

ORIGINAL ARTICLE

Behavioral and Environmental Determinants of Sleep Inequality in College Populations

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ABSTRACT

Background: Sleep inequality in college populations is an emerging public health concern, often shaped by both behavioral habits and environmental conditions.

Objective: To explore behavioral and environmental determinants contributing to disparities in sleep quality among college students.

Methods: Thirty-five participants (18 males, 17 females), aged 18–45 years, from diverse academic backgrounds, participated in in-depth qualitative interviews. Data were analyzed thematically to identify recurrent patterns influencing sleep.

Results: Key behavioral factors included excessive screen use before bed (82.9%), academic stress (85.7%), and bedtime procrastination (77.1%). Environmental contributors were noise disturbance (71.4%), inconsistent lighting (62.9%), and poor ventilation or temperature extremes (48.6%). Interaction between behavioral and environmental factors amplified sleep inequality, with noticeable gender variations—female students more frequently cited safety concerns and environmental discomfort.

Conclusion: Multifactorial interventions addressing both personal behaviors and environmental conditions are crucial to promoting equitable sleep health in college populations.

KEYWORDS

• Sleep Inequality • College Students • Behavioral Determinants • Environmental Determinants • Public Health • Sleep Hygiene

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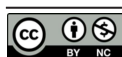
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INTRODUCTION

Sleep is a critical determinant of mental, physical, and academic performance. In college populations, irregular sleep patterns are common due to lifestyle pressures, academic demands, and environmental stressors. Existing literature indicates that both behavioral (e.g., study schedules, screen exposure) and environmental (e.g., noise, room temperature) factors can contribute to unequal sleep experiences across students, impacting health outcomes and educational achievement. Urbanization, hostel living conditions, and cultural attitudes toward rest further complicate sleep patterns in young adults. However, research focusing on the combined behavioral and environmental determinants of sleep inequality in college populations, particularly through qualitative exploration, remains limited.

REVIEW OF LITERATURE

Behavioral factors such as delayed bedtimes, increased screen exposure, and high caffeine intake are consistently linked to reduced sleep duration and quality¹. Bedtime procrastination has emerged as a distinct behavioral barrier to healthy sleep.² Environmental determinants, including noise exposure, light pollution, and inadequate thermal comfort, significantly disrupt sleep continuity.³ Students in shared or urban accommodations are particularly vulnerable to these disruptions.⁴ Furthermore, gender differences have been observed—female students often cite safety and comfort concerns, while male students are more likely to attribute poor sleep to personal habits.⁵ This evidence underscores the importance of an integrated approach that simultaneously targets individual behaviors and the living environment to address sleep inequality in academic settings.

METHODOLOGY

Study Design and Approach

This qualitative study employed an in-depth interview method to explore behavioral and environmental determinants of sleep inequality among college students. The design was chosen to capture rich, context-specific insights into participants' lived experiences and perceptions regarding sleep.

Participants

A purposive sampling strategy was used to recruit 35 college students (18 males, 17 females) aged between 18 and 45 years. Inclusion criteria required participants to be currently enrolled in a degree program, residing in either on-campus or off-campus housing, and willing to discuss their sleep-related behaviors and environmental conditions.

Data Collection

Semi-structured interview guides were developed based on existing literature on sleep hygiene, behavioral factors, and environmental influences. Interviews lasted approximately 30–45 minutes and were conducted in private settings to ensure confidentiality. The guide included open-ended questions covering:

- Bedtime and wake-up patterns
- Pre-sleep activities (e.g., screen time, academic work, caffeine intake)
- Environmental conditions in sleeping space (e.g., noise, lighting, ventilation)
- Perceived barriers to consistent and restful sleep

Ethical Considerations

Participation was voluntary, and informed consent was obtained from all participants. Anonymity was ensured by assigning codes instead of using real names. Ethical approval was obtained from the relevant institutional review board before commencing data collection.

DATA ANALYSIS

Interviews were transcribed verbatim and analyzed thematically following Braun and Clarke's six-step framework. Initial codes were generated, grouped into categories, and subsequently developed into overarching themes. NVivo software was used to assist with data organization and retrieval. Investigator triangulation was applied to enhance analytical rigor, with multiple researchers reviewing the coding framework to ensure consistency and reduce bias.

RESULTS

Participant Characteristics

A total of 35 participants (18 males and 17 females), aged between 18 and 45 years, took

part in the in-depth interviews. Participants represented a mix of undergraduate, postgraduate, and professional programs across disciplines including engineering, health sciences, business administration, and humanities. Most were enrolled full-time, with a few engaged in part-time employment alongside studies.

Behavioral Determinants of Sleep Inequality

Several behavioral patterns emerged as significant contributors to differences in sleep quality among college students. Late-night study sessions, excessive screen use before bedtime, irregular sleep-wake schedules, and high caffeine intake were frequently reported. Many students admitted to sleeping less than 6 hours on academic weekdays, with catch-up sleep on weekends. A substantial proportion described bedtime procrastination driven by recreational social media use, online gaming, or binge-watching digital content. Students also reported stress from academic workload and upcoming examinations as a major driver of sleep onset delays.

Environmental Determinants Affecting Sleep

Environmental factors played a crucial role in creating disparities in sleep quality. Hostel accommodations with shared rooms often had high noise levels, interruptions from roommates, and inconsistent lighting control. Urban-campus students cited ambient noise from traffic, construction, or nightlife, while semi-urban campus participants reported fewer but still notable disturbances from communal living arrangements. Inadequate ventilation, poor bedding quality, and extreme indoor temperatures during seasonal peaks also negatively impacted sleep continuity.

Determinant Category	Specific Factor	Percentage (%)
Behavioral	Late-night study sessions	74.3
	Excessive screen time before bed (>2 hrs)	82.9
	Irregular sleep-wake schedule	68.6
	High caffeine intake in evenings	60.0
	Bedtime procrastination	77.1
	Academic stress and exam anxiety	85.7
Environmental	Noise in hostel/shared accommodation	71.4

Determinant Category	Specific Factor	Percentage (%)
	Urban ambient noise (traffic, nightlife, construction)	51.4
	Inconsistent lighting control	62.9
	Poor ventilation or room temperature extremes	48.6
	Uncomfortable bedding/furniture	42.9

Interaction of Behavioral and Environmental Factors

The findings revealed a strong interaction between behavioral and environmental determinants. For example, students who engaged in prolonged digital device use at night were more susceptible to the disruptive effects of external noise, resulting in frequent awakenings. Similarly, individuals with high caffeine consumption during late evenings experienced greater difficulty adapting to unfavorable environmental sleep conditions, such as bright artificial lighting in shared living spaces.

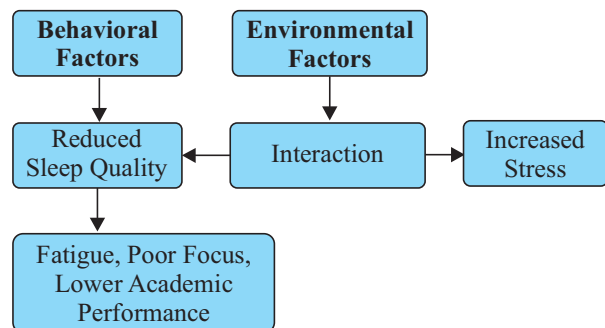


Figure 1: Interaction Between Behavioral and Environmental Determinants of Sleep Inequality

GENDER AND AGE-RELATED VARIATIONS

While both male and female participants reported similar behavioral and environmental challenges, some differences emerged. Female students were more likely to cite safety concerns in hostel environments as a source of stress before bedtime, whereas male students more frequently reported late-night social gatherings as a reason for reduced sleep. Younger participants (18–25 years) tended to have more irregular schedules and a greater tendency toward sleep procrastination, while older students, particularly those balancing work and study, reported shorter but more structured sleep durations.

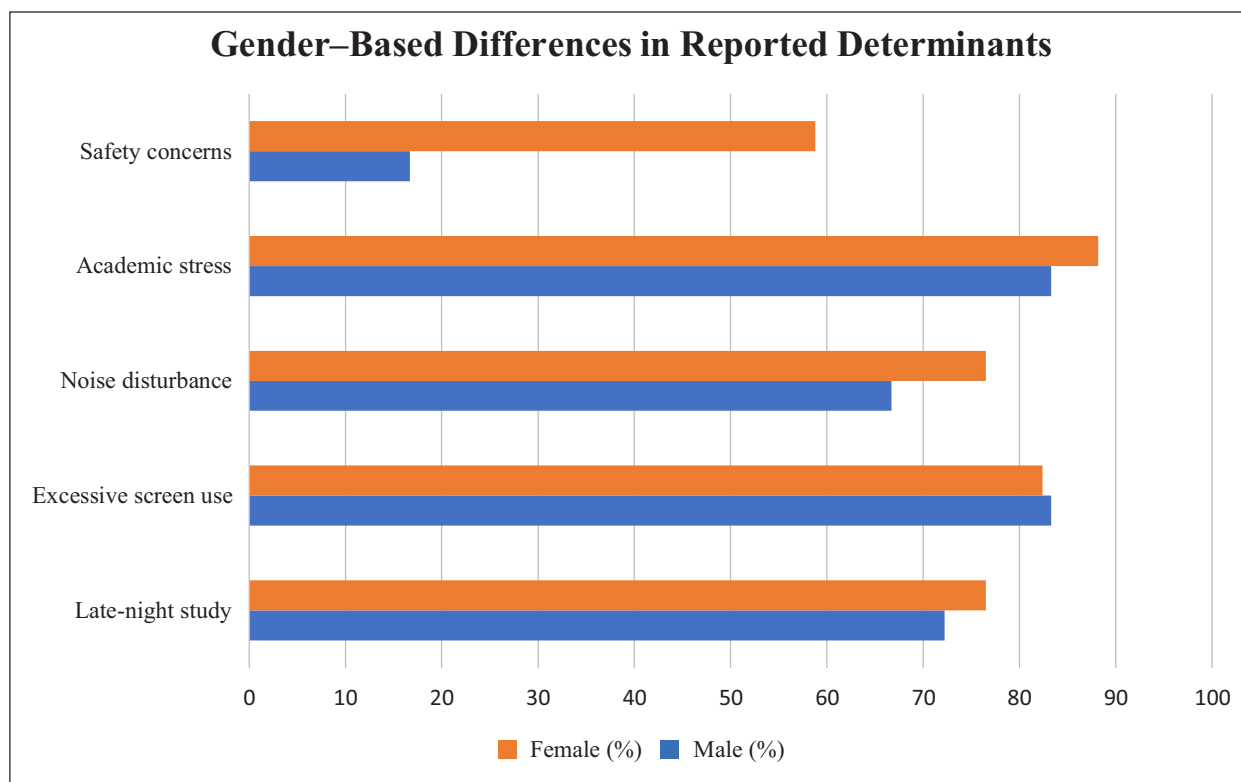


Figure 2: Gender-Based Differences in Reported Determinants

Perceived Consequences of Sleep Inequality

Participants associated poor sleep quality with daytime fatigue, reduced academic performance, impaired concentration, mood disturbances, and increased consumption of high-calorie snacks. Some also reported frequent minor illnesses, suggesting a possible link between sleep disruption and reduced immunity. Those experiencing better sleep patterns attributed it to consistent routines, personal control over their sleep environment, and reduced late-night technology use.

DISCUSSION

The findings of this study align with prior evidence, reinforcing that behavioral habits such as academic stress, excessive nighttime screen use, and bedtime procrastination are primary contributors to sleep inequality. Environmental factors—particularly noise, lighting inconsistencies, and ventilation—exacerbate these challenges. The interaction between these two categories suggests a cumulative effect, where environmental disruptions amplify the impact of poor behavioral choices, and vice versa. Gender variations observed in this study echo

existing literature: female participants more frequently cited environmental and safety concerns, while male participants emphasized behavioral disruptions. These insights highlight the need for gender-sensitive interventions. From a public health perspective, addressing sleep inequality requires not only health education on personal sleep hygiene but also structural changes in student accommodations, such as improved noise insulation, lighting control, and ventilation systems.

CONCLUSION

This study highlights that sleep inequality among college students is shaped by a complex interplay of behavioral and environmental determinants. Academic stress, excessive screen use, and bedtime procrastination consistently undermined sleep quality, while environmental factors such as noise, poor lighting, and inadequate ventilation further exacerbated disparities. The findings underscore the importance of holistic, multi-level interventions that combine individual behavior change with improvements in campus living conditions. Promoting sleep equity in college populations is not only

essential for student health and well-being but also for academic performance and long-term public health outcomes.

Limitations

This study is based on a small, purposive sample from a single academic setting, which may limit generalizability. The reliance on self-reported qualitative data may also introduce recall and reporting biases. Moreover, the cross-sectional nature of the interviews prevents assessment of causal relationships.

Future Implications

Future research should incorporate larger, multi-institutional samples and longitudinal designs to explore temporal trends in sleep inequality. Mixed-method approaches integrating objective sleep tracking (e.g., actigraphy) with qualitative insights may yield richer findings. Public health interventions could be co-developed with students to address both behavioral and environmental determinants in a culturally sensitive manner. Policy-level changes, such as hostel infrastructure improvements and campus-wide sleep health campaigns, may further promote equitable sleep health in academic populations.

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