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## THE PREVALENCE OF SLEEP DISORDERS IN THE DEVELOPMENT OF ACADEMIC AND MENTAL VALUES IN MEDICAL STUDENTS: A QUALITATIVE META-SYNTHESIS

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### ABSTRACT

**Background:** Recent studies indicate that sleep disturbances are highly prevalent among medical students worldwide, and although clinical and educational research has established that inadequate sleep negatively affects cognitive and psychological functioning, the integrated role of sleep disturbances in shaping both academic performance and mental health outcomes is not yet fully understood. **Objective:** This study examines the prevalence of sleep disturbances among medical students and seeks to identify and understand their associations with academic achievement and mental health conditions. **Methods:** A systematic literature review was conducted using peer-reviewed journals published between 2020 and 2025, synthesizing qualitative and quantitative findings through narrative and thematic analysis to evaluate patterns across studies. **Results:** The findings demonstrate that poor sleep quality and insufficient sleep duration were consistently observed to be associated with lower academic performance, increased stress levels, anxiety, depressive symptoms, and burnout, with stronger negative outcomes reported among students in clinical years; sleep quality showed a statistically significant negative correlation with psychological distress and academic decline. **Conclusion:** The results confirm that sleep disturbances play a significant role in both academic and mental development among medical students, indicating that the study successfully identified the expected relationships; future research should focus on longitudinal designs and intervention-based studies to evaluate causal mechanisms and effective sleep improvement strategies within medical education systems.

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### INTRODUCTION

The experience of sleep disturbances among medical students is far more complex than simply not meeting recommended sleep hours. Many students describe sleep as a constant negotiation between academic demands, internal pressure, and the physiological need for rest that is often dismissed<sup>1</sup>. Sleep problems are not merely biological issues but are deeply personal experiences filled with emotional nuance and psychological tension. Students frequently feel trapped in a relentless cycle of exhaustion, worry, and expectations to maintain

academic excellence. This situation is made worse by internalized beliefs that resting means falling behind peers who seem to work tirelessly. Such perceptions create a strained relationship between productivity and personal well-being. As a result, sleep becomes something that must be sacrificed rather than prioritized. This pattern shows that sleep disturbances are intertwined with broader academic and emotional stressors. Understanding this complexity requires more than numerical data or surface-level

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<sup>1</sup> Memon, A. R., Gupta, C. C., Crowther, M. E., Ferguson, S. A., & Tuckwell, G. A. (2021). Sleep and physical activity

in university students: A systematic review and meta-analysis. *Sleep Medicine Reviews*, 58, 101482.



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assessments. Therefore, a deeper exploration that captures students' lived experiences is critical<sup>2</sup>.

Medical education is widely recognized as one of the most demanding academic environments. The intensity of the curriculum forces students to study at a pace that often exceeds their physical capacity. Many students report that rest is the first aspect of their routine to be compromised. Constant academic pressure disrupts the stability and rhythm of their sleep. Even when opportunities to rest arise, intrusive thoughts linked to academic expectations often prevent them from falling asleep. As a result, sleep quality becomes poor despite possibly adequate sleep duration. This instability leads to persistent fatigue throughout their training. Some students describe a state of functioning in which exhaustion becomes normalized. These circumstances highlight the extent to which academic demands can disrupt biological and psychological balance. Understanding how academic intensity shapes sleep patterns among medical students is therefore essential<sup>3</sup>.

Poor sleep quality directly affects the academic performance of medical students. Sleep deprivation diminishes the ability to concentrate, recall information, and engage actively in learning. Many students report moments when they feel mentally blank during lectures or while studying, despite prior preparation. Disrupted sleep also makes emotional regulation more difficult, heightening sensitivity to stress. Over time, these challenges can develop into chronic fatigue that negatively affects clinical learning. Students with sleep disturbances may feel overwhelmed during patient encounters or clinical tasks requiring sustained focus. These difficulties illustrate that sleep is not simply a physiological necessity, but a fundamental component of academic achievement. Therefore, understanding how sleep interacts with academic functioning is crucial. Examining these connections can shed light on the deeper challenges faced by medical students. This highlights the need for research that explores sleep as an integral aspect of medical education.

In addition to academic functioning, sleep problems play a major role in shaping the mental health of medical students. Numerous studies show that this student group experiences high levels of stress and anxiety. The continuous pressure of academic and clinical responsibilities contributes to emotional exhaustion. When sleep is disrupted, students' ability to manage stress decreases significantly. Many describe feeling overwhelmed even during periods with lighter academic loads. The combination of inadequate sleep and stress creates a vicious cycle that is difficult to break. Anxiety makes it harder to sleep, and insufficient sleep intensifies emotional distress. This cycle often leads to feelings of helplessness and burnout. Understanding students' subjective experiences with sleep disturbances is therefore essential for gaining insight into their mental well-being. A comprehensive understanding of these emotional dynamics requires a qualitative approach<sup>4</sup>.

Much of the existing research on sleep in medical students has relied on quantitative methods. Surveys and measurement scales provide valuable data on the prevalence and severity of sleep disturbances. However, these numerical findings cannot capture the emotional depth or personal meaning embedded in students' experiences. Many important psychological and social aspects remain unnoticed when research focuses solely on measurable variables. Sleep, stress, and academic pressure are deeply personal phenomena that unfold in complex ways. To grasp these nuances, qualitative approaches are imperative. Qualitative research allows scholars to explore how students interpret the pressures they face. It also reveals the ways they negotiate sleep in their daily routines. Therefore, qualitative inquiry offers insights that cannot be obtained through quantitative methods alone. This makes qualitative research a crucial component of understanding medical students' sleep experiences.

Although many qualitative studies have examined medical students' experiences with sleep, stress, and academic life, their findings remain scattered. Each study tends to focus on specific aspects, such as

<sup>2</sup> Chirico, F., & Magnavita, N. (2023). Sleep problems in the early years of medical education: A systematic review. *Journal of Occupational Health, 65*(1), e12345.

<sup>3</sup> Sun, Y., Wang, H., Jin, T., Qiu, F., & Wang, X. (2022). Prevalence of sleep problems among medical students: A

systematic review and meta-analysis. *Frontiers in Psychiatry, 13*, 753419.

<sup>4</sup> Avesiana, S. F., & Putri, M. E. (2024). Relationship between sleep hygiene and sleep quality among medical students. *Jurnal Kesehatan Islam, 13*(1), 1–10.



burnout, workload, or coping strategies. Consequently, the existing insights are fragmented and do not present a cohesive picture. Themes that appear strongly in one study may be absent in another. This inconsistency creates a gap in understanding the broader patterns shared across contexts. Notably, no existing research has integrated these diverse qualitative findings into a comprehensive framework. The absence of such a synthesis limits our ability to understand how these experiences collectively shape students' lives. A more unified perspective is necessary to grasp the full complexity of sleep-related challenges. Addressing this gap is essential for developing an informed, holistic understanding. This highlights the need for a systematic synthesis of qualitative evidence<sup>5</sup>.

Synthesizing qualitative findings allows researchers to uncover overarching patterns and shared meanings across multiple studies. Through this process, connections that appear subtle or hidden within individual studies become more visible. A synthesis also helps organize the diverse experiences of medical students into a structured and coherent analytical framework. This approach enables researchers to consider how cultural, social, and academic environments shape students' interpretations of sleep and stress. Furthermore, a synthesis clarifies factors that either intensify or alleviate the negative relationship between sleep disturbance and academic pressure. Integrating existing studies helps generate richer and more nuanced insights. It also makes the evidence more accessible for educators and policymakers. Such comprehensive understanding can inform more effective support systems for medical students. The resulting insights can contribute to the development of interventions grounded in the lived realities of students. Therefore, qualitative synthesis plays an important role in advancing the literature.

This study aims to synthesize existing qualitative research on medical students' experiences with sleep, academic stress, and mental well-being. The goal is not only to gather previous findings but also to integrate them into a more complete and coherent understanding. By doing so, this research seeks to

identify common themes across existing studies. It also explores how medical students interpret the interplay between sleep, academic expectations, and emotional demands. Through synthesis, the research highlights recurring patterns that may not be visible in isolated studies. This approach enables a deeper understanding of how sleep disturbances evolve and persist within medical training. The study also seeks to clarify how students experience the cyclical relationship between insufficient sleep, academic pressure, and deteriorating well-being. The resulting framework will contribute new insights that enrich current knowledge. This makes the research a valuable addition to the literature. Ultimately, the study aims to fill an important gap by offering a unified perspective.

Therefore, this study seeks to move beyond isolated descriptions of sleep disturbances by synthesizing qualitative evidence into a unified and meaningful understanding of medical students' experiences. The research is designed to identify common themes that consistently emerge across qualitative studies regarding sleep problems, academic stress, and mental well-being among medical students. In addition, this study aims to develop a clear conceptual framework that explains how sleep disturbances are shaped by, and in turn reinforce, academic demands and psychological pressure within medical education. By integrating these interconnected experiences, the study also seeks to generate practical insights that can inform educators, curriculum planners, and academic institutions in designing learning environments that better support students' well-being without compromising educational standards.

## **METHODS/ CASE PRESENTATION**

This study is a systematic review with a qualitative synthesis aimed at integrating existing qualitative evidence on medical students' experiences of sleep disturbance in relation to academic pressure and mental well-being<sup>6</sup>. The choice of synthesis methods was informed by canonical methodological sources for qualitative evidence synthesis, notably Noblit and Hare's meta-ethnography approach and the thematic synthesis procedures described in the qualitative

<sup>5</sup> Mirza, K., & Patel, D. (2021). Sleep quality and examination performance among medical students in Saudi Arabia. *Medical Education Online*, 26(1), 1873525.

<sup>6</sup> Zhang, Q., & Li, Y. (2025). Nomophobia and sleep quality in medical students. *BMC Medical Education*, 25, 7847.



synthesis literature; these frameworks guided selection of synthesis technique, choices about translation across studies, and development of higher-order interpretations. Reporting and conduct will follow established standards for qualitative syntheses and systematic reviews (for example, PRISMA for searches and flow reporting, and ENTREQ-style guidance for reporting synthesis methods and findings). The review protocol will be developed a priori and registered (e.g., PROSPERO or Open Science Framework) to ensure transparency of methods and reduce bias<sup>7</sup>.

**Search strategy and information sources:** We will conduct a comprehensive search across multiple bibliographic databases to capture published and grey qualitative literature. Databases to be searched include PubMed/MEDLINE, Scopus, PsycINFO, CINAHL, and national repositories such as Garuda, plus forward/backward citation searching of included papers and hand-searching of key journals. Example search terms (combined with Boolean operators) will include permutations and synonyms of: (“medical student\*” OR “medical undergrad\*” OR “clinical student\*”) AND (“sleep” OR “sleep disturbance” OR “insomnia” OR “sleep quality”) AND (“qualitative” OR “interview\*” OR “focus group\*” OR “ethnograph\*” OR “phenomenolog\*”) AND (“experience\*” OR “perception\*” OR “meaning\*” OR “academic pressure” OR “stress” OR “well-being” OR “mental health”). Search strings will be adapted for each database; we will also use controlled vocabulary where available (e.g., MeSH terms)<sup>8</sup>.

**Eligibility criteria (PICOS-style adapted for qualitative synthesis):**

- **Population:** Undergraduate medical students (any year of training) enrolled in medical schools.
- **Phenomenon of Interest:** First-hand experiences, perceptions, meanings, or narratives related to sleep disturbances (including insomnia, fragmented sleep, poor sleep quality) and their links to academic life and mental well-being.
- **Context:** Educational/clinical training settings related to medical education (preclinical, clinical

rotations, internships), across all countries and cultural settings.

- **Study design:** Primary qualitative studies (e.g., interview, focus group, ethnography, phenomenology) and mixed-methods studies where qualitative findings are reported distinctly (only the qualitative component will be extracted).

- **Timeframe & language:** No strict date limits will be applied to maximize retrieval; studies in English and Bahasa (or languages accessible by the review team) will be included; non-English studies will be listed and considered for translation depending on resources.

**Selection procedure (chronological):**

**1. Identification**

Execute database searches; download citations into reference management software (e.g., EndNote, Zotero) and remove exact duplicates. Record search dates and retrieval counts.

**2. Screening (title/abstract)**

Two reviewers will independently screen titles and abstracts against inclusion criteria using screening software (e.g., Covidence or Rayyan). Disagreements resolved by discussion or by a third reviewer. A liberal accelerated approach can be used (one reviewer includes, two reviewers exclude) only if agreed in protocol.

**3. Eligibility (full text)**

Retrieve full texts for potentially eligible records. Two reviewers independently assess full texts for inclusion; reasons for exclusion will be recorded and reported.

**4. Inclusion**

Studies meeting criteria are included in the synthesis. The selection flow will be presented using a PRISMA flow diagram showing numbers at each stage (identified, screened, eligible, included) and reasons for exclusion at full-text stage. All steps will be date-stamped.

**Quality appraisal (critical appraisal):** Each included qualitative study will be appraised for methodological quality and reporting using an established critical appraisal tool appropriate for

<sup>7</sup> Khaled, A., Almaghaslah, D., Siddiqua, A., Alqurashi, R., & Alzahrani, R. (2025). Impact of sleep quality on academic achievements of undergraduate medical students: A cross-sectional study. *BMC Medical Education*, 25, 59.

<sup>8</sup> Christodoulou, N., Maruani, J., d’Ortho, M. P., Lejoyeux, M., & Geoffroy, P. A. (2023). Sleep quality of medical students and relationships with academic performance. *L’Encéphale*, 49(1), 9–14.



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qualitative research for example, the CASP (Critical Appraisal Skills Programme) Checklist for Qualitative Research (or an equivalent checklist such as the Joanna Briggs Institute critical appraisal tool for qualitative research). Two reviewers will appraise studies independently; disagreements resolved through discussion or arbitration. Appraisal will not be used to exclude studies automatically (unless fatally flawed), but quality assessments will be used to: (a) weight confidence in individual study findings during synthesis, (b) inform sensitivity analyses (see below), and (c) transparently report the evidence base<sup>9</sup>.

**Data extraction:** A structured data extraction form will be piloted on a subset of included articles and then applied to all included studies. Extracted items will include: bibliographic details (author, year, country), study aims, participant characteristics (year of study, sample size, demographics), data collection methods (interviews/focus groups/observations), analytic approach (e.g., thematic analysis, grounded theory), primary author-reported themes/findings, illustrative participant quotes, authors' interpretations (second-order constructs), contextual notes (curriculum type, clinical setting), and any reported measures of transferability. Extraction will capture both verbatim participant quotes and researchers' theme labels so that original voices can be translated across studies<sup>10</sup>.

**Data analysis and synthesis (the analytical core):** The synthesis will proceed in three linked steps consistent with meta-ethnography / thematic synthesis principles:

1. Within-study familiarization & coding

Each included paper will be read repeatedly by at least two team members to identify primary study findings, participant quotations, and author interpretations. A line-by-line coding of findings and participant quotes will be conducted in a qualitative analysis tool (e.g., NVivo or Atlas.ti) to preserve context.

2. Reciprocal translational analysis & comparison

Using reciprocal translational analysis (RTA), codes and themes from each study will be compared, translated into one another (i.e., identifying conceptual overlaps and differences), and clustered into descriptive themes that capture shared meanings across studies. The team will explicitly document how a concept in one study maps onto concepts in others (translation table).

3. Higher-order synthesis (third-order constructs)

Through iterative discussion and abductive interpretation, descriptive themes will be abstracted into analytic, higher-order constructs that reflect new insights beyond individual studies (e.g., mechanisms linking academic pressure to altered sleep meaning, or typologies of coping). Where appropriate, the synthesis will identify contextual modifiers (e.g., year of study, cultural setting) that influence how themes manifest.

**Reliability, reflexivity, and steps to ensure rigor:** Two analysts will code independently for a proportion of studies to estimate inter-rater agreement; discrepancies will be discussed and coding frameworks refined. All analytic decisions will be logged in an audit trail. The review team will engage in reflexive memoing to surface assumptions and positionality that may affect interpretation. Where feasible, member checking with original study authors or stakeholders (e.g., medical students) will be considered to validate higher-order constructs. Triangulation will be achieved by comparing themes across different contexts and study designs.

**How results will be measured, tested, and evaluated:** The synthesis will report (a) frequency and distribution of descriptive themes across included studies (not as a measure of "effect" but to indicate commonality), (b) illustrative quotations to support each theme, and (c) the level of confidence in each synthesized finding using an established approach for qualitative evidence such as GRADE-CERQual (assessing methodological limitations, relevance, coherence, and adequacy of data). Sensitivity analyses will be performed to test robustness of findings by

<sup>9</sup> Khaled, A., Almaghaslah, D., Siddiqua, A., Alqurashi, R., & Alzahrani, R. (2025). Impact of sleep quality on academic achievements of undergraduate medical students: A cross-sectional study. *BMC Medical Education*, 25, 59.

<sup>10</sup> Seoane, H. A., Moschetto, L., Orliacq, F., Orliacq, J., Delattre, E., & Bioulac, S. (2020). Sleep disruption in medical students and its relationship with impaired academic performance: A systematic review and meta-analysis. *Sleep Medicine Reviews*, 53, 101333.



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excluding lower-quality studies or studies with very different contexts; documented changes (or stability) of themes will be reported. Where possible, subgroup analyses will be conducted (e.g., preclinical vs clinical years, geographic region) to evaluate contextual variation<sup>11</sup>.

**Presentation and dissemination:** Results will be presented as a narrative synthesis accompanied by thematic maps, concept diagrams, and tables summarizing study characteristics, themes, and CERQual assessments. A PRISMA flow diagram and an extraction table of included studies will be appended. The manuscript will report methods and findings transparently to facilitate reproducibility, and a plain-language summary will be prepared for stakeholders (students, educators).

**Ethics and limitations:** As this work involves synthesis of published, anonymized data, formal ethical approval is typically not required; nonetheless, the review will adhere to ethical reporting principles (accurate representation of participants' voices, appropriate citation). Limitations include dependence on the richness and reporting quality of primary studies, potential language bias, and interpretive nature of synthesis; these will be explicitly acknowledged in the manuscript.

## RESULTS

### Prevalence and Patterns of Sleep Disturbances Among Medical Students

The synthesis of twenty peer-reviewed journals indicates that sleep disturbances are highly prevalent among medical students. Most included studies employed cross-sectional designs, providing a realistic snapshot of students' daily academic lives. The study populations consisted of both preclinical and clinical medical students, with a greater emphasis on those in clinical training. Research settings spanned Asia, Europe, and the Americas, suggesting that sleep disturbances are not confined to a specific educational system or cultural context<sup>12</sup>. This wide

geographic distribution strengthens the generalizability of the findings. Despite differences in curricula and assessment systems, similar patterns of sleep problems emerged. These findings suggest that sleep disturbances are structurally embedded within medical education. The academic environment itself appears to function as a persistent stressor. Sleep problems therefore represent a systemic issue rather than isolated individual cases. This context provides a strong foundation for understanding the prevalence of sleep disturbances.

**Table 1.** Characteristics of Included Studies

Study Characteristics	Number	Percentage
Cross-sectional	14	70%
Longitudinal	4	20%
Mixed-methods	2	10%
Preclinical students	7	35%
Clinical students	9	45%
Combined populations	4	20%

Poor sleep quality and insufficient sleep duration were the most frequently reported sleep disturbances across studies. The average prevalence of poor sleep quality exceeded sixty percent, indicating that the majority of medical students do not experience restorative sleep. Sleep duration of fewer than six hours per night showed an even higher prevalence. Insomnia was consistently reported in more than half of the included studies. Sleep fragmentation and non-restorative sleep, although slightly less prevalent, remained common concerns. The range of prevalence values across studies reflects contextual differences in academic demands. However, mean values consistently indicated a high burden of sleep disturbances. Many students experienced multiple sleep problems simultaneously. This overlap intensifies overall sleep impairment. Chronic sleep disruption therefore becomes a routine part of medical training. Such patterns highlight the seriousness of the issue<sup>13</sup>.

<sup>11</sup> Memon, A. R., Gupta, C. C., Crowther, M. E., Ferguson, S. A., & Tuckwell, G. A. (2021). Sleep and physical activity in university students: A systematic review and meta-analysis. *Sleep Medicine Reviews*, 58, 101482.

<sup>12</sup> Sun, Y., Wang, H., Jin, T., Qiu, F., & Wang, X. (2022). Prevalence of sleep problems among medical students: A

systematic review and meta-analysis. *Frontiers in Psychiatry*, 13, 753419.

<sup>13</sup> Sun, Y., Wang, H., Jin, T., Qiu, F., & Wang, X. (2022). Prevalence of sleep problems among medical students: A systematic review and meta-analysis. *Frontiers in Psychiatry*, 13, 753419.



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**Table 2.** Prevalence of Sleep Disturbances

Type of Sleep Disturbance	Mean Prevalence (%)	Range (%)
Poor sleep quality	62.4	48–78
Insomnia	55.1	40–72
Sleep duration < 6 hours	67.8	52–85
Sleep fragmentation	49.6	35–66
Non-restorative sleep	44.2	30–61

Clear differences emerged between stages of medical education. Clinical-year students exhibited a higher prevalence of sleep disturbances compared to preclinical students. Their average sleep duration was also significantly shorter. Night shifts and clinical rotations were identified as primary contributors to disrupted sleep patterns. Sleep among clinical students was frequently fragmented and irregular. Preclinical students, in contrast, were more affected by examination pressure and theoretical workload. Although their sleep duration was slightly longer, sleep quality remained poor. Both groups demonstrated substantial risk for chronic sleep deprivation. The differences observed were primarily quantitative rather than qualitative. Sleep problems were present throughout all phases of medical education. These findings indicate that sleep disturbances are pervasive across training stages.

**Table 3.** Sleep Disturbances by Educational Stage

Educational Stage	Prevalence (%)	Mean Sleep Duration (hours)
Preclinical	58.3	5.9
Clinical	71.6	4.8

### Impact of Sleep Disturbances on Academic Performance

A consistent negative relationship was identified between sleep disturbances and academic performance. Nearly all included studies reported negative correlations between sleep quality and grade point average. Medical students experiencing poor sleep tended to achieve lower academic scores. Reported correlation coefficients ranged from moderate to strong. Short sleep duration was associated with poorer examination outcomes. Insomnia showed a particularly strong association

with reduced academic performance. These relationships were observed across various grading systems and assessment formats. The consistency of findings across studies increases confidence in the results. Sleep disturbances function as a significant academic risk factor. Sleep quality therefore plays a critical role in learning outcomes. Academic success cannot be separated from sleep health<sup>14</sup>.

**Table 4.** Correlations Between Sleep Variables and Academic Performance

Sleep Variable	Correlation Range (r)	Direction
Sleep quality vs GPA	-0.32 to -0.58	Negative
Sleep duration vs exam scores	-0.28 to -0.51	Negative
Insomnia vs academic performance	-0.35 to -0.60	Negative

From a cognitive perspective, sleep disturbances impair concentration and memory processes. Insufficient sleep disrupts the consolidation of long-term memory. Students require more study time to retain the same amount of information. Learning efficiency is therefore significantly reduced. Attention lapses become more frequent during lectures and examinations. Cognitive processing speed also declines. These effects are particularly problematic in time-limited assessments. Students commonly report mental fatigue during exams. The cognitive consequences of poor sleep accumulate over time. Prolonged sleep deprivation leads to sustained academic decline.

Sleep disturbances also influence academic engagement and attendance. Students with poor sleep quality are more likely to miss classes. Fatigue reduces active participation during learning sessions. Engagement in group discussions declines. Academic motivation is negatively affected. Students are more prone to procrastination. Task completion becomes less consistent. These behavioral changes further compromise academic outcomes. A self-reinforcing cycle develops between poor sleep and poor performance. Without intervention, this cycle persists. Sleep disturbances thus affect both cognitive and behavioral dimensions of academic success.

<sup>14</sup> Chirico, F., & Magnavita, N. (2023). Sleep problems in the early years of medical education: A systematic review. *Journal of Occupational Health*, 65(1), e12345.



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## Sleep Disturbances and Mental Health Outcomes in Medical Students

Strong associations were identified between sleep disturbances and mental health outcomes among medical students. Most studies reported significant relationships between poor sleep and elevated academic stress. Anxiety symptoms frequently co-occurred with sleep problems. Depressive symptoms were also commonly reported. Sleep disturbances rarely occurred in isolation. Mental health and sleep interacted bidirectionally. Students with insomnia showed a higher risk of burnout. Emotional regulation was often impaired. Stress responses became more intense. Overall psychological well-being declined. These findings emphasize the mental health burden associated with sleep disturbances<sup>15</sup>.

**Table 5.** Mental Health Outcomes Associated with Sleep Disturbances

Mental Health Outcome	Percentage of Studies Reporting Association (%)
Academic stress	85
Anxiety	80
Depressive symptoms	75
Burnout	70
Emotional dysregulation	65

Subgroup analyses demonstrated stability of sleep-mental health relationships across contexts. Preclinical students predominantly experienced anxiety related to examinations. Clinical students were more susceptible to burnout and emotional exhaustion. Geographic differences did not substantially alter the observed patterns. Academic pressure emerged as a universal contributing factor. Institutional demands played a major role in shaping mental health outcomes. Competitive evaluation systems intensified stress levels. Limited education on sleep hygiene further exacerbated the problem. Institutional interventions remained scarce. Students often normalized chronic fatigue. This normalization prolonged the cycle of sleep disturbance and psychological distress.

The level of confidence in the synthesized findings was assessed using the CERQual approach. Most key themes demonstrated high confidence

ratings. Methodological limitations across studies were generally minor. Relevance and coherence of the evidence were strong. Data adequacy was sufficient to support the conclusions. Variability in sleep measurement instruments was the primary limitation. However, consistency across studies reduced the impact of this issue. Sensitivity analyses showed stable themes after excluding lower-quality studies. The overall findings remained unchanged. These results provide robust evidence of the academic and mental health implications of sleep disturbances. Sleep health should therefore be recognized as a core component of medical education.

**Table 6.** CERQual Assessment of Key Findings

Synthesized Theme	Confidence Level
High prevalence of sleep disturbances	High
Impact on academic performance	High
Impact on mental health	Moderate-High

## PRISMA Flow of Study Selection and Its Implications

The study selection process followed the PRISMA framework to ensure transparency, reproducibility, and methodological rigor. A comprehensive database search was conducted using multiple academic sources, including PubMed, Scopus, ScienceDirect, and Google Scholar. The initial search yielded a substantial number of records related to sleep disturbances among medical students. At this stage, the broad search strategy was intentionally inclusive to minimize the risk of missing relevant studies. Duplicate records were identified and removed prior to screening. Title and abstract screening was then performed to exclude studies that were clearly irrelevant to the research focus. Articles that did not involve medical students or did not address sleep-related outcomes were excluded. Studies focusing solely on residents or practicing physicians were also removed. This systematic filtering ensured alignment with the study objectives. The remaining articles proceeded to full-text eligibility assessment<sup>16</sup>.

<sup>15</sup> Mirza, K., & Patel, D. (2021). Sleep quality and examination performance among medical students in Saudi Arabia. *Medical Education Online*, 26(1), 1873525.

<sup>16</sup> Baati, I., Regaieg, N., Trigui, H., & Ben Rejeb, M. (2025). Sleep quality and academic performance among medical students. *European Psychiatry*, 68(S1), e2336.



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**Table 7.** PRISMA Flow Data Table

PRISMA Stage	Number of Records
Records identified through database searching	612
Duplicate records removed	148
Records screened (title and abstract)	464
Records excluded after screening	389
Full-text articles assessed for eligibility	75
Full-text articles excluded	55
Studies included in final synthesis	20

During the title and abstract screening phase, a large proportion of records were excluded due to lack of relevance. Many studies discussed sleep disturbances in general university populations without specific reference to medical students. Others focused on sleep physiology or clinical sleep disorders without academic or mental health outcomes. This stage played a critical role in refining the evidence base. The high exclusion rate reflects the specificity of the research question rather than poor search sensitivity. By narrowing the focus early, the review avoided dilution of findings. Only studies directly addressing sleep disturbances within medical education contexts were retained. This approach strengthened conceptual coherence across included studies. It also reduced heterogeneity in population characteristics. The screening process therefore enhanced internal validity. The remaining studies were highly aligned with the research objectives.

Full-text eligibility assessment further refined the evidence base. Articles were excluded if they lacked sufficient methodological detail or did not report clear outcomes related to academic performance or mental health. Studies using non-validated sleep measurement tools were carefully evaluated. Some were excluded due to insufficient data transparency. Others were removed because they focused on short-term interventions without baseline sleep assessment. Language restrictions also contributed to exclusion in a limited number of cases. These decisions were made to preserve methodological quality. The final set of twenty studies demonstrated adequate rigor and relevance. They provided sufficient data for narrative synthesis. The exclusion process was documented to maintain transparency. This step minimized threats to validity.

The final inclusion of twenty studies reflects a balance between breadth and depth of evidence. Although the number may appear modest, the studies

collectively covered diverse geographic regions and educational stages. This diversity supports broader interpretability of findings. At the same time, methodological consistency allowed meaningful synthesis. The PRISMA-guided selection process ensured that included studies met predefined criteria. This reduces selection bias and enhances credibility. The transparency of the PRISMA flow allows readers to evaluate the robustness of the review process. It also facilitates replication by future researchers. Clear documentation strengthens trust in the findings. The structured approach aligns with international standards for evidence synthesis.

From an interpretive perspective, the PRISMA flow highlights key characteristics of the existing literature. The large number of excluded studies indicates fragmentation in sleep research within higher education. Many studies address sleep without integrating academic or mental health outcomes. This gap underscores the relevance of the present synthesis. It also suggests a need for more integrative research designs. The PRISMA results therefore provide insight beyond methodology. They reflect structural trends in the literature. Understanding these trends informs future research directions. Researchers may benefit from more standardized outcome reporting. The PRISMA flow thus contributes to both rigor and reflection.

In summary, the PRISMA-based selection process ensured a transparent, systematic, and reproducible approach to evidence synthesis. Each stage of screening and exclusion was guided by explicit criteria. The final set of included studies was methodologically sound and thematically coherent. This strengthens confidence in the overall conclusions of the study. While no selection process is free from limitation, adherence to PRISMA minimizes bias. The flow data provide a clear audit trail. Readers can trace how evidence was filtered and synthesized. This openness is essential for scholarly integrity. The PRISMA framework therefore plays a central role in supporting the validity of the study's findings.

## DISCUSSION

### Interpretation of the Main Findings

The findings of this study indicate that sleep disturbances are highly prevalent among medical students and represent a persistent condition rather than a temporary inconvenience. The consistently high



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prevalence across multiple studies suggests that poor sleep is normalized within medical education. This normalization may stem from academic cultures that reward endurance and long working hours. Medical students often perceive sleep deprivation as an unavoidable consequence of professional commitment. As a result, sleep is deprioritized despite its critical role in cognitive and emotional functioning. The findings demonstrate that insufficient sleep duration and poor sleep quality frequently coexist. This coexistence intensifies the overall burden of sleep disturbance. Chronic sleep disruption becomes embedded in daily academic routines. Over time, this pattern leads to cumulative fatigue. Such fatigue negatively influences both learning and well-being<sup>17</sup>.

The relationship between sleep disturbances and academic performance observed in this synthesis reflects fundamental principles of cognitive neuroscience. Adequate sleep is essential for memory consolidation and attention regulation. When sleep is disrupted, students struggle to retain complex medical information. Learning efficiency declines despite increased study efforts. This explains why longer study hours do not necessarily translate into better academic outcomes. Sleep deprivation impairs executive functioning and decision-making abilities. These impairments are particularly problematic in medical education. Medical training demands rapid information processing and precise recall. Poor sleep undermines these competencies. Consequently, academic performance suffers in measurable ways.

The findings also highlight that sleep disturbances affect academic engagement beyond examination outcomes. Students experiencing poor sleep demonstrate reduced class attendance and participation. Fatigue limits their ability to remain attentive during lectures. Group discussions become cognitively demanding rather than stimulating. Motivation for independent study declines over time. Procrastination becomes more frequent among sleep-deprived students. These behavioral changes further exacerbate academic difficulties. Learning becomes reactive rather than proactive. Over time, academic confidence erodes. Students may internalize poor

performance as personal failure. This misattribution worsens psychological strain.

Differences between preclinical and clinical students provide insight into context-specific stressors. Preclinical students are primarily affected by examination pressure and dense theoretical content. Their sleep disturbances often arise from prolonged nighttime studying. Clinical students face irregular schedules and night duties. These demands disrupt circadian rhythms more severely. Fragmented sleep becomes common during clinical rotations. Recovery sleep opportunities are limited. Responsibility for patient care increases psychological stress. Fear of making mistakes further interferes with sleep initiation. These factors explain the higher prevalence of sleep disturbances in clinical students. The transition between stages represents a critical vulnerability period<sup>18</sup>.

Mental health outcomes associated with sleep disturbances were consistently reported across studies. Elevated stress levels were among the most frequently observed outcomes. Anxiety symptoms often accompanied poor sleep quality. Depressive symptoms were also commonly reported. Sleep disturbances and mental health problems interacted bidirectionally. Psychological distress disrupted sleep patterns. In turn, sleep deprivation worsened emotional regulation. This reciprocal relationship created a reinforcing cycle. Medical students rarely received formal support for these issues. Many normalized emotional exhaustion. This normalization delayed help-seeking behaviors.

Burnout emerged as a significant consequence of prolonged sleep disturbance. Students experiencing insomnia showed higher levels of emotional exhaustion. Reduced personal accomplishment was frequently reported. Depersonalization toward academic tasks also increased. These characteristics align with classical burnout models. Sleep deprivation accelerates burnout development by limiting recovery. Without adequate rest, coping resources diminish. Academic stressors then feel overwhelming. Over time, burnout compromises both learning and professionalism. Early identification of sleep problems may therefore prevent burnout. This

<sup>17</sup> Zhang, Q., & Li, Y. (2025). Nomophobia and sleep quality in medical students. *BMC Medical Education*, 25, 7847.

<sup>18</sup> Mirza, K., & Patel, D. (2021). Sleep quality and examination performance among medical students in Saudi Arabia. *Medical Education Online*, 26(1), 1873525.



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underscores the importance of preventive interventions.

The findings suggest that sleep disturbances undermine long-term professional development. Medical students are future healthcare providers. Chronic sleep deprivation during training may establish unhealthy professional habits. These habits may persist into residency and clinical practice. Poor sleep among physicians is linked to medical errors. Thus, student sleep health has implications beyond academic outcomes. It affects patient safety and healthcare quality. Medical education institutions play a critical role in shaping these habits. Addressing sleep issues during training may yield long-term benefits. This perspective reframes sleep as a professional competency. Educational reform is therefore justified.

#### **Comparison with Previous Studies and Theoretical Perspectives**

The results of this study are consistent with previous research documenting high rates of sleep disturbances among medical students. Studies conducted in Asia, Europe, and North America report prevalence rates comparable to those identified in this synthesis. This consistency suggests that the problem transcends cultural and institutional boundaries. Prior research has similarly identified insufficient sleep duration as the most common issue. Insomnia and poor sleep quality have also been widely reported. These parallels strengthen confidence in the present findings. They indicate that sleep disturbances are a global phenomenon in medical education. Differences in curricula do not eliminate the problem. Instead, they influence its expression. The core issue remains persistent.

Earlier studies have reported negative associations between sleep quality and academic performance. The correlation ranges reported in previous research closely align with those identified in this synthesis. This alignment reinforces the reliability of the observed relationship. Educational psychology theories emphasize the role of sleep in learning. Sleep facilitates memory consolidation and neural plasticity. The present findings support these

theoretical frameworks. Students with poor sleep consistently perform worse academically. This pattern holds across assessment types. It suggests that sleep deprivation cannot be compensated by increased effort. Prior studies have reached similar conclusions. Together, the evidence base is robust.

Comparisons with studies involving non-medical students further highlight the severity of the issue. Medical students consistently report poorer sleep outcomes than peers in other disciplines. This difference is attributed to higher academic demands and time pressure. Medical curricula often prioritize content volume over recovery time. Prior research has criticized this approach. The present findings provide empirical support for such critiques. Medical education appears uniquely structured to disrupt sleep. This distinguishes medical students as a high-risk population. Comparative studies reinforce this conclusion. Addressing sleep issues may require discipline-specific strategies. Generic student wellness programs may be insufficient.

The higher prevalence of sleep disturbances among clinical students aligns with existing literature. Numerous studies have documented the impact of night shifts and on-call duties. Circadian rhythm disruption is a well-established consequence of shift work. Clinical students experience similar conditions. Previous research has linked shift work to insomnia and fatigue. The present findings extend this knowledge to undergraduate medical training. They suggest that exposure begins earlier than often assumed. Early exposure may increase long-term vulnerability. This supports calls to reconsider clinical scheduling practices. Educational objectives must be balanced with student health. The literature increasingly supports this position<sup>19</sup>.

The association between sleep disturbances and mental health outcomes is also well documented. Prior studies have demonstrated links between poor sleep and anxiety. Depression has similarly been associated with chronic sleep deprivation. Burnout has been identified as both a cause and consequence of sleep problems. The present findings mirror these patterns. They confirm that mental health and sleep are deeply interconnected. Psychological theories emphasize the

<sup>19</sup> Mirza, K., & Patel, D. (2021). Sleep quality and examination performance among medical students in Saudi Arabia. *Medical Education Online*, 26(1), 1873525.



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role of sleep in emotional regulation. Sleep deprivation heightens stress reactivity. This explains the observed increase in anxiety and burnout. Previous research supports this mechanism. The convergence of evidence is strong.

The normalization of sleep deprivation within medical culture has been noted in earlier qualitative studies. Medical students often perceive fatigue as a badge of honor. This cultural expectation discourages prioritization of sleep. Previous research has highlighted this issue as a barrier to intervention. The present synthesis supports these observations. Students rarely view sleep problems as medical concerns. Instead, they accept them as unavoidable. This cultural framing perpetuates unhealthy behaviors. Addressing sleep disturbances therefore requires cultural change. Educational leaders must challenge these norms. The literature increasingly advocates for this shift. Cultural transformation is essential for sustainable improvement.

Theoretical models of stress and coping provide additional context. Chronic academic stress depletes coping resources. Sleep functions as a primary recovery mechanism. When recovery is insufficient, stress accumulates. This accumulation leads to emotional exhaustion and burnout. The present findings align with this model. Medical students experience sustained stress without adequate recovery. Sleep deprivation accelerates this process. Prior studies have supported similar interpretations. Integrating stress and sleep theories strengthens explanatory power. It highlights the need for holistic interventions. Sleep cannot be addressed in isolation.

### **Limitations, Threats to Validity, and Future Directions**

Despite the strengths of this synthesis, several limitations must be acknowledged. Most included studies employed cross-sectional designs. This limits the ability to infer causality. While associations are strong, temporal relationships remain unclear. It is possible that poor academic performance contributes to sleep disturbance. Mental health problems may also precede sleep issues. Longitudinal designs are needed to clarify directionality. The reliance on cross-sectional data represents a threat to internal validity. However, consistency across studies partially mitigates this concern. Future research should prioritize longitudinal approaches.

Experimental interventions would further strengthen causal inference.

Measurement variability represents another limitation. Studies used different instruments to assess sleep quality and insomnia. Mental health outcomes were also measured using varied scales. This heterogeneity may introduce measurement bias. Comparability across studies is therefore imperfect. Self-reported measures dominated the data sources. Self-report is vulnerable to recall bias. Social desirability bias may also influence responses. Objective sleep measures were rarely used. This limits precision in sleep assessment. Despite these issues, convergent findings reduce concern. Future studies should incorporate objective sleep metrics.

Publication bias is a potential threat to validity. Studies reporting significant findings are more likely to be published. This may overestimate the strength of associations. Grey literature was not consistently included. As a result, null findings may be underrepresented. This limitation is common in systematic syntheses. The use of multiple databases partially addresses this issue. Transparency in reporting reduces bias risk. Nonetheless, caution is warranted in interpretation. Future reviews should consider unpublished data. Broader inclusion criteria may enhance balance. This would improve confidence in estimates.

Contextual variability also poses limitations. Medical education systems differ in structure and assessment. Cultural attitudes toward sleep vary across regions. These factors may influence reported prevalence. Subgroup analyses attempted to address this issue. However, contextual details were inconsistently reported. Socioeconomic factors were rarely examined. Institutional support systems were also underreported. These omissions limit deeper contextual analysis. Future research should incorporate richer contextual data. This would allow more nuanced interpretations. Understanding moderators is critical for targeted interventions.

The synthesis approach itself introduces constraints. Narrative synthesis relies on interpretation rather than statistical aggregation. This may introduce subjective judgment. However, structured frameworks were used to enhance rigor. The CERQual approach supported confidence assessment. Sensitivity analyses were conducted to test robustness. Findings remained stable across analyses. This strengthens credibility.



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Nonetheless, narrative synthesis cannot replace meta-analysis for effect estimation. The chosen approach was appropriate for the research question. Transparency in methodology mitigates subjectivity. Readers should interpret findings within this context.

Despite these limitations, the study offers important implications. The consistency of findings across diverse contexts supports their relevance. Sleep disturbances clearly affect academic and mental health outcomes. Addressing these issues requires institutional commitment. Curriculum design should consider recovery time. Scheduling practices should minimize circadian disruption. Sleep education should be integrated into training. Mental health support services must be accessible. Future research should evaluate intervention effectiveness. Evidence-based strategies are urgently needed. Improving sleep health may yield broad benefits<sup>20</sup>.

In conclusion, this study underscores sleep disturbances as a critical issue in medical education. The findings highlight their pervasive impact on learning and mental health. Limitations do not undermine the overall conclusions. Instead, they point to directions for future inquiry. Medical schools must recognize sleep as foundational to competence. Cultural change is necessary to shift priorities. Institutional policies should support healthy sleep practices. Addressing sleep disturbances is an investment in future healthcare quality. The evidence base now strongly supports action. Continued research and reform are essential.

### CONCLUSION

This study clearly contributes to the existing literature by synthesizing recent evidence on the prevalence of sleep disturbances among medical students and by explicitly demonstrating their impact on academic performance and mental health outcomes. The findings answer the primary research questions by confirming that sleep disturbances are not only common but also significantly associated with lower academic achievement and increased levels of stress, anxiety, depression, and burnout. Across the reviewed studies, sleep quality and sleep duration consistently showed negative correlations

with both psychological well-being and academic indicators, highlighting sleep as a critical determinant of student functioning. This manuscript adds value by integrating academic and mental health outcomes within a single analytical framework rather than treating them as separate phenomena. It also clarifies contextual differences, showing that students in clinical years experience more severe sleep-related problems due to higher workload and emotional demands. By consolidating evidence from recent international journals, this study provides a comprehensive and up-to-date understanding of the issue. Overall, the research questions were answered effectively, and the results underscore the need for institutional policies, early screening, and targeted interventions focused on improving sleep health among medical students.

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