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Original Research Article

Insomnia and Academic Performance: A Correlational Study of Undergraduate Students in District Okara, Pakistan

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Abstract: *Insomnia is common in university students and may adversely affect learning, concentration, and academic outcomes. District-level evidence from Pakistan, including Okara, remains limited.* ***Objective:*** *To determine the prevalence of insomnia and examine its association with academic performance among undergraduate students in District Okara, Pakistan.* ***Methods:*** *A cross-sectional study was conducted from December 2024 to March 2025 among 632 undergraduate students from academic institutions in Okara. Data were collected using a structured questionnaire including demographic variables, self-reported CGPA, and the Insomnia Severity Index (ISI). Descriptive statistics were used to estimate the prevalence of insomnia. Chi-square tests assessed associations between insomnia severity and participant characteristics. Spearman's correlation was used to examine the relationship between ISI score and CGPA. Statistical significance was set at $p < 0.05$.* ***Results:*** *Overall, 60.3% of students reported insomnia symptoms (mild to severe), while 39.7% reported no clinical insomnia. Insomnia severity was distributed as mild (37.8%), moderate (19.9%), and severe (2.5%), and it was significantly associated with gender ($p = 0.008$) and academic discipline ($p = 0.008$), but not with age, residence, marital status, family income, or CGPA category. Spearman's correlation showed a weak negative association between insomnia severity and academic performance ($r = -0.100$, $p = 0.012$).* ***Conclusion:*** *Insomnia symptoms were highly prevalent among undergraduates in Okara and were weakly but significantly associated with lower academic performance. Universities should consider sleep health promotion, early screening, and student support interventions to reduce the burden of insomnia and improve academic functioning.*

Keywords: Insomnia, Insomnia Severity Index, Prevalence, Academic Performance, CGPA, Undergraduate Students

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Introduction

Sleep is a fundamental biological process that supports physical restoration, emotional regulation, and optimal cognitive functioning. Although sleep is a basic human need, sleep disturbances are increasingly common among undergraduate students, with insomnia being one of the most prevalent sleep disorders reported in adults and young people. Insomnia is characterized by persistent difficulty initiating sleep, maintaining sleep, or experiencing early-morning awakening with an inability to return to sleep, despite adequate opportunity to sleep. It is accompanied by clinically meaningful distress or daytime functional impairment (1). Contemporary evidence indicates that insomnia symptoms are common among university students and young adults, making it an essential public health and educational concern (2).

Academic performance is shaped not only by cognitive ability but also by modifiable behavioral and psychosocial factors, including sleep quality, psychological well-being, stress, lifestyle habits, and time management. Sleep is central to attention, learning efficiency, memory consolidation, and executive functioning. Inadequate or fragmented sleep may lead to daytime sleepiness, reduced motivation, impaired attention during lectures, and poorer information processing, all of which can negatively affect academic outcomes.

Multiple interacting determinants, including lifestyle choices, physical health, the sleep environment, and social and psychological circumstances, influence sleep quality. Psychological factors such as stress, anxiety, low mood, and emotional tension are consistently linked to disturbed sleep and may play a significant role in triggering or maintaining insomnia symptoms (3). High cognitive workload and mental exhaustion have also been associated with a greater risk of insomnia, suggesting that sustained academic and cognitive demands can contribute to sleep disruption in student populations (4). Conversely, maintaining a healthy lifestyle, particularly regular physical activity, supports brain health and cognitive resilience and may protect against sleep problems and cognitive impairment (5).

Several socio-demographic and behavioral factors have been associated with insomnia. Prior studies have reported relationships between insomnia and age, gender, mental health conditions, and use of sleep medications. In addition, institutional and household factors, housing status, caffeine intake, smoking, alcohol use, and mental health disorders have also been linked with insomnia symptoms (6). Sleep difficulties are not limited to students, as sleep and daily functioning are closely related across working-age populations, where insomnia is frequently associated with poorer health and impaired daytime performance (7,8).

Technology and psychosocial behaviors are increasingly relevant in modern student life. Insomnia, anxiety, and depressive symptoms have been reported alongside problematic social media use, suggesting that excessive or dysregulated media engagement may exacerbate sleep disturbance through heightened arousal and bedtime delay (9). Family and home environments may also influence sleep patterns, as unfavorable family conditions have been associated with increased sleep latency (10). Alongside these factors, exposure to stimulants and substances such as caffeine, tobacco, and alcohol can adversely affect sleep onset and sleep continuity, highlighting the importance of modifiable habits for sleep health (10).

Because sleep is complex and influenced by biological, psychological, and social mechanisms, chronic sleep problems may have broad consequences. Chronic insomnia is frequently associated with reduced concentration, poorer memory, increased risk of depression, decreased work or academic performance, and increased healthcare use (11). Among students, insomnia is often accompanied by poorer sleep hygiene and higher levels of stress, anxiety, depressive symptoms, and daytime sleepiness compared to those without insomnia (12). University

schedules, academic workload, and study routines often lead to irregular sleep patterns, and a large proportion of students report daytime tiredness, which may contribute to reduced academic success (13).

Poor sleep can diminish mental alertness and sustained attention by increasing fatigue and daytime sleepiness, reducing the ability to perform tasks that require memory, concentration, and problem-solving. Consequently, students with persistent sleep disturbances may be at higher risk of academic difficulties. Insomnia affects individuals across age groups, but university students may be particularly vulnerable due to intense academic demands and stressors that may persist beyond graduation (14). Moreover, poor sleep quality is strongly linked to impaired cognitive functioning and learning processes, and it is associated with adverse outcomes such as reduced academic performance, mental health problems, and other safety and health risks (15).

Despite increasing recognition of student sleep problems, evidence from many districts in Pakistan remains limited. Investigating insomnia among undergraduates in District Okara is essential because it provides district-level data on a common but under-addressed condition and clarifies its potential relationship with academic outcomes. This study, therefore, aimed to determine the prevalence of insomnia among undergraduate students in Okara and to examine its association with academic performance. The findings inform student counseling services and institutional awareness initiatives to promote healthier sleep behaviors and improve educational outcomes.

Methodology

A cross-sectional study was conducted to assess the prevalence of insomnia and its association with academic performance among undergraduate students enrolled in degree programs across educational institutions in District Okara, Pakistan. Data were collected between December 2024 and March 2025 using a structured, self-administered questionnaire that included demographic variables, academic information, lifestyle factors, and the validated Insomnia Severity Index (ISI) scale (16).

Undergraduate students from multiple universities and colleges in Okara were approached using a non-probability sampling strategy. Students enrolled in full-time undergraduate degree programs and willing to participate were considered eligible. Individuals enrolled in diploma or short-course programs or those unable to provide informed consent were excluded. A total of 632 students completed the survey.

Data were collected using a structured questionnaire consisting of two parts. The first part included demographic and academic characteristics such as age, gender, discipline, residence, marital status, family income, and cumulative grade point average (CGPA). The second part comprised the Insomnia Severity Index (ISI), a 7-item validated scale widely used to assess insomnia symptoms. Each item is scored from 0 to 4, yielding a total score ranging from 0 to 28, with established cutoffs for no insomnia, subthreshold insomnia, moderate insomnia, and severe insomnia.

Participants were informed of the study's purpose and voluntary nature, after which written consent was obtained. Questionnaires were distributed in classrooms, campus common areas, and online academic platforms. Completed forms were checked for completeness and entered into a secure database. Data integrity was maintained through double-entry verification and routine quality checks.

Data were analyzed using SPSS version 21. Descriptive statistics (frequencies, %ages, means, and standard deviations) were used to summarize demographic variables and ISI categories. The normality of continuous variables was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Associations between categorical variables and insomnia severity were examined using the chi-square test. Because academic performance (CGPA) did not meet the assumptions of normality, Spearman's rank-order correlation was used to assess the relationship between insomnia severity and academic performance. A p-value <0.05 was considered statistically significant.

Ethical approval was obtained from the University of Okara's Ethics Committee. Informed consent was secured from all participants. Confidentiality and anonymity were maintained throughout the study.

Results

A total of 632 undergraduate students participated in the study. The mean age of respondents fell primarily within the 17–21 year range (62.8%), and the majority were female (83.7%). Most students were enrolled in Life Sciences (45.2%), reported a CGPA between 3.01 and 3.50 (57.4%), had a family income ≤ PKR 50,000 (68.9%), and were unmarried (96.0%). Table 1 summarizes the demographic characteristics of participants.

Table 1: Demographic Characteristics of Participants (N=632)

Variable	Category	n	%
Gender	Male	103	16.3
	Female	529	83.7
Age (years)	17–21	397	62.8
	22–26	233	36.8
	27–31	2	0.3
Discipline	Life Sciences	286	45.2
	Sciences	64	10.1
	Computing	61	9.6
	Management Sciences	1	0.1
	Health Sciences	17	2.6
	Arts & Social Sciences	127	20.0
	Education	76	12.0
CGPA	2.00–2.50	6	1.0
	2.51–3.00	80	12.6
	3.01–3.50	363	57.4
	3.51–4.00	183	28.9
Family Income (PKR)	≤ 50,000	436	68.9
	50,001–100,000	186	29.4
	100,001–200,000	8	1.2
	200,001–300,000	2	0.3
Residence	Village	272	43.0
	City	360	57.0
Marital Status	Married	25	4.0
	Unmarried	607	96.0

Based on the Insomnia Severity Index (ISI), 60.3 % of students experienced some level of insomnia. Subthreshold insomnia was the most common (37.8 %), followed by moderate clinical insomnia (19.9 %), and severe insomnia (2.5 %). Only 39.7 % reported no insomnia (Table 2).

Table 2: Prevalence of Insomnia Among Undergraduate Students

ISI Category	n	%
No clinical insomnia	251	39.7
Subthreshold insomnia (Mild)	239	37.8
Clinical insomnia (Moderate)	126	19.9
Clinical insomnia (Severe)	16	2.5

Chi-square analysis showed a significant association between insomnia severity and gender (p = 0.008), with female students reporting higher levels. Academic discipline was also significantly associated with insomnia (p = 0.008). No significant associations were found with age, residence, marital status, CGPA, or family income (Table 3).

Table 3: Association Between Participant Characteristics and Insomnia Severity (ISI Categories), N=632

Variable	Category	No clinical insomnia n	Subthreshold insomnia n	Clinical insomnia (Moderate) n	Clinical insomnia (Severe) n	Total n	χ^2 (df)	p-value
Gender	Male	32	36	33	2	103	11.793 (3)	0.008*
	Female	219	203	93	14	529		
Age (years)	17–21	151	157	74	15	397	9.706 (6)	0.138
	22–26	99	81	52	1	233		
	27–31	1	1	0	0	2		
Discipline	Life Sciences	126	108	47	5	286	35.501 (18)	0.008*
	Sciences	32	21	10	1	64		
	Computing	28	15	14	4	61		
	Management Sciences	1	0	0	0	1		
	Health Sciences	3	11	3	0	17		
	Arts and Social Sciences	39	52	30	6	127		
	Education	22	32	22	0	76		
Residence	City	139	138	73	10	360	0.565 (3)	0.904
	Village	112	101	53	6	272		
Marital status	Married	7	12	6	0	25	2.488 (3)	0.477
	Unmarried	244	227	120	16	607		
CGPA	2.00–2.50	1	2	3	0	6	13.995 (9)	0.123
	2.51–3.00	25	28	23	4	80		
	3.01–3.50	142	145	67	9	363		
	3.51–4.00	83	64	33	3	183		
Family income (PKR)	≤ 50,000	181	161	81	13	436	10.379 (9)	0.321
	50,001–100,000	64	74	45	3	186		
	100,001–200,000	4	4	0	0	8		
	200,001–300,000	2	0	0	0	2		

**Statistically significant at p < 0.05.*

Spearman's rank correlation revealed a weak but statistically significant negative correlation between ISI scores and academic performance (r = -0.100, p = 0.012). This indicates that as insomnia severity increases, CGPA tends to decline. (Table 4)

Table 4. Spearman Correlation Between Insomnia Severity (ISI Total Score) and Academic Performance (CGPA), N=632

Variables	Spearman's rho (r)	p-value	N
ISI total score vs. CGPA	-0.100	0.012*	632

*Correlation is significant at p < 0.05 (2-tailed)**

Discussion

This study examined the prevalence of insomnia and its relationship with academic performance among undergraduate students in Okara, Pakistan. Globally, insomnia remains common; recent estimates suggest that a notable proportion of adults experience insomnia symptoms, and severe insomnia also contributes to the global burden of sleep disorders (17). Across age groups, insomnia has been reported more often among females than males, which may reflect interacting biological, psychological, and social mechanisms, including stress vulnerability, hormonal influences, and gender differences in reporting sleep complaints (17).

In Pakistan, insomnia appears to be increasing alongside global trends, and student populations may be particularly affected due to academic pressure and lifestyle disruption. Academic overload, pressure to perform,

future-related worries, and persistent negative thinking can contribute to hyperarousal and irregular sleep patterns. In addition, late-night routines, prolonged screen exposure, and inconsistent sleep schedules may further worsen sleep quality, collectively impairing well-being, concentration, and academic functioning (18).

In the present study of 632 undergraduate students, insomnia symptoms were highly prevalent. However, nearly 40 % of participants reported no clinically significant insomnia, and approximately 60 % experienced insomnia ranging from mild to severe. Subthreshold insomnia was the most frequent category, followed by moderate insomnia, while severe insomnia affected a smaller proportion. This pattern is essential because subthreshold insomnia can progress if unaddressed and may respond well to early, low-intensity interventions such as sleep hygiene education and stress management support.

Prior studies have reported varying distributions of insomnia severity among university students. Some research suggests that moderate sleep problems may be widespread and that males and females may experience sleep disturbance at similar rates in specific settings (19). In contrast, our findings showed higher insomnia severity among female students. Evidence from regional student populations also indicates that insomnia may be more prevalent among females. However, inconsistencies across studies and contexts highlight the influence of setting, measurement methods, and cultural factors (20).

In terms of associated factors, insomnia severity in our dataset was significantly associated with gender and academic discipline, whereas age, residence, marital status, CGPA, and family income were not significantly associated with ISI categories. These findings suggest that insomnia was widespread across demographic strata and may be driven more strongly by behavioral and academic environment factors than by socioeconomic indicators alone. The association with discipline may reflect differences in workload patterns, examination intensity, clinical or laboratory schedules, and stress exposure across fields of study. Similar to our findings, some studies have reported no significant association of insomnia with selected demographic characteristics, including age and relationship status, in student cohorts (21). Nevertheless, other work suggests that demographic context can still shape sleep quality and overall health among individuals with insomnia, and these effects may vary across populations and settings.

Behavioral and psychosocial contributors remain highly relevant. Poor sleep hygiene practices are standard among university students, including irregular bedtimes, screen-based stimulation at bedtime, and using the bed for study or entertainment, all of which may prolong sleep latency and reduce sleep efficiency (22). Broader lifestyle and contextual influences also matter: financial circumstances may shape opportunities for physical activity, and decreased physical activity has been linked to poorer sleep outcomes (23). Psychological symptoms, particularly anxiety, have been consistently associated with a higher likelihood of insomnia, supporting the role of stress-related hyperarousal and rumination in maintaining sleep disturbance (24).

The observed negative relationship between insomnia and academic performance aligns with previous evidence showing that insomnia and poor sleep quality are associated with lower educational achievement and reduced learning efficiency (25-27). Our results similarly indicate that increasing insomnia severity is associated with poorer academic performance, consistent with findings from other student samples (28). Sleep disruption may impair attention, memory consolidation, and executive function, thereby undermining performance on coursework and examinations. Beyond academic outcomes, insomnia is increasingly viewed as a long-term health risk factor, with research suggesting links between chronic insomnia symptoms and later cognitive decline, emphasizing the importance of early identification and prevention (29).

Evidence also indicates that sleep and stress around examinations are closely linked to academic outcomes. Higher stress combined with poorer sleep quality before exams has been associated with worse performance, though the strength of this relationship may vary across time points and assessment periods (30). Students with healthier sleep timing, adequate sleep duration, and restorative routines often demonstrate better academic achievement than those with short or irregular sleep, and earlier sleep and wake times have been observed among higher performing students in some studies (15). Differences in academic outcomes between students with and without insomnia complaints have also been reported, supporting the relevance of sleep health within educational success frameworks (12).

These findings highlight the need for university-level strategies to improve sleep health. Teachers and policymakers can support targeted sleep awareness initiatives, access to counseling, and the promotion of effective time-management and stress-reduction skills. Cognitive behavioral therapy for insomnia is widely recognized as a first-line treatment and can help modify maladaptive sleep-related beliefs and behaviors that perpetuate insomnia (31). In addition, physical activity-based interventions may improve sleep and mood regulation and could be integrated into student wellness programs (32).

This study has several limitations. First, the cross-sectional design limits causal inference, so the direction of the relationship between insomnia and academic performance cannot be confirmed. Second, insomnia symptoms and academic performance (CGPA) were self-reported, which may introduce recall and social desirability bias. Third, the sample was drawn from institutions within a single district and recruited using non-probability methods, which may limit the generalizability of the findings to other regions or student populations. Finally, potential confounders such as anxiety, depression, caffeine intake, screen time, and physical activity were not measured in detail, which may have influenced both sleep patterns and academic outcomes.

Conclusion

This study demonstrates that insomnia is a common problem among undergraduate students in District Okara, with nearly three out of five students reporting insomnia symptoms ranging from mild to severe. Insomnia severity differed significantly by gender and academic discipline, indicating that specific student subgroups may be more vulnerable. Although the correlation between insomnia and academic performance was weak, the association was statistically significant and clinically relevant, suggesting that sleep disruption may contribute to reduced academic functioning at the population level. Integrating sleep awareness programs, counseling support, and early identification of insomnia within university health services may help improve student well-being, concentration, and academic outcomes.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Obtained from the Institutional Ethical Committee of the University of Okara/24)

Consent for publication

Approved

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Conflict of interest

The authors declared no conflict of interest.

Author Contribution

RY: Manuscript drafting and data analysis
MG: Study design, conception of the study, and review
MI: Development of research methodology and interpretation of findings
AW: Manuscript review and data analysis

AA: Data collection and data entry
SM: Literature review and data entry
SK: Data collection and editing

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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