



Review Article

Determinants of sleep quality in college students: A literature review

Feifei Wang^{a,*}, Éva Bíró^{b,1}^a Institute of Health Promotion and Sport Sciences, Faculty of Education and Psychology, Eötvös Loránd University ELTE, 1075 Budapest, Kazinczy u. 23-27, Hungary^b Division of Health Promotion, Department of Preventive Medicine, Faculty of Public Health, University of Debrecen, 4028 Debrecen Kassai út 26, Hungary

ARTICLE INFO

Article History:

Received 6 September 2019

Revised 12 October 2020

Accepted 15 November 2020

Keywords:

Sleep quality

College students

Sleep determinants

Scoping review

ABSTRACT

Purpose: To review the various determinants of sleep quality among college students.**Methods:** The PubMed, Web of Science and Cochrane Library databases were searched with the search string “sleep quality” AND “college students” for articles published between January 2007 and October 2017. Articles were excluded if they (1) examined sleep quality as a risk factor for other outcomes or (2) involved inpatients or participants under medical care.**Results:** The 112 identified studies were classified into categories according to the investigated determinants and their effect on sleep quality. Physical activity and healthy social relations improved sleep quality, while caffeine intake, stress and irregular sleep-wake patterns decreased sleep quality. Less consistent results were reported regarding eating habits and sleep knowledge, while proper napping during the day might improve overall sleep quality.**Conclusions:** College students are vulnerable to different risk factors for sleep quality. When designing interventions to improve sleep quality among college students, the main determinants need to be taken into consideration.© 2020 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Sleep problems are common and are likely to increase.^{1–3} Over the past few years, sleep quality among young adults has been decreasing, as revealed by several studies and reports.^{4–6} Despite the common use of the term sleep quality, it does not have a widely accepted definition; it is mostly defined as an individual's general level satisfaction with the sleep experience, and its main components are the quantity of sleep, sleep continuity, and revitalizing feeling upon awakening.⁷

Sleep duration is an important element of sleep quality.⁸ The prevalence of short sleep duration (<9 h for children aged 6–12 years; <8 h for teens aged 13–18 years and <7 h for adults aged 18–60 years old) is high (72.7%) in the US.^{9–10} A recent survey investigated sleep duration in university students from 26 low-, middle- and high-income countries and reported that the prevalence of ≤6, 7–8, and ≥9 h sleep durations was 39.2, 46.9, and 13.9%, respectively.¹¹ In addition to sleep duration loss, sleep initiation and maintenance problems – which are aspects of sleep continuity – and morning tiredness are the main features of decreased sleep quality.⁷ Furthermore, sleep problems are common among college students,¹²

and more than half of college students suffer from poor sleep quality.¹³ Therefore, it can be asserted that poor sleep quality is becoming a considerable problem among college students.

Greater academic and social pressures and irregular schedules render students susceptible to sleep disturbances and deprivation. The social life of college students involves a variety of entertainment opportunities and products that reduce sleep quality. University life is characterized by substantial freedom, minimal supervision, unhealthy habits such as smoking and drinking, and leisure activities that are conveniently available and accessible (e.g., student clubs, concerts, night bars). Energy drinks, which are targeted to young adult consumers,¹⁴ and higher drinking motives predict poorer sleep quality.¹⁵ Based on present knowledge, caffeine consumption is associated with common symptoms of poor sleep quality, including insomnia¹⁶ and sleep disturbances.¹⁷ Additionally, screen-based technologies are often used among young people, and low physical activity and high screen time are significantly positively correlated with poor sleep quality.¹⁸ Although there are many reasons for reduced sleep quality, nighttime media use is frequently cited as one probable cause.¹⁹ Smartphone overuse not only results in sleep problems but also contributes to physical inactivity, which in turn contributes to poor sleep.²⁰ Rapid lifestyle and behavioral changes can lead to poor sleep patterns in college students.²¹ Several studies have demonstrated the relationship between sleep problems and chronotype; people with an evening chronotype have more sleep debt and

* Corresponding author.

E-mail address: feifei.wang@ppk.elte.hu (F. Wang).¹ Present address: Department of Public Health and Epidemiology, Faculty of Medicine, University of Debrecen, Hungary

more subjective somnolence compared to morning types.²² The results have consistently shown that the sleep quality of evening types was worse than that of morning types.²³

Attending college can be a stressful time for many students, and mental health problems have been highlighted because college students' need for mental health care has increased dramatically.²⁴ Research reveals that sleep problems are common and are associated with poorer mental health even among young people²⁵ and college students.^{26–28} However, students, due to ambiguous help-seeking behaviors, may not be willing to admit that they need psychological treatment.²⁹ It is reasonable to assume that the mental health problems of college students exceed the current estimates reported in the literature. Currently, there is convincing evidence that there is a bidirectional relationship between mental health and sleep quality. As mentioned, sleep problems are associated with poor mental health^{25–29}; furthermore, it has been demonstrated that poor mental health could result in poor sleep quality.³⁰ Supplementary evidence for sleep quality determinants from multiple angles (e.g., sleep quantity³¹) was examined by previous studies.

Thus far, determinants of sleep quality among college students have not been systematically reviewed, and it is very important to study these factors since nurturing physically and mentally healthy young generations is crucial for public health promotion. Scoping reviews can be useful in evidence synthesis when the aim of the review is to “identify knowledge gaps, scope a body of literature, clarify concepts or to investigate research conduct”. Scoping reviews may also be antecedents to systematic review.³² The purpose of this review was to analyze the current literature and identify the main determinants of sleep quality among college students. Therefore, a scoping review is a reasonable research strategy to fulfil the research goals.

Method

Data sources

The PubMed, Web of Science and Cochrane Library databases were searched for articles published between January 2007 and October 2017 using the following search string: (sleep quality) AND (college students).

Study selection

We coded all of the articles from the PubMed ($n = 207$), Web of Science ($n = 327$) and Cochrane Library ($n = 29$) databases with numbers in the sequence listed in the search results from the three databases. Articles were recorded with labels and were classified into several categories. Fig. 1 shows the study selection process and the number of articles. For instance, we excluded articles that considered sleep quality as a risk factor for other variables; nevertheless, the noncollege population, questionnaire reexamination, intervention studies and prevalence investigation were not considered in this review.

Inclusion and exclusion criteria

Studies of all designs that were accessible online were included if they met the following criteria: (1) published in English, (2) involved college students, (3) examined the risks factors for reduced or constrained sleep quality, sleep health, and sleep efficiency, etc. Articles were excluded if their target population included off-campus students. For example, students who were participating in internships at companies or medical students who were practicing in hospitals were excluded. Articles showing the correlation between sleep and risk factors were carefully checked, and only articles with sleep quality as the dependent variable were taken into consideration.

In PubMed, after sorting and labeling all the articles, eight categories were created according to the nature of the articles: 1. sleep risk factor

articles ($n = 58$), 2. intervention studies ($n = 22$), 3. sleep quality was considered as a risk factor and not as an outcome ($n = 28$), 4. simple cross-sectional studies on sleep quality ($n = 24$), 5. questionnaire reexaminations ($n = 13$), 6. high school-/middle school-based studies ($n = 6$), 7. reviews/meta-analyses ($n = 3$) and 8. irrelevant studies ($n = 53$). A number of articles were excluded for various reasons, e.g., 28 articles examined sleep quality as a determinant of other factors (e.g., school performance, mental health, stress, quality of life). Although we searched the literature with targeted and specific terms related to college students, 6 articles examined middle/high school students, and 53 articles were not related to sleep quality among college students. Only two categories from PubMed ($n = 61$), including sleep risk factor articles ($n = 58$) and reviews ($n = 3$), remained for further discussion in our review.

Of the Web of Science articles, 127 were duplicates of PubMed articles. Of the remaining 200 articles, only articles discussing sleep risk factors were included in our review. The categories were as follows: 1. risk factors for poor sleep quality ($n = 50$); 2. intervention strategies ($n = 6$); 3. sleep quality scale reexaminations ($n = 6$); 4. sleep quality prevalence ($n = 25$); and 5. articles that examined sleep quality as a risk factor for other variables ($n = 46$) (e.g., academic performance, psychosocial dysfunction, anxiety, etc.); and 6. non-college-based studies ($n = 25$). In addition, 42 articles were completely biased on the intended theme (e.g., lifestyle factors to mental health, experience of living with chronic insomnia, psychology and suicide, health habits) and were excluded from the database. Finally, 50 articles about categories of sleep factors were included in this review.

Only one article from the Cochrane Library was taken into consideration after excluding 4 intervention studies, 22 duplicate articles from PubMed and Web of Science and 2 studies that were not related to sleep quality.

Data extraction

The creation of the data extraction categories was based on the characteristics and the nature of the studies. Before categorization, all of the search results from each database were manually coded, and only studies and reviews on sleep risk factors were included in this review.

Data synthesis

The thematic coding method was used to identify and record the determinants reported in each included article. The most significant factors were identified and grouped based on the results of the studies. The determinants were categorized based on content analysis, and then, the coding of each category was conducted based upon the synthesized information grouped in these categories. The outcomes were synthesized into three categories (i.e., positive, negative and no effect/not enough data). The first author coded and identified all determinants in each article, and then, the two authors sorted out and grouped the determinants. For example, perceived stress is identified in article A with reduced sleep quality, and it will be marked as “stress_reduceSQ_articleA”. In addition, in case physical activity is also identified in article A with an improved effect of sleep, it will be marked as “physical activity_improveSQ_articleA”, that is, one article could be cited twice or more times depending on how many determinants were identified.

Results

Sleep quality can be influenced by several short-term and long-term risk factors. Table 1 summarizes these factors based upon the results of our literature review and the number of relevant articles. Risk factors were classified into four domains: lifestyle (e.g., smoking, physical activity, eating habits, body mass index (BMI), caffeine and stimulant use, alcohol drinking, media use, sleep-wake patterns, sedentary behavior and napping) ($n = 71$), mental health (e.g.,

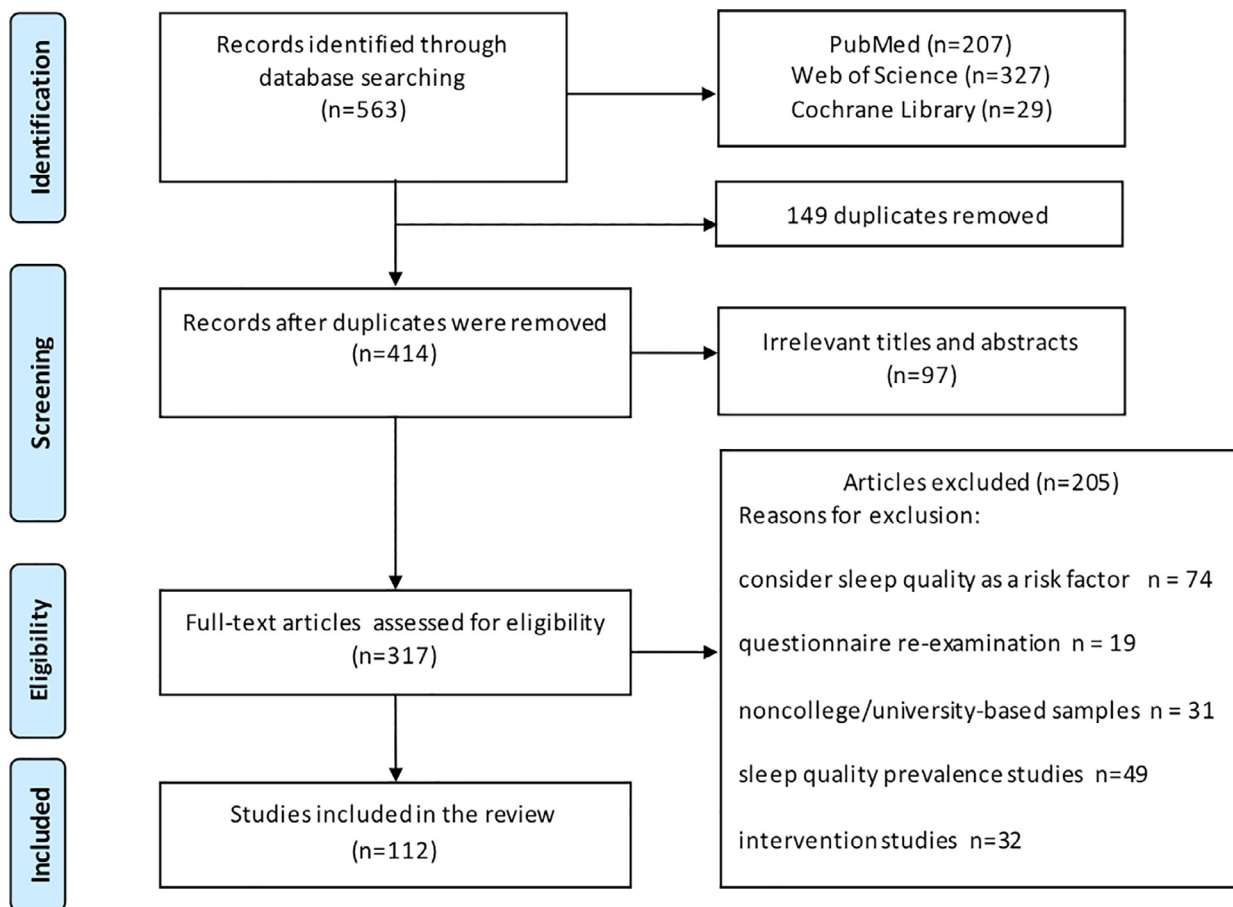


Fig. 1. Flow chart of identified and excluded articles.

Note: Adapted from the PRISMA flow diagram.

Source: <http://prisma-statement.org/PRISMAStatement/FlowDiagram.aspx>.

depression, psychiatric disorders, perceived stress, anxiety) ($n = 31$), social factors (e.g., racial discrimination, social relations, academic performance and sleep knowledge) ($n = 16$), and physical factors (e.g., pain and fatigue, sleep medication) ($n = 8$). The effects of these risk factors on sleep quality (SQ) were distributed into three categories (improves SQ; reduces SQ; no effect/not enough data). Furthermore, three articles investigated the connection between SQ and demographic factors, such as age,³³ gender³⁴ and ethnic background³⁵; however, in this case, the direction of the effect (i.e., positive or negative) could not be judged, but according to the literature, women experienced worse sleep quality than men.³⁶

Lifestyle determinants

Lifestyle factors most strongly affected sleep quality among college students, followed by mental factors, social factors and physical factors. Smoking and sedentary behavior had negative effects on sleep, as revealed by a single article³⁷ and a few articles,^{94,95} respectively. In addition, caffeine and stimulant use, media use (e.g., smartphone addiction, problematic internet use, lying position, nighttime use, screen time), alcohol use, and irregular sleep-wake patterns had negative effects on sleep.^{18,38,57–68,72–75,79–84,87–92} An irregular sleep-wake pattern is defined as a disordered form of circadian rhythm, which is characterized by the relative absence of a circadian pattern in an individual's sleep-wake cycle.¹⁴⁸ Additionally, higher amounts of technological device use predicted poorer sleep quality.⁸³

Physical activity was identified as a factor that could have both positive and negative effects on sleep, which depends on the intensity, type, and length of the activity. Aerobic exercise, such as Tai chi

and Pilates, showed beneficial effects on sleep quality.⁴¹ A relatively large number of studies^{18,38–42} reported on the positive effects of physical activity on sleep, while only one article⁴³ reported negative results. A national study³⁶ found that exercise effects vary between sexes, age groups, etc. Nevertheless, the baseline physical activity level of participants, as well as the exercise type, onset time, duration, and adherence, were also determinants of sleep amelioration. With the present knowledge, there is a high chance that physical activity improves sleep quality, but more evidence is required on the details of the intensity and quantity of physical exercise. Eating habits and nutrient intake both had positive and negative effects, but the positive effects outnumber the negative effects. It appeared that competent eating habits could improve sleep quality⁴⁷ because competent eaters had good overall sleep quality. Food addiction is not helpful for good sleep,⁴⁸ and poor sleep quality is associated with elevated emotional eating.^{50–52} Five articles discussed the relationship between BMI and sleep quality; four^{46,54–56} out of five articles showed negative effects of nonnormal BMI, and the remaining one article³⁷ presented a positive effect of normal BMI. Alcohol consumption did not benefit sleep, and higher drinking motives were closely associated with poor sleep quality.^{65, 72–75} It might be a good choice to have a short nap during the day, but nap length and nap frequency also impacted sleep quality.^{96–98}

Determinants related to mental health

As mentioned above, mental disorders showed a significant effect on sleep quality. Mental problems such as depression, psychiatric disorders (assessed by the Psychiatric Diagnostic Screening

Table 1

The number of relevant articles regarding the determinants of sleep quality (SQ) and their effect on sleep, with reference numbers.

Determinant	Improves SQ	Reduces SQ	No effect or not enough data
Lifestyle			
Smoking		1 ³⁷	
Physical activity	6 ^{18,38–42}	1 ⁴³	3 ^{44–46}
Eating habits	1 ⁴⁷		
Competent eating			
Food addiction		1 ⁴⁸	
Night eating			2 ^{37,49}
Emotional eating		3 ^{50,52}	1 ⁵³
Body Mass Index			
Normal	1 ³⁷		
Higher or lower		4 ^{46,54–56}	
Caffeine and stimulants		13 ^{57,68}	3 ^{69–71}
Alcohol drinking		5 ^{65,72–75}	1 ⁷⁶
Media use habits		2 ^{77,78}	1 ⁷⁹
Smartphone addiction		3 ^{80,82}	
Problematic internet use		1 ⁸³	
Lying position		2 ^{84,85}	1 ⁸⁶
Nighttime use			
Low screen time	2 ^{18,38}		
Irregular sleep-wake pattern		6 ^{87,92}	1 ⁹³
Sedentary behavior		2 ^{94,95}	
Napping	3 ^{96,98}	1 ⁹⁹	
Mental health			
Depression		5 ^{100,104}	
Psychiatric disorders		3 ^{105,107}	
Perceived stress		14 ^{75,101,108,109–119}	4 ^{120,123}
Anxiety		4 ^{99,124–126}	1 ¹²⁷
Social factors			
Racial discrimination		3 ^{128,130}	1 ¹³¹
Social relations	4 ^{132,135}		
Academic performance		2 ^{114,136}	
Sleep knowledge	2 ^{137,138}	3 ^{117,139,140}	1 ¹⁴¹
Physical factors			
Pain		1 ¹⁴²	
Fatigue		3 ^{92,113,143}	
Sleep medication	2 ^{144,145}	1 ¹⁴⁶	1 ¹⁴⁷

Questionnaire and General Health Questionnaire–12), stress and anxiety were negatively associated with sleep quality based on 25 articles (Table 1).^{75,99–119,124–126} Four articles showed no effect with perceived stress,^{120–123} and no studies found positive results between mental disorders and sleep quality. Relying on the concrete results above, it is reasonable to conclude that mental health problems are closely negatively associated with sleep.

Social determinants

Many social factors were correlated with sleep quality. As indicated in Table 1, healthy social relations^{132–135} positively affected sleep, while racial discrimination acted as a risk factor for poor sleep quality.^{128–130} Unsatisfying academic performance could also be a risk for poor sleep quality.^{114,136} Better sleep knowledge, which can also be understood as good sleep hygiene practice, was correlated with good sleep habits, while there was also a possibility that poor sleep was a result of poor sleep hygiene, which comprised a variety of habits that were necessary for good nighttime sleep quality.^{117,137–140} Additionally, students' attitudes and poor knowledge of sleep were also identified as risk factors for poor sleep quality.^{117,139,140}

Physical determinants

Physical factors such as pain and fatigue were significant risk factors for worse sleep quality,^{92,113,142,143} but the source of physical disorders was not investigated. Physical discomfort was an apparent risk factor, as shown in Table 1. Moreover, sleep medication use showed both positive and negative effects on sleep quality,^{144–146} which may be due to the illicit use of the prescribed medication.¹⁴⁴ An irregular circadian rhythm caused either by a psychiatric medication or an unorganized lifestyle was identified as a potential risk factor for poor sleep.^{87,106}

Discussion

This literature review provides evidence regarding the determinants of sleep health among college students by identifying risk factors reported in the literature. In a recent review about the determinants of children's sleep behavior, a categorization of the determinants was used that was similar to the one used in our study, thus supporting our results.¹⁴⁹ Pooled comparisons were made based on positive and negative sleep outcomes. The four domains of sleep determinants indicated that lifestyle factors were the most frequently investigated domain in sleep quality research, followed by mental health and social and physical factors. Different effects on sleep outcomes (i.e., improves or reduces sleep quality, no effect/insufficient data) were found, and positive and negative correlations were marked accordingly.

In summary, well-organized physical activity and healthy social relations improve sleep quality, while caffeine intake, stress and irregular sleep-wake patterns reduce sleep quality, which emphasizes existing findings that unhealthy or risky life behaviors are negatively associated with sleep health.⁸⁶ Eating habits and sleep knowledge were reported as determinants of sleep quality. For college students, nutrition intake and academic performance are correlated with social jetlag, which should be emphasized for college health,^{150,151} and according to a study, morning-type campus residents have worse well-being than other campus residents due to social jetlag.⁹³ In addition, a recent finding revealed that a heavy lunch and rapidly absorbing carbohydrates enhance sleepiness, and a light evening meal rich in carbohydrates may help one fall asleep.¹⁵² Better information about nutritional issues must be taken into consideration in terms of sleep health promotion. Additionally, proper napping during the day might strengthen overall sleep quality, but more effort is needed to provide guidance for proper napping. Pain and fatigue were also identified as possible causes of poor sleep.

Mental health problems (such as depression, psychiatric disorders, perceived stress, and anxiety) are undoubtedly hazardous to sleep quality, a previous publication highlighted the relationship between mental health and sleep quality.¹⁵³ Based on these results, more attention should be given to the importance of mental health in relation to sleep quality. Given the abundance of evidence suggesting that poor mental health impairs sleep quality, interventions to improve mental health status are highly recommended.

Despite the substantive findings above, the controversial sleep outcomes of certain determinants need to be taken into account. Several reasonable explanations could be as follows. First, the measurement of the predictors was not consistent. For instance, perceived stress was measured by the Depression Anxiety Stress Scale (DASS 21),¹⁰⁹ the Perceived Stress Scale (PSS-10)¹²² or simply by one sentence (“At the moment, I feel stressed out”) on a scale from 1 (not at all) to 5 (very).¹¹⁴ In the case of physical activity, existing evidence demonstrated that its dimensions (i.e., frequency, intensity, and duration) are associated with self-reported sleep parameters.¹⁵⁴ Furthermore, the quality of the included studies may have differed. Additionally, the use of different sleep quality measurements should also be considered.¹⁵⁵ In fact, a majority of the included articles adopted the Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality and sleep components, but other scales or equipment were also utilized to measure sleep quality. The reliability and validity of different measurements are supposed to be varied. However, the quantitative comparison of the positive and negative outcomes provides directive and solid evidence on determinants of sleep quality.

The present study has several implications and significance. In this study, a number of studies related to sleep determinants were identified. This study examined research-based evidence regarding sleep interventions and health promotion. The practical implications of the present study include fostering healthy life habits and formulating a conception of sleep health. Another implication of the current study is that it highlighted the importance of various factors that may influence sleep quality. Therefore, when conducting sleep interventions, potential confounding factors should be taken into consideration. Education is important for promoting sleep health and improving sleep quality among college students. The significance of the present study mainly includes synthesizing the existing literature on sleep determinants and providing accumulative evidence for sleep health interventions.

This review also has limitations. First, when selecting articles from the three databases (PubMed, Web of Science and Cochrane Library), publication bias (i.e., studies with positive results have a higher chance to be published) can be a potential risk that, unfortunately, cannot be avoided. Second, different methods were used to measure sleep quality in the included studies, which can limit comparability. Additionally, the review did not distinguish demographic factors that contribute to sleep quality, which could be a limitation. Third, institutional factors such as the education system and study field of college students may also violate sleep outcomes. Last but not least, the included studies were mostly cross-sectional studies.

Conclusions

This study examined the determinants of sleep quality by using the scoping review method. To the best of our knowledge, this is the first review of the scientific literature to synthesize the main determinants of sleep quality among college students. We categorized the relevant studies and summarized the positive and negative effects on sleep quality of the different determinants. The determinants of sleep quality are diverse, and we found that lifestyle factors closely affect sleep quality, and mental health factors, social factors and physical factors were also significant elements associated with sleep quality in college populations. One of the important findings of this study is that physical activity, as a determinant of sleep quality, has both

positive and negative effects. This result may lead to future studies and directions for sleep interventions. This study provided additional evidence to clarify the main risk factors for poor sleep quality. Lifestyle confounders should be taken into consideration before launching sleep quality intervention studies. Particularly for college students, more investigations on social jetlag by combining the identified determinants are recommended. These findings can be useful for planning interventions to improve sleep quality, and through the improvement of sleep quality, the general health and academic performance of college students can also be enhanced.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- Adams R, Appleton S, Taylor A, et al. Sleep health of Australian adults in 2016: results of the 2016 Sleep Health Foundation national survey. *Sleep Health*. 2017;3(1):35–42. <https://doi.org/10.1016/j.sleh.2016.11.005>.
- Dao-Tran T, Seib C. Prevalence and correlates of sleep disturbance among older women in Vietnam. *J Clin Nurs*. 2017;27(17–18):3307–3313. <https://doi.org/10.1111/jocn.14080>.
- Ferrie J, Kumari M, Salo P, Singh-Manoux A, Kivimaki M. Sleep epidemiology—a rapidly growing field. *Int J Epidemiol*. 2011;40(6):1431–1437. <https://doi.org/10.1093/ije/dyr203>.
- AlDabal L. Metabolic, endocrine, and immune consequences of sleep deprivation. *Open Respir Med J*. 2011;5(1):31–43. <https://doi.org/10.2174/1874306401105010031>.
- Vélez J, Souza A, Traslaviña S, et al. The epidemiology of sleep quality and consumption of stimulant beverages among patagonian chilean college students. *Sleep Disord*. 2013;2013:1–10. <https://doi.org/10.1155/2013/910104>.
- Edwards M, Loprinzi P. Experimentally increasing sedentary behavior results in decreased sleep quality among young adults. *Ment Health Phys Act*. 2017;12:132–140. <https://doi.org/10.1016/j.mhpa.2017.04.002>.
- Kline C. Sleep Quality. In: Gellman MD, Turner JR, eds. *Encyclopedia of Behavioral Medicine*. New York, NY: Springer; 2013. <https://doi.org/10.1007/978-1-4419-1005-9>.
- Buyse D, Reynolds C, Monk T, Berman S, Kupfer D. The Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. *Psychiatry Res*. 1989;28(2):193–213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4).
- Data & Statistics. CDC. <https://www.cdc.gov/features/datastatistics.html>. Published 2018. Accessed 8 October 2018.
- Sleep and Sleep Disorders. CDC. How much sleep do i need? https://www.cdc.gov/sleep/about_sleep/how_much_sleep.html. Published 2017, Accessed 16 April 2020.
- Peltzer K, Pengpid S. Sleep duration and health correlates among university students in 26 countries. *Psychol Health Med*. 2016;21(2):208–220. <https://doi.org/10.1080/13548506.2014.998687>.
- Rowland, Emily C, Khimani, et al. Differentiating sleep problems most related to depression and anxiety in college students. Undergraduate Research Posters. 2015; Poster 176. https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?referer=https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Differentiating+sleep+problems+most+related+to+depression+and+anxiety+in+college+student&btnG=&httpsredir=1&article=1183&context=uresposters.
- Afandi O, Hawi H, Mohammed L, et al. Sleep quality among university students: evaluating the impact of smoking, social media use, and energy drink consumption on sleep quality and anxiety. *Inquiries Journal*. 2013;5(6). Retrieved from: <http://www.inquiriesjournal.com/a?id=738>.
- Malinauskas B, Aeby V, Overton R, et al. A survey of energy drink consumption patterns among college students. *Nutr J*. 2007;6(1):35. <https://doi.org/10.1186/1475-2891-6-35>.
- Kenney S, Paves A, Grimaldi E, LaBrie J. Sleep quality and alcohol risk in college students: examining the moderating effects of drinking motives. *J Am Coll Health*. 2014;62(5):301–308. <https://doi.org/10.1080/07448481.2014.897953>.
- Seifert S, Schaechter J, Hershorin E, et al. Health effects of energy drinks on children, adolescents, and young adults. *Pediatrics*. 2011;127(3):511–528. <https://doi.org/10.1542/peds.2009-3592>.
- Bunka D. The drink of athletics, rock stars, college students and your twelve year old! RxFiles. Saskatoon Health Region. <http://www.rxfiles.ca/rxfiles>. 2011.
- Wu X, Tao S, Zhang Y, et al. Low physical activity and high screen time can increase the risks of mental health problems and poor sleep quality among Chinese college students. *PLoS One*. 2015;10(3):e0119607.
- Whipps J, Byra M, Gerow K, Hill Guseman E. Evaluation of nighttime media use and sleep patterns in first-semester college students. *Am J Health Behav*. 2018;42(3):47–55. <https://doi.org/10.5993/ajhb.42.3.5>.
- Gangwar A, Tiwari S, Rawat A, et al. Circadian preference, sleep quality, and health-impairing lifestyles among undergraduates of medical university. *Cureus*. 2018. <https://doi.org/10.7759/cureus.2856>.

21. Hershner S, Chervin R. Causes and consequences of sleepiness among college students. *Nat Sci Sleep*. 2014;6:73–84. <https://doi.org/10.2147/NSS.S62907>.
22. Taillard J, Philip P, Bioulac B. Morningness/eveningness and the need for sleep. *J Sleep Res*. 2002;8(4):291–295. <https://doi.org/10.1046/j.1365-2869.1999.00176.x>.
23. Bakhshandeh Bavarsad M, Azimi N, Moradbeigi K, Latifi M. Associations between morningness-eveningness and sleep quality among female dormitory residents. *Thrita*. 2015;4(1). <https://doi.org/10.5812/thrita.25088>.
24. Kirsch D, Pinder-Amaker S, Morse C, Ellison M, Doerfler L, Riba M. Population-based initiatives in college mental health: students helping students to overcome obstacles. *Curr Psychiatry Rep*. 2014;16(12). <https://doi.org/10.1007/s11920-014-0525-1>.
25. Quach J, Hiscock H, Wake M. Sleep problems and mental health in primary school new entrants: cross-sectional community-based study. *J Pediatr Child Health*. 2012;48(12):1076–1081. <https://doi.org/10.1111/j.1440-1754.2012.02466.x>.
26. Castillo L, Schwartz S. Introduction to the special issue on college student mental health. *J Clin Psychol*. 2013;69(4):291–297. <https://doi.org/10.1002/jclp.21972>.
27. Crady T. College of the overwhelmed: the campus mental health crisis and what to do about it. *J Coll Stud Dev*. 2005;46(5):556–558. <https://doi.org/10.1353/csd.2005.0046>.
28. American College Health Association. American College Health Association-National College Health Assessment Spring 2008 Reference Group Data Report (abridged): the American College Health Association. *J Am college Health*. 2009;57(5):477–488. <https://doi.org/10.3200/JACH.57.5.477-488>.
29. Ryan A, Gheen M, Midgley C. Why do some students avoid asking for help? An examination of the interplay among students' academic efficacy, teachers' social-emotional role, and the classroom goal structure. *J Educ Psychol*. 1998;90(3):528–535. <https://doi.org/10.1037/0022-0663.90.3.528>.
30. Milojevic HM, Lukowski AF. Sleep and mental health in undergraduate students with generally healthy sleep habits. *PLoS one*. 2016;11(6):e0156372. <https://doi.org/10.1371/journal.pone.0156372>.
31. Pilcher J, Ginter D, Sadowsky B. Sleep quality versus sleep quantity: relationships between sleep and measures of health, well-being and sleepiness in college students. *J Psychosom Res*. 1997;42(6):583–596. [https://doi.org/10.1016/S0022-3999\(97\)00004-4](https://doi.org/10.1016/S0022-3999(97)00004-4).
32. Munn Z, Peters M, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol*. 2018;18(1). <https://doi.org/10.1186/s12874-018-0611-x>.
33. da Cunha Silva Santiago L, Batista R, Lyra M, et al. The role played by gender and age on poor sleep quality among institutionalized adolescents. *Sleep and Breathing*. 2017;21(1):197–202. <https://doi.org/10.1007/s11325-017-1463-z>.
34. Tsai L, Li S. Sleep patterns in college students: gender and grade differences. *J Psychosom Res*. 2004;56(2):231–237. [https://doi.org/10.1016/S0022-3999\(03\)00507-5](https://doi.org/10.1016/S0022-3999(03)00507-5).
35. Czeisler C. Medical and genetic differences in the adverse impact of sleep loss on performance: ethical considerations for the medical profession. PubMed Central (PMC). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2744509/>. Published 2009. Accessed October 9, 2018.
36. Tang J, Liao Y, Kelly B, et al. Gender and regional differences in sleep quality and insomnia: a general population-based study in Hunan Province of China. *Sci Rep*. 2017;7(1). <https://doi.org/10.1038/srep43690>.
37. Yahia N, Brown C, Potter S, et al. Night eating syndrome and its association with weight status, physical activity, eating habits, smoking status, and sleep patterns among college students. *Eating and Weight Disorders - Studies on Anorexia, Bulimia Obesity*. 2017;22(3):421–433. <https://doi.org/10.1007/s40519-017-0403-z>.
38. Feng Q, Zhang Q, Du Y, et al. Associations of physical activity, screen time with depression, anxiety and sleep quality among Chinese college freshmen. *PLoS One*. 2014;9(6):e100914.
39. Loprinzi P, Cardinal B. Association between objectively-measured physical activity and sleep. *NHANES 2005–2006. Ment Health Phys Act*. 2011;4(2):65–69. <https://doi.org/10.1016/j.mhpa.2011.08.001>.
40. Al-Eisa E, Buragadda S, Melam G, et al. Association between physical activity and insomnia among Saudi female college students. *J Phys Ther Sci*. 2013;25(11):1479–1482. <https://doi.org/10.1589/jpts.25.1479>.
41. Caldwell K, Harrison M, Adams M, et al. Effect of Pilates and taiji quan training on self-efficacy, sleep quality, mood, and physical performance of college students. *J Bodyw Mov Ther*. 2009;13(2):155–163. <https://doi.org/10.1016/j.jbmt.2007.12.001>.
42. Chastin S, Palarea-Albaladejo J, Dontje M, et al. Combined effects of time spent in physical activity, sedentary behaviors and sleep on obesity and cardio-metabolic health markers: a novel compositional data analysis approach. *PLoS One*. 2015;10(10):e0139984.
43. Mothes H, Klaperski S, Seelig H, et al. Regular aerobic exercise increases dispositional mindfulness in men: a randomized controlled trial. *Ment Health Phys Act*. 2014;7(2):111–119. <https://doi.org/10.1016/j.mhpa.2014.02.003>.
44. Wengreen H, Moncur C. Change in diet, physical activity, and body weight among young-adults during the transition from high school to college. *Nutr J*. 2009;8(1). <https://doi.org/10.1186/1475-2891-8-32>.
45. Kredlow M, Capozzoli M, Hearon B, et al. The effects of physical activity on sleep: a meta-analytic review. *J Behav Med*. 2015;38(3):427–449. <https://doi.org/10.1007/s10865-015-9617-6>.
46. Morris J, Firkins A, Millings A, et al. Internet-delivered cognitive behavior therapy for anxiety and insomnia in a higher education context. *Anxiety, Stress Coping*. 2016;29(4):415–431. <https://doi.org/10.1080/10615806.2015.1058924>.
47. Quick V, Shoff S, Lohse B, et al. Relationships of eating competence, sleep behaviors and quality, and overweight status among college students. *Eat Behav*. 2015;19:15–19. <https://doi.org/10.1016/j.eatbeh.2015.06.012>.
48. Nolan L, Geliebter A. "Food addiction" is associated with night eating severity. *Appetite*. 2016;98:89–94. <https://doi.org/10.1016/j.appet.2015.12.025>.
49. Nolan L, Geliebter A. Validation of the Night Eating Diagnostic Questionnaire (NEDQ) and its relationship with depression, sleep quality, "food addiction", and body mass index. *Appetite*. 2017;111:86–95. <https://doi.org/10.1016/j.appet.2016.12.027>.
50. Nielsen T, Powell R. Dreams of the Rarebit Fiend: food and diet as instigators of bizarre and disturbing dreams. *Front Psychol*. 2015;6. <https://doi.org/10.3389/fpsyg.2015.00047>.
51. Wang L, Qin P, Zhao Y, et al. Prevalence and risk factors of poor sleep quality among Inner Mongolia Medical University students: a cross-sectional survey. *Psychiatry Res*. 2016;244:243–248. <https://doi.org/10.1016/j.psychres.2016.04.011>.
52. Dweck J, Jenkins S, Nolan L. The role of emotional eating and stress in the influence of short sleep on food consumption. *Appetite*. 2014;72:106–113. <https://doi.org/10.1016/j.appet.2013.10.001>.
53. Nolan L, Geliebter A. Night eating is associated with emotional and external eating in college students. *Eat Behav*. 2012;13(3):202–206. <https://doi.org/10.1016/j.eatbeh.2012.02.002>.
54. Frates E, Xiao R, Sannidhi D, et al. A web-based lifestyle medicine curriculum: facilitating education about lifestyle medicine, behavioral change, and health care outcomes. *JMIR Med Educ*. 2017;3(2):e14.
55. Alodhayani A, Alshaikh O, Ghomraoui F, et al. Correlation between obesity and sleep disturbance in Saudi medical students. *J Phys Ther Sci*. 2017;29(2):181–186. <https://doi.org/10.1589/jpts.29.181>.
56. Quick V, Byrd-Bredbenner C, Shoff S, et al. Relationships of sleep duration with weight-related behaviors of U.S. college students. *Behav Sleep Med*. 2015;14(5):565–580. <https://doi.org/10.1080/15402002.2015.1065411>.
57. Lohsoonthorn V, Khidir H, Casillas G, et al. Sleep quality and sleep patterns in relation to consumption of energy drinks, caffeinated beverages, and other stimulants among Thai college students. *Sleep Breath*. 2012;17(3):1017–1028. <https://doi.org/10.1007/s11325-012-0792-1>.
58. Patrick M, Griffin J, Huntley E, Maggs J. Energy drinks and binge drinking predict college students' sleep quantity, quality, and tiredness. *Behav Sleep Med*. 2016;16(1):92–105. <https://doi.org/10.1080/15402002.2016.1173554>.
59. Faris Jahrami H, Al-Hilali M, et al. Energy drink consumption is associated with reduced sleep quality among college students: a cross-sectional study. *Nutr Dietet*. 2016;74(3):268–274. <https://doi.org/10.1111/1747-0080.12289>.
60. Liu Y, Liu L, Yang Y, et al. A school-based study of irritable bowel syndrome in medical students in Beijing, China: prevalence and some related factors. *Gastroenterol Res Pract*. 2014;2014:1–8. <https://doi.org/10.1155/2014/124261>.
61. Anderson B, Juliano L. Behavior, sleep, and problematic caffeine consumption in a college-aged sample. *J Caffeine Res*. 2012;2(1):38–44. <https://doi.org/10.1089/jcr.2012.0009>.
62. Spaeth A, Goel N, Dinges D. Cumulative neurobehavioral and physiological effects of chronic caffeine intake: individual differences and implications for the use of caffeinated energy products. *Nutr Rev*. 2014;72:34–47. <https://doi.org/10.1111/nure.12151>.
63. Zunhammer M, Eichhammer P, Busch V. Sleep quality during exam stress: the role of alcohol, caffeine and nicotine. *PLoS One*. 2014;9(10):e109490.
64. Rohsenow D, Howland J, Alvarez L, et al. Effects of caffeinated vs. non-caffeinated alcoholic beverage on next-day hangover incidence and severity, perceived sleep quality, and alertness. *Addict Behav*. 2014;39(1):329–332. <https://doi.org/10.1016/j.addbeh.2013.09.008>.
65. Wiwanitkit V. Sleep and beverage drinking among Thai college students. *Sleep and Breathing*. 2013;17(3):895. <https://doi.org/10.1007/s11325-013-0802-y>.
66. Lohsoonthorn V, Khidir H, Casillas G, et al. Sleep quality and sleep patterns in relation to consumption of energy drinks, caffeinated beverages, and other stimulants among Thai college students. *Sleep Breath*. 2012;17(3):1017–1028. <https://doi.org/10.1007/s11325-012-0792-1>.
67. Monahan C. Health-related quality of life among heavy-drinking college students. *Am J Health Behav*. 2012;36(3). <https://doi.org/10.5993/AJHB.36.3.1>.
68. Fucito L, DeMartini K, Hanrahan T, et al. Using sleep interventions to engage and treat heavy-drinking college students: a randomized pilot study. *Alcoholism: Clin Exp Res*. 2017;41(4):798–809. <https://doi.org/10.1111/acer.13342>.
69. Snel J, Lorist M. Effects of caffeine on sleep and cognition. *Prog Brain Res*. 2011;190:105–117. <https://doi.org/10.1016/B978-0-444-53817-8.00006-2>.
70. bib70, 2020.
71. Clegg-Kraynok M, McBean A, Montgomery-Downs H. Sleep quality and characteristics of college students who use prescription psychostimulants nonmedically. *Sleep Med*. 2011;12(6):598–602. <https://doi.org/10.1016/j.sleep.2011.01.012>.
72. Hasler B, Franzen P, de Zambotti M, et al. Eveningness and later sleep timing are associated with greater risk for alcohol and marijuana use in adolescence: initial findings from the national consortium on alcohol and neurodevelopment in adolescence study. *Alcohol: Clin Exp Res*. 2017;41(6):1154–1165. <https://doi.org/10.1111/acer.13401>.
73. Luquians A, Falissard B, Aubin H. Students worry about the impact of alcohol on quality of life: roles of frequency of binge drinking and drinker self-concept. *Drug Alcohol Depend*. 2016;167:42–48. <https://doi.org/10.1016/j.drugalcdep.2016.07.031>.
74. Kenney S, Lac A, LaBrie J, Hummer J, Pham A. Mental health, sleep quality, drinking motives, and alcohol-related consequences: a path-analytic model. *J Stud Alcohol Drugs*. 2013;74(6):841–851. <https://doi.org/10.15288/jsad.2013.74.841>.
75. Digdon N, Landry K. University students' motives for drinking alcohol are related to evening preference, poor sleep, and ways of coping with stress. *Biol Rhythm Res*. 2013;44(1):1–11. <https://doi.org/10.1080/09291016.2011.632235>.

76. Fucito L, DeMartini K, Hanrahan T, et al. Perceptions of heavy-drinking college students about a sleep and alcohol health intervention. *Behav Sleep Med*. 2014;13(5):395–411. <https://doi.org/10.1080/15402002.2014.919919>.
77. Demirci K, Akgönlü M, Akpinar A. Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *J Behav Addict*. 2015;4(2):85–92. <https://doi.org/10.1556/2006.4.2015.010>.
78. Thomée S, Härenstam A, Hagberg M. Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults – a prospective cohort study. *BMC Public Health*. 2011;11(1). <https://doi.org/10.1186/1471-2458-11-66>.
79. Lee J, Jang S, Ju Y, Kim W, Lee H, Park E. Relationship between Mobile Phone Addiction and the Incidence of Poor and Short Sleep among Korean Adolescents: a longitudinal study of the Korean Children & Youth Panel Survey. *J Korean Med Sci*. 2017;32(7):1166. <https://doi.org/10.3346/jkms.2017.32.7.1166>.
80. Tan Y, Chen Y, Lu Y, Li L. Exploring associations between problematic internet use, depressive symptoms and sleep disturbance among Southern Chinese adolescents. *Int J Environ Res Public Health*. 2016;13(3):313. <https://doi.org/10.3390/ijerph13030313>.
81. Tao S, Wu X, Zhang Y, Zhang S, Tong S, Tao F. Effects of sleep quality on the association between problematic mobile phone use and mental health symptoms in Chinese college students. *Int J Environ Res Public Health*. 2017;14(2):185. <https://doi.org/10.3390/ijerph14020185>.
82. Li J, Lepp A, Barkley J. Locus of control and cell phone use: implications for sleep quality, academic performance, and subjective well-being. *Comput Human Behav*. 2015;52:450–457. <https://doi.org/10.1016/j.chb.2015.06.021>.
83. Yoshimura M, Kitazawa M, Maeda Y, et al. Smartphone viewing distance and sleep: an experimental study utilizing motion capture technology. *Nat Sci Sleep*. 2017;9:59–65. <https://doi.org/10.2147/NSS.S123319>.
84. Whippis J, Byra M, Gerow KG, Guseman EH. Evaluation of nighttime media use and sleep patterns in first-semester college students. *Am J Health Behav*. 2018;42(3):47–55. <https://doi.org/10.5993/AJHB.42.3.5>.
85. Orzech K, Grandner M, Roane B, Carskadon M. Digital media use in the 2 h before bedtime is associated with sleep quality in university students. *Comput Human Behav*. 2016;55:43–50. <https://doi.org/10.1016/j.chb.2015.08.049>.
86. Adams S, Kisler T. Sleep quality as a mediator between technology-related sleep quality, depression, and anxiety. *Cyberpsychol Behav Soc Netw*. 2013;16(1):25–30. <https://doi.org/10.1089/cyber.2012.0157>.
87. Vitale J, Roveda E, Montaruli A, et al. Chronotype influences activity circadian rhythm and sleep: differences in sleep quality between weekdays and weekend. *Chronobiol Int*. 2014;32(3):405–415. <https://doi.org/10.3109/07420528.2014.986273>.
88. Tzischinsky O, Shohat T. Eveningness, sleep patterns, daytime functioning, and quality of life in Israeli adolescents. *Chronobiol Int*. 2011;28(4):338–343. <https://doi.org/10.3109/07420528.2011.560698>.
89. Selvi Y, Kandeger A, Boysan M, et al. The effects of individual biological rhythm differences on sleep quality, daytime sleepiness, and dissociative experiences. *Psychiatry Res*. 2017;256:243–248. <https://doi.org/10.1016/j.psychres.2017.06.059>.
90. Murdock K, Horissian M, Crichlow-Ball C. Emerging adults' text message use and sleep characteristics: a multimethod, naturalistic study. *Behav Sleep Med*. 2016;15(3):228–241. <https://doi.org/10.1080/15402002.2015.1120203>.
91. Lee T, Chang P, Tseng I, Chung M. Nocturnal sleep mediates the relationship between morningness–eveningness preference and the sleep architecture of afternoon naps in university students. *PLoS One*. 2017;12(10):e0185616.
92. Kang J, Chen S. Effects of an irregular bedtime schedule on sleep quality, daytime sleepiness, and fatigue among university students in Taiwan. *BMC Public Health*. 2009;9(1). <https://doi.org/10.1186/1471-2458-9-248>.
93. Lau E, Wong M, Ng E, Hui C, Cheung S, Mok D. “Social Jetlag” in morning-type college students living on campus: implications for physical and psychological well-being. *Chronobiol Int*. 2013;30(7):910–918. <https://doi.org/10.3109/07420528.2013.789895>.
94. Pilcher J, Morris D, Bryant S, Merritt P, Feigl H. Decreasing sedentary behavior: effects on academic performance, meta-cognition, and sleep. 2017;11:219–229. <https://doi.org/10.3389/fnins.2017.00219>.
95. Deforche B, Van Dyck D, Deliens T, De Bourdeaudhuij I. Changes in weight, physical activity, sedentary behaviour and dietary intake during the transition to higher education: a prospective study. *Int J Behav Nutr Phys Act*. 2015;12(1):16. <https://doi.org/10.1186/s12966-015-0173-9>.
96. Ye L, Hutton Johnson S, Keane K, Manasia M, Gregas M. Napping in college students and its relationship with nighttime sleep. *J Am Coll Health*. 2015;63(2):88–97. <https://doi.org/10.1080/07448481.2014.983926>.
97. Lovato N, Lack L, Wright H. The napping behaviour of Australian university students. *PLoS One*. 2014;9(11):e113666.
98. Mackert M, Lazard A, Guadagno M, Hughes Wagner J. The role of implied motion in engaging audiences for health promotion: encouraging naps on a college campus. *J Am Coll Health*. 2014;62(8):542–551. <https://doi.org/10.1080/07448481.2014.944534>.
99. Vela-Bueno A, Fernandez-Mendoza J, Olavarrieta-Bernardino S, et al. Sleep and behavioral correlates of napping among young adults: a survey of first-year university students in Madrid, Spain. *J Am Coll Health*. 2008;57(2):150–158. <https://doi.org/10.3200/JACH.57.2.150-158>.
100. Koffel E, Watson D. The two-factor structure of sleep complaints and its relation to depression and anxiety. *J Abnorm Psychol*. 2009;118(1):183–194. <https://doi.org/10.1037/a0013945>.
101. Knowlden A, Burns M, Harcrow A, Shewmake M. Cross-sectional analysis of food choice frequency, sleep confounding beverages, and psychological distress predictors of sleep quality. *Int J Adolesc Med Health*. 2016;30(1). <https://doi.org/10.1515/ijamh-2015-0120>.
102. Yang C, Hung C, Lee H. Stress-related sleep vulnerability and maladaptive sleep beliefs predict insomnia at long-term follow-up. *J Clin Sleep Med*. 2014;10(9):997–1001. <https://doi.org/10.5664/jcs.4036>.
103. Sing C, Wong W. Prevalence of insomnia and its psychosocial correlates among college students in Hong Kong. *J Am Coll Health*. 2010;59(3):174–182. <https://doi.org/10.1080/07448481.2010.497829>.
104. Almojali A, Almalki S, Allothman A, Masuadi E, Alaqeel M. The prevalence and association of stress with sleep quality among medical students. *J Epidemiol Glob Health*. 2017;7(3):169–174. <https://doi.org/10.1016/j.jegh.2017.04.005>.
105. Miller M, Van Reen E, Barker D, et al. The impact of sleep and psychiatric symptoms on alcohol consequences among young adults. *Addict Behav*. 2017;66:138–144. <https://doi.org/10.1016/j.addbeh.2016.11.023>.
106. Haregu A, Gelaye B, Pensuksan W, et al. Circadian rhythm characteristics, poor sleep quality, daytime sleepiness and common psychiatric disorders among Thai college students. *Asia-Pacific Psychiatry*. 2014;7(2):182–189. <https://doi.org/10.1111/appy.12127>.
107. Müller M, Kundermann B, Cabanel N. Eveningness and poor sleep quality independently contribute to self-reported depression severity in psychiatric inpatients with affective disorder. *Nord J Psychiatry*. 2015;70(5):329–334. <https://doi.org/10.3109/08039488.2015.1112832>.
108. Wallace D, Boynton M, Lytle L. Multilevel analysis exploring the links between stress, depression, and sleep problems among two-year college students. *J Am Coll Health*. 2016;65(3):187–196. <https://doi.org/10.1080/07448481.2016.1269111>.
109. Fawzy M, Hamed S. Prevalence of psychological stress, depression and anxiety among medical students in Egypt. *Psychiatry Res*. 2017;255:186–194. <https://doi.org/10.1016/j.psychres.2017.05.027>.
110. Marshall L, Allison A, Nykamp D, Lanke S. Perceived stress and quality of life among doctor of pharmacy students. *Am J Pharm Educ*. 2008;72(6):137. <https://doi.org/10.5688/aj7206137>.
111. Alsagoff M, Wali S, Merdad R, Merdad L. Sleep quantity, quality, and insomnia symptoms of medical students during clinical years. Relationship with stress and academic performance. *Saudi Med J*. 2016;37(2):173–182. <https://doi.org/10.15537/smj.2016.2.14288>.
112. Valerio T, Kim M, Sexton-Radek K. Association of stress, general health, and alcohol use with poor sleep quality among U.S. College Students. *Am J Health Educ*. 2016;47(1):17–23. <https://doi.org/10.1080/19325037.2015.1111173>.
113. Sawah M, Ruffin N, Rimawi M, et al. Perceived stress and coffee and energy drink consumption predict poor sleep quality in podiatric medical students. *J Am Podiatr Med Assoc*. 2015;105(5):429–434. <https://doi.org/10.7547/14-082>.
114. Doerr J, Ditzen B, Strahler J, et al. Reciprocal relationship between acute stress and acute fatigue in everyday life in a sample of university students. *Biol Psychol*. 2015;110:42–49. <https://doi.org/10.1016/j.biopsycho.2015.06.009>.
115. Waqas A, Khan S, Sharif W, Khalid U, Ali A. Association of academic stress with sleeping difficulties in medical students of a Pakistani medical school: a cross sectional survey. *PeerJ*. 2015;3:e840.
116. Lovell G, Nash K, Sharman R, Lane B. A cross-sectional investigation of depressive, anxiety, and stress symptoms and health–behavior participation in Australian university students. *Nurs Health Sci*. 2015;17(1):134–142. <https://doi.org/10.1111/nhs.12147>.
117. Vargas I, Lopez-Duran N. Dissecting the impact of sleep and stress on the cortisol awakening response in young adults. *Psychoneuroendocrinology*. 2014;40:10–16. <https://doi.org/10.1016/j.psyneuen.2013.10.009>.
118. Harsh J. The Relationship of Sleep Hygiene and Sleep Quality to Stress and Burnout Among College Students. *Sleep*. 2010;33:A78. https://aquila.usm.edu/fac_pubs/868.
119. Garland S, Carlson L, Campbell T. A comparison of mindfulness-based stress reduction and cognitive behavioral therapy for improving sleep and mood outcomes in cancer patients with insomnia. *J Altern Complement Med*. 2014;20(5):A56. <https://doi.org/10.1089/acm.2014.5146.abstract>.
120. El Ansari W, Osokrochi R, Labeeb S, Stock C. Symptoms and health complaints and their association with perceived stress at university: survey of students at eleven faculties in Egypt. *Cent Eur J Public Health*. 2014;22(2):68–79. <https://doi.org/10.21101/cejph.a3873>.
121. Williams P, Moroz T. Personality vulnerability to stress-related sleep disruption: pathways to adverse mental and physical health outcomes. *Pers Individ Dif*. 2009;46(5–6):598–603. <https://doi.org/10.1016/j.paid.2008.12.017>.
122. Zhang Y, Chernaik M, Hallet K. Relationship issues among college nursing students: associations with stress, coping, sleep, and mental disorders. *Teach Learn Nurs*. 2017;12(4):246–252. <https://doi.org/10.1016/j.teln.2017.06.005>.
123. Roeser K, Meule A, Schwerdtle B, Kübler A, Schlarb A. Subjective sleep quality exclusively mediates the relationship between morningness–eveningness preference and self-perceived stress response. *Chronobiol Int*. 2012;29(7):955–960. <https://doi.org/10.3109/07420528.2012.699124>.
124. Nyer M, Farabaugh A, Fehling K, et al. Relationship between sleep disturbance and depression, anxiety, and functioning in college students. *Depress Anxiety*. 2013;30(9):873–880. <https://doi.org/10.1002/da.22064>.
125. Calkins A, Hearon B, Capozzoli M, Otto M. Psychosocial predictors of sleep dysfunction: the role of anxiety sensitivity, dysfunctional beliefs, and neuroticism. *Behav Sleep Med*. 2013;11(2):133–143. <https://doi.org/10.1080/15402002.2011.643968>.
126. Orsal O, Orsal O, Alparslan GB, Unsal A. Evaluation of the relation between quality of sleep and anxiety among university students. *HealthMED*. 2012;6(7):2244–2255. https://www.researchgate.net/profile/Yasam_Kemal_Akpak/publication/280251514_The_Role_of_Fetal_Gender_in_Prolonged_Pregnancies/links/55af871608ae11d31037b7d7.pdf?page=5.

127. Zawadzki M, Graham J, Gerin W. Rumination and anxiety mediate the effect of loneliness on depressed mood and sleep quality in college students. *Health Psychol.* 2013;32(2):212–222. <https://doi.org/10.1037/a0029007>.
128. Hoggard L, Hill L. Examining how racial discrimination impacts sleep quality in African Americans: is perseverance the answer? *Behav Sleep Med.* 2016;16(5):471–481. <https://doi.org/10.1080/15402002.2016.1228648>.
129. Fuller-Rowell T, Curtis D, El-Sheikh M, Duke A, Ryff C, Zgierska A. Racial discrimination mediates race differences in sleep problems: a longitudinal analysis. *Cultur Divers Ethnic Minor Psychol.* 2017;23(2):165–173. <https://doi.org/10.1037/cdp0000104>.
130. Ong A, Cerrada C, Lee R, Williams D. Stigma consciousness, racial microaggressions, and sleep disturbance among Asian Americans. *Asian Am J Psychol.* 2017;8(1):72–81. <https://doi.org/10.1037/aap0000062>.
131. Walsemann K, Ailshire J, Gee G. Student loans and racial disparities in self-reported sleep duration: evidence from a nationally representative sample of US young adults. *J Epidemiol Commun Health.* 2015;70(1):42–48. <https://doi.org/10.1136/jech-2015-205583>.
132. Jin Y, Ding Z, Fei Y, et al. Social relationships play a role in sleep status in Chinese undergraduate students. *Psychiatry Res.* 2014;220(1–2):631–638. <https://doi.org/10.1016/j.psychres.2014.08.029>.
133. Goodin B, McGuire L, Smith M. Ethnicity moderates the influence of perceived social status on subjective sleep quality. *Behav Sleep Med.* 2010;8(4):194–206. <https://doi.org/10.1080/15402002.2010.509193>.
134. Schlarb A, Claßen M, Grünwald J, Vögele C. Sleep disturbances and mental strain in university students: results from an online survey in Luxembourg and Germany. *Int J Ment Health Syst.* 2017;11(1). <https://doi.org/10.1186/s13033-017-0131-9>.
135. Willoughby T, Hamza C. A longitudinal examination of the bidirectional associations among perceived parenting behaviors, adolescent disclosure and problem behavior across the high school years. *J Youth Adolesc.* 2010;40(4):463–478. <https://doi.org/10.1007/s10964-010-9567-9>.
136. BaHammam A, Alaseem A, Alzakri A, Almenaeessier A, Sharif M. The relationship between sleep and wake habits and academic performance in medical students: a cross-sectional study. *BMC Med Educ.* 2012;12(1). <https://doi.org/10.1186/1472-6920-12-61>.
137. Al-Kandari S, Alsalem A, Al-Mutairi S, et al. Association between sleep hygiene awareness and practice with sleep quality among Kuwait University students. *Sleep Health.* 2017;3(5):342–347. <https://doi.org/10.1016/j.sleh.2017.06.004>.
138. Bosie G, Tefera T, Hailu G. Knowledge, attitude and practice with respect to sleep among undergraduate medical students of Mekelle University. *Sleep Biol Rhythms.* 2012;10(4):264–269. <https://doi.org/10.1111/j.1479-8425.2012.00569.x>.
139. Lillehei A, Halcón L, Gross C, Savik K, Reis R. Well-being and self-assessment of change: secondary analysis of an RCT that demonstrated benefit of inhaled lavender and sleep hygiene in college students with sleep problems. *EXPLORE: The Journal of Science and Healing.* 2016;12(6):427–435. <https://doi.org/10.1016/j.explore.2016.08.004>.
140. Li J, Zhou K, Li X, et al. Mediator effect of sleep hygiene practices on relationships between sleep quality and other sleep-related factors in Chinese Mainland university students. *Behav Sleep Med.* 2014;14(1):85–99. <https://doi.org/10.1080/15402002.2014.954116>.
141. Sweileh W, Ali I, Sawalha A, et al. Sleep habits and sleep problems among Palestinian students. *Child Adolesc Psychiatry Ment Health.* 2011;5(1):25. <https://doi.org/10.1186/1753-2000-5-25>.
142. Graham J, Streitel K. Sleep quality and acute pain severity among young adults with and without chronic pain: the role of biobehavioral factors. *J Behav Med.* 2010;33(5):335–345. <https://doi.org/10.1007/s10865-010-9263-y>.
143. Chen T-Y, Chou Y-C, Tzeng N-S, et al. Effects of a selective educational system on fatigue, sleep problems, daytime sleepiness, and depression among senior high school adolescents in Taiwan. *Neuropsychiatr Dis Treat.* 2015;11:741–750. <https://doi.org/10.2147/NDT.S77179>.
144. Hall K, Irwin M, Bowman K, Frankenberger W, Jewett D. Illicit use of prescribed stimulant medication among college students. *J Am Coll Health.* 2005;53(4):167–174. <https://doi.org/10.3200/JACH.53.4.167-174>.
145. McCabe S, West B, Teter C, Boyd C. Trends in medical use, diversion, and nonmedical use of prescription medications among college students from 2003 to 2013: connecting the dots. *Addict Behav.* 2014;39(7):1176–1182. <https://doi.org/10.1016/j.addbeh.2014.03.008>.
146. Kumar A. Analgesics self-medication and its association with sleep quality among medical undergraduates. *J Clin Diagn Res.* 2016;10(12):FC07–FC11. <https://doi.org/10.7860/JCDR/2016/22504.8953>.
147. Drazdowski T. A systematic review of the motivations for the non-medical use of prescription drugs in young adults. *Drug Alcohol Depend.* 2016;162:3–25. <https://doi.org/10.1016/j.drugalcdep.2016.01.011>.
148. Zee P, Vitiello M. Circadian rhythm sleep disorder: irregular sleep wake rhythm. *Sleep Med Clin.* 2009;4(2):213–218. <https://doi.org/10.1016/j.jsmc.2009.01.009>.
149. Belmon LS, Van Stralen MM, Busch V, Harmsen IA, Chinapaw MJ. What are the determinants of children's sleep behavior? A systematic review of longitudinal studies. *Sleep Med Rev.* 2019;43:60–70. <https://doi.org/10.1016/j.smrv.2018.09.007>.
150. Silva C, Mota M, Miranda M, Paim S, Waterhouse J, Crispim C. Chronotype, social jetlag and sleep debt are associated with dietary intake among Brazilian undergraduate students. *Chronobiol Int.* 2016;33(6):740–748. <https://doi.org/10.3109/07420528.2016.1167712>.
151. Haraszti R, Ella K, Gyöngyösi N, Roenneberg T, Káldi K. Social jetlag negatively correlates with academic performance in undergraduates. *Chronobiol Int.* 2014;31(5):603–612. <https://doi.org/10.3109/07420528.2013.879164>.
152. Partinen M. Nutrition and sleep. *Sleep Disorders Medicine.* 2017:539–558. https://doi.org/10.1007/978-1-4939-6578-6_30.
153. Lund HG, Reider BD, Whiting AB, Prichard JR. Sleep patterns and predictors of disturbed sleep in a large population of college students. *J Adolesc Health.* 2010;46(2):124–132. <https://doi.org/10.1016/j.jadohealth.2009.06.016>.
154. Loprinzi PD, Cardinal BJ. Association between objectively-measured physical activity and sleep, NHANES 2005–2006. *Ment Health Phys Act.* 2011;4(2):65–69. <https://doi.org/10.1016/j.mhpa.2011.08.001>.
155. Goelma M, Regis M, Haakma R, van den Heuvel E, Markopoulos P, Overeem S. Determinants of perceived sleep quality in normal sleepers. *Behav Sleep Med.* 2017;17(4):388–397. <https://doi.org/10.1080/15402002.2017.1376205>.