

## Sleep Quality and Cognitive Failure among College Students

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### ABSTRACT

Sleep gives refreshment to do any activities in a better way. Sleep quality is when an individual can maintain and sustain their sleep in depth manner. Cognition involves mental operation linked to acquired knowledge and information processing. Cognitive failure refers forgetting something in our day to day life. The purpose of the present study was to find out the nature and extend of sleep quality and cognitive failure among colleges students. This study examines the relationship between sleep quality and cognitive failure. The current study adopts correlation research design. The tools used for the research were cognitive failure questionnaire and sleep quality scale. This study used convenient sampling through 722 data was collected. SPSS-21- statistical software techniques of Spearman's rank order correlation, Mann Whitney U test, and Kruskal Wallis H test were used to analyze the data. The result of this study indicates that there is a strong positive correlation between sleep quality and cognitive failure. The findings show that college students have low sleep problems and low cognitive failure.

**Keywords:** *Sleep Quality, Cognitive Failure, College Students*

**S**leep is a complex and dynamic process that occupies a significant portion of the 24 hours day cycle. Despite its ubiquitous nature, the concept of sleep remains elusive. The attainment of optimal sleep quality depends on a myriad of factors including both intrinsic and extrinsic determinants such as physiological arousal, sleep hygiene habits and ambient noise levels. Sleep serves a vital role in the cognitive process of forgetting (Rasch & Born, 2013), sleep improves memory consolidation (Chambers A.M., 2017) as it facilitates the consolidation of previously acquired memories and the integration of recent memories into long term storage. College students, navigating the complexities of academia, find themselves uniquely susceptible to the ramifications of inadequate sleep. Poor sleep quality is prevalent among students, associated with various detrimental health effects, including reduced academic performance (Kloss et al., 2011; Lund et al., 2010; Orzech et al., 2011; Schmickler et al., 2023). The pivotal aspect of a student's life bears immense significance, impacting both their academic performance and overall well-being.

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Cognitive failures are errors in cognitive processing that occur during tasks people would normally be competent to complete, reflecting a failure to perform at the level expected (Wallace et al. 2003; Wallace & Chen, 2005). The term 'cognitive failures' introduced by Broadbent et al. (1982), describes minor errors that interrupt the typically smooth progression of intended actions, whether they are physical or mental. These failures represent an inability to operate at the expected level of proficiency and can arise from various factors, including stress, distractions, and fatigue (Swan, 2016). They are thought to encompass a variety of mental lapses, such as perception, focus, attentional (i.e., perceptual failure), and motor function (i.e., performing unintentional actions or action slips) and behaviour (Broadbent et al., 1982; Wallace J.C & Chen, G., 2005).

Sleep is critical for cognitive function, impacting various aspects such as memory consolidation and emotional regulation. Impoverished sleep is a probable adjustable threat aspect for negative life outcomes and cognitive decline. Sleep disruption is related to harmful cognitive functioning in older adults, indicating that poor sleep is a hazard for cognitive deterioration (Behrens et al., 2023). Pre-slumber negative cognitive activities resulting from stressful events are associated with poor sleep (Takano et al., 2014). Sleep deprivation, marked by a reduced capacity to start and sustain sleep, has been associated with a decrease in cognitive energy resources (Zohar et al., 2005). These resources are crucial for choosing suitable emotional regulation strategies in difficult situation (Palmer & Alfano, 2017). People with the elevated commonness of sleep difficulties, including inadequate sleep rate, excessive amount of daylight drowsiness, and sleeplessness are associated with major health problems (Tang et al., 2020).

Sleep disturbances, stress, anxiety, and depression often coexist, and holistic management of these factors is important for the overall well-being of the students (Abdulghani et al., 2014). Dr. Paulo Rodrigues suggested that sleep disturbances can be particularly detrimental for university learners since they are linked with numerous adverse consequences on educational pursuits. Adolescent sleep quality mediates the relationship between mobile phone addiction and cognitive failure, and a high level of self-regulation reduces the impact of mobile phone addiction on cognitive failure through improved sleep quality (Hong et al., 2020). Irregular sleep can have a destructive influence on a broad combination of cognitive functions including decision-making, problem-solving, creative thinking, memory, learning, attention, reasoning, and terminology. For Instance, Poor sleep quality among employees can lead to reduced safety behaviors and increased workplace cognitive failures (Brossoit et al., 2019). Sleep is crucial to ensure healthy cognitive processes and it can even improve performance above the limitation of the usual state. Total sleep deprivation impairs attention, working memory, long-term memory, and decision-making, while partial deprivation primarily affects vigilance (Aloha et al., 2007). Cognitive functioning declines with age across various domains, including attention and intelligence, and there is significant individual variability in the significance of age-related cognitive deficits (Ardila, 2007). Sleep disruptions emerge as one of the most prevalent health concerns among late teens and emerging adults, with students reporting insufficient sleep, difficulty falling asleep, and maintaining uninterrupted slumber (Yang et al., 2003). Irregular sleep schedules, bedtime thirst, environmental noise, and bedtime worries contribute to poor sleep; however, awareness of sleep hygiene is associated with better practices and improved sleep quality.

Previous studies have documented associations between sleep quality and cognitive function, but only a few studies have explored the relationship between sleep quality and cognitive failure among college students. College students frequently experience

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compromised sleep quality owing to academic pressures, social engagements, and erratic sleep schedules, all of which may disrupt cognitive functions essential for effective learning and daily activities. Investigating how variations in sleep quality impact cognitive failures, such as lapses in attention and memory, is pivotal for elucidating the broader implications on academic performance and mental health within this population. Previous studies have documented associations between sleep quality and cognitive function. Insights on this relationship are crucial for developing targeted interventions aimed at improving sleep hygiene and mitigating cognitive impairments. The findings could influence policies and support services, enhancing student well-being and academic success.

### *Objectives:*

- To study the nature and extent of sleep quality and cognitive failure among college students.
- To find out whether there is any significant relationship between sleep quality and cognitive failure.
- To study whether sleep quality and cognitive failure differ with respect to socio-demographic factors such as gender.

### *Hypothesis:*

- There will be a significant relationship between sleep quality and cognitive failure among college students.
- There will be a significant difference in sleep quality and cognitive failure differs with respect to socio-demographic factors such as gender.

## **METHODOLOGY**

### *Research Design:*

The present study employed a Correlational research design to investigate the relationship between sleep quality and cognitive failure. Correlational research is intended to explore the connections between variables, assessing both the direction and strength of their associations. This study specifically aims to elucidate the nature of the relationship between sleep quality and cognitive failure, providing insights into how variations in sleep quality may be linked to changes in cognitive performance.

### *Sample:*

The study comprised a sample of 722 college students, drawn from both undergraduate and postgraduate programs, with ages ranging from 17 to 31. The study utilized a non-probability sampling method, convenience sampling, to select participants. Non-probability sampling involves non-random procedures for sample selection, which in this case focused on college students. Convenience sampling involves selecting individuals based on their easy accessibility and availability.

### *Inclusion Criteria:*

- College students who are currently enrolled in either undergraduate or postgraduate programs.
- Full-time college students.

### *Exclusion Criteria:*

- Individuals with diagnosed sleep disorders
- Individuals with severe psychiatric conditions

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### *Tools used for Data Collection:*

The study utilized two tools to gather data: the Cognitive Failure Questionnaire (CFQ) to assess cognitive functioning and the Sleep Quality Scale (SQS) to evaluate the sleep quality of college students.

- 1. Socio-Demographic Sheet:** A socio-demographic sheet was provided to gather basic information about the participants such as their age and gender.
- 2. Cognitive Failures Questionnaire:** The Cognitive Failure Questionnaire (CFQ) is designed to assess everyday cognitive lapses or failures that people may experience in their daily lives including forgetfulness, distractibility, and false triggering. It was developed by D.E. Broadbent in 1982. The CPQ demonstrates good internal consistency, with a high Cronbach's alpha coefficient value of 0.85. The CPQ shows good construct validity and has a convergent validity. The questionnaire consists of 25 items, and 5 - a point Likert scale ("Very often"-4, "Quiet often"-3, "Occasionally"-2, "Very rarely" -1, "Never"- 0) is used as a response for the participants to reflect on their experience. The cognitive failure scores varying from 0 to 100 are categorized into high (80 to 100), moderate (50-79), and low (0-49) based on the total score, with higher scores revealing greater cognitive failure.
- 3. Sleep Quality Scale:** The Sleep Quality Scale (SQS) is a self-report scale used to analyze sleep latency, daytime dysfunction, and restorative function of sleep. It was developed by Yi, H., and Shin, C in 2006. Yi and coworkers' initial psychometric assessment revealed an internal consistency of 0.92 and a test-retest reliability of 0.81. The scale consists of 28 items. Respondents rate the frequency of various sleep behaviours using a four-point Likert scale ("Few"-0, "Sometimes" - 1, "Often" - 2, "Almost always" -3). Sleep quality scores vary from 0 to 84 and are split into three levels: high (70-84), moderate (50-69), and low (0-49) based on the total score, where a higher score implies more severe sleep problems.

### *Procedure:*

The study utilized survey method for data collection. Formal permission was obtained from the college administration to collect data. The self-reported questionnaire was circulated via Google Forms by directly approaching the students in their classes after securing formal permission from each college authority. Prior to data collection, participants were provided with a comprehensive informed consent form outlining the purpose of the study, the nature of their participation, and assurances regarding the confidentiality of their responses. Participants were briefed on how their data would be used and the measures taken to protect their privacy. Preliminary information was taken together with informed consent form. Both the tools were administered according to the standard procedures of the respective tools. After data collection, the raw data was carefully reviewed. Incomplete responses were identified and excluded from the dataset to ensure the integrity of the data. The responses were then coded and scored, and the scores were tabulated and analyzed using different statistical procedures. The data was analyzed using Statistical Package for the Social Sciences (SPSS). Accordingly, interpretations were made, and conclusions were drawn.

### *Statistical Analysis:*

The study utilized statistical methods to analyze the data, such as Spearman's rank-order correlation and the Mann-Whitney U test. Spearman's rank-order correlation was applied to investigate the association between sleep quality and cognitive failure. It helps to understand how variations in sleep quality are related to variations in cognitive failure. Mann-Whitney U test was employed to examine potential differences in cognitive failure and sleep quality

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across gender groups. This test was instrumental in identifying any gender-based variations in cognitive failure and sleep quality.

### RESULT

The results obtained are presented in tables and explained under each subheading.

**Table 1- Socio-demographic profile of the participants**

Variable	Category	Frequency	Percentage
Gender	Male	359	49.7
	Female	363	50.3

Table 1 shows the gender distribution of participants, showing 49.7 % of males and 50.3 % of females. This indicates an even distribution of two gender groups within the sample.

**Table 2 - Mean and standard deviation of variables sleep quality and cognitive failure**

Variables	N	Mean	SD
Sleep Quality	722	35.55	11.049
Cognitive failure	722	48.24	18.216

Table 2 provides the mean and standard deviation for the variables of sleep quality and cognitive failure among the participants. The mean score of the sleep quality 35.55 indicates low level of sleep problems among the sample, with the standard deviation of 11.049. Meanwhile, the mean score of cognitive failure, 48.24 implies that low level of cognitive failure among the participants, with the standard deviation of 18.216.

**Table 3 - Correlation between sleep quality and cognitive failure among college students**

Variables	Sleep quality
Cognitive failure	.201**

\*\*Indicates Correlation is significant at 0.01 level

Table 3 presents the correlation between sleep quality and cognitive failure among college students. The table reports a correlation coefficient of  $r = 0.201$ , which signifies a statistically significant positive relationship between the two variables. The correlation is significant at 0.01 levels, demonstrating a robust association between sleep quality and cognitive failure within the population.

**Table 4 – Comparison of sleep quality and cognitive failure with respect to gender among college students**

Variable	Group	N	Mean rank	Sum of rank	U	P
Sleep Quality	Male	359	350.26	125742.50	61122.500	.150
	Female	363	372.62	135260.50		
Cognitive failure	Male	359	360.01	129243.00	64623.000	.848
	Female	363	362.98	131760.00		

Table 4 illustrates the comparison of sleep quality and cognitive failure between male and female college students. The p-values of 0.150 and 0.848 indicate that there are no statistically significant differences between male and female students in sleep quality and cognitive failure. The results indicate that gender does not have a statistically significant

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influence on either sleep quality or cognitive failure among the college students in this study.

### **DISCUSSION**

Sleep is critical for optimal cognitive functioning, with even modest reductions in sleep duration potentially impairing a broad spectrum of cognitive processes, including attention, language processing, reasoning, decision-making, learning, and memory. Adequate sleep is fundamental for maintaining standard cognitive health and efficiency. Moreover, sleep not only supports baseline cognitive functions but can also facilitate performance enhancements that surpass typical levels of cognitive ability. A lack of sleep negatively affect memory, attention, alertness, judgment, decision-making, and overall brain function, which can reduce cognitive performance (Khan & Al-Jahdali, 2023). The present study aimed to analyze the relationship between sleep quality and cognitive failure among college students.

The findings from the descriptive statistics revealed that the participants have low scores in both sleep quality and cognitive failure. The participants in the study experience fewer sleep-related issues and cognitive failures. Poor sleep quality is correlated with anxiety, increased depression symptoms, mood disturbances, a decrease in sustained attention, and negative cognitive bias (Gobin et al., 2015). The current study's findings indicate that participants experience better sleep quality and lower levels of cognitive failure. Lemma et al. (2014) reported that students with better sleep quality tend to have better academic performance.

Further, the findings reveal a statistically significant positive correlation between sleep quality and cognitive failure among college students. Analysis of sleep quality and cognitive failure indicated a significant correlation, emphasizing the critical link between adequate sleep and cognitive functioning. This result is consistent with the finding of Asem et al. (2021) demonstrating that there is a strong association between sleep quality and cognitive functions among collegiate students. They also documented that sleep quality is a significant predictor of pre-frontal cognitive functions. Okano et al. (2019) found that enhanced quality, extended duration, and greater consistency of sleep are significantly correlated with improved academic performance among college students. Complementing these findings, Carney et al. (2006) analyzed the relationship between sleep quality and the daily activities of college students, demonstrating that variations in sleep quality are closely linked to student's engagement in their daily routines. The findings of the study also align with the research findings of Liao et al. (2022), which identified a positive correlation between cognitive function and both the quality and duration of sleep. This comprehensive understanding reinforces the necessity for students to maintain healthy sleep habits to support their cognitive abilities.

The study also examines sleep quality and cognitive failure in relation to gender among college students and found that there are no significant differences between males and females in either sleep quality or cognitive failure. The finding that there is no statistically significant difference in sleep quality between male and female college students is contrary to the findings of Okano et al. (2019) reporting the existence of gender disparities in sleep quality among young adults.

The robust association between sleep quality and cognitive failure among college students advocates for the inclusion of effective sleep hygiene practices in educational programs. Enhancing awareness of the impact of sleep can lead to better academic outcomes and

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improved overall well-being for students. Such interventions could help mitigate the risk of sleep-related declines in cognitive functions, ultimately supporting student's cognitive health and academic performance.

### CONCLUSION

Sleep plays a vital role in cognitive functioning, influencing mental processes such as attention, memory, and problem-solving. This study highlights the crucial link between sleep quality and cognitive failure, revealing a significant positive correlation among college students. Findings suggest that better sleep quality is associated with fewer cognitive failures, emphasizing the importance of maintaining healthy sleep patterns for better cognitive functioning. Although previous research supports the benefits of improving sleep quality, further studies are needed to develop effective interventions tailored to enhance sleep among college students.

#### *Implications:*

- The findings suggest a need for integrating sleep education into college curricula. By enhancing student's understanding of the importance of sleep for cognitive functioning, educational programs can promote healthier sleep habits and better cognitive functioning.
- Institutions may consider developing policies that support students' mental and physical health, such as flexible deadlines and reduced academic stress during periods of sleep disruption. Policies promoting balanced workloads and adequate rest could help mitigate the adverse effects of poor sleep on cognition.
- Future research should focus on designing and testing targeted interventions aimed at improving sleep quality among college students. These interventions could include cognitive-behavioral strategies for better sleep, time management techniques, and stress reduction practices.
- The study opens avenues for further research to explore the mechanisms linking sleep quality with cognitive failure. Longitudinal studies and experimental designs could provide deeper insights into how sleep interventions impact cognitive outcomes over time.
- Understanding the correlation between sleep quality and cognitive failures can lead to improved mental health services on campus. Colleges should consider integrating sleep assessments into their mental health screenings and offer resources for students struggling with sleep-related issues. This may help in early identification and support to mitigate cognitive impairments associated with poor sleep quality.

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### **Conflict of Interest**

The author(s) declared no conflict of interest.

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