Muhamad Noor Mohamed . Raja Nurul Jannat Raja Hussain .
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Nurul Ain Abu Kasim . Nur Hani Syazwani Bakri .
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Editors

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Effect of Physical Activity on Cognitive Function and Sleep Quality Among UiTM Seremban 3 Students

Akif Saat, Nurun Naja, Nur Najihah, Naimi Sahira, Muhammad Taufiq, and Sharifah Maimunah Syed Mud Puad*.

Abstract | In the demanding landscape of university life, where sleep deprivation and mental exhaustion are commonplace, this study explores whether physical activity could be a game-changer for students, enhancing both academic success and overall well-being. Could physical activity be key to unlocking more significant cognitive potential and ensuring restorative sleep? Purpose: Although exercise and sleep quality are associated with cognitive function, their beneficial effects on cognitive function remain unclear. This study examines the impact of physical activity on sleep quality and cognitive function. Methods: 26 healthy young adults (age 22.3 ± 1.04 years) participated in this study. The Exercise amount was assessed using a uniaxial accelerometer. This study evaluated physical activity and sleep quality by actigraphy. Cognitive function was tested using the N-back task and the Wisconsin Card Sorting Test (WCST).Results: There were no significant associations between physical activity and sleep quality (B = -2.63e-4, p = 0.616), Nback task performance (B = -2.84e-4, p = 0.670), or WCST performance (B = -2.61e-5, p = 0.679), while sleep quality was significantly associated with N-back task performance (B = 0.540, p = 0.030) but not WCST performance (B = 0.0401, p = 0.097). Conclusion: Physical activity was not significantly associated with sleep quality or cognitive function. However, sleep quality was positively associated with working memory performance, suggesting that better sleep quality may enhance cognitive abilities in specific domains.

Keywords: *Physical activity, cognitive function, sleep quality, students, accelerometer, university students.*

A., Saat, N., Naja, N., Najihah, N., Sahira, M., Taufiq, and S.M., Syed Mud Puad* (✉).
Faculty of Sports Science and Recreation, Universiti Teknologi MARA Negeri Sembilan Branch, Seremban Campus, Malaysia.
**Corresponding author: shari0971@uitm.edu.my*

I. Introduction

A. *Physical Activity*

Regular physical activity can reduce the risk of chronic diseases such as heart disease, stroke, type 2 diabetes, and some types of cancer [1].

B. *Cognitive Function*

Individuals with strong cognitive function are less likely to experience depression, anxiety, and other mental health disorders [2].

C. *Sleep Quality*

Quality sleep strengthens the immune system, enhancing the body's ability to fight off infections and diseases [3].

II. Methods

26 healthy young adults (age 22.3 ± 1.04 years) participated in this study. The Exercise amount was assessed using a uniaxial accelerometer. This study evaluated physical activity and sleep quality by actigraphy. Cognitive function was tested using the N-back task and the Wisconsin Card Sorting Test (WCST).

III. Results and Discussion

A. *Results*

There were no significant associations between physical activity and sleep quality (B = -2.63e-4, p = 0.616), N-back task performance (B = -2.84e-4, p = 0.670), or WCST performance (B = -2.61e-5, p = 0.679), while sleep quality was significantly associated with N-back task performance (B = 0.540, p = 0.030) but not WCST performance (B = 0.0401, p = 0.097).

i. Association of Physical Activity with Sleep Quality

This could be due to the small number of students studied, other factors affecting sleep (like stress), or the fact that students who take breaks might sleep better even if they don't exercise much [4]. The relationship between exercise and sleep might also be more complex than just "more exercise equals better sleep" [5].

ii. Association of Physical Activity with Cognitive Function

This lack of a clear link has been seen in some other research too [6], even though some studies have found a positive effect of exercise on thinking [7] [8]. The study suggests a few reasons for this: the small sample size, the specific cognitive tests used, and not considering individual differences in fitness or exercise habits. It also proposes that even though students might not exercise a lot, the demands of university life, like organizing their time and giving presentations, could help them develop their working memory and executive function skills [9].

iii. Association of Sleep Quality and Cognitive Function

These findings support the idea that good sleep is important for working memory, which is a key skill for students [10]. This agrees with other research showing that poor sleep can harm working memory [11] [12]. The weaker link between sleep and executive function might still be important, and future studies with more participants could help clarify this relationship [13].

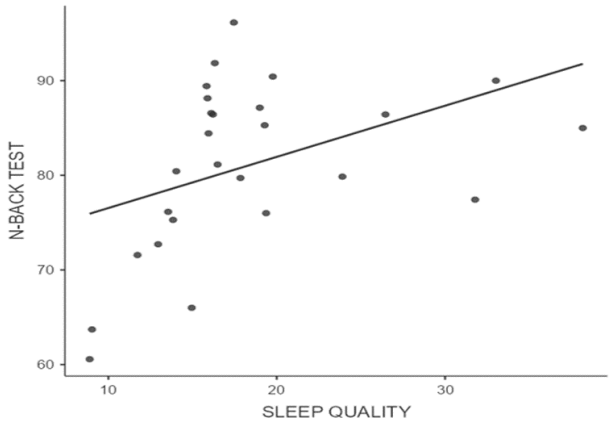

Fig. 1 Simple linear regression of each of the variables

IV. CONCLUSIONS

The study's findings suggest that among university students, sleep quality, particularly its impact on working memory, plays a more significant role in cognitive function than physical activity levels. The research emphasizes the importance of prioritizing healthy sleep habits for students to achieve optimal academic performance and overall well-being.

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