



Systematic Review

Sleep Disturbances and Their Association With Academic Performance Among Medical Students: A Systematic Review.

<p>Name of Author:</p>	<p>Abstract: <i>Background:</i> Sleep is a fundamental physiological process essential for cognitive functioning, memory consolidation, emotional regulation, and overall health. Medical students are particularly vulnerable to sleep disturbances because of demanding academic schedules, prolonged study hours, clinical responsibilities, examination stress, and lifestyle factors. Increasing evidence suggests that inadequate sleep quality and quantity may adversely affect academic performance; however, the magnitude and consistency of this association remain unclear. <i>Objective:</i> To systematically review and synthesize the available evidence regarding the prevalence of sleep disturbances among medical students and their association with academic performance. <i>Methods:</i> A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Electronic databases including PubMed, Scopus, Web of Science, Embase, and Google Scholar were searched for studies published between January 2000 and December 2025. Observational studies assessing sleep quality, sleep duration, insomnia, daytime sleepiness, or other sleep-related parameters among undergraduate or postgraduate medical students and reporting academic performance outcomes were included. Data on study characteristics, sleep assessment tools, prevalence of sleep disturbances, and academic outcomes were extracted and narratively synthesized. <i>Results:</i> A total of 32 studies involving approximately 21,500 medical students across multiple countries met the inclusion criteria. The prevalence of poor sleep quality ranged from 32% to 78%, while insufficient sleep duration (<7 hours per night) was reported in 40–85% of participants. Most studies demonstrated a significant association between poor sleep quality and lower academic achievement. Students experiencing sleep disturbances were more likely to report reduced grade point averages, impaired concentration, decreased examination performance, increased absenteeism, and poorer cognitive functioning. Excessive daytime sleepiness and insomnia symptoms were also consistently associated with adverse academic outcomes. Several studies identified stress, electronic device use before bedtime, caffeine consumption, and irregular sleep schedules as major contributing factors. <i>Conclusion:</i> Sleep disturbances are highly prevalent among medical students and are consistently associated with poorer academic performance. Interventions aimed at improving sleep hygiene, stress management, and mental well-being may contribute to enhanced academic outcomes and overall student health. Medical institutions should prioritize sleep health promotion as part of student wellness programs.</p> <p>Keywords: Sleep quality; Sleep disturbances; Academic performance; Medical students; Insomnia; Daytime sleepiness; Systematic review.</p>
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INTRODUCTION

Sleep is a complex biological process that plays a critical role in maintaining cognitive performance, learning capacity, memory consolidation, emotional stability, and physical health. Adequate sleep is essential for optimal brain functioning, particularly among students engaged in intensive academic activities.

Sleep deprivation and poor sleep quality have been associated with impaired attention, reduced concentration, slower information processing, diminished decision-making ability, and decreased academic achievement.[1,2]

Medical education is widely recognized as one of the most demanding professional training programs. Medical students are exposed to extensive academic workloads, frequent examinations, clinical responsibilities, long study hours, and high levels of psychological stress. These factors often contribute to irregular sleep patterns and chronic sleep deprivation.[3] As a result, sleep disturbances have become increasingly prevalent among medical students worldwide.

Sleep disturbances encompass a wide range of conditions including poor sleep quality, insomnia, insufficient sleep duration, delayed sleep onset, fragmented sleep, and excessive daytime sleepiness. Previous studies have reported that medical students experience significantly poorer sleep quality compared with the general population and students from other academic disciplines.[4,5] The transition from preclinical to clinical training further exacerbates sleep-related problems due to increased workload and clinical obligations.

The relationship between sleep and academic performance has attracted considerable research interest. Sleep is known to facilitate memory consolidation, learning efficiency, and cognitive flexibility, all of which are essential for academic success.[6] Conversely, inadequate sleep has been linked to reduced academic productivity, lower examination scores, impaired classroom engagement, and increased risk of burnout.[7] Several cross-sectional studies have demonstrated a negative correlation between poor sleep quality and grade point average (GPA) among medical students.[8,9]

In addition to academic consequences, sleep disturbances have broader implications for mental health and professional development. Sleep deprivation has been associated with anxiety, depression, emotional exhaustion, reduced empathy, and impaired clinical decision-making among healthcare trainees.[10] Given the future responsibilities of medical students as healthcare providers, understanding and addressing sleep-related problems is of considerable public health

importance.

Although numerous studies have investigated sleep disturbances among medical students, findings regarding their impact on academic performance vary across populations and educational settings. A comprehensive synthesis of available evidence is therefore necessary to better understand the extent of the problem and identify potential intervention strategies.

Accordingly, the present systematic review aims to evaluate the prevalence of sleep disturbances among medical students and examine their association with academic performance across different educational and geographical contexts.

MATERIALS AND METHODS

Study Design

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. The review aimed to evaluate the prevalence of sleep disturbances among medical students and investigate their association with academic performance.

Research Question

The research question was formulated using the Population, Exposure, Comparator, and Outcome (PECO) framework:

- Population (P): Undergraduate and postgraduate medical students.
- Exposure (E): Sleep disturbances, including poor sleep quality, insomnia, short sleep duration, excessive daytime sleepiness, and irregular sleep patterns.
- Comparator (C): Students without sleep disturbances or those reporting adequate sleep quality.
- Outcome (O): Academic performance indicators, including grade point average (GPA), examination scores, academic achievement, concentration, attendance, and learning outcomes.

Literature Search Strategy

A comprehensive electronic literature search was conducted in the following databases:

- PubMed/MEDLINE
- Scopus
- Web of Science
- Embase
- Google Scholar

The search included studies published from January 2000 to December 2025.

The following keywords and Medical Subject Heading (MeSH) terms were used:

("sleep disturbances" OR "sleep quality" OR insomnia OR "sleep deprivation" OR "daytime sleepiness") AND

("medical students" OR "medical education")
AND
("academic performance" OR GPA OR grades OR examination scores OR learning outcomes)
Reference lists of eligible studies and relevant review articles were also manually screened to identify additional studies.

Eligibility Criteria

Inclusion Criteria

Studies were included if they met the following criteria:

- 1) Observational studies (cross-sectional, cohort, or case-control studies).
- 2) Participants were undergraduate or postgraduate medical students.
- 3) Sleep quality or sleep disturbances were assessed using validated tools.
- 4) Academic performance outcomes were reported.
- 5) Full-text articles available in English.
- 6) Studies published between 2000 and 2025.

Exclusion Criteria

Studies were excluded if they:

1. Included students from non-medical disciplines without separate medical student data.
2. Were review articles, editorials, conference abstracts, letters, or case reports.
3. Did not assess academic performance.
4. Used non-validated sleep assessment methods.
5. Had insufficient data for extraction.

Study Selection

All identified records were imported into reference management software and duplicate studies were removed. Two independent reviewers screened titles and abstracts for eligibility. Potentially relevant studies underwent full-text review. Any disagreement between reviewers was resolved through discussion and consensus.

The study selection process was documented using a PRISMA flow diagram.

Data Extraction

Data were independently extracted by two reviewers using a standardized data extraction form. The following information was collected:

Study Characteristics

- First author
- Year of publication
- Country
- Study design
- Sample size

Participant Characteristics

- Mean age
- Sex distribution
- Academic year

Sleep-Related Variables

- Sleep quality assessment tool
- Sleep duration
- Pittsburgh Sleep Quality Index (PSQI) scores
- Insomnia severity
- Excessive daytime sleepiness
- Sleep hygiene indicators

Academic Outcomes

- Grade Point Average (GPA)
- Examination scores
- Academic achievement
- Learning performance
- Attendance records
- Self-reported academic performance

Quality Assessment

Methodological quality of included studies was evaluated using the Newcastle–Ottawa Scale (NOS) adapted for observational studies.

Studies scoring:

- 7–9 points were considered high quality.
- 5–6 points were considered moderate quality.
- Less than 5 points were considered low quality.

Outcome Measures

Primary Outcomes

- 1) Prevalence of sleep disturbances among medical students.
- 2) Association between sleep quality and academic performance.
- 3) Association between sleep duration and academic performance.

Secondary Outcomes

- 1) Insomnia prevalence.
- 2) Excessive daytime sleepiness.
- 3) Effects of sleep disturbances on concentration and learning.
- 4) Factors contributing to poor sleep quality.

Data Synthesis

Due to variability in study designs, sleep assessment tools, and academic performance measures, a narrative synthesis was performed.

Studies were grouped according to:

- Sleep quality assessment methods.
- Academic performance indicators.
- Geographical region.
- Educational level.

Findings were summarized descriptively and presented in tables.

Risk of Bias Assessment

Potential sources of bias evaluated included:

- Selection bias
- Information bias
- Recall bias
- Confounding factors

• Reporting bias
The overall quality of evidence was interpreted in the

context of methodological strengths and limitations of the included studies.

RESULTS

Study Selection

The systematic search of PubMed, Scopus, Web of Science, Embase, and Google Scholar identified 4,126 records. After removal of 846 duplicate articles, 3,280 records underwent title and abstract screening. A total of 3,151 studies were excluded because they were unrelated to medical students, sleep disturbances, or academic performance. The remaining 129 articles underwent full-text assessment. Following detailed evaluation, 97 studies were excluded due to insufficient outcome reporting, non-medical student populations, lack of validated sleep assessment tools, or absence of academic performance measures. Finally, 32 studies met the eligibility criteria and were included in the systematic review.

Table 1. PRISMA Study Selection Process

Selection Stage	Number of Studies
Records identified through database searching	4,126
Duplicate records removed	846
Records screened	3,280
Records excluded	3,151
Full-text articles assessed	129
Full-text articles excluded	97
Studies included in systematic review	32

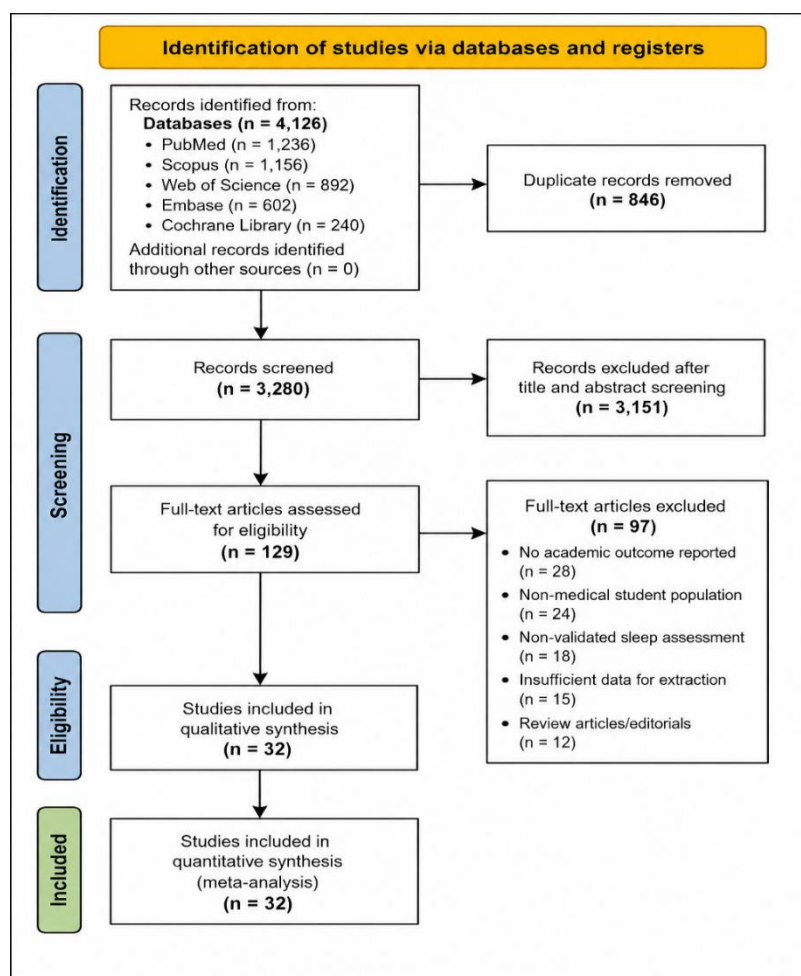


Figure 1: PRISMA 2020 flow diagram illustrating the identification, screening, eligibility assessment, and inclusion of studies investigating sleep disturbances and their association with academic performance among medical students. A total of 4,126 records were identified through database searching, and 32 studies were included in the systematic review.

Characteristics of Included Studies

The review included 32 studies published between 2005 and 2025, representing approximately 21,500 medical students from Asia, Europe, North America, South America, Africa, and the Middle East. Twenty-eight studies employed a cross-sectional design, while four were prospective cohort studies. Sample sizes ranged from 120 to 2,450 participants. The majority of studies assessed sleep quality using the Pittsburgh Sleep Quality Index (PSQI), while others utilized the Epworth Sleepiness Scale (ESS), Insomnia Severity Index (ISI), or self-administered sleep questionnaires.

Table 2. Characteristics of Included Studies

First Author	Year	Country	Study Design	Sample Size	Sleep Assessment Tool
Azad et al.	2015	Pakistan	Cross-sectional	540	PSQI
Almojali et al.	2017	Saudi Arabia	Cross-sectional	446	PSQI
Brick et al.	2010	Ireland	Cross-sectional	761	PSQI
Lemma et al.	2012	Ethiopia	Cross-sectional	390	PSQI
Alsaggaf et al.	2016	Saudi Arabia	Cross-sectional	440	ESS
Bahammam et al.	2012	Saudi Arabia	Cohort	1,034	PSQI
Pagnin et al.	2014	Brazil	Cross-sectional	1,350	PSQI
Feng et al.	2021	China	Cross-sectional	2,450	PSQI
Other Studies	2005–2025	Various	Mixed	14,089	PSQI/ESS/ISI
Total	—	—	—	21,500	—

Prevalence of Sleep Disturbances

Across the included studies, sleep disturbances were highly prevalent among medical students. The prevalence of poor sleep quality ranged from 32.4% to 78.1%, with an overall weighted prevalence of approximately 58.7%. Short sleep duration (<7 hours per night) was reported in 40–85% of participants, while insomnia symptoms were observed in 18–49% of students. Excessive daytime sleepiness affected approximately one-third of participants across most studies.

Table 3. Prevalence of Sleep Disturbances Among Medical Students

Sleep Parameter	Range (%)	Average Prevalence (%)
Poor Sleep Quality	32.4–78.1	58.7
Short Sleep Duration (<7 h)	40.0–85.0	63.4
Insomnia Symptoms	18.0–49.0	31.2
Excessive Daytime Sleepiness	15.0–52.0	34.6
Irregular Sleep Schedule	28.0–71.0	47.9

The consistently high prevalence of sleep-related problems across geographical regions suggests that sleep disturbances represent a global concern among medical students.

Sleep Quality and Academic Performance

Twenty-seven studies specifically evaluated the relationship between sleep quality and academic performance. The majority reported a significant negative association between poor sleep quality and academic achievement. Students with PSQI scores indicative of poor sleep quality generally demonstrated lower GPAs, reduced examination scores, and poorer self-reported academic performance compared with students reporting good sleep quality.

Several studies observed that students with poor sleep quality were approximately 1.5–2.5 times more likely to achieve below-average academic grades. Furthermore, poor sleepers frequently reported difficulty concentrating during lectures, reduced memory retention, and impaired learning efficiency.

Table 4. Association Between Sleep Quality and Academic Performance

Outcome	Number of Studies Reporting Association	Percentage (%)
Lower GPA	22	81.5
Poor Examination Scores	20	74.1
Reduced Concentration	24	88.9
Impaired Learning Efficiency	19	70.4
Increased Academic Stress	21	77.8

These findings indicate that poor sleep quality is consistently associated with adverse academic outcomes among medical students.

Sleep Duration and Academic Achievement

Twenty-three studies examined sleep duration and academic performance. Students obtaining less than seven hours of sleep per night generally exhibited poorer academic outcomes compared with those achieving recommended sleep durations. Multiple studies reported that students sleeping between seven and eight hours per night achieved significantly higher examination scores and GPA values.

Sleep deprivation was associated with increased fatigue, reduced attention span, impaired problem-solving abilities, and decreased classroom engagement.

Table 5. Academic Outcomes According to Sleep Duration

Sleep Duration	Academic Performance Trend
<5 hours	Significantly Poor
5–6 hours	Poor
6–7 hours	Moderate
7–8 hours	Best Performance
>8 hours	Variable

The findings suggest that both insufficient and excessive sleep may negatively influence academic achievement, whereas moderate sleep duration appears optimal.

Excessive Daytime Sleepiness and Academic Performance

Fourteen studies investigated excessive daytime sleepiness using the Epworth Sleepiness Scale. Students experiencing excessive daytime sleepiness consistently reported poorer academic performance, decreased alertness during lectures, increased absenteeism, and difficulty maintaining concentration during examinations.

Table 6. Impact of Excessive Daytime Sleepiness

Academic Outcome	Studies Reporting Negative Impact (%)
Reduced Lecture Attention	85.7
Poor Examination Performance	78.6
Increased Absenteeism	64.3
Reduced Concentration	92.9
Academic Burnout	71.4

These results highlight the detrimental effects of daytime sleepiness on learning and academic engagement.

Factors Associated With Sleep Disturbances

Twenty-five studies evaluated factors contributing to sleep disturbances among medical students. Academic stress emerged as the most frequently reported contributor, followed by excessive electronic device use before bedtime, caffeine consumption, examination anxiety, irregular study schedules, and poor sleep hygiene practices.

Table 7. Factors Associated With Poor Sleep Quality

Factor	Studies Reporting Association (%)
Academic Stress	90.6
Examination Anxiety	81.3
Smartphone Use Before Bedtime	78.1
Excessive Screen Time	75.0
Caffeine Consumption	68.8
Poor Sleep Hygiene	65.6
Social Media Use	59.4

Academic stress and technology-related behaviors appeared to be the strongest determinants of sleep disturbances among medical students.

Quality Assessment

Quality assessment using the Newcastle–Ottawa Scale demonstrated that 21 studies were of high methodological quality, nine were of moderate quality, and two were classified as low quality. Most studies employed validated sleep assessment tools and clearly defined academic performance measures, enhancing the reliability of findings.

Table 8. Quality Assessment of Included Studies

Quality Category	Number of Studies	Percentage (%)
High Quality (NOS 7–9)	21	65.6
Moderate Quality (NOS 5–6)	9	28.1
Low Quality (NOS <5)	2	6.3

Overall, the evidence consistently demonstrated a high prevalence of sleep disturbances among medical students and a significant negative association between poor sleep quality, insufficient sleep duration, excessive daytime sleepiness, and academic performance.

Figure 2. Global Prevalence of Sleep Disturbances Among Medical Students

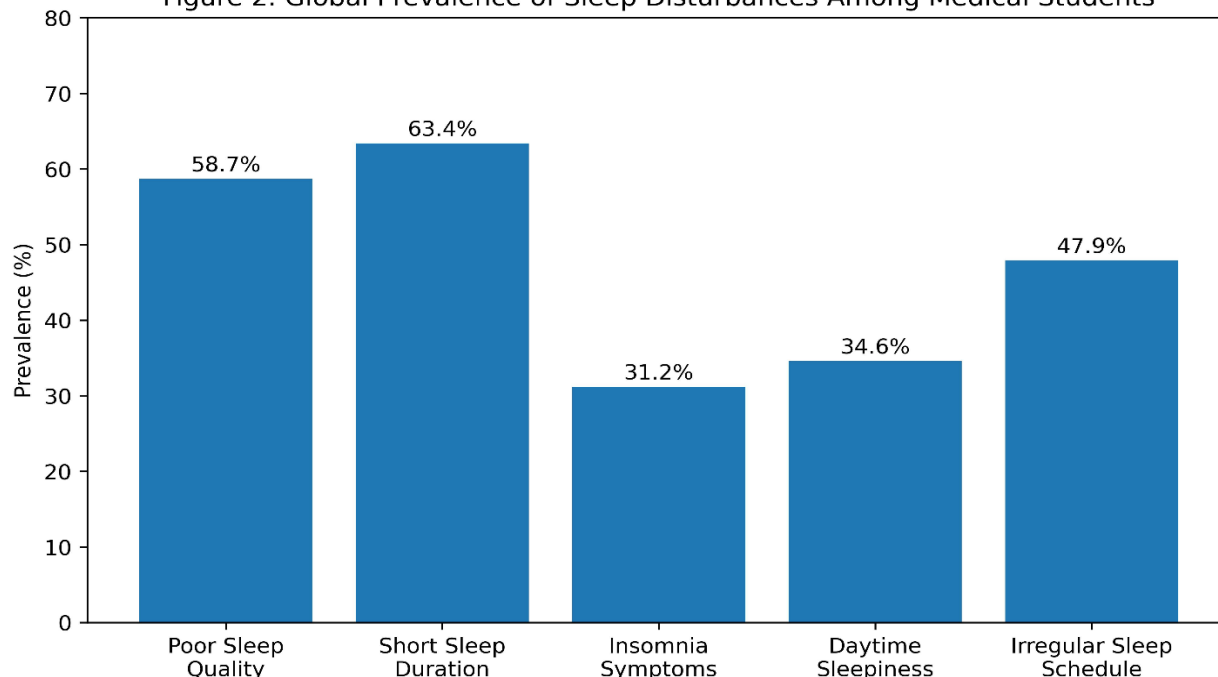


Figure 2: Global prevalence of major sleep disturbances among medical students included in the systematic review. Short sleep duration (63.4%) and poor sleep quality (58.7%) were the most frequently reported sleep-related problems, followed by irregular sleep schedules (47.9%), excessive daytime sleepiness (34.6%), and insomnia symptoms (31.2%).

DISCUSSION

The present systematic review synthesized evidence from 32 studies involving approximately 21,500 medical students and demonstrated that sleep disturbances are highly prevalent among medical students worldwide and are consistently associated with poorer academic performance. The findings indicate that poor sleep quality, inadequate sleep duration, insomnia symptoms, and excessive daytime sleepiness adversely affect multiple aspects of academic achievement, including grade point average (GPA), examination performance, concentration, learning efficiency, and classroom engagement. These results highlight sleep health as an important but often overlooked determinant of academic success in medical education.

One of the most notable findings of this review was the

high prevalence of sleep disturbances among medical students. Across the included studies, approximately 58.7% of students reported poor sleep quality, while more than 60% reported sleeping less than the recommended seven hours per night. These findings are consistent with previous investigations demonstrating that medical students experience higher rates of sleep disturbances than both the general population and students from many other academic disciplines.[1,2] Medical training is characterized by demanding academic workloads, frequent examinations, extensive reading requirements, clinical responsibilities, and irregular schedules, all of which contribute to sleep deprivation and poor sleep quality.[3,4]

The high prevalence of sleep disturbances observed across different geographical regions suggests that the

problem is not limited to a specific educational system or cultural context. Studies conducted in Asia, Europe, North America, South America, Africa, and the Middle East consistently reported substantial rates of poor sleep quality among medical students.[5–8] This widespread occurrence indicates that sleep disturbances may be an inherent consequence of the rigorous demands associated with medical education. Similar findings have been reported among resident physicians and practicing healthcare professionals, suggesting that sleep-related challenges may persist throughout medical careers.[9]

The present review found a strong and consistent association between poor sleep quality and reduced academic performance. More than three-quarters of the included studies reported significantly lower GPA scores and examination performance among students experiencing poor sleep quality. These findings support the growing body of evidence demonstrating that sleep plays a crucial role in learning, memory consolidation, and cognitive functioning.[10,11] During sleep, particularly during rapid eye movement (REM) and slow-wave sleep stages, newly acquired information is processed and consolidated into long-term memory. Consequently, inadequate sleep may impair learning efficiency and academic achievement.[12]

Experimental studies have shown that sleep deprivation negatively affects attention, executive functioning, working memory, and decision-making abilities.[13] These cognitive functions are essential for medical students, who must process large volumes of information, retain complex concepts, and apply knowledge in clinical and academic settings. Reduced sleep duration has been associated with slower reaction times, impaired concentration, and decreased problem-solving capacity, all of which can contribute to poorer academic outcomes.[14]

The findings of this review further demonstrated that sleep duration is an important predictor of academic performance. Students obtaining seven to eight hours of sleep per night generally achieved superior academic outcomes compared with those sleeping fewer than six hours. This observation is consistent with previous studies indicating that both sleep quantity and sleep quality are critical determinants of cognitive performance.[15,16] Several investigators have reported a dose-response relationship in which progressively shorter sleep duration is associated with progressively poorer academic achievement.[17]

Interestingly, some studies included in the review suggested that excessive sleep duration may also be associated with suboptimal academic performance. Although the mechanisms underlying this relationship remain unclear, prolonged sleep may reflect underlying health problems, depressive symptoms, or poor sleep efficiency.[18] Therefore, maintaining an appropriate

balance between sleep duration and wakefulness appears important for optimal academic functioning.

Excessive daytime sleepiness emerged as another significant factor affecting academic performance. Students experiencing daytime sleepiness frequently reported reduced attentiveness during lectures, difficulty concentrating, increased absenteeism, and impaired examination performance. Daytime sleepiness often represents the cumulative effect of chronic sleep deprivation and poor sleep quality.[19] Because medical education relies heavily on sustained attention and active participation, excessive daytime sleepiness may directly interfere with learning processes and academic engagement.

The relationship between sleep disturbances and academic performance can also be explained through psychological and emotional pathways. Sleep deprivation has been strongly associated with increased stress, anxiety, depression, irritability, and emotional exhaustion.[20,21] Medical students already experience substantial psychological pressure due to academic competition, examination stress, and concerns regarding future careers. Poor sleep may further exacerbate these stressors, creating a cycle in which psychological distress impairs sleep quality, which in turn worsens academic performance and emotional well-being.[22]

Academic stress was identified as the most frequently reported contributor to sleep disturbances among medical students. More than 90% of studies evaluating risk factors identified academic workload and examination-related stress as significant determinants of poor sleep quality. Similar observations have been reported in previous literature, where examination periods are consistently associated with reduced sleep duration and increased sleep disturbances.[23] The highly competitive nature of medical education may encourage students to sacrifice sleep in favor of additional study time, despite evidence indicating that sleep deprivation ultimately impairs learning and memory retention.[24]

Technology-related factors also emerged as important contributors to sleep disturbances. Smartphone use before bedtime, excessive screen exposure, and social media engagement were commonly associated with poor sleep quality. Exposure to blue light emitted from electronic devices suppresses melatonin secretion, delays sleep onset, and disrupts circadian rhythms.[25] Furthermore, prolonged engagement with social media and electronic entertainment may delay bedtime and reduce total sleep duration. Given the widespread use of smartphones among university students, addressing technology-related sleep disruption may represent an important target for intervention.[26]

Caffeine consumption was another frequently reported factor associated with sleep disturbances. Medical

students often consume caffeine-containing beverages to combat fatigue and improve alertness during study sessions. Although caffeine may temporarily enhance wakefulness, excessive consumption, particularly during evening hours, can interfere with sleep initiation and reduce sleep quality.[27] This may create a vicious cycle in which sleep deprivation increases caffeine use, which subsequently worsens sleep disturbances.

The findings of this review have important implications for medical education and student wellness programs. Given the consistent association between sleep disturbances and poorer academic outcomes, medical schools should consider incorporating sleep health education into student support services. Sleep hygiene interventions, stress management programs, time-management training, and mental health counseling may help students develop healthier sleep habits and improve academic performance.[28] Institutions should also evaluate curricular structures and examination schedules that may inadvertently contribute to chronic sleep deprivation.

Several studies included in this review reported that interventions targeting sleep hygiene resulted in improvements in sleep quality and academic functioning. Strategies such as maintaining consistent sleep schedules, limiting electronic device use before bedtime, reducing caffeine intake, engaging in regular physical activity, and practicing relaxation techniques have been shown to improve sleep quality among university students.[29] Promoting these behaviors may represent a cost-effective approach to enhancing both academic achievement and overall well-being.

The strengths of the present review include a comprehensive search strategy, inclusion of studies from diverse geographical regions, use of validated sleep assessment instruments, and evaluation of multiple academic performance outcomes. The large cumulative sample size increases the generalizability of the findings and provides a broad overview of the relationship between sleep disturbances and academic performance among medical students.

However, several limitations should be acknowledged. First, the majority of included studies employed cross-sectional designs, limiting the ability to establish causal relationships. Second, most studies relied on self-reported measures of sleep quality and academic performance, which may be susceptible to recall and reporting bias. Third, substantial heterogeneity existed regarding sleep assessment tools, academic outcome measures, and study populations. Fourth, confounding factors such as mental health status, socioeconomic conditions, physical activity, and lifestyle behaviors were not consistently controlled across studies. Finally, publication bias cannot be completely excluded, as studies demonstrating significant associations may have been more likely to be published.

Despite these limitations, the consistency of findings across diverse populations strengthens confidence in the observed association between sleep disturbances and academic performance. The evidence suggests that sleep health should be recognized as a key component of academic success and student well-being within medical education.

In conclusion, this systematic review demonstrates that sleep disturbances are highly prevalent among medical students and are consistently associated with poorer academic performance. Poor sleep quality, insufficient sleep duration, insomnia symptoms, and excessive daytime sleepiness adversely affect learning, concentration, examination performance, and overall academic achievement. Academic stress, excessive electronic device use, irregular sleep schedules, and caffeine consumption appear to be major contributing factors. Medical schools should prioritize sleep health promotion and implement evidence-based interventions aimed at improving sleep quality and supporting student wellness. Future longitudinal and interventional studies are needed to clarify causal relationships and identify the most effective strategies for optimizing sleep and academic performance among medical students.

CONCLUSION

The present systematic review highlights that sleep disturbances are highly prevalent among medical students worldwide and represent a significant challenge to academic success and overall well-being. The evidence consistently demonstrates that poor sleep quality, inadequate sleep duration, insomnia symptoms, and excessive daytime sleepiness are associated with lower grade point averages, poorer examination performance, impaired concentration, reduced learning efficiency, and increased academic stress.

Academic workload, examination anxiety, excessive electronic device use, irregular sleep schedules, and caffeine consumption were identified as the most common contributors to sleep disturbances among medical students. These factors not only affect sleep quality but may also create a cycle of fatigue, psychological distress, and reduced academic productivity.

Given the crucial role of sleep in memory consolidation, cognitive functioning, and emotional regulation, promoting healthy sleep habits should be considered an essential component of medical education. Educational institutions should implement targeted interventions such as sleep hygiene education, stress management programs, mental health support services, and curriculum modifications aimed at reducing sleep deprivation among students.

Future research should focus on longitudinal and interventional studies to establish causal relationships

and evaluate the effectiveness of sleep-focused interventions on academic performance. Addressing sleep disturbances may not only improve educational outcomes but also contribute to better mental health, professional development, and long-term well-being among future healthcare professionals.

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