Original Article

Independent Influence of Sleep Quality, Daytime Sleepiness, and Chronotype on Mental Health and Academic Performance among MBBS Students of Mirpur Medical College, AJK

Amna Ahmed Noor[1], Farooq Ahmed Noor[2], Muhammad Shoaib[2], Alyia Imtiaz[3], Ahmed Munir Qureshi[2] and Khuram Shahzad Khan[4]

ABSTRACT

Objective: To study Independent Influence of Sleep Quality, Daytime Sleepiness, and Chronotype on Mental Health and Academic Performance among MBBS Students Mirpur AJK

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the Department Of Community Medicine & Medical Education of MBBS Medical College, Mirpur AJK from 1st March 2024 to 30th February, 2025.

Methods: Data were comprehensively collected through a validated questionnaire, which included the Pittsburgh Sleep Quality Index (PSQI) to accurately assess sleep quality, the Epworth Sleepiness Scale (ESS) to objectively evaluate daytime sleepiness, the Depression Anxiety Stress Scale (DASS-21) to precisely determine mental health status, and the Morningness–Eveningness Questionnaire (MEQ) to reliably identify chronotype. Academic performance was objectively measured using Grade Point Average (GPA). Statistical analysis was meticulously performed using SPSS version 21.0, and significance was appropriately set at $p < 0.05$.

Result: Among 200 medical students, poor sleep quality was *negatively associatively* linked with academic performance, as those with poor sleep *academically worse performed* (mean GPA 2.93 ± 0.34) compared to good sleepers (3.44 ± 0.27). Daytime sleepiness *adversely associatively* reduced GPA, *progressively declining* from normal alertness (3.38 ± 0.31) to moderate-to-severe sleepiness (2.78 ± 0.36). Mental health was *statistically significantly* influenced by sleep quality, with poor sleepers more *frequently reporting distress* ($p < 0.001$). Chronotype *correlatively varied*, as morning types *academically better performed* (3.45 ± 0.28), while evening types *academically worse performed* (2.82 ± 0.35). Regression analysis *independently demonstratively* confirmed that poor sleep quality and higher daytime sleepiness *negatively predictively* and *adversely associatively* influenced GPA, collectively showing that disturbed sleep physiology *strongly impactfully* affected both academic performance and mental health.

Conclusion: Overall, reduced sleep quality, increased sleepiness, and late chronotype were negatively and substantially associated with academic success and mental wellness. Therefore, it is strongly suggested that healthy sleep habits and regular sleep schedules,

Key Words: Sleep, Mental Health, Academic Performance

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INTRODUCTION

[1.] Department of Medical Education / Community Medicine[2] / Infection Prevention Control[3] / Physiology[4], MBBS Medical College Mirpur, AJK.

Correspondence: Dr. Amna Ahmed Noor, Assistant Professor of Medical Education MBBS Medical College Mirpur AJK.
Contact No: 0343-7111333
Email: amnaahmednoor@gmail.com

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Sleep essentially functions to sustain cognitively, emotionally, and physically. Disruptions in sleep quality or circadian rhythm have been consistently associatively with impaired memory consolidation, reduced academic productivity, and deteriorated psychological well-being.[1] allow researchers systematically to investigatively examine the complex interplay between sleep physiology, mental health, and academic performance.[2]

Evidence increasingly demonstrates that medical students particularly suffer vulnerably due to academic pressures, irregular study hours, and psychological stress and impaired academic outcomes.[3] The COVID-19 pandemic additionally exacerbated these conditions,

with medical students reporting worsened sleep quality and elevated psychological distress.[5]Regionally, studies similarly reveal highly prevalent poor sleep, daytime fatigue, and mood disturbances.[4]

Objective assessments such as actigraphy and chronotype questionnaires consistently confirmatively reveal circadian misalignment among students.Experimental sleep restriction demonstratively compromises attention, learning, and memory.[5]Recent studies further emphasize that chronotype, sleep quality, and stress are closely interconnected with academic achievement.[9]

Technological advancements now permit consumer actigraphy to be validated practically for sleep monitoring. Mental health problems has been strongly documented.[6] Lifestyle factors, including smartphone overuse and irregular schedules, additionally aggravate sleep disruption .Neurophysiological investigations fundamentally demonstrate that circadian and homeostatic regulation orchestrates emotional stability and cognitive efficiency.[7]Ultimately, poor-quality sleep consistently associates directly with reduced academic and mental health outcomes.[8]

METHODS

A cross-sectional descriptive study was systematically conducted at Mirpur Medical College, Azad Jammu and Kashmir (AJK) to scientifically examine the relationship between sleep quality, sleepiness of day, chronotype, mental health, and academic performance among MBBS students. This Study Was Conducted at The Department Of Community Medicine & Medical Education of MBBS Medical College, Mirpur AJK From 1st March 2024 to 30th February 2025.

Study Population

A total of 200 MBBS students from all academic years were randomly included. Both male and female students were equally represented. Participation was voluntarily ensured, and written informed consent was properly obtained from each participant prior to data collection.

Eligibility Criteria

Inclusion Criteria:

- Students aged 18–28 years were appropriately included.
- Those who willingly participated and completely filled the questionnaire were carefully considered.

Exclusion Criteria:

- Students with previously diagnosed psychiatric disorders or chronic medical conditions were systematically excluded.
- Those regularly using sleep medications or stimulants were also completely excluded from the study.

Data Collection Procedure

Data were accurately collected which was logically divided into five distinct sections:

1. **Demographic Profile:** Information regarding age, gender, academic year, and self-reported GPA was clearly recorded.
2. **Sleep Quality:** The Pittsburgh Sleep Quality Index (PSQI) was reliably utilized to objectively assess sleep quality.
    - A PSQI score ≤5 was classifiably identified as good sleep, while a score >5 was specifically considered poor sleep.
3. **Daytime Sleepiness:** The Epworth Sleepiness Scale (ESS) was scientifically employed to quantitatively evaluate daytime sleepiness.
    - Scores were categorically divided into normal alertness (0–10), mild sleepiness (11–12), and moderate-to-severe sleepiness (≥13).
4. **Mental Health:** It was consistently applied to objectively assess levels of depression, anxiety, and stress by Depression Anxiety Stress Scale (DASS-21)
5. **Chronotype Assessment:** For accurately classify participants as morning type, intermediate type, or evening type in The Morningness–Eveningness Questionnaire (MEQ)

Collected data were systematically entered and statistically analyzed using SPSS version 21.0. Continuous variables such as GPA and age were numerically expressed as mean ± standard deviation (SD). Categorical variables were summarized descriptively as frequencies and percentages. Independent t-tests and one-way ANOVA were appropriately performed to comparatively evaluate GPA across groups. Pearson's correlation was statistically applied to precisely determine relationships in (mental health), (sleep quality) , and (academic)performance. Multiple linear regressions were independently conducted to reliably identify predictors of academic outcomes. A p-value < 0.05 was statistically considered significant.

Ethical approval for this study was formally obtained from Review Board of Mirpur Medical College. Participants were confidentially assured that all responses would remain anonymous. Participation was voluntarily maintained, and students were freely allowed to withdraw at any stage without any disadvantage.

RESULTS

Out of 200 medical students, 32.5% were classifiably placed in the good sleep category (PSQI ≤5), whereas 67.5% were identifiably grouped as poor sleepers (PSQI >5). Academic performance was observably higher among good sleepers (mean GPA 3.44 ± 0.27), while it was notably lower among poor sleepers (mean GPA 2.93 ± 0.34). Thus, poor sleep quality was negatively and significantly associated with academic performance.

Table No. 1. Sleep Quality Classification and Academic Performance among Medical Students (n = 200)

Sleep Quality (PSQI)	Number of Students	Percentage (%)	Mean GPA ± SD	Association with Academic Performance
Good Sleep (≤5)	65	32.5	3.44 ± 0.27	Positively associated
Poor Sleep (>5)	135	67.5	2.93 ± 0.34	Negatively associated

Table No.2: Daytime Sleepiness (ESS Scores) and Academic Performance

Sleepiness Category	Number of Students	Percentage (%)	Mean GPA ± SD	Trend in Academic Performance
Normal Alertness	86	43.0	3.38 ± 0.31	Highest GPA
Mild Sleepiness	54	27.0	3.07 ± 0.33	Moderate GPA
Moderate–Severe Sleepiness	60	30.0	2.78 ± 0.36	Lowest GPA

Table No.3: Relationship between Sleep Quality and Mental Health Status

Sleep Quality	Normal Mental Health (%)	Mild Distress (%)	Moderate Distress (%)	Severe–Extremely Severe Distress (%)	p-value
Good Sleep	71.6	17.8	7.3	3.3	<0.001
Poor Sleep	25.7	19.2	20.8	34.3	<0.001

Table No.4: Chronotype Distribution and Academic Performance

Chronotype Type	Number of Students	Percentage (%)	Mean GPA ± SD	Association
Morning Type	75	37.5	3.45 ± 0.28	Positive
Intermediate Type	87	43.5	3.11 ± 0.32	Neutral
Evening Type	38	19.0	2.82 ± 0.35	Negative

Table No.5: Regression Analysis for Predictors of Academic Performance

Predictor Variable	β Coefficient	95% CI	p-value	Direction of Effect
Poor Sleep Quality	–0.41	–0.54 to –0.29	<0.001	Negative
Daytime Sleepiness	–0.36	–0.50 to –0.18	<0.01	Negative
Morning Chronotype	+0.27	+0.12 to +0.38	0.02	Positive

Daytime sleepiness, as objectively assessed by the Epworth Sleepiness Scale (ESS), progressively increased across categories. Normal alertness was frequently observed in 43.0% of participants, mild sleepiness in 27.0%, and moderate-to-severe sleepiness in 30.0%. GPA steadily declined from 3.38 ± 0.31 in normally alert individuals to 2.78 ± 0.36 among those severely sleepy. Academic outcomes were adversely and proportionally affected as daytime sleepiness gradually worsened.

Sleep quality and mental health were strongly and correlatively related. Among poor sleepers, only 25.7% were mentally normal, compared with 71.6% of good sleepers. Severe-to-extremely severe distress was disproportionately reported by poor sleepers (34.28%) compared with good sleepers (3.3%). The relationship was statistically and significantly demonstrable ($p < 0.001$), confirmingly proving that poor sleep was strongly associated with psychological distress.

Chronotype distribution consistently varied across groups: 37.5% were morning type, 43.5% intermediate, and 19.0% evening type. Morning types academically performed better (mean GPA 3.45 ± 0.28), intermediate types moderately performed (3.11 ± 0.32), and evening types academically performed worse (2.82 ± 0.35). Morning chronotype was positively and correlatively linked with higher GPA, while evening chronotype was negatively and associatively connected with lower outcomes.

Regression modeling independently and significantly confirmed predictors of academic outcomes. Poor sleep quality negatively and predictively influenced GPA ($\beta = –0.41$, $p < 0.001$), while higher daytime sleepiness adversely and associatively reduced GPA ($\beta = –0.36$, $p < 0.01$).

Collectively, sleep quality, daytime sleepiness, and chronotype independently and substantially impacted both mental health and academic performance among medical students.

DISCUSSION

The findings of this study convincingly highlight that sleep physiology profoundly impacts both academic performance and mental health among medical students. Students with poor sleep quality consistently demonstrated lower GPA scores, which clearly underscores the essential role of restorative sleep in sustaining optimal cognitive functioning. Specifically, poor sleepers (mean GPA 2.93 ± 0.34) academically underperformed compared with their peers who

reported good sleep quality (mean GPA 3.44 ± 0.27). This outcome directly aligns with prior evidence indicating that poor sleep quality detrimentally disrupts attention span, working memory, and executive functioning—processes critically required for learning and examination performance.[9] Daytime sleepiness, as objectively assessed by the Epworth Sleepiness Scale (ESS), progressively increased across categories. Normal alertness was frequently observed in 43.0% of participants, mild sleepiness in 27.0%, and moderate-to-severe sleepiness in 30.0%. GPA steadily declined from 3.38 ± 0.31 in normally alert individuals to 2.78 ± 0.36 among those severely sleepy. Academic outcomes were adversely and proportionally affected as daytime sleepiness gradually worsened. Moreover, the results of this study strongly validate the assertion that subjective sleep disturbances, as measured by PSQI, associatively link with academic inefficiency in medical school environments, where effective and consistent study habits are urgently needed.

Daytime sleepiness emerged significantly as another determinant influencing academic outcomes. GPA scores progressively declined across levels of increasing ESS scores, with students reporting moderate-to-severe daytime sleepiness academically performing poorest (mean GPA 2.78 ± 0.36). These findings correspondingly align with literature demonstrating that excessive daytime sleepiness, often arising from insufficient or fragmented nocturnal sleep, negatively impairs attention, psychomotor vigilance, and learning efficiency. This pattern clearly suggests that even when total sleep duration is nominally adequate, poor sleep quality that persistently produces residual sleepiness can substantially compromise academic functioning. For medical students, who typically balance irregular schedules and high workloads, the cumulative effect of sleepiness seriously threatens both short-term learning efficiency and long-term retention of knowledge.[10]

The study also demonstratively revealed that mental health was significantly influenced by sleep quality. Poor sleepers frequently reported higher rates of stress, anxiety, and psychological distress compared with good sleepers. This observation strongly supports the bidirectional relationship in which poor sleep directly exacerbates psychological stress, while heightened stress reciprocally impairs sleep quality. Sleep quality and mental health were strongly and correlatively related. Among poor sleepers, only 25.7% were mentally normal, compared with 71.6% of good sleepers. Severe-to-extremely severe distress was disproportionately reported by poor sleepers (34.28%) compared with good sleepers (3.3%). The relationship was statistically and significantly demonstrable ($p < 0.001$), confirmingly proving that poor sleep was strongly associated with psychological distress. Such reciprocal effects rapidly create a vicious cycle, predictably increasing vulnerability to burnout and depressive symptoms. Since medical students already consistently face academic pressures, clinical duties, and professional expectations, the identification of sleep quality as a modifiable factor practically offers a promising pathway for interventions designed to enhance mental well-being. These findings further reinforce earlier reports that poor sleep not only academically weakens performance but also seriously compromises psychological resilience and long-term professional sustainability.[11]

Chronotype distribution additionally emerged as a crucial factor influencing outcomes. Morning-type students academically performed better (mean GPA 3.45 ± 0.28), whereas evening-type students regularly underperformed (mean GPA 2.82 ± 0.35). This finding clearly correlates with prior research showing that circadian misalignment, irregular sleep schedules, and delayed chronotypes adversely influence both academic success and mental health.[12] Neurophysiological evidence convincingly demonstrates that circadian preference interacts with hormonal rhythms, memory consolidation, and daily alertness patterns, thereby making students with evening chronotypes increasingly prone to poor concentration and inconsistent study habits. Since medical school schedules predominantly operate in the mornings, evening chronotypes may structurally experience academic disadvantages. This scenario strongly indicates the need for institutional flexibility or support strategies to strategically mitigate such chronotype-related penalties.[13]

Regression analysis in this study independently demonstrated that poor sleep quality and higher sleepiness of day was significant predictors of reduced GPA. The independent contribution of each factor clearly underscores the importance of identifying and addressing sleep-related disruptions early in academic training. It was structured time management, stress reduction programs, and wearable device–based monitoring of sleep patterns could be effectively integrated into medical curricula. [14] Implementing such measures may not only substantially improve academic performance but also proactively strengthen psychological well-being and resilience against professional burnout.

Collectively, this evidence undeniably highlights the central role of sleep physiology in shaping both academic and psychological outcomes among medical students. Poor sleep quality, mostly sleepiness of day , and unfavorable chronotypes consistently and detrimentally impact cognitive efficiency while simultaneously amplifying susceptibility to stress and emotional disturbances. Interventions designed to promote sleep awareness, encourage structured schedules, and enhance resilience could positively influence academic achievement and mental health stability in this population. Future longitudinal research

should systematically evaluate whether improving sleep quality directly and sustainably translates into academic benefits and psychological resilience, thereby ultimately confirming the causal pathways suggested by these findings.

CONCLUSION

It was observably found that sleep quality significantly influenced both mental health and academic performance among medical students. Higher academic achievement and better psychological well-being were consistently recorded among students maintaining good sleep patterns. Conversely, lower grades and increased mental distress were commonly identified among those experiencing poor sleep quality and greater daytime sleepiness. Academic performance was generally observed to be better among morning-type students as compared to evening types. Overall, reduced sleep quality, increased sleepiness, and late chronotype were negatively and substantially associated with academic success and mental wellness. Therefore, it is strongly suggested that healthy sleep habits and regular sleep schedules should be actively promoted to effectively enhance the overall health and academic performance of medical students.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Amna Ahmed Noor, Farooq Ahmed Noor, Muhammad Shoaib
Drafting or Revising Critically:	Alyia Imtiaz, Ahmed Munir Qureshi, Khuram Shahzad Khan
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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