CS 2704 Final Report

# Introduction and Background

Academic success isn’t just about intelligence, it's also about behavior. This project explores how certain habits like how much students study, attend class, sleep, and participate in extracurriculars might impact their GPA. These everyday behaviors could be key to understanding what helps students do well in school. We used a real dataset from Kaggle that includes all this information, study time, attendance rates, sleep habits, and more, and looked for patterns. By analyzing the data, we hoped to learn what kinds of behaviors are most closely linked to strong academic performance.

# The Hypothesis

Our hypothesis is simple:

**Student behavior directly affects academic performance.**

We believe that students who spend more time studying, regularly attend classes, and get enough sleep will generally have higher GPAs. On the flip side, students who don’t attend class often, have poor sleep habits, or don’t put much time into studying might not perform as well. We tested this idea by analyzing how each behavior relates to GPA using both statistical summaries and a prediction model. Our goal was to see whether these behaviors really make a difference in how students perform.

# The Analysis and the Implication

We started with basic stats. On average, students studied 12 hours a week, attended 85% of their classes, slept 7.5 hours a night, and had a GPA of 3.4. Not bad!

Digging deeper, we saw clear trends. More study time and better attendance were linked to higher GPAs. The strongest connection was between GPA and study time (correlation = 0.79). We also found that students who reported feeling less stressed had better grades.

To predict GPA, we built a linear regression model. It looked at study time, sleep, attendance, and extracurriculars. The model explained about 31% of GPA variation, not perfect, but still useful. The errors (residuals) looked normally distributed, which is a good sign our model wasn’t biased.

What this all means: habits really matter. Students who put in consistent effort, especially when it comes to studying and showing up, tend to do better. But behavior isn’t everything. Stress and other factors (maybe motivation, mental health, or support systems) also play a role. So, while good habits help, there’s more to the story.

# Conclusion

In short, our project supports the idea that student behavior has a real impact on academic performance. Studying more and attending class regularly were especially important. While sleep and extracurriculars had smaller effects, they still played a role.

Our prediction model wasn’t perfect, but it showed that these behaviors explain a meaningful chunk of a student’s GPA. The takeaway? Encouraging better study habits and attendance could help students do better in school. At the same time, it’s clear that GPA is also influenced by things we didn’t measure, like stress, mental health, or personal challenges. Future research could dig into those areas for a more complete picture.

# References

- Kaggle: Students Grading Dataset (https://www.kaggle.com/)

- Pandas: https://pandas.pydata.org/

- Matplotlib: https://matplotlib.org/

- Seaborn: https://seaborn.pydata.org/

- Scikit-learn: https://scikit-learn.org/