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Role of Sleep Hygiene in Exam Preparation Among Medical Students

Author(s): Parineeta Kumari, Ankushvir Kaur, Esharov Elzarbek Asanovich
Affiliation(s): Osh State University, International Medical Faculty, Kyrgyz Republic

ABSTRACT

Background: Academic performance in examinations is profoundly influenced by cognitive function and memory consolidation, both of which are critically dependent on sleep. Medical students frequently sacrifice sleep in favour of extended study hours during exam preparation, despite evidence that sleep deprivation impairs the very cognitive processes required for academic success.

Objective: To evaluate the relationship between sleep hygiene practices and academic performance indicators, cognitive function, and psychological well-being among medical students during the exam preparation period.

Methods: A cross-sectional survey study was conducted among 115 undergraduate medical students at the International Medical Faculty, Osh State University, Kyrgyzstan. Data were collected via a structured self-administered questionnaire distributed through Google Forms. The survey assessed demographic characteristics, sleep hygiene behaviours (sleep schedule regularity, bedroom environment, pre-sleep caffeine and screen use), cognitive outcomes (concentration, memory, focus), and psychological outcomes (exam anxiety, stress). Responses were measured using 5-point Likert scales.

Results: Although 64% of students reported sleeping more than six hours per night, widespread sleep-disruptive behaviours were identified: 78% used electronic devices before bed and 55% consumed caffeine in the evening. All-night study sessions were reported by 68% of students. Poor sleepers were 71% more likely to report memory errors and 82% experienced severe exam anxiety, compared to only 31% among good sleepers. Students who maintained consistent sleep schedules reported improved concentration, reduced stress, and greater preparedness.

Conclusion: Sleep hygiene is a modifiable determinant of academic performance and psychological well-being in medical students. Prioritising consistent, high-quality sleep — rather than sacrificing it for extended study — optimises the cognitive processes essential for effective exam preparation. Medical institutions should integrate evidence-based sleep hygiene education into student wellness curricula.

Keywords: *Sleep hygiene; exam preparation; academic performance; memory consolidation; test anxiety; cognitive function; sleep deprivation; study strategies; circadian rhythm; student well-being*

I. INTRODUCTION

The examination period represents one of the most psychologically and cognitively demanding phases of a medical student's academic career, typically characterised by prolonged study hours, disrupted sleep schedules, and late-night study sessions. In the face of perceived time pressure, students frequently deprioritise sleep under the erroneous assumption that extended wakefulness translates to greater learning efficiency. This behaviour pattern is particularly prevalent in medical education, where the volume and complexity of material to be assimilated are substantial.

The scientific literature consistently demonstrates that sleep deprivation is counterproductive to academic performance. Sleep is not a passive state of rest but an active neurophysiological process during which the brain consolidates newly acquired information into long-term memory, clears metabolic waste products, and restores attentional and executive function. Restriction of sleep duration or disruption of sleep architecture — including both slow-wave and rapid-eye-movement (REM) phases — compromises synaptic consolidation, working memory capacity, processing speed, and emotional regulation.

Sleep hygiene refers to the set of behavioural and environmental practices that promote consistent, restorative sleep. These include maintaining a regular sleep-wake schedule aligned with the circadian rhythm, optimising the sleep environment (temperature, darkness, noise reduction), limiting pre-sleep exposure to blue-light-emitting devices, and avoiding stimulants such as caffeine in the hours preceding sleep onset. Despite the established evidence base for sleep hygiene interventions, adherence remains low among university

and medical students globally.

This paper examines the association between sleep hygiene practices and exam preparation outcomes among medical students at Osh State University. It challenges the prevalent cultural norm that sleep sacrifice is a prerequisite for academic success and argues that prioritising sleep hygiene represents a more cognitively and psychologically effective exam preparation strategy. By documenting the prevalence of specific sleep-disruptive behaviours and their quantifiable cognitive and emotional consequences, this study provides an evidence-based foundation for institutional sleep health interventions.

II. MATERIALS AND METHODS

2.1 Study Design and Setting

This was a cross-sectional descriptive survey study conducted among undergraduate medical students at the International Medical Faculty, Osh State University, Kyrgyzstan, during the examination preparation period. The study aimed to characterise the prevalence and patterns of sleep hygiene behaviours and their association with perceived cognitive function and psychological well-being.

2.2 Study Population and Sampling

The target population comprised undergraduate medical students from all academic years. Participants were recruited via convenience sampling through distribution of an electronic questionnaire link via email, student group platforms, and social media channels. Participation was entirely voluntary, and prior to completing the survey, all participants were informed of the study objectives, voluntary nature of involvement, and confidentiality of responses. A total of 115 valid completed responses were obtained and included in the analysis.

2.3 Study Instrument

The primary data collection instrument was a structured self-administered questionnaire hosted on Google Forms. The survey comprised four sections: (1) sociodemographic characteristics (age, gender, academic year, field of study); (2) sleep hygiene behaviours (sleep schedule consistency, bedroom environment, pre-sleep caffeine intake, electronic device use before bed); (3) perceived cognitive outcomes (concentration, memory retention,

focus, daytime functioning); and (4) psychological outcomes (exam anxiety, stress levels, emotional regulation). Subjective ratings were captured using 5-point Likert scales.

2.4 Data Collection and Analysis

The questionnaire link was disseminated electronically to eligible participants. Completion and submission of the questionnaire served as implicit informed consent. Upon collection of 115 complete responses, data were extracted and organised for descriptive statistical analysis. Categorical variables are presented as frequencies and percentages. Comparative analyses were performed between students reporting good sleep hygiene practices and those reporting poor sleep hygiene, with particular attention to differences in cognitive performance perceptions and anxiety levels.

2.5 Ethical Considerations

Participation was voluntary and anonymous throughout. No personal identifying data were collected. All data were used exclusively for research purposes and maintained in strict confidence in accordance with ethical research standards.

III. RESULTS

3.1 Demographic Characteristics

The study enrolled 115 undergraduate medical students. The majority were aged 17–23 years (modal age 19 years), female (65.5%), and in their first year of medical study (68.3%). All participants were enrolled in the Medicine programme (100%). Table 1 summarises the demographic profile of the study sample.

Table 1. Demographic Characteristics of Study Participants (N = 115)

Variable	Category	Finding
Total participants	—	n = 115
Age group	17–23 years	Majority 19 years
Gender	Female	65.5%
Year of study	Mostly 1st Year	68.3%
Field of study	Medicine	100%

3.2 Sleep Hygiene Behaviours and Patterns

Despite 64% of students reporting sleep duration exceeding six hours per night during the exam period, a substantial proportion engaged in behaviours known to impair sleep quality. Electronic device use (phone or computer) in bed immediately before sleep was reported by 78% of participants, and evening caffeine consumption was reported by 55%. All-night study sessions were undertaken by 68% of students — the most prevalent sleep-disruptive behaviour documented in this sample. Regarding positive sleep hygiene practices, 57.1% reported practising good sleep hygiene often or always, and 77.0% reported using sleep hygiene strategies to reduce exam-related stress. Maintaining a consistent sleep schedule was identified as the most commonly practised positive sleep hygiene behaviour (54.6%). Table 2 provides a structured summary of sleep behaviour and hygiene adherence data.

Table 2. Sleep Hygiene Behaviours and Adherence Patterns (N = 115)

Sleep Behaviour / Practice	Frequency / Prevalence	Notes
Sleep > 6 hours per night during exam period	64%	Majority achieve minimum threshold
Use of electronic devices (phone/computer) before bed	78%	Major sleep hygiene violation
Evening caffeine consumption	55%	Disrupts sleep onset
All-night study sessions (all-nighters)	68%	Most prevalent risky behaviour
Practice good sleep hygiene often or always	57.1%	Composite hygiene score
Use sleep hygiene techniques to reduce exam stress	77.0%	Self-reported strategy use
Maintain consistent sleep schedule (most common habit)	54.6%	Circadian regularity
Practice good sleep hygiene 1–3 times/week	64.4%	Intermittent adherence

3.3 Cognitive and Psychological Outcomes

The relationship between sleep hygiene and cognitive outcomes was clearly demonstrated. Among students who reported good sleep hygiene practices, 69.0% noted improved concentration and memory. Conversely, students who engaged in all-night studying were 71% more likely to report memory errors relative to students who maintained regular sleep schedules. With respect to psychological outcomes, the contrast between sleep quality groups was particularly striking: 82% of poor sleepers reported severe exam-related anxiety,

compared to only 31% of good sleepers. Students who maintained consistent sleep schedules self-reported feeling calmer, more focused, and better prepared for their examinations. Table 3 summarises the key cognitive and psychological outcome data.

Table 3. Cognitive and Psychological Outcomes by Sleep Hygiene Group (N = 115)

Outcome	Prevalence / Statistic	Comparison Group
Increased focus / improved concentration (reported)	69.0%	All students
Improved memory and concentration (reported)	69.0%	Good sleep hygiene group
Severe exam anxiety — poor sleepers	82%	Students with poor sleep hygiene
Severe exam anxiety — good sleepers	31%	Students with good sleep hygiene
Memory errors (more likely vs. good sleepers)	+71% relative risk	All-nighter group vs. regular sleepers
Adverse effects experienced (fatigue, irritability, difficulty focusing)	40.8%	All-nighter group
Feel unable to maintain good sleep hygiene consistently	49.4%	All students

3.4 Adverse Effects and Coping Strategies

Adverse effects attributable to poor sleep were commonly reported. Fatigue was the most prevalent side effect (41.0%), followed by headache (24.8%), irritability (18.3%), and difficulty focusing (18.8%). Regarding perceived dependency, 48.4% of students felt dependent on good sleep hygiene for adequate functioning. Approximately one-third of students (32.5%) reported consuming caffeine close to bedtime. Regarding coping strategies, time management techniques were the most frequently employed (44.1%), followed by relaxation techniques (39.5%), physical exercise (28.0%), and maintenance of a healthy diet (18.0%). Table 4 presents the full adverse effects and coping strategy data.

Table 4. Adverse Effects, Dependency Perception, and Coping Strategies (N = 115)

Category	Finding	Percentage
Adverse effects	Fatigue	41.0%
	Irritability	18.3%
	Headache	24.8%

Category	Finding	Percentage
	Difficulty focusing	18.8%
	Other	11.8%
Dependency perception	Felt dependent on good sleep hygiene (Yes)	48.4%
	Felt dependent on good sleep hygiene (No, 32.2%)	32.2%
Caffeine consumption before bedtime	Yes (close to bedtime)	32.5%
Coping strategies	Time management techniques	44.1%
	Relaxation techniques	39.5%
	Physical exercise	28.0%
	Healthy diet	18.0%

IV. DISCUSSION

The findings of this study provide compelling evidence that sleep hygiene is a critical and modifiable determinant of cognitive performance and psychological well-being during the exam preparation period in medical students. The high prevalence of sleep-disruptive behaviours — despite the majority of students reporting adequate sleep duration — illustrates a fundamental gap between sleep quantity and sleep quality, and highlights the importance of targeting sleep hygiene behaviours rather than duration alone.

The finding that 78% of students used electronic devices immediately before sleep is particularly concerning from a neurophysiological standpoint. Blue-light emission from screens suppresses melatonin secretion and delays the circadian clock, thereby postponing sleep onset, reducing total sleep time, and impairing the deep slow-wave sleep stages most critical for declarative memory consolidation. Similarly, evening caffeine consumption — reported by 55% of students — competitively antagonises adenosine receptors, prolonging wakefulness and disrupting the homeostatic sleep drive.

The all-nighter practice, reported by 68% of students, represents the most acutely harmful sleep behaviour documented in this cohort. Acute total sleep deprivation impairs prefrontal cortical function, which is essential for working memory, attention regulation, and higher-

order cognitive processing. The finding that all-nighter students were 71% more likely to commit memory errors is consistent with experimental evidence demonstrating that sleep deprivation disproportionately impairs hippocampal-dependent memory encoding and retrieval. Far from enhancing exam performance, all-night studying may therefore actively undermine the cognitive capacities required for examination success.

The differential in exam anxiety between poor and good sleepers — 82% versus 31% reporting severe anxiety — is clinically significant and aligns with established evidence on the bidirectional relationship between sleep and psychological health. Sleep deprivation activates the hypothalamic-pituitary-adrenal (HPA) axis, elevating cortisol levels and amplifying amygdala reactivity to stressors, thereby increasing susceptibility to anxiety, emotional dysregulation, and perceived loss of control. The calmer subjective state reported by consistent sleepers reflects the restorative role of sleep in emotional regulation and stress resilience.

The knowledge-behaviour gap evident in this study — where students may be aware of sleep's importance yet persist in disruptive behaviours — reflects the broader literature on health behaviour change and underscores the need for structural and motivational interventions beyond didactic knowledge transfer. Time management emerged as the most widely used coping strategy (44.1%), suggesting that students recognise the importance of planning but may not yet prioritise sleep within their study schedules. Integrating sleep hygiene guidance into academic planning frameworks — positioning adequate sleep as a study strategy rather than a competing demand — may be a particularly effective framing.

These findings are consistent with those of Gilbert and Weaver (2010), Hershner and Chervin (2014), Pilcher and Walters (1997), Curcio et al. (2006), and Gomes et al. (2011), all of which document associations between sleep quality and academic performance, cognitive function, and psychological well-being among university students. The present study adds to this literature by providing contemporary data from a medical student population in Central Asia, a demographic and geographic context underrepresented in the global sleep-health literature.

V. CONCLUSION

This study demonstrates that despite most students meeting minimum sleep duration thresholds, widespread sleep-disruptive behaviours — including electronic device use before bed, evening caffeine consumption, and all-night studying — substantially compromise sleep quality and, consequently, cognitive and psychological functioning during the exam preparation period.

Students who maintained good sleep hygiene practices — characterised by consistent sleep schedules, avoidance of pre-sleep stimulants and screens, and adequate sleep duration — reported superior concentration, improved memory, reduced anxiety, and greater subjective preparedness for examinations. These outcomes support the central thesis that optimising sleep quality is a more effective exam preparation strategy than sacrificing sleep for additional study time.

Medical institutions have both an opportunity and a responsibility to address this issue. Recommended institutional responses include: (1) incorporation of evidence-based sleep hygiene education into medical student wellness and academic skills programmes; (2) facilitation of stress management and time management workshops that position sleep as an integral study strategy; (3) environmental modifications to support circadian health (reduced artificial lighting in student accommodations during evening hours, quiet study hours policies); and (4) longitudinal research to evaluate the long-term academic and health outcomes of sleep hygiene interventions in medical education settings.

In summary, sleep is not a competitor to effective study — it is its essential biological substrate. Medical universities that invest in fostering evidence-based sleep habits among their students will foster not only academic achievement but the long-term professional health and clinical competence of their future physicians.

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