



The role of sleep in student's health: A preliminary study in Karachi

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Abstract

Objective: To quantify the relationship between sleep quality and self-perceived physical and mental health in university students aged 20-29 years, and to identify gaps in the adoption of sleep promoting practices. **Methods:** A cross sectional survey of 100 students (62 females, 38 males) was conducted using convenience sampling. An online questionnaire combined items adapted from the Pittsburgh Sleep Quality Index and Epworth Sleepiness Scale with self-reported indicators of health (daytime fatigue, concentration problems, mood swings, stress/anxiety). Total scores were classified into four sleep quality categories (i.e., excellent, good, fair, and poor). Associations between sleep category and health outcomes were analysed by chi-square test. **Results:** Among the 100 participants (62 females, 38 males), categorized according to sleep quality scores showed a significant association with overall self-rated health ($p = 0.0003$). Poor sleep was linked to increased daytime fatigue, mood swings, concentration issues, and stress. A dose-response relationship indicated that declining sleep quality corresponded with worsening physical and psychological health. Notably, 76% of participants reported not using any sleep improvement strategies. **Conclusions:** Variations in sleep duration and quality are closely associated with both physical and psychological health among young adults. The high prevalence of inadequate sleep and the limited adoption of remedial strategies underscore a critical focus area for health promotion initiatives within universities. Future studies should evaluate structured sleep education and behavioral interventions to determine whether enhancing sleep facilitates sustained improvements in student well-being.

Keywords: Sleep quality, Sleep and health, Sleep hygiene, Psychological stress

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1. Introduction

Sleep is a vital physiological process essential for maintaining optimal health, along with proper nutrition and regular physical activity (Irish *et al.*, 2015). It comprises of two important components, quality and quantity (duration), both of which are required for cognitive, emotional, and physical restoration (Hirshkowitz *et al.*,

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2015). Sleep acts as a regulatory mechanism that supports neurocognitive function, energy conservation, and metabolic regulation, thereby sustaining overall homeostasis (Medic *et al.*, 2017). It facilitates synaptic plasticity, stores memories, supports the immune system, and removes neurotoxic waste through the lymphatic system (Xie *et al.*, 2013; Bubu *et al.*, 2020).

Current findings suggest that inadequate sleep, whether due to reduced duration, poor sleep quality, or sleep disorders such as insomnia and obstructive sleep apnea, have been linked to a wide range of adverse health outcomes. These include cardiovascular and metabolic disorders, anxiety, depression and diminished cognitive performance (Itani *et al.*, 2017; Grandner, 2020). Sleep disturbances exert widespread influence across multiple physiological systems, including the immune, cardiovascular, respiratory, and neuroendocrine systems (Besedovsky *et al.*, 2019).

Despite its importance, many university students, face challenges related to good quality of sleep and irregular sleep-wake cycles, largely due to academic pressure, digital media use, and psychosocial stressors (Lund *et al.*, 2010). Several research studies have shown that insufficient sleep among students is associated with impaired academic performance, greater emotional reactivity, increased stress levels, and a greater risk of anxiety and depressive symptoms (Taylor *et al.*, 2013; Kalmbach *et al.*, 2017).

Understanding the multifactorial relationship between sleep and health in young adults is critical for the development of effective interventions. This study aims to investigate the impact of sleep duration, bedtime routines, and sleep disturbances on the overall physical and psychological health of university students in their twenties. By collecting data on sleep-related behaviors and associated health outcomes, this research seeks to inform institutional strategies that promote healthier sleep patterns and enhance student well-being (Khaled *et al.*, 2025). Addressing the growing prevalence of sleep disorders in academic environments is essential to improve health outcomes and academic success among university students.

2. Methodology

This cross-sectional study was conducted in Karachi, Pakistan, to evaluate the association between sleep patterns and its effects on health among university students aged 20-29 years. A total of 100 participants were recruited through convenience sampling, based on the availability and willingness of participants. Ethical approval was obtained, and participant confidentiality, anonymity, and the voluntary nature of participation were maintained throughout the study. Participants retained the right to withdraw at any stage.

Inclusion criteria encompassed currently enrolled university students within the specified age range who provided informed consent. Exclusion criteria included postgraduate students, individuals outside the age range, those unable to comprehend the questionnaire due to cognitive impairments, and those who declined to participate.

Data were collected using an online questionnaire derived from validated sleep assessment tools, the Pittsburgh Sleep Quality Index (PSQI) (Buysse *et al.*, 1989) and the Epworth Sleepiness Scale (ESS) (Johns, 1991). Modifications were made to adapt the specific objectives of this study. The questionnaire assessed multiple domains including sleep duration, bedtime and wake-up routines, latency of sleep onset, nocturnal awakenings, perceived sleep quality, and symptoms such as daytime fatigue, mood disturbances, concentration difficulties, stress, and anxiety. General health indicators were also evaluated.

Participant responses were quantified using a scoring system adapted from PSQI and ESS guidelines, and results were categorized into sleep quality bands: excellent, good, fair, and poor.

Data were analyzed using IBM SPSS Statistics version 26.0. Participants' total sleep-health scores were stratified into four predefined ranges: >60, 50-60, 40-50, and 30-40. A Chi-square (χ^2) test to examine the statistical association between sleep quality and reported health effects, with a significance threshold set at $p < 0.05$.

3. Results

A total of 100 participants, aged 20-29 years (62 females and 38 males) were included in the final analysis. Responses were collected through an online questionnaire, assessing sleep duration, sleep latency, quality, disturbances, and related physical and mental health effects, including fatigue, mood swings, concentration

issues, and stress or anxiety. Responses were scored and categorized into sleep quality categories according to adapted PSQI and ESS scoring criteria. Participants were stratified based on their total sleep-health scores into four categories (Table 1).

Table 1: Categories based on the quality of sleep	
Sleep-Score Categories	Number of Participants
>60 (Excellent)	10
50-60 (Good)	37
40-50 (Fair)	45
30-40 (Poor)	8

A χ^2 – test to assess the association between categorized sleep quality scores and reported health outcomes, revealed a statistically significant association ($p = 0.0003$) between sleep quality and overall perceived health, including symptoms such as daytime fatigue, difficulty in concentrating, mood swings, and levels of stress or anxiety.

Figure 1 indicates the participants with excellent sleep scores (>60) reported minimal health disturbances and the highest overall physical and mental well-being. Conversely, those in the lower sleep score categories (≤ 50) exhibited more frequent occurrences of daytime fatigue (72%), difficulty in concentrating (69%), mood swings (61%), and high stress/anxiety (65%).

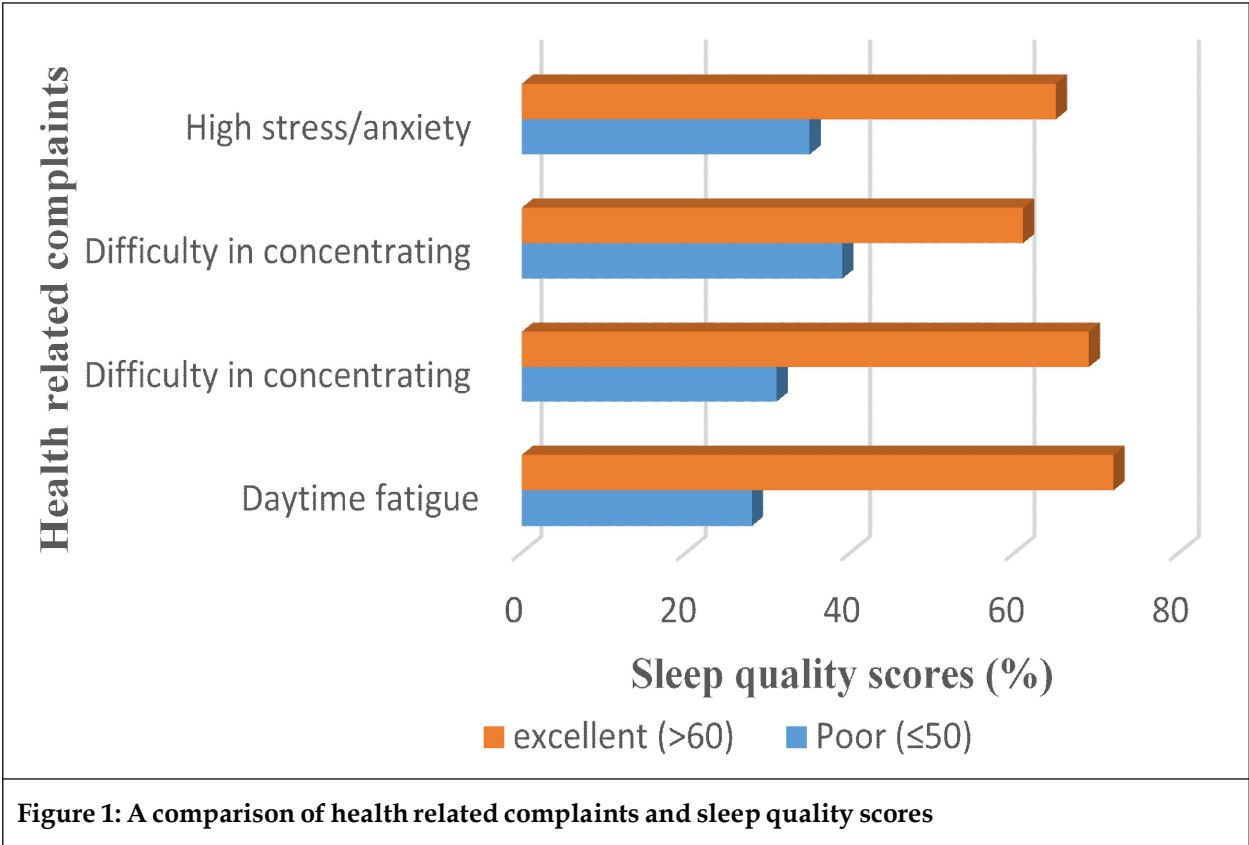


Figure 1: A comparison of health related complaints and sleep quality scores

The association between better sleep-score and self-rated overall health demonstrated a dose-response trend across the categories (Figure 2), suggesting as sleep quality declines, physical and psychological health complaints increase.

Figure 3 illustrates that the majority of the participants ($n=76$) reported not using any methods or tools to improve sleep quality. The remaining ($n = 24$) reported using specific sleep-promoting strategies such as relaxation techniques (e.g., yoga), herbal supplements, or maintaining sleep hygiene routines.

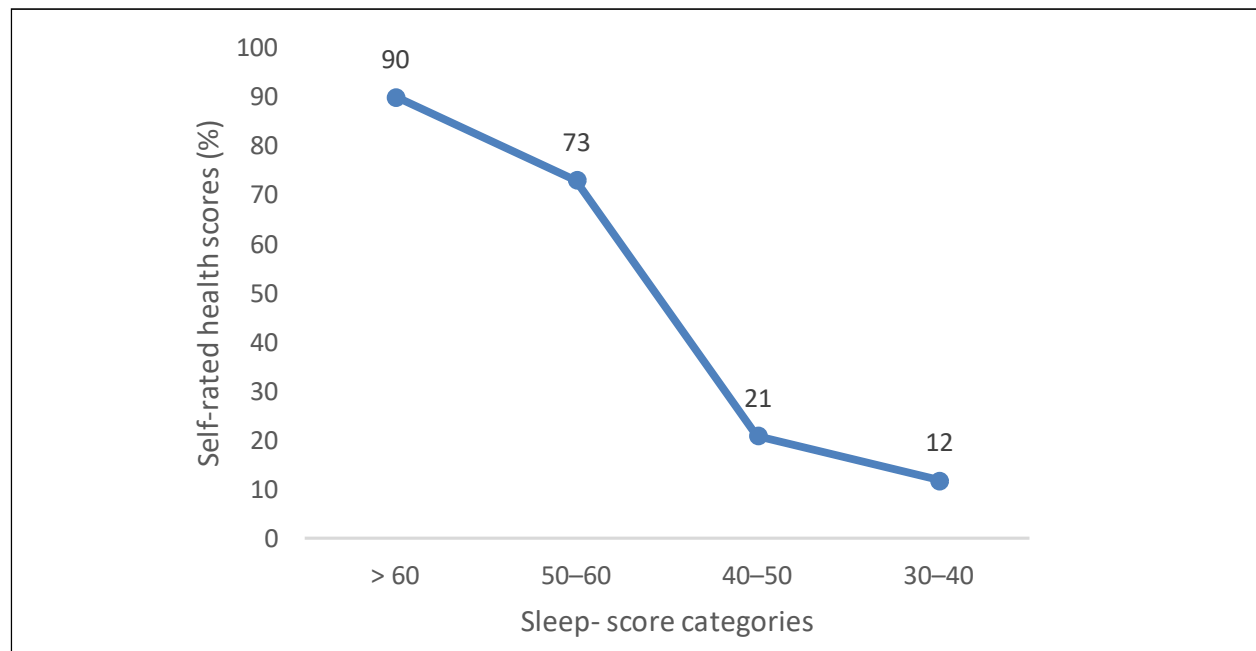


Figure 2: Relationship between sleep- score categories and overall health ratings

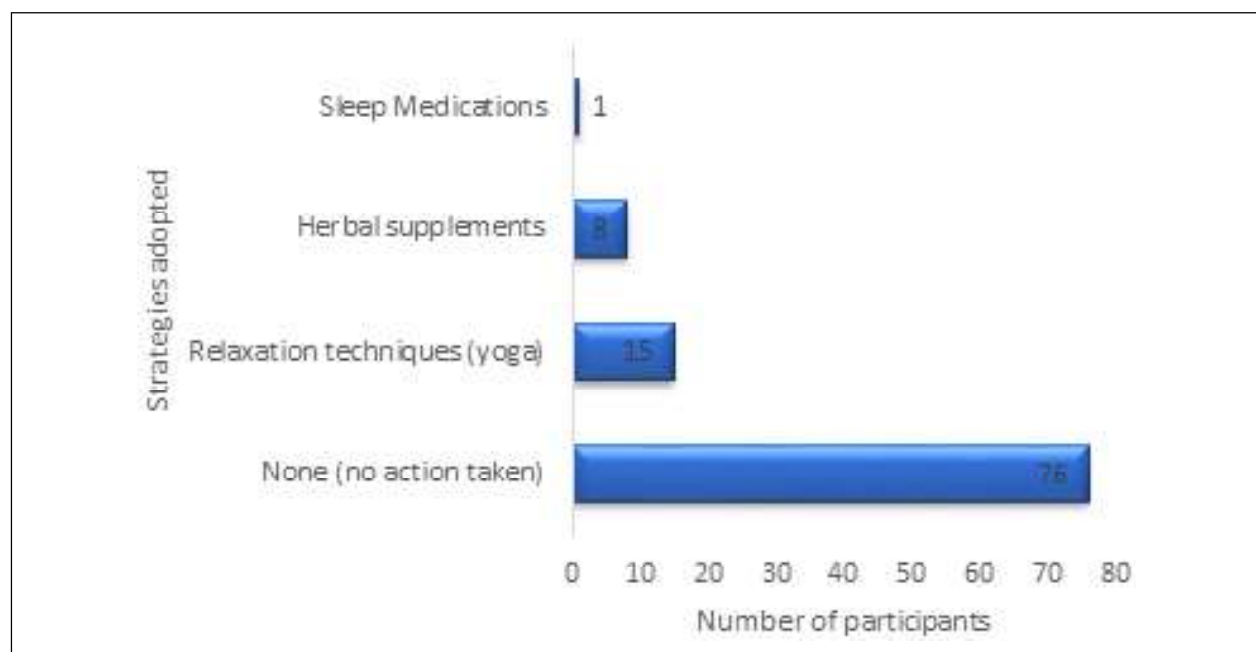


Figure 3: Strategies adopted to improve the quality of sleep

4. Discussion

The data collected from the university students, aged 20-29 years, highlights the significant relationship between sleep quality and perceived health outcomes. The findings revealed a clear, positive association between better sleep and improved physical and mental well-being. Participants with higher sleep scores, particularly those scoring > 60 , reported fewer complaints of daytime fatigue, difficulty concentrating, mood swings, and symptoms of stress or anxiety. In contrast, those with lower sleep scores (≤ 50) experienced more frequent health disturbances (Figure 1). These results align with existing literature emphasizing the important role of sleep duration and quality in maintaining overall well-being and regulating both physiological and psychological functions (Ramar *et al.*, 2021).

Moreover, a dose-response trend (Figure 2), where the reduction in sleep quality correlates with the deterioration of health outcomes, validating the importance of adequate sleep in sustaining optimal physical

and mental health. Sufficient sleep not only enhances day-to-day functioning but also reduces the risk of accidents and injuries related to fatigue, such as workplace incidents and vehicular crashes (Alhainen *et al.*, 2022; Faria *et al.*, 2024). In addition to physical safety, adequate sleep contributes to improved cognitive functioning, particularly memory consolidation. Research suggests that sleep, especially slow-wave sleep, enhances declarative memory and protects it from disruption by new information (Fjell and Walhovd, 2025; Genzel *et al.*, 2022).

The study revealed a significant gap in awareness and practice related to sleep health among university students. Although the benefits of proper sleep hygiene are well-established, a significant proportion of participants reported not adopting any methods to improve their sleep quality, such as the use of sleep aids, relaxation techniques, or environmental modifications (Figure 3). In contrast, a relatively small fraction of individuals appeared to adopt non-pharmacological interventions like yoga, herbal remedies, or consistent sleep hygiene practices.

5. Conclusion

Overall, the findings indicate that improving sleep quality represents an important, but insufficiently implemented strategy for enhancing both physical and mental health among young adults. University students, who frequently experience academic pressures, irregular schedules, and psychosocial stressors, are susceptible to poor sleep patterns and inadequate restorative routines. The lack of adoption of sleep-promoting behaviors highlighted the need for targeted interventions. Structured sleep education and behavior-based strategies, such as mindfulness, routine regulation, and environmental modifications, are recommended to improve sleep health and support long-term well-being in the university students.

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