The Academic
International Journal of Multidisciplinary Research

An Online Peer Reviewed / Refereed Journal
Volume 4 | Issue 5 | May 2026
ISSN: 2583-973X (Online), SJIF IF: 5.6
Website: www.theacademic.in

Evaluating the Impact of Insomnia and Gender on Undergraduate Academic Performance: A Statistical Analysis

Dr. Sanjeev Raj

Assistant Professor, Guru Nanak College of Education, Gopalpur, Ludhiana, Punjab

DOI : https://doi.org/10.5281/zenodo.20606612

ARTICLE DETAILS

Research Paper

Accepted: 19-05-2026

Published: 10-06-2026

Keywords:

Academic performance, correlation, gender, insomnia, undergraduate student.

ABSTRACT

This study examines the impact of insomnia on the academic performance of undergraduate students, focusing on a sample of 399 participants. The research aims to test the null hypothesis that insomnia does not significantly influence academic outcomes among male and female students. Notably, the highest severity insomnia category was excluded from analysis due to the lack of female observations and insufficient male observations, thus maintaining statistical validity. A 2x2 Analysis of Variance (ANOVA) was utilized to compare medium and low insomnia levels across genders. Results indicated a significant negative correlation between insomnia severity and academic performance; specifically, students with low insomnia achieved superior academic scores compared to those with medium insomnia. Although a main effect of gender was recorded, its interaction with insomnia severity was minimal. Consequently, the null hypothesis was rejected, confirming that sleep quality is a crucial determinant of academic success among this demographic. The study employed a descriptive, correlational design and used a multistage random sampling method along with the Insomnia Scale by Chopdar and Mishra (2017) to assess participants' sleep quality.

Introduction

Sleep is a fundamental biological process required for cognitive maintenance, memory consolidation, and physiological restoration. Insomnia, characterized by persistent difficulties in initiating or maintaining

sleep, disrupts these essential mechanisms and leads to severe daytime impairments. In undergraduate populations, the pressure of academic deadlines, extracurricular commitments, and shifting social dynamics frequently exacerbates sleep disturbances. Understanding how these sleep disturbances interact with demographic variables to influence educational outcomes remain a critical priority for academic institutions.

This paper focuses on testing the specific hypothesis (H_0) that there is no significant impact of insomniac problems among undergraduate students, across both male and female groups, on their academic performance. Specifically, the study aims to quantify the degree to which varying levels of sleep deprivation correlate with academic achievement. The scope of this research encompasses a sample of undergraduate students categorized by gender and their self-reported severity of insomnia. By isolating the impact of these variables, the research seeks to establish clear empirical evidence regarding the cognitive penalty of poor sleep.

Existing approaches to modeling sleep and academic success remain insufficient for several notable reasons. First, many educational studies evaluate sleep deprivation as a universally uniform variable, frequently failing to account for the potential interaction effects between gender-specific psychological traits and insomnia severity. Second, standard statistical models utilized in pedagogical research often assume perfect data distributions, thereby failing to account for heteroscedasticity and missing data in real-world samples, which inherently leads to biased estimators and unreliable conclusions.

To address these methodological gaps, this paper provides the following key contributions:

- This work presents a rigorously validated statistical evaluation of how varying levels of insomnia impact academic achievement, explicitly incorporating robust heteroscedasticity corrections to ensure valid inferences.

- This study delivers an intersectional analysis of gender and sleep disorders, demonstrating empirically that while baseline academic performance may differ by gender, the cognitive penalty of insomnia applies uniformly regardless of sex. These specific insights establish a more reliable and nuanced framework for identifying at-risk students in higher education environments.

Literature Review

Numerous studies highlight the negative impacts of sleeplessness, particularly on students' academic performance and well-being. Uygur et al. (2024) found that Type D personality is linked to lower

subjective vitality and higher smartphone addiction and sleeplessness, with smartphone addiction partially mediating this relationship. Lu et al. (2024) showed that perceived stress predicts sleeplessness symptoms in college students, with cell phone reliance and fear of missing out (FOMO) as mediators, while environmental sensitivity affects these outcomes. Wang et al. (2024) found that physical exercise moderates the relationship between mobile phone addiction and sleeplessness, with social anxiety mediating their connection, revealing a negative correlation between physical activity and social anxiety and a positive correlation between mobile phone addiction and insomnia. Kao (2023) studied 587 Taiwanese students, revealing that smartphone addiction negatively affects attention and sleep quality, while improved sleep positively influences attention. Furthermore, loneliness intensifies smartphone addiction. Complementarily, Liu et al. (2022) reported a 52.8% smartphone addiction rate in a survey of 2741 students at Wannan Medical College in China, linking addiction to unhappiness with one's specialization, alcohol use, nighttime cellphone use, anxiety, and depression. In a survey of 275 undergraduate medical students in India, Telgote et al. (2021) identified a significant correlation between smartphone addiction and insomnia, highlighting the pressing need for intervention programs. Al-Battashi et al. (2020) found that 404 college students with high smartphone addiction experienced increased anxiety and sleeplessness, reinforcing the call for such programs. Additionally, Veerapu et al. (2019) reported that 17% of a sample of 364 medical students experienced mild, 64.3% moderate, and 18.7% severe nomophobia, with a slight association between nomophobia and anxiety and sleep issues, indicating further need for management strategies. Research indicates that a significant percentage of mental health outpatients (83.4%) experience sleep problems, with insomnia reported by 78.2% of participants, highlighting variations across different mental illnesses (Mondal et al., 2018). Additionally, a study of over 700 college students (Rosen et al., 2016) revealed that many sleeps with their smartphones nearby, negatively impacting sleep quality and academic performance. This behavior is linked to anxiety over social connectivity and smartphone addiction, which correlates with increased stress and severe insomnia, ultimately affecting overall health and focus. Alqudah et al. (2019) studied 700 medical and paramedical students in Jordan, finding a 47.4% prevalence of insomnia linked to poor academic performance. Severe insomnia, particularly among females with erratic sleep patterns, correlated with higher stress, lower accomplishments, and increased absences. Zhao et al. (2019) assessed insomnia in 4,966 adolescents aged 11-20 using the Adolescent Sleep Disturbance Questionnaire, revealing significant correlations between insomnia symptoms and academic struggles, such as issues with sleep onset affecting concentration and motivation. In a study involving 1,230 college students, Haile et al. (2017) identified a significant negative correlation between insomnia and academic

performance, with 42.1% reporting insomnia and lower GPAs linked to higher insomnia levels. Similarly, Alsaggaf et al. (2016) found that 33% of 320 medical students had insomnia, while 40% experienced daytime drowsiness. Factors such as stress, poor sleep quality, and excessive daytime sleepiness were significantly correlated with insomnia. Menon and Mamatha (2015) studied 750 nursing students, highlighting that poor sleep and daytime drowsiness related to increased headaches, depression, and decreased academic performance, exacerbated by night work that led to cognitive decline. These studies emphasize the importance of addressing these connected issues. However, there is not enough research on the link Insomnia and academic performance, and this study aims to fill that gap.

Method/Approach

Study Design and Sampling Strategy

In a study on insomnia and academic performance among 400 undergraduate students in the colleges situated in Ludhiana district, researcher utilized a descriptive, correlational design. He applied a multistage random sampling method and employed an Insomnia Scale by Chopdar and Mishra (2017) to assess the participants' sleep quality. Data analysis on 399 participants, excluding the highest severity insomnia group, was conducted via a 2x2 ANOVA. Findings revealed a significant negative relationship between insomnia and academic performance, with low-insomnia students achieving better scores than those with medium insomnia. Although a main effect of gender was noted, its interaction with insomnia severity was minimal, leading to the rejection of the null hypothesis and highlighting the critical role of sleep quality in academic success.

Data Collection Instruments

The data collection architecture utilized two key metrics: the assessment of insomnia and the quantification of academic success. The Insomnia Scale by Chopdar and Mishra (2017) was employed to evaluate participants' sleep quality, involving three sections. Section A included 25 statements with three possible responses (completely true, somewhat true, false). Section B had three statements with four response options, and Section C consisted of two items with four grading options (Worse, Common, Good, Very Good). Academic performance was measured objectively by aggregating the percentage of students' grades from prior semesters up to the fifth semester. This methodology combines a subjective psychological scale with objective institutional data to provide a comprehensive perspective on the examined variables.

Data Distribution and Descriptive Statistics

Table 1: Nature of Data Distribution

Variables	Mean	Median	Standard deviation	Variance	Skewness	Kurtosis
Insomnia (Male)	50.8150	48.00	8.55492	73.187	1.269	1.435
Insomnia (Female)	44.2350	44.000	7.00608	49.085	.891	1.402
Academic Performance (Male)	55.8941	56.4750	8.70770	75.824	-0.327	0.032
Academic Performance (Female)	63.6222	63.4500	9.78744	95.794	-0.116	-0.307

Table 2: Number of participants divided on the basis of Gender and Levels of Insomniac Problems

Gender	Levels of Insomnia	N
Male	**High**	1
Male	**Medium**	189
Male	**Low**	10
Female	**High**	0
Female	**Medium**	139
Female	**Low**	61

The foundational step of our methodology involved a rigorous evaluation of the nature of the data distribution to justify the selection of appropriate statistical frameworks. The dataset utilized in this analysis comprises 399 undergraduate students, segmented by gender and self-reported levels of insomnia. Descriptive statistics revealed that the mean insomnia score for males was 50.81 (SD = 8.55), with a skewness of 1.269 and kurtosis of 1.435, indicating a moderately peaked, positive skew. Conversely, females exhibited a lower mean insomnia score of 44.23 (SD = 7.00), demonstrating a more symmetrical distribution with a skewness of 0.891 and kurtosis of 1.402. Crucially, because these skewness and kurtosis values fell within the widely accepted +/- 1.96 range, the underlying curves were considered normal probability curves, fulfilling the primary prerequisite for parametric testing. Regarding academic performance, males recorded a mean of 55.89 (SD = 8.70), while females demonstrated a

higher mean of 63.62 (SD = 9.78), with both distributions exhibiting negligible skewness and near-normal kurtosis.

Statistical Framework and Evaluation Plan

To robustly evaluate the hypothesis, the analytical pipeline consisted of several integrated statistical steps. These steps were specifically chosen to validate the findings despite the identified violations of variance equality:

1. **Descriptive Profiling:** Computing group means, standard deviations, and distribution shapes (skewness/kurtosis) to visualize baseline differences.
2. **Assumption Testing:** Utilizing Levene's statistic to map heteroscedasticity across the four intersecting demographic groups.
3. **Two-Way Factorial ANOVA:** Applying a Type III Sum of Squares ANOVA to compute the main effects of insomnia levels, the main effects of gender, and the interaction effect between the two variables.
4. **Heteroscedasticity Correction:** Executing a secondary heteroscedasticity-consistent test to ensure that the ANOVA's p-values remained statistically valid despite unequal variances.
5. **Post-Hoc Comparison:** Deploying an independent samples t-test to precisely quantify the absolute academic difference strictly between the medium and low insomnia cohorts.

Assumption Testing and Structural Adjustments

Before executing the primary inferential models, we conducted rigorous assumption testing, which necessitated critical structural adjustments to the data pipeline. A preliminary inspection of participant categorization based on insomnia severity (High, Medium, Low) revealed a severe class imbalance that compromised within-group variance calculations. Specifically, the dataset contained zero observations for females with high insomnia and only a single observation (n=1) for males in the same category. Because ANOVA fundamentally relies on comparing variance between group means against variance within groups, the absence of within-group variability in the high insomnia category rendered accurate variance estimation mathematically impossible. Consequently, the high insomnia group was dropped from the analysis, restricting the scope of the study to a 2x2 factorial design analyzing Medium and Low insomnia levels across both genders. Furthermore, a Test of Homogeneity of Variances utilizing

Levene's statistic yielded a significant result (Statistic = 5.193, p = 0.002), indicating heteroscedasticity and a violation of the equal variance assumption required for standard ANOVA.

Discussion & Findings

Inferential Analysis Pipeline

Table 3: Nature of Data Distribution of Academic achievement by gender and different levels of Insomniac problem

Gender	Levels of Insomnia	N	Mean	Median	S.D.	Skewness	Kurtosis
Male	**Medium**	189	55.214	55.830	7.951	–0.467	-0.06
Male	**Low**	10	71.263	72.000	3.714	-2.16	4.4
Female	**Medium**	139	58.879	59.700	7.150	-0.71	0.28
Female	**Low**	61	74.430	75.300	5.409	-0.51	-0.036

Table 4: Two-Way ANOVA for Academic Scores by Gender and Levels of Insomniac Problems

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	**18463.688[a]**	**3**	**6154.563**	**116.765**	**<.001**
Intercept	**523662.053**	**1**	**523662.053**	**9934.995**	**<.001**
Insomniac level	**7748.274**	**1**	**7748.274**	**147.001**	**<.001**
Gender	**362.247**	**1**	**362.247**	**6.873**	**.009**
Insomniac level *Gender	**1.925**	**1**	**1.925**	**.037**	**.849**
Error	**20819.991**	**395**	**52.709**		
Total	**1467592.705**	**399**			
Corrected Total	**39283.679**	**398**			
a. R Squared = .470 (Adjusted R Squared = .466)					

To accommodate the identified heteroscedasticity while evaluating our core hypothesis, we deployed a robust inferential analysis pipeline incorporating both standard and heteroscedasticity-adjusted metrics. A

two-way ANOVA was utilized to assess the independent and interactive effects of gender and insomnia levels on academic scores. The Corrected Model indicated a highly significant main effect of insomnia levels on academic achievement ($F = 147.001$, $p < 0.001$), underscoring substantial performance variations tied to sleep quality. Gender also exhibited a statistically significant independent effect ($F = 6.873$, $p = 0.009$), aligning with prior observations that females performed better academically in this specific cohort. Notably, the interaction effect between gender and insomnia level was entirely non-significant ($F = 0.037$, $p = 0.849$), establishing that the academic penalty of insomnia is applied consistently regardless of the student's gender. To validate these findings against the assumption violations, a subsequent heteroscedasticity test confirmed the robust negative impact of insomnia ($B = -15.551$, $p < 0.001$), ultimately leading to the definitive rejection of the null hypothesis.

Limitations

While the statistical methodology is robust, several distinct limitations must be acknowledged to contextualize the findings accurately. First, the necessary exclusion of the "high insomnia" category due to an insufficient sample size (n=1) restricts the generalizability of our conclusions, preventing us from predicting academic outcomes for students experiencing severe, chronic clinical insomnia. Second, the significant result from Levene's test indicates the presence of heteroscedasticity, meaning that the variance in academic scores is not uniform across all subgroup combinations. Although we applied secondary heteroscedasticity tests to validate the primary findings, the reliance on linear models may still fail to capture the full complexity of data dynamics. Third, the study relies entirely on self-reported psychometric scales to categorize insomnia levels, which may introduce subjective reporting biases that objective physiological measurements would otherwise eliminate.

Ethical Considerations and Future Work

The deployment of targeted psychological profiling within educational datasets necessitates strict adherence to ethical research standards. Researchers and institutional administrators must ensure the absolute privacy and cryptographic confidentiality of students' linked academic and health data to prevent unintended discrimination. Furthermore, institutions must actively prevent the stigmatization of specific gender or demographic groups based on documented vulnerabilities to sleep-related academic decline, ensuring that interventions remain supportive rather than punitive.

Looking forward, this analytical framework opens several promising avenues for future scientific inquiry. Future work should prioritize the integration of objective EEG spectral analysis to directly correlate

localized brain wave patterns and sleep inertia with long-term academic scores (Jo et al., 2024). Additionally, conducting longitudinal cohort studies would allow researchers to track the temporal trajectory of students transitioning between low, medium, and high insomnia states. Understanding the chronicity of these sleep disturbances will be vital for developing dynamic, adaptive support systems that intercept educational decline before it becomes irreversible.

Conclusion

This research systematically investigated the intersectional impact of insomnia and gender on the academic performance of undergraduate students. By employing a rigorously corrected 2x2 ANOVA on a sample of 399 individuals, the study established that elevated levels of insomnia profoundly degrade academic achievement. Although female students generally exhibited higher baseline academic scores than their male counterparts, the absence of a significant interaction effect confirms that the cognitive impairments caused by sleep deprivation are universal across genders.

Ultimately, the definitive rejection of the null hypothesis serves as a vital empirical mandate for higher education administrators. By proactively acknowledging the severe educational toll of insomnia and implementing structural, therapeutic support systems, universities can foster a healthier academic environment. Addressing sleep disparities is not merely a medical necessity, but a fundamental educational strategy required to maximize student potential and ensure academic equity. Evidence also suggests that accuracy in time estimation, which correlates with academic performance in certain disciplines, may differ across genders, highlighting the complex interplay between cognitive factors and scholastic outcomes (Jaffe et al., 2012).

References

- Alahdal, W. M., Alsaedi, A. A., Garrni, A. S., & Alharbi, F. S. (2023). The impact of smartphone addiction on sleep quality among high school students in Makkah, Saudi Arabia. *Cureus*, *15*(6), e40759.
- Al-Battashi, N., Al-Omari, O., Sawalha, M., Al-Maktoumi, S., Alsuleitini, A., & Al- Qadire M. (2020). The Relationship Between Smartphone Use, Insomnia, Stress, and Anxiety Among University Students: A Cross-Sectional Study. *Clinical Nursing Research, 30*(6), 734-740. doi:10.1177/1054773820983161

- Aldhahir, A. M., Bintalib, H. M., Alhotye, M., Alqahtani, J. S., Alqarni, O. A., Alqarni, A. A., ... & Alzahrani, E. M. (2023). Prevalence of Nomophobia and Its Association with Academic Performance Among Physiotherapy Students in Saudi Arabia: A Cross-Sectional Survey. *Journal of Multidisciplinary Healthcare*, 2091-2100.

- Alqudah, M., Balousha, S. A., Al-Shboul, O., Al-Dwairi, A., Alfaqih, M. A., & Alzoubi,K. H. (2019). Insomnia among medical and paramedical students in Jordan: impact on academic performance. *BioMed Research International*, *2019*(1), 7136906.

- Al-Menayes, J. J. (2015). Social media use, engagement and addiction as predictors of academic performance. *International Journal of Psychological Studies*, *7*(4), 86-94.

- Alsaggaf, M. A., Wali, S. O., Merdad, R. A., & Merdad, L. A. (2016). Sleep quantity, quality, and insomnia symptoms of medical students during clinical years: relationship with

- stress and academic performance. *Saudi medical journal*, *37*(2), 173.
- American Academy of Sleep Medicine. (2017). *The impact of blue light on sleep*.https://aasm.org/resources/pdf/blue-light-sleep.pdf

- Atadokht, A., Hamidifar, V., & Mohammadi, I. (2014). Over-use and type of mobile phone users in high school students and its relationship with academic performance and achievement motivation. *Journal of School Psychology*, *3*(2), 122-136.

- Baert, S., Omey, E., Verhaest, D., & Vermeir, A. (2015). Mister Sandman, bring me good marks! On the relationship between sleep quality and academic achievement. *Social Science & Medicine*, *130*, 91-98. https://doi.org/10.1016/ j. socsimed.2015.02.011

- Balasubramanian, N., & Parayitam, S. (2023). Fear of Missing out, Smartphone Addiction and Academic Performance: Smartphone Obstacles and Positive Affect as Moderators. *Knowledge Management & E-Learning*, *15*(4), 614-642.

- Boumosleh, J., & Jaalouk, D. (2018). Smartphone addiction among university students and its relationship with academic performance. *Global Journal of Health Science*, *10*(1), 48-59.

- Bukhori, B., Said, H., Wijaya, T., & Nor, F. M. (2019). The effect of smartphone addiction, achievement motivation, and textbook reading intensity on students‘ academic achievement.

- Buysse, D. J. (2008). Chronic insomnia. *American Journal of Psychiatry*, *165*(6), 678- 686.
- Christensen, M.A., Bettencourt, L., Kaye, L., Moturu, S.T., Nguyen, K.T., Olgin, J.E., Pletcher, M.J., & Marcus, G.M. (2016). Direct Measurements of Smartphone Screen-Time: Relationships with Demographics and Sleep. *PLOS ONE*, *11*(11), 1-14. doi: 10.1371/journal.pone.0165331
- Chopdar, B., & Mishra, G. (2017). *Insomnia scale*. National Psychological Corporation, Agra.
- CNW. (2012). *Nomophobia on the rise in Canada: Majority of Canadian smartphone owners sleep next to their device and expect to be even more connected in 2013.* http://www.newswire.ca/en/story/1094005/nomophobia-on-the-rise-in-canada- majority-ofcanadian-smartphone-oweners-sleep-next-to-their-device-and-except- to-be-even-more-connected-in-2013
- Dang, N. (2021). *5 Most Common Causes of Insomnia.* Retrieved from https://inoacliving.vn/en/blog-en/5-most-common-causes-of-insomnia/
- Demirci, K., Akgönül, M., & Akpinar, A. (2015). Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *Journal of Behavioral Adictions*, *4*(2), 85-92. doi:10.1556/2006.4.2015.010
- Devi, U., & Dutta, R. (2022). A review paper on prevalence of NOMOPHOBIA among students and its impact on their academic achievement. *Journal of Positive School Psychology*, *6*(3), 5397-5405.
- Dontre, A. J. (2021). The influence of technology on academic distraction: A review.
- *Human Behavior and Emerging Technologies*, *3*(3), 379-390.
- Durak, H.Y. (2019). Investigation of nomophobia and smartphone addiction predictors among adolescents in Turkey: Demographic variables and academic performance. *The Social Science Journal*, *56*(4), 492-517. https://doi.org/10.1016/ j.soscij.2018.09.003
- Essel, H. B., Vlachopoulos, D., & Tachie-Menson, A. (2021). The relationship between the nomophobic levels of higher education students in Ghana and academic achievement. *PLOS ONE, 16*(6), e0252880.

- Eugene, A. R., & Masiak, J. (2015). The neuroprotective aspects of sleep. *MED tube science*, *3*(1), 35-43.
- Farooq, M.S., Chaudhry, A.H., Shafiq, M., & Berhanu, G. (2011). Factors affecting students' quality of academic performance: A case of secondary school level. *Journal of Quality and Technology Management*, *7*(2), 01-14.
- https://www. researchgate. net/ publication /284150574_ Factors_ affecting_ students'_ quality_of_academic_performance_A_case_of_secondary_school_level
- Galambos, N. L., Vargas, L. D. I., AL, H., & Maggs, J. L. (2013). Who sleeps best? Longitudinal patterns and covariates of change in sleep quantity, quality, and timing across four university years. *Behavioral Sleep Medicine*, *11*(1), 8-22.
- doi: 10.10 80 /15 402002.2011.596234
- Haile, Y. G., Alemu, S. M., & Habtewold, T. D. (2017). Insomnia and Its Temporal Association with Academic Performance among University Students: A Cross- Sectional Study. *BioMed Research International*, *2017*(1), 2542367.
- Harvey, A. G. (2008). Insomnia, psychiatric disorders, and the transdiagnostic perspective. *Current Directions in Psychological Science, 17*(5), 299-303.
- Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., Don Carlos, L., ... & Hillard, P. J. (2015). National Sleep Foundation ‘s sleep time duration recommendations: methodology and results summary. *Sleep Health, 1*(1), 40-43.
- Hohn, C., Schmid, S. R., Plamberger, C. P., Bothe, K., Angerer, M., Gruber, G., ..& Hoedlmoser, K. (2021). Preliminary results: the impact of smartphone use and short-wavelength light during the evening on circadian rhythm, sleep and alertness. *Clocks & sleep*, *3*(1), 66-86.
- Jackson, L. A., von Eye, A., Witt, E. A., Zhao, Y., & Fitzgerald, H. E. (2011). A longitudinal study of the effects of internet use and videogame playing on academic performance and the roles of gender, race and income in these relationships. *Computers in Human Behavior, 27*(1), 228–239. https://doi.org/10.1016/j.chb.2010.08.001

- Jaffe, Klaus, Mascitti, Gullermo, & Seguias, Daniella (2012), Gender differences in time perception and its relation with academic performance: non-linear dynamics in the formation of cognitive systems. Https://arxiv.org/pdf/1203.3954v2

- Jahrami, H. (2023, May). The relationship between nomophobia, insomnia, chronotype, phone in proximity, screen time, and sleep duration in adults: a mobile phone app- assisted cross-sectional study. *Healthcare*, *11*(10), 1503-1507.

- Janatolmakan, M., Karampour, A., Rezaeian, S., & Khatony, A. (2024). Nomophobia: Prevalence, associated factors, and impact on academic performance among nursing students. Heliyon, 10(22).

- Jha, V.M., Jha, S.K. (2020). Sleep Loss: What Does It Do to Our Brain and Body? In: *Sleep: Evolution and Functions*. Springer, Singapore. https://doi.org/10.1007/978-981-15-7175-6_4

- Jo, Ha-Na, Kweon, Young-Seok, & Lee, Seo-Hyun (2024).EEG spectral Analysis in Gray Zone Between Healthy and Insomnia.https://arxiv.org/pdf/2411.09875v1
- Kao, P. C. (2023). The Interrelationship of Loneliness, Smartphone Addiction, Sleep Quality, and Students' Attention in English as a Foreign Language Class. *International Journal of Environmental Research and Public Health*, *20*(4), 3460. doi:10.3390/ijerph 20043460

- Karpinski, A. C., Kirschner, P. A., Ozer, I., Mellott, J. A., & Ochwo, P. (2013). An exploration of social networking site use, multitasking, and academic performance among United States and European university students. *Computers in Human Behavior, 29(3*), 1182-1192. https://dx.doi.org/10.1016/j.chb.2012.10.011

- Kibona, L., & Mgaya, G. (2015). Smartphones 'Effects on Academic Performance of Higher Learning Students- A Case of Ruaha Catholic University – Iringa, Tanzania, *Journal of Multidisciplinary Engineering Science and Technology*, *2*(4), 777-784. https://www.jmest.org/wp-content/uploads/JMESTN4235064 3.pdf
- Kumar, R. S., & Kumar, K. S. (2019). Prevalence of insomnia and sleep pattern among MBBS students of Stanley Medical College, Chennai. *International Journal of Community Medicine Public Health*, *6*(3), 1057.

- Lepp, A., Barkley, J. E., & Karpinski, A. C. (2014).The relationship between cell phone use, academic performance, anxiety, and Satisfaction with Life in college students. Computers in Human Behavior, *31*, 343-350. https://doi.org/10.1016/j. chb.2013.10. 049

- Liu, H., Zhou, Z., Huang, L., Zhu, E., Yu, L., & Zhang, M. (2022). Prevalence of smartphone addiction and its effects on subhealth and insomnia: a cross-sectional study among medical students. *BMC Psychiatry, 22, 305.* https://doi.org/10.1186/s12888-022-03956-6

- Lu, Z., Li, Y., Yan, Z., Sang, Q., & Sun, W. (2024). The Effect of Perceived Stress on Insomnia Symptoms Among College Students: A Moderated Mediation Model. *Psychology Research and Behavior Management*, 3021-3032.
- Martha, K. (2009). Factors affecting academic performance of undergraduate students at Uganda Christian University [Master's thesis, Makerere University]. https://www. mak.ac.ug/documents/Makfiles/theses/Kyoshaba%20Martha.pdf

- Marta, O. F. D., Kuo, S. Y., Bloomfield, J., Lee, H. C., Ruhyanudin, F., Poynor, M. Y., ... & Chiu, H. Y. (2020). Gender differences in the relationships between sleep disturbances and academic performance among nursing students: A cross- sectional study. *Nurse Education Today*, *85*, 104270.

- Menon, B., Karishma, H. P., & Mamatha, I. V. (2015). Sleep quality and health complaints among nursing students. *Annals of Indian Academy of Neurology*, *18*(3), 363-364.

- Mondal, G., Bajaj, V., Goyal, B. L., & Mukherjee, N. (2018). Prevalence of sleep disorders and severity of insomnia in psychiatric outpatients attending a tertiary level mental health care facility in Punjab, India. *Asian Journal of Psychiatry*, *32*, 8-13.

- Morin, C. M. (2013). *Insomnia: Psychological assessment and management.* Guilford Press.
- Narad, A., & Abdullah, B. (2016). Academic Performance of Senior Secondary School Students: Influence of Parental Encouragement and School Environment. *Rupkatha Journal on Interdisciplinary Studies in Humanities*, *8*, 12-19. https:// doi.org /10.2165 9 /rupkatha. V8n2.02

- National Heart, Blood and Lung Institute. (2022, June 15). *Sleep Deprivation and Deficiency*.https://www.nhlbi.nih.gov/health/sleep-deprivation/health-effects# :~:text=Studies%20show%20that%20a%20good,some%20parts%20of%20the%20brain.

- National Highway Traffic Safety Administration. (2018). *Drowsy Driving: Asleep at the Wheel.* https://www.nhtsa.gov/risky-driving/drowsy-driving
- National Institute for Health. (2022). *What is Insomnia?* https://www.nhlbi.nih.gov/ health-topics/insomnia
- Neelam, (2013). Academic achievement of secondary school students having differential level of academic anxiety. *International Journal of Behavioural Social and Movement Sciences, 2*(2), 117-123.
- Ng, S. F., Hassan, N. S. I. C., Nor, N. H. M., & Malek, N. A. A. (2017). The Relationship between Smartphone Use and Academic Performance: A Case of Students in A Malaysian Tertiary Institution. *Malaysian Online Journal of Educational Technology, 5*(4), 58-70. https://www.learntechlib.org/p/188650/.
- Nguyen, T. V., Nguyen, Q. A. N., Nguyen, N. P., & Nguyen, U. B. (2024). Smartphone use, nomophobia, and academic achievement in Vietnamese high school students. *Computers in Human Behavior Reports*, *14*, 100418
- Parajuli, M., & Thapa, A. (2017). Gender differences in the academic performance of students. *Journal of Development and Social Engineering*, *3*(1), 39-47.
- Peszka, J., Michelle, S., Collins, B. T., Abu-Halimeh, N., Quattom, M., Henderson, M., ... & Mastin, D. F. (2020). Sleep, Sleepiness, and Sleep Hygiene Related to Nomophobia (No Mobile Phone Phobia). *Sleep*, *43*(Supplement_1), A71-A78.
- Petrucco, C., & Agostini, D. (2023). Problematic smartphone use and university students' academic performance. *Journal of E-Learning and Knowledge Society, 19*(2), 30-38.
- Raj, S. (2025), A Study of Nomophobic Behaviour, Insomniac Problems and Smartphone Addiction Among Undergraduate Students and Its Impact on Their Academic Performance. Ph.D. Thesis, Department of Education, Panjab University, Chandigarh,
- URL. http://hdl.handle.net/10603/660795
- Rathakrishnan, B., Singh, S. S. B., Kamaluddin, M. R., Yahaya, A., Nasir, M. A. M., Ibrahim, F., & Rahman, Z. A. (2021). Smartphone Addiction and Sleep Quality on Academic Performance of

University Students: An Exploratory Research. *International Journal of Environmental Research and Public Health, 18*, 8291. https://doi.org/10.3390 /ijerph18168291

- Rosen, L. D., Carrier, L. M., Miller, A. Rokkum, J., & Ruiz, A. (2016). Sleeping with technology: cognitive, affective, and technology usage predictors of sleep problems among college students. *Sleep Health*, *2*(1), 49–56.https://doi:10.1016/j.sleh.2015. 11.003.

- Samaha, M., & Hawi, N. S. (2016). Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Computers in Human Behavior*, *57*, 321-325. https://doi.org/10.1016/j.chb.2015.12.045

- Singh, S. P., Malik, S. & Singh, P. (2016). Factors affecting academic performance of students. *Paripex Indian Journal of Research*, *5*(4), 176-178. doi: https:// www.doi.org/10.36106/paripex

- Somu, M. (2023). A Study to Determine the Effect of Smartphone Addiction on Academic Performance and Mental Wellbeing of College Students in the Post COVID-19 Scenario. *International Journal of Research Publication and Reviews, 4*(3), 1217-1221.
- Suni, E., Singh, A. (2023). *Stages of Sleep: What Happens in a Sleep Cycle.* https://www.sleepfoundation.org/stages-of-sleep

- Talan, T., Dogan, Y., & Kalinkara, Y. (2024). Effects of smartphone addiction, social media addiction and fear of missing out on university students 'phubbing: A structural equation model. *Deviant Behavior*, *45*(1), 1-14.

- Tavernier, R., & Willoghby, T. (2014). Sleep problems: predictor or outcome of media use among emerging adults at university? *European Sleep Research Society,* 1-8. doi: 10.1111/jsr.12132

- Telgote, S. A., Ghogare, A. S., Khadse, V., & Karwande, S. G. (2021). Smartphone Addiction and its Impact on Insomnia among the Undergraduate Medical Students of a Teaching Hospital of Maharashtra, India: A Cross-sectional Study. *Journal of Clinical and Diagnostic Research, 15(12*), 1-5. doi: 10.7860/JCDR/2021/52819.15753

- Thomée, S., Härenstam, A., & Hagberg, M. (2011). Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults - a prospective cohort study. *BMC Public Health, 11*, 66. https://doi.org/10.1186/1471-2458-11- 66

- Ting, C. H., & Chen, Y. Y. (2020). Smartphone addiction. In *Adolescent addiction* (2nd ed., pp. 215-240). Practical Resources for the Mental Health Professional. Academic Press.

- Uygur, Ö., Kandeger, A., Pınar, Ö., & Erdoğan, E. (2024).The Association between Smartphone Addiction, Type D Personality Traits and Insomnia in University Students. *Van Tıp Dergisi*, *31*(2).

- Veerapu, N., Baer Philip, R. K., Vasireddy, H., Gurrala, S., & Kanna, S. T. (2019). A study on nomophobia and its correlation with sleeping difficulty and anxiety among medical students in a medical college, Telangana. *International Journal of Community Medicine and Public Health*, *6*(5), 2074–2076. https://doi.org/10. 18203/ 2394-6040.ijcmph20191821

- Wang, J., Xu, X., Zuo, L., Wang, H., & Yang, G. (2024). Mobile phone addiction and insomnia among college students in China during the COVID-19 pandemic: a moderated mediation model. *Frontiers in Public Health*, *12*, 1338526.

- Wentworth, D.K., & Middleton, J.H. (2014). Technology Use and Academic Performance. *Computers & Education, 78*, 306-311.http://dx.doi.org/10.1016/ j. compedu.2014.06. 012