Survey on Sleep Patterns and Concentration Levels

Introduction

Sleep plays a crucial role in cognitive function, memory retention, and overall well-being. For university students, maintaining a proper sleep schedule can be particularly challenging due to academic pressures, social commitments, and lifestyle habits. However, the impact of sleep on concentration and productivity remains a critical area of study. Understanding how sleep duration affects concentration levels can help students optimize their schedules for better academic performance and mental well-being.

This report explores the relationship between sleep hours and concentration levels, using data analysis techniques to uncover potential patterns. By analyzing real-world data while controlling for external factors such as stress, mobile usage before bed, and nap rates, we aim to provide meaningful insights into how sleep influences cognitive efficiency. This study is not only relevant for students but also for educators and health professionals who seek to promote better sleep habits for improved learning outcomes.

Research Question

How does sleep duration affect concentration levels among university students?

Hypothesis

It is hypothesized that students who get more sleep will exhibit higher concentration levels compared to those with fewer sleep hours. This hypothesis is based on the well-established link between sleep and cognitive function, which suggests that adequate rest enhances memory, attention span, and mental clarity.

To test this hypothesis, data on sleep hours and concentration levels were collected while controlling for potential confounding variables such as stress levels, mobile usage before bedtime, and nap rates. By analyzing the patterns in this data, we aim to determine whether a clear relationship exists and whether students with better sleep habits tend to have improved focus and concentration.

Population of Interest:

Among 2023 EUI students.

Sampling Method:

We will use **convenience sampling** by distributing the survey to university students through a **WhatsApp group**. This method is chosen for its **efficiency and accessibility**, allowing us to gather responses quickly and easily within the given time constraints. While it may lead to a **non-representative sample**, it is a **practical approach** for exploratory research, providing useful insights into sleep patterns and concentration levels among students. To mitigate potential biases, we will encourage diverse participation within the group to improve sample variability.

Bias Identification:

In designing this survey, we have identified potential sources of bias, such as **self-reporting bias**, where participants might overestimate or underestimate their **stress and anxiety levels** due to social desirability or lack of self-awareness. To minimize this, the survey questions are **straightforward and anonymous**, encouraging honest and accurate responses. Additionally, we have used **neutral language** to avoid leading questions that might influence participants' answers. Also, we've let the participants enter the number of hours slept exactly instead of providing choices like (5-6 hours) or (7-8 hours) which could have made the data inaccurate.

Survey Questions:

- What's your gender?
- How many hours of sleep do you get on average per night?
- How often do you take naps during the day?
- How would you rate (out of 5) your concentration levels during classes?
- How often do you use devices (phones, laptops) before sleeping?
- On a scale of 1 to 10, how would you rate your current stress level?

Online survey link:

https://docs.google.com/forms/d/e/1FAIpQLSeK4BIRGRE_1JA1ikh7YU-3kMJLxbrDOgl730Yrsy_KQd7UFw/viewform?usp=sharing

Number of samples collected:

Total number of samples: 54

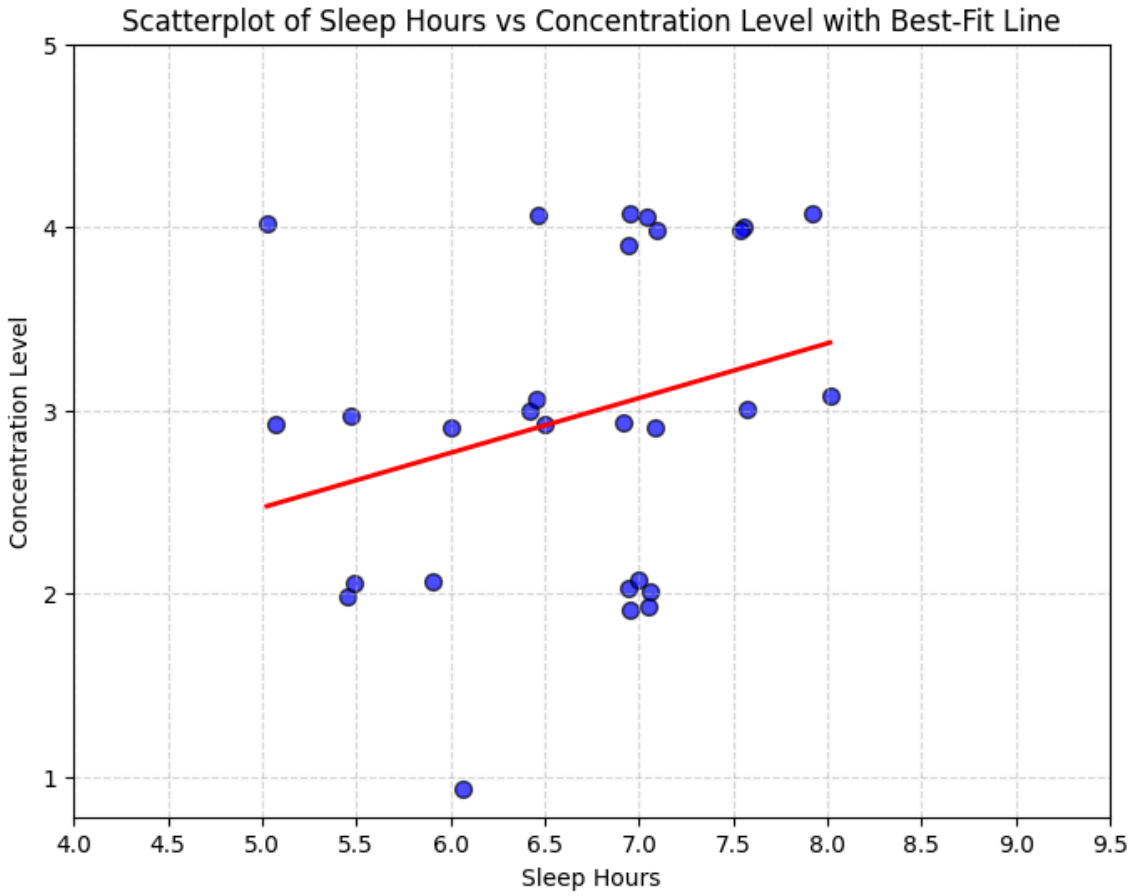
Total number of samples used for graphs and experiment: 28

– **excluded** 7-10 stress rate, naps: 5+ times a week, and 1-2 hours of mobile usage before sleeping.

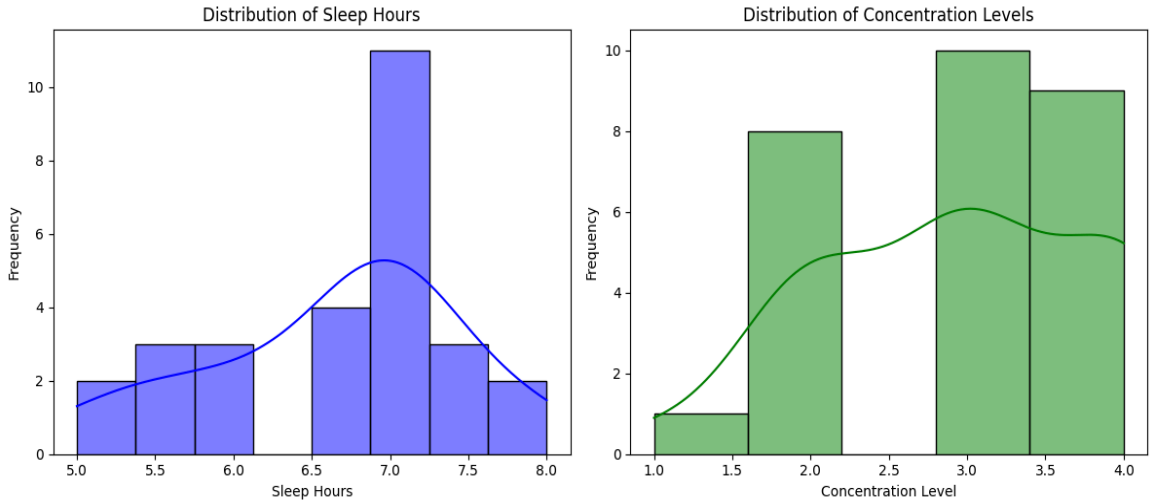
Analysis:

Sleep Hours: Mean: 6.64, Median: 7.0, Mode: 7.0

Concentration Level: Mean: 2.96, Median: 3.0, Mode: 3



This scatterplot visualizes the relationship between **Sleep Hours and Concentration Level**, with a best-fit line indicating a slight positive correlation. While the trend suggests that increased sleep may improve concentration, the scattered distribution of points implies that other factors also play a role. Notably, there are **outliers at (7,2), (6,1), and (5,4)** that deviate from the general pattern, indicating variations in individual responses to sleep duration.



The visualizations display the distribution of **Sleep Hours (left) and Concentration Levels (right)** among participants. The **Sleep Hours histogram** shows that most individuals sleep between **6.5 to 7.5 hours**, with fewer people sleeping either significantly less or more. The **Concentration Levels histogram** indicates that most participants have a concentration level between **2 and 4**, with a peak at level **3**. The presence of smooth density curves suggests some variation in both distributions, implying that while most people follow a common trend, individual differences exist.

Conclusion:

The analysis of sleep patterns and concentration levels among university students reveals a slight positive correlation between the two variables. The scatterplot suggests that students who sleep more tend to have higher concentration levels, although there are outliers such as (7,2) and (5,4), indicating variability in the data. The histograms further show that most students sleep between 6.5 to 7.5 hours and have concentration levels primarily between 2 and 4.

Although we did not include all possible samples in our study, we deliberately excluded certain factors that could significantly impact concentration levels, such as individuals experiencing high stress, those who use mobile devices for 1-2 hours before sleep, and students with high nap rates. While this helped control some external influences, it also means that our findings are specific to a relatively filtered group.

Despite the observed trend, the study has limitations, including self-reporting bias, recall inaccuracies, and the exclusion of other factors like caffeine intake and diet, which may also impact concentration. While the data suggests that sufficient sleep may contribute to better concentration, further research with a broader sample and additional influencing variables would be needed for a more comprehensive understanding.

Hypothesis Evaluation

Our analysis suggests a slight positive correlation between sleep duration and concentration levels, indicating that students who sleep more tend to have better concentration. However, the relationship is not strongly linear, and variations exist. Most students sleep between 6 to 8 hours, with extreme sleep deprivation linked to lower concentration.

We excluded samples with high stress, excessive mobile use before sleep, and frequent napping to focus on the direct relationship. While our findings somewhat support the hypothesis, other factors likely influence concentration, making sleep just one piece of the puzzle.

Additionally, the data suggests that students with the **highest concentration levels typically had 7 to 8 hours of sleep** per night. Sleep durations below 6 hours were often associated with lower concentration scores. While the dataset does not specify exact sleep schedules, maintaining a **consistent sleep routine** and reducing screen exposure before bedtime may help optimize focus and cognitive performance.

Any Potential Issues:

- **Response Bias**: Participants may provide answers they believe are socially acceptable rather than accurate.
- **Accuracy of Self-Reported Sleep Hours**: Recall bias may lead to overestimation or underestimation of sleep duration.
- **Potential Inaccuracy in Concentration Ratings**: The 1-5 rating scale is subjective, and participants may overestimate or underestimate their focus levels.
- **Excluded Factors**: Factors like caffeine intake and diet may influence concentration, they were not included to keep the survey focused and manageable.
- **Convenience Sampling & Non-Representativeness**: Since the form is sent to a WhatsApp group for university students, the sample is based on easy accessibility rather than random selection. This may lead to a non-representative sample, as those who respond might share similar traits, such as academic performance or engagement levels, potentially skewing the findings.