 2014;6:73–84.
4. Drake CL, Roehrs T, Roth T. Insomnia causes, consequences, and therapeutics: an overview. Depress Anxiety. 2003;18(4):163–76.
5. Kieling C, Buchweitz C, Caye A, Silvani J, Ameis SH, Brunoni AR, et al. Worldwide Prevalence and Disability From Mental Disorders Across Childhood and Adolescence: Evidence From the Global Burden of Disease Study. JAMA Psychiatry [Internet]. 31 de janeiro de 2024 [citado 31 de março de 2024]; Disponível em: https://doi.org/10.1001/jamapsychiatry.2023.5051
6. Sun Y, Wang H, Jin T, Qiu F, Wang X. Prevalence of Sleep Problems Among Chinese Medical Students: A Systematic Review and Meta-Analysis. Front Psychiatry. 2022;13:753419.
7. Al Salmani AA, Al Shidhani A, Al Qassabi SS, Al Yaaribi SA, Al Musharfi AM. Prevalence of sleep disorders among university students and its impact on academic performance. Int J Adolesc Youth. 31 de dezembro de 2020;25(1):974–81.
8. Maciel FV, Wendt AT, Demenech LM, Dumith SC. Fatores associados à qualidade do sono de estudantes universitários. Ciênc Saúde Coletiva. 7 de abril de 2023;28:1187–98.
9. Campsen N, WC B. Lifestyle Factors' Impact on Sleep of College Students. Austin J Sleep Disord. 3 de março de 2017;4.
10. Gajardo YZ, Ramos JN, Muraro AP, Moreira NF, Ferreira MG, Rodrigues PRM. Problemas com o sono e fatores associados na população brasileira: Pesquisa Nacional de Saúde, 2013. Ciênc Saúde Coletiva. 12 de fevereiro de 2021;26:601–10.
11. Wu Q, Yuan L, Guo XH, Li JA, Yin D. Study on lifestyle habits affecting sleep disorders at the undergraduate education stage in Xuzhou City, China. Front Psychol. 25 de outubro de 2022;13:1053798.
12. American College of Lifestyle Medicine [Internet]. [citado 6 de fevereiro de 2026]. American College Of Lifestyle Medicine. Disponível em: https://lifestylemedicine.org/
13. Ma C, Xu W, Zhou L, Ma S, Wang Y. Association between lifestyle factors and suboptimal health status among Chinese college freshmen: a cross-sectional study. BMC Public Health. 5 de janeiro de 2018;18(1):105.
14. Vieira F da ST, Muraro AP, Rodrigues PRM, Sichieri R, Pereira RA, Ferreira MG. Lifestyle-related behaviors and depressive symptoms in college students. Cad Saúde Pública. 8 de outubro de 2021;37:e00202920.
15. Santos M, Sirtoli R, Rodrigues R, López-Gil JF, Martínez-Vizcaíno V, Guidoni CM, et al. Relationship between free-time physical activity and sleep quality in Brazilian university students. Sci Rep. 24 de abril de 2023;13(1):6652.
16. Brautsch LA, Lund L, Andersen MM, Jennum PJ, Folker AP, Andersen S. Digital media use and sleep in late adolescence and young adulthood: A systematic review. Sleep Med Rev. abril de 2023;68:101742.
17. Dzierzewski JM, Sabet SM, Ghose SM, Perez E, Soto P, Ravyts SG, et al. Lifestyle Factors and Sleep Health across the Lifespan. Int J Environ Res Public Health. 20 de junho de 2021;18(12):6626.
18. Jin Y, Ding Z, Fei Y, Jin W, Liu H, Chen Z, et al. Social relationships play a role in sleep status in Chinese undergraduate students. Psychiatry Res. 15 de dezembro de 2014;220(1–2):631–8.
19. Chen H, Bo QG, Jia CX, Liu X. Sleep Problems in Relation to Smoking and Alcohol Use in Chinese Adolescents. J Nerv Ment Dis. maio de 2017;205(5):353–60.
20. Wang Y, Dai X, Zhu J, Xu Z, Lou J, Chen K. What complex factors influence sleep quality in college students? PLS-SEM vs. fsQCA. Front Psychol [Internet]. 25 de agosto de 2023 [citado 15 de abril de 2024];14. Disponível em: https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2023.1185896/full
21. Anderson AR, Ostermiller L. The clustering of lifestyle behaviors in U.S. college students: a network approach. J Am Coll Health J ACH. 1º de dezembro de 2023;1–11.
22. El Ansari W, Ssewanyana D, Stock C. Behavioral Health Risk Profiles of Undergraduate University Students in England, Wales, and Northern Ireland: A Cluster Analysis. Front Public Health. 2018;6:120.
23. Schuch FB, Waclawoscky A, Tornquist D, Oyeyemi AL, Sadarangani KP, Takano K, et al. UNIversity students' LIFEstyle behaviours and Mental health cohort (UNILIFE-M): study protocol of a multicentre, prospective cohort study. 1º de janeiro de 2026 [citado 5 de fevereiro de 2026]; Disponível em: https://bmjopen.bmj.com/content/16/1/e085006.full
24. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)

statement: guidelines for reporting observational studies. J Clin Epidemiol. abril de 2008;61(4):344–9.

25. Balanzá-Martínez V, Kapczinski F, de Azevedo Cardoso T, Atienza-Carbonell B, Rosa AR, Mota JC, et al. The assessment of lifestyle changes during the COVID-19 pandemic using a multidimensional scale. Rev Psiquiatr Salud Ment. 2021;14(1):16–26.
26. Mahoney MR, Farmer C, Sinclair S, Sung S, Dehaut K, Chung JY. Utilization of the DSM-5 Self-Rated Level 1 Cross-Cutting Symptom Measure-Adult to Screen Healthy Volunteers for Research Studies. Psychiatry Res. 27 de janeiro de 2020;286:112822.
27. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. Psychiatry Res. 1º de maio de 1989;28(2):193–213.
28. Becker SP, Jarrett MA, Luebbe AM, Garner AA, Burns GL, Kofler MJ. Sleep in a large, multi-university sample of college students: sleep problem prevalence, sex differences, and mental health correlates. Sleep Health. abril de 2018;4(2):174–81.
29. Doi Y, Minowa M, Uchiyama M, Okawa M, Kim K, Shibui K, et al. Psychometric assessment of subjective sleep quality using the Japanese version of the Pittsburgh Sleep Quality Index (PSQI-J) in psychiatric disordered and control subjects. Psychiatry Res. 27 de dezembro de 2000;97(2–3):165–72.
30. Chen JH. Social Epidemiology of Sleep: Extant Evidence and Future Directions. Curr Epidemiol Rep. 1º de dezembro de 2019;6(4):449–65.
31. Papadopoulos D, Sosso FE, Khoury T, Surani SR. Sleep Disturbances Are Mediators Between Socioeconomic Status and Health: a Scoping Review. Int J Ment Health Addict. 1º de fevereiro de 2022;20(1):480–504.
32. Hashim H, Ng JS, Ngo JX, Ng YZ, Aravindkumar B. Lifestyle factors associated with poor sleep quality among undergraduate dental students at a Malaysian private university. Sleep Sci. 2022;15(4):399–406.
33. Zhang S, Zhang N, Wang S, Hong J, Li F, Guo H, et al. Circadian rhythms and sleep quality among undergraduate students in China: The mediating role of health-promoting lifestyle behaviours. J Affect Disord. 15 de julho de 2023;333:225–32.
34. Ramón-Arbués E, Martínez Abadía B, Granada López JM, Echániz Serrano E, Pellicer García B, Juárez Vela R, et al. [Eating behavior and relationships with stress, anxiety, depression and insomnia in university students.]. Nutr Hosp. 26 de dezembro de 2019;36(6):1339–45.
35. Ramón-Arbués E, Granada-López JM, Martínez-Abadía B, Echániz-Serrano E, Antón-Solanas I, Jerue BA. The Association between Diet and Sleep Quality among Spanish University Students. Nutrients. 11 de agosto de 2022;14(16):3291.
36. Duong M, Cohen JI, Convit A. High cortisol levels are associated with low quality food choice in type 2 diabetes. Endocrine. fevereiro de 2012;41(1):76–81.
37. Noorwali EA, Cade JE, Burley VJ, Hardie LJ. The relationship between sleep duration and fruit/vegetable intakes in UK adults: a cross-sectional study from the National Diet and Nutrition Survey. BMJ Open. 1º de abril de 2018;8(4):e020810.
38. Kent de Grey R, Uchino B, Trettevik R, Cronan S, Hogan J. Social Support and Sleep: A Meta-Analysis. Health Psychol. 28 de maio de 2018;37.
39. Krause N, Rainville G. Exploring the Relationship Between Social Support and Sleep. Health Educ Behav Off Publ Soc Public Health Educ. fevereiro de 2020;47(1):153–61.
40. Association (APA) AP. DSM-5: Manual Diagnóstico e Estatístico de Transtornos Mentais. Artmed Editora; 2014. 779 p.
41. Alonzo R, Hussain J, Stranges S, Anderson KK. Interplay between social media use, sleep quality, and mental health in youth: A systematic review. Sleep Med Rev. abril de 2021;56:101414.
42. Alshoaibi Y, Bafil W, Rahim M. The effect of screen use on sleep quality among adolescents in Riyadh, Saudi Arabia. J Fam Med Prim Care. julho de 2023;12(7):1379–88.
43. West KE, Jablonski MR, Warfield B, Cecil KS, James M, Ayers MA, et al. Blue light from light-emitting diodes elicits a dose-dependent suppression of melatonin in humans. J Appl Physiol Bethesda Md 1985. março de 2011;110(3):619–26.
44. Arshad D, Joyia UM, Fatima S, Khalid N, Rishi AI, Rahim NUA, et al. The adverse impact of excessive smartphone screen-time on sleep quality among young adults: A prospective cohort. Sleep Sci. março de 2021;14(4):337.