Open Horizon Scientific Review

Vol. 04 No.02 2026

Determinants of Sleep Quality and Daytime Functioning Among University Students

Muhammad Zaryab Khalid

Department of Public Health, University of Health Sciences, Lahore, Pakistan

ABSTRACT

Sleep quality influences students' ability to participate in education, manage emotions, and meet everyday responsibilities. This narrative review examines behavioral, psychological, biological, environmental, and institutional determinants of sleep quality and their relationships with daytime functioning among university students. It draws on selected foundational measurement studies, observational university research, controlled experiments, and intervention trials, including evidence relevant to Pakistan. Sleep quality is treated as a multidimensional construct involving perceived restfulness, sleep continuity, timing, duration, and regularity. The synthesis indicates that academic pressure, inconsistent schedules, evening digital engagement, stimulant consumption, unsuitable accommodation, and psychological distress can interact rather than operate independently. Daytime consequences may appear as sleepiness, reduced sustained attention, difficulties organizing study, emotional irritability, and impaired participation. However, associations do not establish that sleep independently causes every academic or psychological outcome. Measurement overlap, reverse causation, selection effects, and unmeasured social conditions complicate interpretation. The article proposes an integrated university response combining confidential assessment, accessible behavioral support, accommodation improvements, and review of academic scheduling. A graph reproduces two aggregate outcomes from a published sleep education trial and does not represent newly collected data. Future Pakistani research should recruit across disciplines and institutions, assess students repeatedly, and distinguish sleep quality from daytime impairment using independent measures. Supporting sleep requires both individual resources and institutional conditions that make adequate, regular rest feasible.

Key words : *Sleep quality, Daytime functioning, University students, Academic stress, Sleep regularity*

Introduction:

University education requires students to coordinate intellectual effort with changing social and personal responsibilities. Lectures, examinations, employment, commuting, family obligations, and online communication may compete for the same hours. Sleep is often the most flexible part of this schedule because its immediate loss is easier to conceal than a missed deadline. Nevertheless, a student who remains physically present in class may have difficulty following an argument, maintaining motivation, or responding appropriately to other people. For this

reason, the educational importance of sleep extends beyond nightly duration to the quality of waking participation.

The literature provides several distinct kinds of evidence. Lund et al. (2010) examined disturbed sleep in a large college population, while Hershner and Chervin (2014) reviewed causes and consequences of student sleepiness. These works establish the relevance of the problem but do not justify assigning one prevalence estimate to every university. Campus populations differ in age, discipline, residence, resources, and assessment practices. A careful scholarly account should therefore connect evidence to the circumstances in which it was produced and avoid treating students as a uniform population.

In Pakistan, sleep research should consider how educational demands interact with living arrangements, transport, household expectations, and access to confidential support. Waqas et al. (2015) investigated academic stress and sleep difficulties in a Pakistani medical school, providing locally relevant evidence of association. Medical students, however, cannot represent all students in public and private universities. Engineering laboratories, evening business programs, humanities coursework, and clinical placements create different schedules. The present discussion treats contextual factors as questions for investigation rather than claiming that each one has been demonstrated across Pakistan.

This article is a narrative review and conceptual synthesis, not an original survey, systematic review, or meta-analysis. Selected publications were located through targeted searches on student sleep, daytime sleepiness, sleep measurement, circadian timing, caffeine, digital devices, and behavioral interventions. Selection emphasized established instruments, explanatory experiments, university studies, and a Pakistani example. No exhaustive screening protocol, formal risk-of-bias assessment, or pooled effect calculation was conducted. The objective is to explain plausible relationships, identify interpretive limitations, and develop practical research and institutional implications without inventing participants, ethical approval, or statistical findings.

1 Conceptualizing Sleep Quality and Daytime Functioning

Sleep quality describes how satisfactorily and continuously a person sleeps, rather than simply the number of hours allocated to bed. Relevant dimensions include difficulty initiating sleep, awakenings, perceived depth, waking restoration, timing, and regularity. A student may spend a long period in bed while sleeping poorly, whereas another may report satisfactory sleep despite a relatively restricted

opportunity. These examples show why time in bed, actual sleep duration, and subjective quality should be recorded separately. A single global question may identify dissatisfaction but cannot explain its source.

Buysse et al. (1989) introduced the Pittsburgh Sleep Quality Index, a widely used multidimensional questionnaire. Johns (1991) developed the Epworth Sleepiness Scale to assess the likelihood of dozing in everyday situations. These instruments address related but different constructs: poor perceived sleep does not necessarily imply a strong tendency to fall asleep, and sleepiness does not capture every form of impaired functioning. Researchers should describe what their chosen scores measure and avoid substituting a questionnaire label for a clinical assessment. A screening result identifies a need for closer evaluation rather than establishing a specific sleep disorder.

Daytime functioning is broader than academic marks. It includes attention during teaching, task initiation, memory use, emotional regulation, social participation, and safe performance during practical activities. Fatigue should also be distinguished from sleepiness. A fatigued student may feel exhausted without being likely to doze, while a sleepy student may fall asleep during sedentary activities despite describing reasonable energy. These distinctions affect intervention selection. For example, a timetable problem may require changes to sleep opportunity, whereas persistent symptoms despite adequate opportunity may require clinical evaluation.

A conceptual model should allow reciprocal relationships. Academic worry may interfere with sleep, and an unproductive day may increase worry about unfinished work. Financial strain can affect both sleep conditions and daytime concentration, creating an association that is partly explained by a shared cause. Sleep can also act as an intermediate pathway between institutional demands and educational participation. Consequently, the word determinant is used here for a potentially influential factor, not as proof of causation. Establishing causality requires stronger designs than a single questionnaire administered at one time.

Research interpretation also depends on whether the same items contribute to both predictor and outcome. If a sleep quality score already contains daytime dysfunction, correlating it with another dysfunction score may partly reproduce shared measurement content. A stronger design would separate nocturnal symptoms from independent daytime outcomes and explain the overlap that remains. Repeated diaries, attendance records

obtained with consent, and brief attention measures can complement questionnaires. Combining methods does not eliminate error, but it reduces dependence on one respondent's overall impression of their health.

2 Academic Workload and Psychological Distress

Academic workload can influence sleep by reducing available time and increasing mental activation near bedtime. The issue is not only the total volume of work but also its distribution. Several deadlines falling together may encourage late study sessions, while uncertain assessment expectations can prolong rumination even after work stops. These mechanisms are plausible explanations that institutions should test locally. Students facing similar workloads may respond differently because of previous preparation, financial responsibilities, available study space, and the predictability of their daily routines.

Waqas et al. (2015) reported an association between academic stress and sleeping difficulties among Pakistani medical students. The study supports attention to stress within local student health services, but its cross-sectional design cannot determine whether stress preceded sleep disruption. Poor sleep may increase the perceived difficulty of coursework, while distressed students may describe both their workload and sleep more negatively. Reporting this ambiguity strengthens interpretation. It prevents a useful local finding from becoming an unsupported claim that academic stress alone explains sleep difficulties throughout the university sector.

Psychological distress may be maintained by an escalating cycle of worry, delayed work, and reduced confidence. A student who expects failure may repeatedly check learning materials late at night, obtain little reassurance, and feel less capable the following day. This example is a proposed behavioral pathway rather than a quantified result from the selected studies. Its practical value is that it directs support toward concrete problems: unclear instructions, unrealistic work plans, fear of requesting help, or a lack of recovery time during demanding weeks.

Universities can respond through coordination between academic and student support services. Departments could review assessment calendars for avoidable clusters, communicate expectations earlier, and offer study planning before examinations. Counseling services can help students whose worry remains persistent or intrusive. These measures should not assume that all distress is a time management failure. Housing insecurity, harassment, disability, bereavement, and

family difficulties may require different responses. A sleep initiative becomes more credible when students can identify a realistic route to assistance rather than receive generic advice about working harder.

Evaluation should measure whether changes improve both rest and functioning. A less crowded assessment calendar might improve students' perceived control without changing average sleep duration, which would still be an informative finding. Conversely, additional sleep may not immediately improve grades if teaching quality or prior knowledge remains limiting. Baseline mental health, workload, and previous achievement should therefore be considered in research. Distinguishing these influences helps avoid blaming students when a narrow intervention fails to address the conditions creating their difficulties.

3 Circadian Timing and Irregular Sleep Schedules

Sleep occurs within a daily timing system as well as a limited time budget. Students differ in when they naturally feel alert or sleepy, and university schedules may align more closely with some preferences than others. A late bedtime combined with an early compulsory class can shorten sleep opportunity. When students then sleep later on free days, the discrepancy may make subsequent early mornings difficult. This framework explains why average duration alone may miss an important part of a student's sleep experience.

Phillips et al. (2017) associated irregular sleep and wake patterns with poorer academic performance and delayed circadian timing in college students. Their findings support examining regularity as a distinct feature rather than assuming that sufficient weekly hours guarantee an appropriate schedule. Nevertheless, observational relationships should not be read as proof that enforcing one bedtime will improve every student's results. Irregular schedules may also reflect employment, social circumstances, or an already difficult academic experience. The direction and strength of these pathways can vary between individuals.

The adult consensus statement by Watson et al. (2015) recommends at least seven hours of sleep regularly for health. This population guidance is useful for recognizing restricted sleep opportunity, but it does not prescribe an identical bedtime or prove that exactly seven hours is sufficient for each student. Universities should therefore communicate duration guidance alongside attention to restoration, regularity, and daytime symptoms. Students who continue to experience substantial impairment despite an adequate opportunity to sleep need a

more individualized assessment of possible causes.

Institutional scheduling offers a practical area for investigation. Programs could examine whether compulsory sessions alternate unnecessarily between very early and late hours, particularly when students also commute. Clinical or laboratory requirements may limit flexibility, so proposed changes must be assessed against learning needs and operational constraints. Pilot evaluations should compare attendance, sleep diaries, and daytime alertness before and after a change. Without these measurements, a later start could simply be accompanied by a later bedtime, producing little improvement in actual sleep opportunity.

Individual guidance should emphasize achievable consistency rather than perfection. A student with fixed employment may have less control than one living near campus without external duties. A workable plan begins by identifying the most stable waking commitments and the available window for rest. Research should document why irregularity occurs and whether it is chosen or imposed. This distinction matters because advice aimed at motivation will have limited effect when transport schedules, household labor, or paid work determine the hours available for sleep.

4 Digital Engagement and Evening Stimulation

Digital devices serve academic, social, and recreational purposes, making total screen time an incomplete explanation of sleep disruption. A late online lecture, an emotionally charged conversation, and passive entertainment may differ in their timing and psychological effects. Device use can displace planned sleep, sustain attention, or make disengagement difficult. Notifications may interrupt a settling routine even after the main task ends. These proposed pathways suggest that research should ask what students do, when they do it, and whether they feel able to stop.

Chang et al. (2015) experimentally compared evening reading on a light-emitting device with printed material and found effects on sleep, circadian timing, and next-morning alertness. This controlled evidence supports a biological pathway under the conditions tested. It does not establish that every brief smartphone exposure has the same magnitude of effect. Device brightness, exposure duration, content, viewing distance, and the surrounding light environment may differ considerably in student life. Translating laboratory results into campus advice therefore requires proportional claims and attention to actual behavior.

An exclusively technological solution may overlook the reason students remain online. Reducing brightness does not recover time already spent checking messages or resolve an urgent assignment. Similarly, removing a phone may be impractical when a student relies on it for transport, family contact, or access to course materials. A more realistic intervention would help students set boundaries around discretionary use while ensuring that essential academic communication does not routinely arrive at night. Institutional expectations can either support or undermine the behavior students are encouraged to adopt.

Universities could publish routine announcements during predictable daytime windows and clarify that immediate nighttime responses are generally unnecessary. Lecturers might distinguish urgent safety information from ordinary course communication. Student workshops could encourage awareness of the difference between finishing a task and continuing habitual checking. These are implementation proposals, not interventions demonstrated effective in all settings. They should be evaluated through actual changes in bedtime behavior, perceived pressure to respond, and sleep outcomes rather than through the number of students who attend a session.

Digital interventions also create opportunities for accessible support, but accessibility should not become compulsory surveillance. A voluntary sleep diary or educational resource may be useful without collecting detailed browsing histories. Students should understand what information is recorded and who can access it. Researchers should avoid assuming that high device use is a moral failure or a single cause of poor sleep. For students experiencing loneliness or distress, digital engagement may also be a source of support, which makes simplistic restrictions potentially counterproductive.

5 Caffeine Use and Everyday Health Behaviors

Caffeine may be used to sustain alertness during study, but its timing can conflict with the intended sleep period. Drake et al. (2013) demonstrated sleep disruption after caffeine administered at different intervals before bedtime, including six hours beforehand. The experiment supports considering timing as well as amount. It does not justify one universal cutoff for every drinker because individual sensitivity, dose, habitual consumption, and intended bedtime differ. Student surveys should record relevant sources and timing instead of classifying all users together.

A plausible reinforcing cycle begins when a student sleeps poorly, uses more caffeine to manage the next

day, and then finds it harder to settle at night. The cycle is an explanatory model rather than a measured effect in this article. Its value lies in identifying points for discussion: whether alertness problems are being masked, whether consumption has shifted later, and whether the underlying timetable allows sufficient rest. Treating caffeine use in isolation may fail if the student's first obligation begins before adequate sleep is realistically possible.

Physical activity, meal schedules, and other daily routines also deserve assessment, although the selected evidence does not quantify their independent effects in Pakistani students. Activity may structure the day, provide opportunities for outdoor exposure, and interact with perceived stress. Illness or disability can alter both activity and sleep, creating confounding. Researchers should therefore distinguish general participation from timing, intensity, and barriers. A finding that inactive students report poorer sleep would not by itself establish that increasing activity would correct their sleep difficulties.

Napping requires similar care. A nap may reflect insufficient nocturnal rest, a planned strategy around an unusual schedule, or an attempt to cope with persistent sleepiness. Simply treating all naps as harmful would obscure these differences. Diaries can record when naps occur and whether they interfere with intended nighttime sleep. Students should be helped to understand their own pattern rather than judged against a rigid routine that ignores the demands of their course, household, or employment circumstances.

Health education should avoid replacing one coping strategy with another unexamined solution. Self-directed use of sedating products may conceal unresolved insomnia or another problem and should not become the default response to university stress. Campus services can offer confidential review of medications and substances when relevant, while keeping general educational advice distinct from individualized treatment. A successful program would make it easier to seek help early and would assess whether daytime alertness improves without creating new difficulties for the student.

6 Residential Conditions and Social Inequalities

Sleep opportunities depend partly on the spaces students occupy. Shared bedrooms, incompatible roommate routines, noise, uncomfortable temperatures, and inadequate privacy are plausible barriers to continuous rest. Some students may have quiet accommodation but spend substantial time commuting, while others live close to campus in crowded rooms. These differences make residence status alone a

weak proxy for actual conditions. Researchers should ask about the features of the sleeping environment and the degree of control students have over them.

In Pakistani university settings, environmental assessment could include seasonal heat, transport reliability, and interruptions to basic services where these occur. These are proposed contextual variables, not national prevalence claims. Their importance should be established with local data rather than assumed. A campus in a large city may face different conditions from one in a smaller town, and privately rented accommodation may differ from supervised hostels. Students' own accounts can help identify which problems are common, which are severe, and which are feasible to address.

Economic resources may shape the ability to act on sleep advice. Recommendations about separate bedrooms, cooling equipment, or reduced employment hours may be unrealistic for students facing financial constraints. A student who shares one room with relatives cannot necessarily create an ideal environment through motivation alone. This limitation has implications for both fairness and effectiveness. When an intervention requires resources that some participants lack, average results may hide widening differences between students who can and cannot implement the recommendations.

Residential policy can address collective conditions. Universities could review complaint procedures, establish mutually agreed quiet periods, maintain basic facilities, and help roommates negotiate conflicting routines. Such policies should preserve reasonable cultural and social needs and avoid punitive monitoring of private behavior. An effective complaint system would allow students to raise concerns without fear of retaliation. Improvements should be assessed through reports of disturbance and practical access to resolution, alongside sleep measures, rather than through the mere existence of written hostel rules.

Social support may help students manage competing demands, but it should not be assumed to operate uniformly. Family expectations can provide stability while also restricting personal time, and peer groups can support healthy routines while encouraging late social activity. Qualitative research can clarify these mixed influences. Combining interviews with repeated quantitative assessment would show how conditions are experienced and whether changes in those conditions correspond to changes in sleep. This approach would produce more useful explanations than attributing problems broadly to student lifestyle.

7 Attention Learning and Everyday Performance

The educational relevance of sleep should be examined through specific daytime tasks. Following a lecture requires sustained attention, while organizing an assignment requires planning, prioritization, and the ability to return after interruption. Students may compensate for difficulties by studying longer, creating the impression of high effort without efficient learning. This account is a conceptual explanation, not a claim that every poorly rested student has measurable cognitive impairment. Performance depends on task difficulty, motivation, prior knowledge, health, and the circumstances of assessment.

Okano et al. (2019) reported associations between objectively estimated sleep characteristics and academic performance over a college course. Their work provides a useful example of measuring sleep across an extended period rather than relying only on the night before an examination. However, the study does not demonstrate that changing sleep alone would produce a guaranteed grade increase. A course-specific sample and observational design limit generalization. The appropriate implication is that sustained sleep patterns deserve investigation alongside the other conditions supporting learning.

Daytime functioning also includes activities outside formal assessment. Students may struggle to participate in group discussions, keep appointments, manage household work, or remain attentive during travel. These difficulties can matter even when examination scores remain satisfactory. A narrow focus on grades may therefore overlook students who maintain academic performance at a substantial personal cost. Research should include outcomes meaningful to students themselves, such as manageable effort, reliable participation, and the ability to complete ordinary responsibilities without persistent exhaustion.

Safety-sensitive activities require particular attention to impairment. Clinical placements, workshops, laboratory tasks, and commuting may involve consequences beyond an individual’s marks. Universities should provide a route for students to disclose problematic sleepiness and obtain appropriate assessment without automatically being treated as irresponsible. The purpose is to identify and reduce risk in a fair manner. Policies should specify how support, temporary adjustments, and evaluation are considered while protecting confidentiality and maintaining the essential requirements of the educational activity.

Interpreting performance data requires awareness of compensation and selection. Students with strong prior preparation may achieve high marks despite poor sleep, while students managing several disadvantages may experience greater disruption. Those most affected may miss surveys or leave a course, making the observed sample appear healthier. Longitudinal follow-up should record attendance, withdrawal, and missing responses with appropriate consent. Understanding who is absent from the data is essential before concluding that sleep has little relevance to functioning or that a program benefits everyone equally.

8 Emotional Wellbeing and Clinical Assessment

Sleep complaints and emotional distress frequently appear together, but their relationship should not be reduced to a single direction. Worry can interfere with settling, while a difficult night may leave a student less able to manage ordinary frustrations. The review by Hershner and Chervin (2014) situates sleepiness within wider student health and educational concerns. This broad perspective supports coordinated services, although it does not replace clinical assessment of an individual whose symptoms are persistent, severe, or unexplained by limited sleep opportunity.

Freeman et al. (2017) evaluated digital cognitive behavioral therapy for insomnia in university students in the OASIS randomized trial and found benefits extending to mental health outcomes. The trial strengthens the case for treating sleep difficulties as a meaningful target rather than merely a secondary complaint. Its results should still be connected to the participants, treatment, and outcomes studied. They do not establish that every wellbeing problem originates in sleep or that a general sleep workshop is equivalent to a structured insomnia intervention.

Campus assessment should distinguish restricted opportunity from persistent difficulty sleeping despite an adequate opportunity. It should also consider symptoms suggesting that another condition may need investigation. Recurrent loud snoring with witnessed breathing pauses, marked involuntary sleep episodes, and unusual nighttime events warrant appropriate professional assessment. These examples identify possible referral needs rather than diagnoses. Students should not be encouraged to interpret a questionnaire score or a wearable display as sufficient evidence that they have a particular clinical disorder.

Access depends on trust. Students may avoid services if they believe health information will reach teachers, employers, or family members

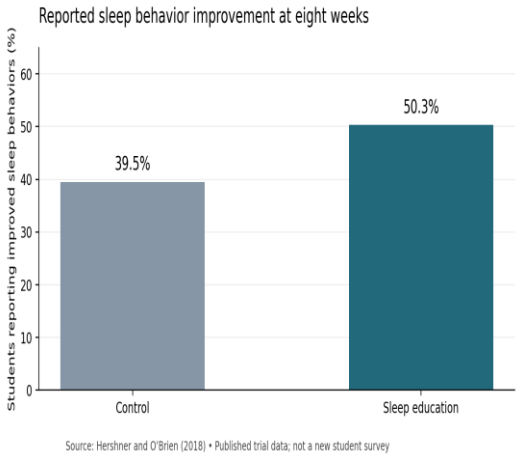
without explanation. Clear confidentiality procedures, understandable appointment routes, and culturally respectful communication can reduce uncertainty. Services should also explain the limits of confidentiality where relevant. For students studying away from home or balancing employment, appointment timing and cost can be practical barriers. A technically sound intervention is unlikely to help if students cannot realistically enter or continue the care pathway.

Support should be proportionate to need. General information can assist students seeking to improve routines, while persistent insomnia may require a structured psychological intervention delivered or supervised appropriately. Students with significant coexisting symptoms may need coordinated clinical care. Universities should evaluate completion, acceptability, and functioning as well as symptom change. A program that attracts many initial registrations but few completed sessions may require redesign. Understanding disengagement is more useful than assuming that students lack commitment to improving their health.

9 Integrated University Responses and Future Research

A comprehensive university approach should connect educational planning, accommodation, and health support. Orientation can introduce realistic information about sleep, but reinforcement may be needed when students encounter their first demanding assessment period. Academic staff can review communication and scheduling practices, while residential services address conditions beyond students' individual control. Health professionals can assess persistent symptoms and provide appropriate treatment pathways. These responsibilities should be coordinated so that students are not repeatedly referred between services without a clear account of what help is available.

Hershner and O'Brien (2018) tested a brief personalized online sleep education intervention. At eight weeks, improved sleep behaviors were reported by 50.3% of the intervention group and 39.5% of controls. The graph presents these published aggregate percentages. The absolute difference is 10.8 percentage points; it is not a guaranteed benefit for a new campus. The comparison concerns self-reported behavioral improvement, not examination marks or the prevalence of diagnosed insomnia. Keeping the outcome explicit prevents a modest, useful finding from becoming an exaggerated claim about academic transformation.



Summary

Sleep quality and daytime functioning among university students emerge from interactions between personal routines and the conditions in which education takes place. Academic pressure, irregular timing, evening device engagement, caffeine use, accommodation, and psychological distress can plausibly influence one another. Published studies support the relevance of several pathways, but their methods and populations differ. A narrative synthesis should preserve these distinctions rather than combine every association into a single causal explanation or imply that one prevalence estimate describes all universities.

The practical response should combine accessible education with opportunities for students to obtain individualized help and improvements in the conditions surrounding study. Students need advice they can implement, academic schedules that recognize the time required for rest, and residential arrangements that permit reasonable sleep continuity. Persistent impairment requires careful assessment rather than repeated reminders about sleep hygiene. Institutional responsibility and personal agency are complementary because behavior changes are easier to sustain when the environment supports them.

Future research in Pakistan should broaden recruitment beyond single medical institutions and measure sleep and functioning over time. Independent daytime outcomes, explicit handling of confounding, and transparent analysis plans would strengthen interpretation. The published intervention comparison shown in the graph illustrates a measurable behavioral outcome, while also showing why outcome labels matter. The most defensible conclusion is that universities should treat sleep as a relevant component of student health and educational participation, evaluate their responses carefully, and avoid promising benefits that the available evidence has not established.

References:

- Buysse, D. J., Reynolds, C. F., III, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Research, 28(2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4
- Chang, A.-M., Aeschbach, D., Duffy, J. F., & Czeisler, C. A. (2015). Evening use of light-emitting eReaders negatively affects sleep, circadian timing, and next-morning alertness. Proceedings of the National Academy of Sciences, 112(4), 1232–1237. https://doi.org/10.1073/pnas.1418490112
- Drake, C., Roehrs, T., Shambroom, J., & Roth, T. (2013). Caffeine effects on sleep taken 0, 3, or 6 hours before going to bed. Journal of Clinical Sleep Medicine, 9(11), 1195–1200. https://doi.org/10.5664/jcsm.3170
- Freeman, D., Sheaves, B., Goodwin, G. M., et al. (2017). The effects of improving sleep on mental health (OASIS): A randomised controlled trial with mediation analysis. The Lancet Psychiatry, 4(10), 749–758. https://doi.org/10.1016/S2215-0366(17)30328-0
- Hershner, S. D., & Chervin, R. D. (2014). Causes and consequences of sleepiness among college students. Nature and Science of Sleep, 6, 73–84. https://doi.org/10.2147/NSS.S62907
- Hershner, S., & O'Brien, L. M. (2018). The impact of a randomized sleep education intervention for college students. Journal of Clinical Sleep Medicine, 14(3), 337–347. https://doi.org/10.5664/jcsm.6974
- Johns, M. W. (1991). A new method for measuring daytime sleepiness: The Epworth Sleepiness Scale. Sleep, 14(6), 540–545. https://doi.org/10.1093/sleep/14.6.540
- Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. R. (2010). Sleep patterns and predictors of disturbed sleep in a large population of college students. Journal of Adolescent Health, 46(2), 124–132. https://doi.org/10.1016/j.jadohealth.2009.06.016
- Okano, K., Kaczmarzyk, J. R., Dave, N., Gabrieli, J. D. E., & Grossman, J. C. (2019). Sleep quality, duration, and consistency are associated with better academic performance in college students. npj Science of Learning, 4, Article 16. https://doi.org/10.1038/s41539-019-0055-z
- Phillips, A. J. K., Clerx, W. M., O'Brien, C. S., Sano, A., Barger, L. K., Picard, R. W., Lockley, S. W., Klerman, E. B., & Czeisler, C. A. (2017). Irregular sleep/wake patterns are associated with poorer academic performance and delayed circadian and sleep/wake timing. Scientific Reports, 7, Article 3216. https://doi.org/10.1038/s41598-017-03171-4
- Waqas, A., Khan, S., Sharif, W., Khalid, U., & Ali, A. (2015). Association of academic stress with sleeping difficulties in medical students of a Pakistani medical school: A cross sectional survey. PeerJ, 3, e840. https://doi.org/10.7717/peerj.840