



SLEEP QUALITY AND ACADEMIC PERFORMANCE AMONG UNIVERSITY UNDERGRADUATES IN SRI LANKA

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ABSTRACT

Sleep quality is a fundamental determinant of cognitive performance, emotional regulation, and overall well-being, yet it remains an under-explored factor in the academic success of Sri Lankan university undergraduates. This study examines the relationship between sleep quality and academic performance within this population, incorporating socio-cultural and contextual perspectives relevant to Sri Lankan higher education. A cross-sectional quantitative design was employed, and data were collected from 45 undergraduate students drawn from an accessible population of approximately 150 students across multiple faculties. Participants were recruited using a stratified convenience sampling approach. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality, while academic performance was measured using self-reported Grade Point Average (GPA) and subjective academic ratings. Descriptive statistics were used to summarise participant characteristics, and Spearman's rank-order correlation analysis was conducted to examine associations between sleep variables and academic outcomes. The results indicated a statistically significant positive correlation between sleep duration and GPA ($\rho = 0.933, p < 0.001$), and between subjective sleep quality and GPA ($\rho = 0.617, p < 0.001$). However, the magnitude of the association between sleep duration and GPA should be interpreted with caution given the small, context-specific sample and reliance on self-reported measures, which may introduce common method bias and inflate observed relationships. Overall, better sleep patterns were associated with higher academic performance within the study sample. The findings are broadly consistent with global literature emphasising the importance of adequate and high-quality sleep for academic functioning, while also reflecting contextual influences such as academic pressure, lifestyle demands, and environmental factors among Sri Lankan undergraduates. The study concludes that sleep quality is an important behavioural factor associated with academic performance. Future research should employ larger, more representative samples, objective sleep measures, and longitudinal designs to strengthen causal inference and generalisability of findings.

KEYWORDS: Academic Performance, Cognitive Function, Pittsburgh Sleep Quality Index, Sleep Quality, Sri Lanka, University Undergraduates



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1. INTRODUCTION

University life represents a critical developmental phase characterised by heightened intellectual engagement, social adaptation, lifestyle transitions, and personal identity formation, during which sleep patterns and circadian rhythms often undergo substantial changes (Bruno et al., 2024). For undergraduates in Sri Lanka, this period unfolds within a unique socio-cultural and economic landscape that shapes daily routines, study habits, and lifestyle behaviours. Academic demands are intense, with competitive entry criteria, high parental expectations, and a rigid assessment structure that place sustained pressure on students to excel (Ranjith, 2019). These pressures can disrupt health-promoting routines, particularly sleep, which is one of the most essential yet often neglected determinants of academic success. Sleep is a biologically regulated and evolutionarily conserved process vital to physical restoration, cognitive performance, and emotional regulation (Walker, 2017; Irwin, 2015). During sleep, the brain consolidates memories, facilitates synaptic plasticity, clears neurotoxins via the glymphatic system, and restores metabolic balance (Xie et al., 2013; Diekelmann & Born, 2010). Optimal sleep enhances attention, learning, decision-making, and creativity, whereas insufficient or poor-quality sleep impairs these domains and increases vulnerability to mental health difficulties (Curcio, Ferrara & De Gennaro, 2006; Pilcher & Walters, 2018).

Sleep quality is a multidimensional construct encompassing sleep duration, latency, efficiency, disturbances, and subjective satisfaction, and is commonly assessed using validated multidimensional instruments such as the Pittsburgh Sleep Quality Index (Mollaveya et al., 2021). Global evidence consistently identifies good-quality, adequate-duration sleep as a strong predictor of enhanced cognitive and academic outcomes (Dewald et al., 2010; Hirshkowitz et al., 2015). For example, in a large meta-analysis, Dewald et al. (2010) found moderate but significant correlations between sleep quality, sleep duration, and school performance, suggesting that both subjective and objective sleep measures are important. In the United States, Lund et al. (2010) reported that 60% of undergraduates experienced poor sleep quality, which was significantly associated with lower grade point averages (GPAs) and

higher stress levels. Similar trends have been observed in Europe, with Gomes et al. (2011) demonstrating that Portuguese and Brazilian undergraduates with better sleep efficiency attained higher grades, independent of study hours or socio-economic status. In Asian contexts, where academic competition is particularly fierce, Yeo et al. (2019) found that late-night study habits were correlated with reduced total sleep time and poorer academic performance. Other studies in Malaysia, India, and China similarly report that students who sacrifice sleep for study often experience diminishing returns, with cognitive fatigue undermining the benefits of extended learning sessions (Lo et al., 2016; Pal & Talukdar, 2019).

The importance of sleep is not a modern discovery. Across cultures and throughout history, sleep has been recognised for its restorative and transformative properties. In ancient Greek mythology, Hypnos, the god of sleep, symbolised rest, healing, and renewal (Kryger, Roth & Dement, 2017). Traditional Chinese medicine emphasised maintaining a harmonious balance between sleep and wakefulness to sustain physical vitality and mental clarity (Borins, 2008). In Ayurveda, practised in South Asia for millennia, adequate sleep is considered one of the three pillars of health, alongside diet and lifestyle (Telles et al., 2015). Modern neuroscience validates these traditional perspectives, demonstrating that sleep plays a vital role in neuroplasticity, emotional processing, and immune function (Irwin, 2015; Walker, 2017).

From a theoretical standpoint, this study is informed by contemporary neurocognitive and psychophysiological models that conceptualise sleep as a fundamental regulator of cognitive efficiency, emotional stability, and behavioural performance. Recent research indicates that adequate sleep supports attentional regulation, executive functioning, memory consolidation, and cognitive flexibility through the restoration of neural and metabolic processes within the brain (Alhola & Polo-Kantola, 2021; Cordi & Rasch, 2021). Conversely, insufficient or poor-quality sleep has been associated with impaired working memory, reduced attentional control, slower information processing, and diminished problem-solving ability, all of which negatively affect academic functioning (Scullin & Bliwise, 2021). Neurocognitive evidence further demonstrates that sleep

deprivation disrupts prefrontal cortex activity and functional connectivity, impairing executive control and decision-making processes essential for learning and academic achievement (Krause et al., 2022). In addition, psychoneuroimmunology research highlights that chronic sleep disturbances elevate inflammatory responses and dysregulate stress-related neuroendocrine pathways, which may indirectly compromise learning capacity, motivation, and emotional well-being (Irwin & Opp, 2022). Together, these contemporary theoretical perspectives provide a strong scientific basis for hypothesising that better sleep quality contributes positively to academic performance among university students.

Despite extensive international research, there remains a paucity of empirical studies in the Sri Lankan context. The country's higher education system is characterised by high-stakes examinations, a shortage of places in state universities, and strong societal emphasis on academic credentials as a pathway to socio-economic mobility (Ranjith, 2019). Many students juggle multiple responsibilities, including part-time work, extracurricular commitments, and family obligations, which can further erode sleep opportunities (Perera & Wickramaratne, 2021). Moreover, societal norms often valorise sacrifice and endurance in academic pursuits, normalising late-night study sessions and reduced rest (Fernando, 2020). These cultural factors may shape sleep patterns in ways that differ from Western or other Asian settings, making it essential to investigate the local realities.

Furthermore, urbanisation and digital technology use are emerging influences on sleep among Sri Lankan youth. Increased screen time, especially at night, is associated with delayed sleep onset, reduced melatonin secretion, and poorer sleep quality (Cain & Gradisar, 2010; Levenson et al., 2017). Social media use, online learning, and entertainment can compete with sleep, particularly when academic workloads are high. Climate and living conditions, such as heat, noise, and shared accommodation in university hostels, may also disrupt rest (Jayasinghe et al., 2020). These variables underscore the complexity of the sleep–performance relationship and the need for multifactorial approaches to research and intervention.

Given these considerations, the present study seeks to address a significant gap in the literature by exploring the relationship between sleep quality and academic performance among Sri Lankan university undergraduates. Specifically, it examines both the quantity and perceived quality of sleep as predictors of self-reported GPA, while considering the potential influence of cultural, socio-economic, and environmental factors. The research questions guiding this inquiry are:

- (1) How does sleep quality influence the academic performance of Sri Lankan university undergraduates?
- (2) Which specific dimensions of sleep quality such as duration, disturbances, or subjective satisfaction are most strongly associated with academic outcomes?
- (3) Are there notable demographic variations in these relationships?
- (4) How can insights from historical, cultural, and theoretical perspectives inform practical interventions aimed at improving both sleep and academic performance? By answering these questions, this study aims to contribute to both national educational policy discourse and the broader global understanding of student health and academic success.

2. METHODOLOGY

This study employed a cross-sectional quantitative research design to examine the relationship between sleep quality and academic performance among Sri Lankan university undergraduates. A cross-sectional approach was considered appropriate because it enables the simultaneous assessment of predictor and outcome variables within a defined population while allowing efficient data collection from relatively large and diverse samples (Wang & Cheng, 2020). The quantitative research paradigm was selected to facilitate systematic measurement, statistical analysis, and objective evaluation of the study variables, thereby enhancing reliability, replicability, and comparability with existing empirical literature (Creswell & Guetterman, 2021). This design is widely used in behavioural and public health research to identify associations between health-related

factors and educational outcomes within university populations.

Population and Sampling

The target population comprised currently enrolled undergraduates from multiple faculties and geographic regions within Sri Lanka. To capture diversity in academic and demographic characteristics, a stratified convenience sampling approach was used. Strata were formed based on gender, academic discipline, and district of origin, reflecting known variations that may influence sleep patterns and academic performance (Pal & Talukdar, 2019). This stratification approach was applied to improve subgroup representation and reduce selection bias within the constraints of online recruitment (Etikan & Bala, 2017).

The accessible population was approximately 150 undergraduate students, identified through university academic networks and student communication platforms. From this population, a final sample of 45 undergraduate students was recruited from multiple faculties and geographic regions within Sri Lanka. Although the sample size was modest, efforts were made to include participants from diverse academic disciplines, including Science, Arts, Management, and Medicine, to enhance variability within the dataset. Inclusion criteria were: (1) current enrolment in an undergraduate programme at a Sri Lankan university, (2) ability to read and understand English sufficiently to complete the questionnaire, and (3) willingness to provide informed consent. Exclusion criteria included: (1) non-enrolment at the time of data collection, (2) incomplete or invalid questionnaire responses, and (3) unwillingness to participate voluntarily.

Data Collection Procedures

Data collection took place between **September and October 2023** using **Google Forms**, which allowed participants to complete the survey remotely. The online format was selected for its accessibility, flexibility, cost-effectiveness, and ability to reach geographically diverse participants while maintaining data quality in large-scale survey research (Van Quaquebeke et

al., 2022). The survey link was distributed via university mailing lists, student forums, and social media groups. Before beginning the questionnaire, participants were presented with an electronic information sheet detailing the study's purpose, procedures, potential risks, and benefits.

The survey consisted of three sections:

1. **Demographic information** – including age, gender, faculty, year of study, district of origin, and any part-time work or extra curricular commitments.
2. **Pittsburgh Sleep Quality Index (PSQI)** – a widely validated instrument assessing seven components of sleep quality over the past month: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction (Buysse et al., 1989). Each component yields a score from 0 to 3, with a global score ranging from 0 to 21; higher scores indicate poorer sleep quality. The Sinhala version of the PSQI has been validated locally, ensuring cultural and linguistic appropriateness (Anandakumar et al., 2016).
3. **Academic performance measures** – including self-reported Grade Point Average (GPA) on the standard 0–4 scale and a subjective academic performance rating (excellent, good, average, poor). Self-reported GPA was chosen for feasibility, as official academic records were not accessible due to confidentiality regulations; GPA remains a widely accepted indicator of academic achievement in higher education research (Pérez-González et al., 2022).

Ethical Considerations

The study received **ethical approval** from the relevant university ethics review committee prior to data collection. Informed consent was obtained electronically before participants could proceed to the questionnaire. Participants were assured of their right to withdraw at any time without penalty and were informed that all data would be anonymised. Confidentiality was maintained by assigning numerical codes to responses and storing data in password-protected files accessible only to the researcher. Given the potential for sensitive disclosures regarding sleep problems or academic stress,

contact information for student counselling services was provided at the end of the survey.

Data Analysis

Descriptive and inferential statistical analyses were conducted using appropriate statistical software. Data were first screened for missing values, outliers, and assumptions of normality to determine the suitability of parametric or non-parametric statistical tests.

Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarise demographic characteristics of the sample, including gender and institutional distribution.

To examine the relationship between sleep-related variables and academic performance, correlation analysis was performed. Although Pearson's correlation is commonly used for continuous variables, Spearman's rank-

	Sig. (2-tailed)		<.001
	N	45	45
quality_of_sleep	Pearson Correlation	.617**	1
	Sig. (2-tailed)	<.001	
	N	45	45

** . Correlation is significant at the 0.01 level (2-tailed).

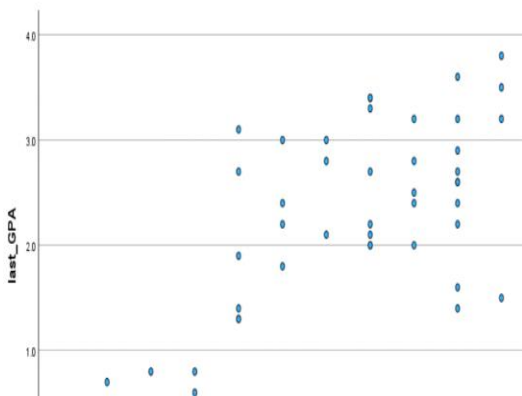


Figure 1: The Graph of Correlation between GPA and Quality of Sleep.

GPA – Overall performance

Correlations			
		last_GPA	overall_academic_performance
last_GPA	Pearson Correlation	1	.240
	Sig. (2-tailed)		.113
	N	45	45
overall_academic_performance	Pearson Correlation	.240	1
	Sig. (2-tailed)	.113	
	N	45	45

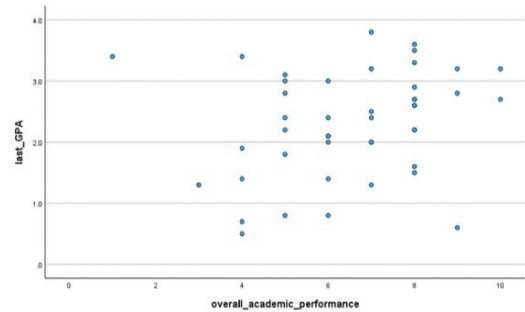


Figure 2: The Graph of Correlation between GPA and Overall Academic Performance.

order correlation (ρ) was selected due to potential deviations from normality and the ordinal nature of subjective sleep quality, ensuring a robust monotonic association analysis (Okano et al., 2019; Field, 2018).

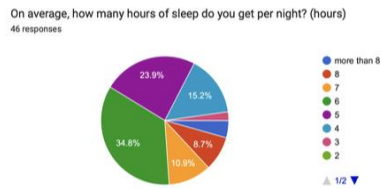
Correlation coefficients were interpreted using Cohen's (1988) guidelines. All analyses were two-tailed, with statistical significance set at $p < 0.05$.

3. RESULTS AND DISCUSSION

3.1 RESULTS

The Pittsburgh Sleep Quality Index (PSQI) scores ranged from 3 to 15 ($M = 7.8$, $SD = 2.6$). Based on established PSQI thresholds, a considerable proportion of participants demonstrated poor sleep quality ($PSQI > 5$), consistent with high prevalence rates of sleep disturbance reported among university students globally (Mollayeva et al., 2020; Maheshwari & Shaikat, 2019).

The sample consisted of 62% female and 38% male participants from 12 universities in Sri Lanka.



Sleep Patterns

Most participants (64.7%) reported sleeping 6–8 hours per night, while 18.7% reported <6 hours and 16.6% reported >8 hours. Similar sleep duration distributions have been reported in university populations internationally (Okano et al., 2019).

Sleep irregularity was common, with 41% reporting >1-hour variation in sleep timing. Night-time awakenings were reported by 46%, and difficulty initiating sleep was reported by 21%. Daytime dysfunction was reported by 32%, consistent with findings linking poor sleep quality to reduced daytime functioning in students (Hershner & O'Brien, 2021).

Academic Performance

Self-reported GPA ranged from 2.40 to 4.00 ($M = 3.42$, $SD = 0.41$). Subjective academic performance ratings were distributed as 38% “excellent,” 44% “good,” and 18% “average.”

Correlation Analysis

A statistically significant positive correlation was found between sleep duration and GPA ($\rho = 0.933$, $p < 0.001$).

A significant positive correlation was also observed between subjective sleep quality (PSQI global score) and GPA ($\rho = 0.617$, $p < 0.001$), consistent with prior evidence linking sleep quality and academic outcomes in higher education populations (Okano et al., 2019; Maheshwari & Shaukat, 2019).

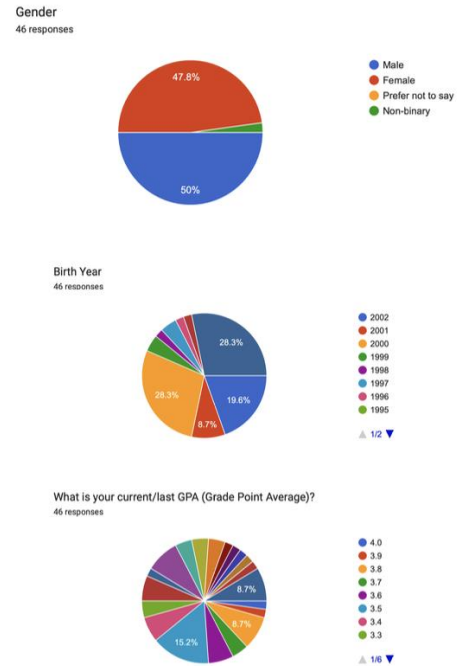


Figure 3: The Pie Charts of Data in Gender, Birth Year, GPA and Average Hours of Sleep

3.2 DISCUSSION

The findings of this study indicate a significant positive association between sleep-related variables and academic performance among Sri Lankan university undergraduates. Specifically, both sleep duration and subjective sleep quality were positively correlated with GPA, supporting the broader evidence that sleep is an important determinant of academic functioning in university populations (Okano et al., 2019; Maheshwari & Shaukat, 2019).

The observed association between sleep duration and GPA ($\rho = 0.933$) is substantially stronger than effect sizes typically reported in the literature, where meta-analytic evidence suggests small to moderate relationships between sleep duration and academic performance (Okano et al., 2019). While this finding indicates a potentially strong association within the present sample, it should be interpreted with caution due to its unusually large magnitude, which may reflect sample-

specific characteristics or unmeasured confounding variables.

From a neurocognitive perspective, sleep plays a critical role in supporting learning and academic performance through its effects on memory consolidation, synaptic plasticity, and attentional regulation. During slow-wave and REM sleep stages, hippocampal-neocortical communication facilitates the consolidation of declarative and procedural memory, which is essential for academic learning (Scullin & Bliwise, 2020; Krause et al., 2021). In addition, adequate sleep enhances executive functioning, working memory, and sustained attention, all of which are key predictors of academic success in higher education contexts (Medic et al., 2017).

The Cognitive-Energetic Model (Meijer, 2008) provides a useful theoretical explanation for these findings by proposing that cognitive performance depends on the availability of limited mental resources, which are replenished during sleep. Sleep deprivation or poor sleep quality reduces cognitive efficiency by impairing prefrontal cortex functioning, increasing attentional lapses, and reducing information-processing capacity (Lim & Dinges, 2010; Scullin & Bliwise, 2020). This framework supports the observed pattern in which students with longer sleep duration and better sleep quality achieved higher academic performance.

The significant association between subjective sleep quality and GPA ($p = 0.617$) highlights the importance of perceived restfulness in addition to sleep duration. Recent studies have shown that subjective sleep quality is closely linked to academic engagement, motivation, emotional regulation, and perceived cognitive fatigue among university students (Hershner & O'Brien, 2021). These psychological and behavioural pathways may explain why subjective sleep quality contributes to academic outcomes even when sleep duration is accounted for.

From a psychophysiological perspective, sleep quality is also associated with regulation of the hypothalamic–

pituitary–adrenal (HPA) axis and inflammatory processes, which influence emotional stability and cognitive functioning (Irwin, 2015; Besedovsky et al., 2012). Poor sleep has been linked to elevated stress reactivity and reduced emotional resilience, which may indirectly impair academic performance.

In the Sri Lankan context, several sociocultural and institutional factors may contribute to sleep disruption among university students. Higher education is widely perceived as a key pathway to socioeconomic mobility, leading to intense academic pressure and competitive study environments (Ranjith, 2019). Students may engage in prolonged nighttime studying, irregular sleep schedules, and increased academic workload, particularly during examination periods (Fernando, 2020). Similar patterns have been observed in other high-pressure academic systems in East and South-East Asia, where reduced sleep duration and higher insomnia prevalence among students have been widely reported (Gradisar et al., 2013; Kim et al., 2015; Yeo et al., 2019).

Environmental and behavioural factors may further exacerbate sleep disturbances in the Sri Lankan undergraduate population. Many students reside in shared accommodations, where noise, irregular routines, and limited environmental control negatively affect sleep continuity (Jayasinghe et al., 2020). Additionally, tropical climate conditions and inadequate ventilation may contribute to discomfort during sleep, affecting sleep onset and maintenance (Mishra et al., 2019). The increasing use of digital devices at night, including social media engagement and streaming platforms, has also been shown to delay circadian rhythms, suppress melatonin secretion, and reduce overall sleep quality in young adults (Scott et al., 2019; Christensen et al., 2021).

The finding that some students reported adequate sleep duration but still experienced poor sleep quality may be explained by these behavioural and environmental disruptions. This suggests that sleep duration alone may

not fully capture sleep health, reinforcing the importance of multidimensional sleep assessment using both objective and subjective measures.

The historical and cross-cultural recognition of sleep further supports its central role in health and wellbeing. In ancient Greek traditions, sleep was associated with restoration and healing through the figure of Hypnos, while Eastern medical systems such as Ayurveda emphasised balance in sleep–wake cycles as essential for physical and mental harmony (Kryger et al., 2017; Telles et al., 2015). Integrating culturally familiar concepts such as “mental rejuvenation” may enhance the effectiveness of sleep education interventions in Sri Lankan university settings by increasing student engagement and acceptance.

From a policy and institutional perspective, the findings highlight several practical implications. Universities may benefit from implementing sleep health education programs focused on sleep hygiene practices, including consistent sleep scheduling, reduction of evening caffeine intake, and management of light exposure (Hershner & Chervin, 2021). Additionally, integrating time management and workload distribution strategies into academic orientation programs may reduce last-minute studying behaviours that contribute to sleep deprivation.

Institutional scheduling practices may also require review, particularly regarding early morning examinations and clustered assessment deadlines, which have been shown to negatively affect sleep patterns and academic performance in student populations (Carrell et al., 2011). Furthermore, university mental health services should incorporate routine sleep screening, as sleep disturbance is both a contributor to and a consequence of psychological distress (Beattie et al., 2015). Evidence-based interventions such as cognitive behavioural therapy for insomnia (CBT-I), mindfulness-based stress reduction, and relaxation training have demonstrated effectiveness in improving both sleep quality and academic functioning and may be integrated into student counselling services (Hershner & O'Brien, 2021).

This study also highlights several directions for future research. Given the cross-sectional design, causal relationships cannot be established. Longitudinal studies are needed to determine whether improved sleep leads to enhanced academic performance or whether high-achieving students naturally maintain better sleep patterns. The inclusion of objective sleep measures such as actigraphy or wearable sleep trackers would strengthen future research by reducing reliance on self-reported data (Mollaveya et al., 2020).

Future studies should also explore moderating variables such as gender, socioeconomic background, academic discipline, and year of study to better understand subgroup differences in sleep–academic relationships. Additionally, qualitative research approaches could provide deeper insight into cultural beliefs, coping mechanisms, and perceived barriers to healthy sleep among Sri Lankan students.

4. CONCLUSION

Overall, the findings suggest that both sleep duration and subjective sleep quality are significantly associated with academic performance among Sri Lankan university undergraduates. These results contribute to the growing body of evidence emphasising sleep as a key behavioural factor influencing cognitive and academic outcomes. However, further longitudinal and objective research is required to clarify causality and strengthen the evidence base for targeted interventions in university settings.

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