

## Physical activity levels and their relationship with sleep quality and stress in nursing students

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### Abstract

Nursing students often experience sleep disturbances and stress due to their education. Proper physical activity can be a factor in improving sleep quality and reducing stress in students. However, research specifically targeting nursing students in Yogyakarta has not been conducted.

This study aims to determine the relationship between physical activity and sleep quality and stress in nursing students. This is a descriptive observational study with a cross-sectional approach. The sample consisted of 169 second-semester nursing students from Universitas Aisyiyah Yogyakarta. The instruments used were the Global Physical Activity Questionnaire (GPAQ), the Pittsburgh Sleep Quality Index (PSQI), and the Perceived Stress Scale (PSS). Data were analyzed using the Kendall's Tau c test and the Somers test.

The results showed that the majority of respondents had high levels of physical activity (56.2%), poor sleep quality (95.9%), and moderate stress levels (78.7%). There was no relationship between physical activity, sleep quality, and stress levels in nursing students ( $p > 0.05$ ).

**Keywords:** physical activity, stress, sleep quality, nursing students

### 1. Introduction

University students frequently encounter stress in their daily lives, which is a typical physical, mental, or emotional reaction to unforeseen or undesirable circumstances. Stressors, whether personal or environmental, trigger this response. Research indicates that perceived stress is particularly prevalent among undergraduate healthcare students, as highlighted by various studies (Alwhaibi et al., 2023).

College represents the most dynamic phase of personal psychological transformation, characterized by psychological paradoxes and stress. The sources of psychological stress among college students are linked to the prevailing competitive social environment and their physical and mental maturation. Recent studies in healthcare-related domains have demonstrated that nursing students endure elevated stress levels relative to other disciplines, and these levels are increasing (Zheng et al., 2022a).

Research in China has determined that the primary stressors for nursing undergraduates are preparation and examinations, followed by graduation tasks, public perceptions of the profession, and the workload. Further research reveals that the principal source of stress for nursing undergraduates is the necessity to learn knowledge (Zheng et al., 2022a).

The repercussions of stress transcend physical, emotional, and behavioural manifestations, as adolescents may encounter challenges in achieving academic objectives. Chronic stress in nursing students can result in memory impairment, diminished concentration, chest pain, tachycardia, sadness, general discontent, and sleep disturbances, potentially culminating in burnout (Gomathi et al., 2017).

In addition to stress-related issues, nursing students also encounter sleep disturbances. The study's results indicated that nursing students exhibited poor sleep quality. Nursing students may experience sleep disturbances due to the demanding nature of their degree, which requires significant time and effort. Consequently, students who have insufficient sleep may encounter a range of medical, social, and psychological issues. (Ilmaz et al., 2017).

Physical activity is a determinant of stress levels and sleep quality. Physical activity denotes any physiological movement generated by skeletal muscles that necessitates energy expenditure. It includes many activities such as exercise, sports, and routine actions like walking and running (Öğrencilerinde et al., 2024). Engaging in physical activity is frequently advised as a method for alleviating stress. While correlations between physical exercise and stress have been recorded in both adults and children, they have not been thoroughly examined within college populations (Nguyen-Michel et al., 2006).

Research worldwide indicates that physical activity is linked to sleep outcomes; however, the underlying mechanisms are intricate. Research from Italy and the United States has identified correlations between moderate to vigorous physical activity and enhanced sleep pleasure and duration, but low levels of physical activity were linked to adverse results (Conte et al., 2022; Bajamal et al., 2025). However, Bajamal et al.'s (2025) research demonstrates significant sleep deprivation and inadequate physical activity among nursing students, reflecting a concerning health trend.

Substantial negative associations between sleep efficiency and leisurely physical activity indicate that although exercise is associated with enhanced sleep quality, excessive exercise may act as an extra stressor, resulting in detrimental effects on the sleep quality of healthcare students. Simultaneously, substantial positive connections between sleep duration and sedentary behaviour suggest that sufficient rest should not be underestimated in its impact on sleep (Alhusami et al., 2024). Based on the background, this study aims to determine the relationship between physical activity, stress and sleep quality in nursing students.

## **2. Method**

### **2.1 Design, sample size and sampling technique**

This study employed a cross-sectional design, an observational methodology that collects data at a certain point to analyze outcomes and their related factors within a specified population. Respondents were selected voluntarily based on the following inclusion criteria: they were second-semester nursing students at Universitas Aisyiyah Yogyakarta in 2025. Exclusion criteria: respondents who failed to complete the questionnaire thoroughly. The total sampling technique produced 169 replies from individuals who met the specified inclusion and exclusion criteria.

### **2.2. Data Collection Methods, Instruments Used, Measurements**

The data collected in this research were gathered using validated and dependable tools that have exhibited consistency in numerous previous studies. Online surveys were conducted using G-Forms distributed via WhatsApp groups. The online survey consists of three main elements. The initial section comprises four questions that gathered data on participants' sociodemographic characteristics, including age, gender, weight, and height. The subsequent section utilized the Global Physical Activity Questionnaire (GPAQ), designed for the global assessment of physical activity and inactivity among individuals aged 18 to 65 years. The data was transformed into MET minutes per week. The length of vigorous activity was multiplied by a MET value of 8, whereas the length of moderate activity was multiplied by a MET coefficient of 4. The transformed data were subsequently categorized based on high, medium, and low activity criteria. The final element of the questionnaire consists of the 19-item Pittsburgh Sleep Quality Index. The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse et al. (1989), evaluates overall sleep quality over a duration of one month. The items yield seven component scores: sleep duration, sleep efficiency, sleep disturbances, sleep onset latency, use of sleep medication, daytime functioning, and perceived sleep quality. Each item is assessed on a range from 0 to 3, yielding a cumulative score between 0 and 21; higher values indicate poorer sleep quality. The sleep quality category consists of >5 poor sleep quality and <5 good sleep quality. The fourth section of the questionnaire comprises the Perceived Stress Scale (PSS). Values on the PSS range from 0 to 40, with higher values indicating greater perceived stress. Numbers ranging from 0 to 13 indicate low stress, numbers from 14 to 26 signify moderate stress, and scores between 27 and 40 reflect severe perceived stress.

### **2.3 Data Management and Analysis**

Upon gathering all the data, the researcher input it into an Excel spreadsheet for analysis. The Statistical Package for the Social Sciences (SPSS Version 22.0) was employed for data analysis. Multiple analytical methods were employed, including descriptive statistics such as frequencies and percentages, to characterize all variables. Bivariate testing of the relationship between physical activity and sleep quality was carried out using the Kendall Tau c test, and bivariate testing of the relationship between physical activity and stress using the Somers test.

## 2.4 Ethics

Before beginning the research, the Ethical Board Approval was granted by the Medical and Health Research Ethics Committee (MHREC), Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada-DR. Sardjito General Hospital.

## 3. Results and Discussion

### 3.1 Results

One hundred sixty-nine people completed the online questionnaire. Descriptive statistics have been used to describe the sociodemographic attributes of the sample. The participants' ages varied from 18 to 27 years, with the predominant group (99.4%) aged between 17 and 21 years, and only 0.6% (n = 1) aged 27. Table 1 indicates that a predominant proportion of the participants were female (85.8%).

**Table 1.** Sociodemographic Characteristics of Participants (n = 169)

| Variable | Category | n   | %    |
|----------|----------|-----|------|
| Age      | 17-21    | 168 | 99.4 |
|          | >21      | 1   | 0.6  |
| Gender   | Female   | 145 | 85.8 |
|          | Male     | 24  | 14.2 |

Table 2 demonstrates that the most significant percentage (56.2%, n = 95) participated in high physical activity. Moderate physical activity was reported by 30.8% (n = 52), but only 13.0% (n = 22) reported low physical activity. A predominant majority (56.2%, n = 95) experienced moderate levels of stress. Low stress was reported by 11.2% (n = 19), whereas only 10.1% (n = 17) indicated severe perceived stress. 95.9% (n = 162) reported good sleep quality, while only 4.1% (n = 7) reported poor sleep quality.

**Table 2.** Physical activity, level of stress and sleep quality among respondents (n = 169)

| Category           | Frequency (n) | Percentage (%) |
|--------------------|---------------|----------------|
| Physical activity  |               |                |
| Low                | 22            | 13.0           |
| Moderate           | 52            | 30.8           |
| High               | 95            | 56.2           |
| Level of stress    |               |                |
| Minimal stress     | 19            | 11.2           |
| Moderate stress    | 133           | 78.7           |
| Severe stress      | 17            | 10.1           |
| Sleep quality      |               |                |
| Poor sleep quality | 162           | 95.9           |
| Good sleep quality | 7             | 4.1            |

There was no relationship between physical activity and stress, nor between physical activity and sleep quality (Table 3).

**Table 3.** Association between physical activity and the level of stress and sleep quality (n = 169)

| Category                  | Low |       | Moderate |       | Vigorous |       | r     | p     |
|---------------------------|-----|-------|----------|-------|----------|-------|-------|-------|
|                           | n   | %     | n        | %     | n        | %     |       |       |
| <b>Perceived stress</b>   |     |       |          |       |          |       | 0.010 | 0.717 |
| <b>Low stress</b>         | 2   | 1.18  | 7        | 4.14  | 10       | 5.92  |       |       |
| <b>Moderate stress</b>    | 16  | 9.47  | 41       | 24.26 | 76       | 44.97 |       |       |
| <b>Severe stress</b>      | 4   | 2.37  | 4        | 2.37  | 9        | 5.33  |       |       |
| <b>Sleep quality</b>      |     |       |          |       |          |       | -0.25 | 0.789 |
| <b>Poor sleep quality</b> | 22  | 13.02 | 48       | 28.40 | 92       | 54.44 |       |       |
| <b>Good sleep quality</b> | 0   | 0.00  | 4        | 2.37  | 3        | 1.78  |       |       |

Note :  $p < 0,05$

### 3.2 Discussion

The study included 145 women (85.8%) and 24 men (14.2%). The participants in the study ranged between 17 and years old, mainly between 17-27 years (99.4% of all participants). The most significant percentage (56.2%,  $n = 95$ ) participated in high physical activity, but only 13.0% ( $n = 22$ ) reported low physical activity. In the context of health and well-being, high levels of physical activity tend to indicate a healthier lifestyle. In contrast, low levels of physical activity can increase the risk of health problems. Therefore, these results can be used to identify groups of students who may require special attention in efforts to improve their physical activity levels to support their health and well-being (Rivaldi et al., 2023). The results of this study align with those of Pastuszak et al. (2015), who found that the majority of students have high levels of physical activity. This is likely due to supporting factors. The physical activity of nursing students was most accurately predicted by self-efficacy and social support (Blake et al., 2017). However, other studies have yielded conflicting results. Research conducted by Rivaldi et al. (2023) and Bajamal et al. (2025) found that the majority of students have low levels of physical activity.

The majority of respondents (78.7%) reported experiencing moderate stress, while only 10.1% reported mild stress. This study's findings align with a review that concluded that the majority of nursing students experience moderate stress levels (Zheng et al., 2022b). Nursing students may have higher levels of stress relative to students in other healthcare professions (Reeve et al., 2013). In numerous nations, nursing students frequently report elevated stress levels compared to other student demographics, and the clinical aspect of nursing education is more stressful than the theoretical component (Zheng et al., 2022b). Furthermore, academic pressures, including clinical examinations and interactions with educators, have been recognized as substantial stressors for nursing students (Aloufi et al., 2021).

The study revealed that a significant majority of nursing students (95.9%) experienced poor sleep quality. This aligns with prior studies indicating that the average PSQI score for nursing students was  $14.10 \pm 2.38$ , with a minimum score of 9. An analysis of the mean scores and the lowest score of the students revealed that their sleep quality was subpar, with none demonstrating adequate sleep quality (Öğrencilerinde et al., 2024). The results correspond with a study by Ghosh et al. (2021), which found that merely 19.78% of nursing students exhibited good sleep quality, as evidenced by a PSQI score of 5 or lower (Ghosh et al., 2021). Poor sleep quality is caused by insufficient sleep. Students must complete assigned assignments, which can lead to problems such as fatigue, increased stress, anxiety, and decreased concentration during daytime activities. Students who experience sleep disorders can experience a decline in health (Hami et al., 2021).

Several previous studies have found a relationship between physical activity, sleep quality, and stress in college students (Bajamal et al., 2025; Alhusami et al., 2024; Öğrencilerinde et al., 2024). However, the results of this study differ. This study found no significant relationship between physical activity and sleep quality ( $p > 0.05$ ) or stress ( $p > 0.05$ ) in nursing students. Several factors may have influenced this finding, including the presence of other factors that affect stress and sleep quality in nursing students. Furthermore, the respondents in this study were Gen-Z nursing students who use gadgets daily. This situation makes the factors influencing sleep quality and stress more complex. In the current fast-paced and stressful environment, Gen Z students often prioritize their academic, social, and digital engagements over sleep, leading to irregular and insufficient sleep patterns. These disruptions significantly affect their physical and mental health, as well as impede their cognitive abilities (Sharma & Sharma, 2025). Physical activity actually has a positive relationship with stress, as exercise can lower stress hormones, increase endorphin production (the feel-good hormone), and improve mood (Nguyen-Michel et al., 2006). Nevertheless, the primary stressors affecting Gen Z students encompass academic pressure, apprehensions regarding career prospects, financial difficulties, societal and environmental expectations, along with the effects of social media and digital fatigue, which may influence the outcomes of this study due to their uncontrolled nature.

### 4. Conclusion

There is no significant relationship between physical activity, sleep quality, and stress among nursing students.

## 5. Acknowledgement

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## 6. Conflict of Interest

The authors declare no conflict of interest.

## 7. Financial Disclosure

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