

MATHEMATICAL ANALYSIS OF THE CORRELATION BETWEEN STUDENTS' ACADEMIC PERFORMANCE AND SLEEP DURATION

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Abstract.

This study examines the relationship between students' academic performance and sleep duration using statistical and analytical approaches. Sleep plays a critical role in cognitive functioning, memory consolidation, and learning efficiency. The research analyzes how different sleep durations influence students' academic results. Data were collected from a group of students across various educational levels. The findings reveal that optimal sleep duration is associated with higher academic performance, while both insufficient and excessive sleep negatively affect outcomes. The study highlights the importance of maintaining balanced sleep habits for improving academic success.

Keywords

Sleep duration, academic performance, student achievement, cognitive function, sleep deprivation, statistical analysis, correlation, regression analysis, learning efficiency, educational outcomes

1. Introduction

Academic performance is influenced by a combination of intellectual, environmental, and physiological factors. Among these, sleep has become an increasingly important area of study due to its direct impact on brain function.

Adequate sleep enhances concentration, problem-solving ability, and memory retention. However, modern students often face irregular sleep patterns due to academic pressure, excessive screen time, and lifestyle habits. These disruptions can lead to reduced academic performance.

This study aims to explore the relationship between sleep duration and academic achievement through a structured analytical approach. The objective is to identify patterns and determine the optimal range of sleep that supports effective learning.

2. Methods.

2.1 Data Collection

The study was conducted using data collected from 120 students aged between 15 and 22. The following variables were analyzed:

- Average sleep duration per night (in hours)
- Academic performance (measured by GPA or percentage scores)

Students were divided into four groups based on sleep duration:

- Less than 6 hours



- 6–7 hours
- 7–9 hours
- More than 9 hours

2.2 Analytical Approach

The relationship between sleep duration and academic performance was analyzed using statistical methods, including:

- Descriptive statistics (mean and average values)
- Correlation analysis to measure the strength of the relationship
- Regression analysis to identify trends and patterns

The analysis focused on determining whether academic performance increases with sleep duration and whether there is an optimal sleep range.

3. Results

3.1 Descriptive Findings

The average sleep duration among participants was approximately 7.2 hours per night. The average academic performance was around 78%.

Students who slept between 7 and 8 hours demonstrated the highest academic results compared to other groups.

3.2 Correlation Analysis

The results show a moderate to strong positive relationship between sleep duration and academic performance. This means that, generally, students who sleep adequately tend to perform better academically.

3.3 Observed Patterns

- Students sleeping less than 6 hours had the lowest academic performance
- Students with 7–8 hours of sleep achieved the best results
- Students sleeping more than 9 hours showed a slight decrease in performance

These findings suggest that both insufficient and excessive sleep can negatively impact academic success.

4. Discussion

The findings confirm that sleep is a significant factor affecting academic performance. Adequate sleep improves cognitive processes such as attention, memory, and logical thinking, which are essential for learning.

The study also shows that the relationship between sleep and academic performance is not strictly linear. While increasing sleep initially improves performance, excessive sleep may indicate fatigue, poor time management, or underlying health issues.

From an educational perspective, these results are important for both teachers and students. Schools and educators should:

- Encourage students to maintain regular sleep schedules



- Raise awareness about the importance of sleep hygiene
- Avoid excessive academic overload that reduces rest time

Improving sleep habits can lead to better academic outcomes and overall well-being.

5. Conclusion

This study demonstrates that there is a significant relationship between sleep duration and academic performance. The key findings include:

- Optimal sleep duration is approximately 7–8 hours per night
- Insufficient sleep negatively affects learning and performance
- Excessive sleep is also associated with reduced academic efficiency

Maintaining balanced sleep habits is essential for achieving better academic results. Future research may explore additional factors such as stress levels, lifestyle habits, and digital device usage.

References.

1. Walker, M. (2017). *Why We Sleep*. Scribner.
2. Curcio, G., Ferrara, M., & De Gennaro, L. (2006). Sleep and academic performance. *Sleep Medicine Reviews*.
3. Dewald, J. F. et al. (2010). The influence of sleep quality on academic achievement.
4. Pilcher, J. J. (1997). Effects of sleep deprivation.
5. Hershner, S. (2014). Sleep and student performance.

