https://www.kaggle.com/datasets/steve1215rogg/student-lifestyle-dataset

Introduction:

The dataset I chose studies factors of student life that contribute to their academic output. These factors include study hours per day, hours of sleep per night, hours of social activities, extracurricular hours, etc. As a student myself, I wanted to look into certain factors that I consider important as part of my regiment and determine if they actually are necessary for improved academic success. I chose to investigate hours of sleep per night and hours of social activity per day, and compare them to GPA. I felt these factors are important, but not obvious in influencing student gpa, so I decided to investigate.

Methods:

In order to test my hypothesis, I decided to plot social hours against gpa, and then sleep hours against gpa. After that, I tried to combine the sleep and social hours and plot them against gpa to see if there was a general trend as both hours increase. The fourth test I did involved grouping the hours of each against average gpa. Looking at the dataset, the minimum hours logged for sleep and social hours begin at 5 and max out at 10. Thus, I grouped each section into 2 hour blocks. I made a graph with bars of 5-6 hours, 7-8 hours, and 9-10 hours. These blocks consisted of combining sleep and social hours against gpa. For the final graph, I looked to plot a regression line between gpa, social hours, and sleep hours, following the same methods we used for lab 7.

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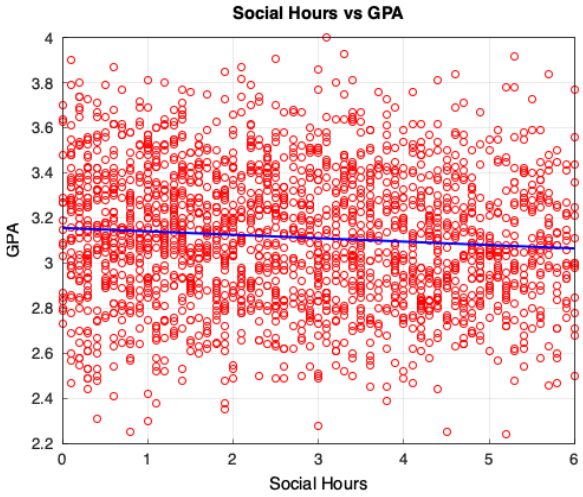
clang++ -std=c++17 -I/opt/homebrew/include/ -L /opt/homebrew/lib -l matplot student.cpp -o student
```

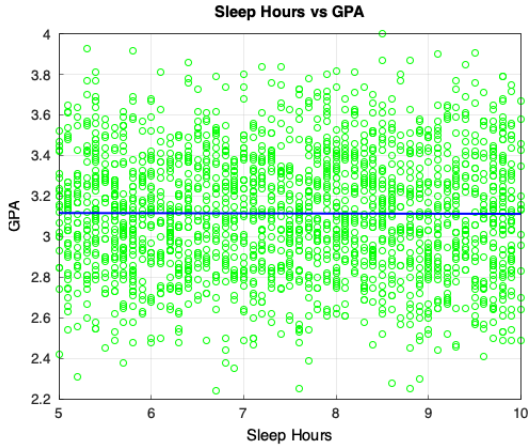
Results:

Figure 1.



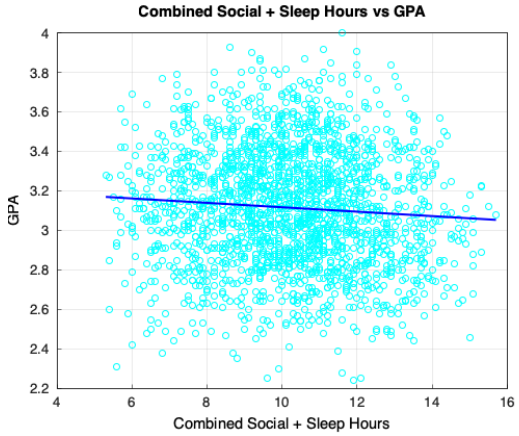
Looking at the trendline, we can see a negative correlation in GPA as social hours increase. This is quite sensible, as increased social hours will inevitably lead to less study/sleep hours.

Figure 2.



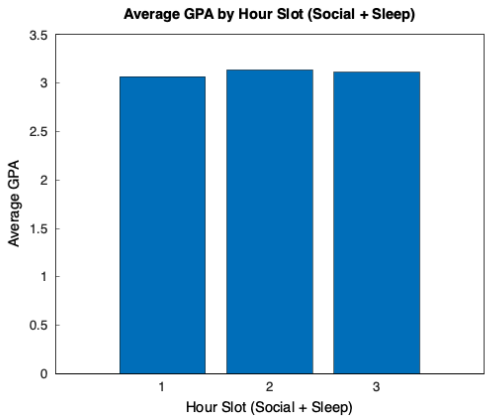
As we can see pictured, there appears to be no correlation between hours of sleep per night and GPA. This is likely a result of many other factors that contribute to GPA, and sleep averages out over all.

Figure 3.



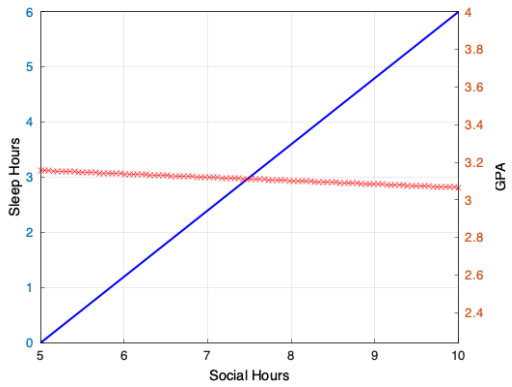
In the above graph, there is a clear negative correlation between social and sleep hours, and GPA. The likely reason for this is the negative correlation between social hours and GPA outweighs the neutral correlation between sleep and GPA. However, looking at the total number of combined hours, it appears that study time is very minimal if both sleep hours and social hours are high.

Figure 4.



This figure shows a grouping of hour slots of both sleep and social hours combined. Bar 1 is 5-6 hours. Bar 2 is 7-8 hours. Bar 3 is 9-10 hours. While all 3 bars are very close numerically, the 7-8 hour bar is the highest, potentially meaning that a good balance of sleep and social hours is best for maintaining a higher GPA. A new hypothesis stating that too few or too many study/sleep hours may lead to an imbalance of study time may be plausible to argue based on the graph.

Figure 5. Regression line between sleep hours, social hours, and GPA



Discussion and Conclusion:

Based on the figures above, there appears to be a negative correlation between social hours and GPA. This is logical because too many social hours may decrease sleep hours or study hours. However, when viewing the correlation between sleep hours and GPA, there is no correlation. I concluded in the methods section that this is likely due to many other factors contributing to negative correlations in GPA, such as study hours. If I were to continue investigating this topic, I would aim to include study hours as well. The reason I didn't initially was because I assumed there would be a very high correlation between study hours and GPA, which would skew the results when including study hours. I also assumed that it was obvious that study hours would greatly impact GPA, so I wanted to look into more specific factors. Based on the fact that sleep hours were neutral, I decided to try to combine sleep/social data and look at the data categorically. Although figure 4 does not appear to show significant changes between hours, the highest bar could provide evidence that balancing sleep and social hours will increase GPA average. This is because extra study time would be a major factor. Too little sleep or social time may impact a student's mental state, while too much sleep and social time will inhibit study time. For the 5th graph, there is not much conclusive evidence and there is certainly human error when compiling and plotting the data. I could not fully compute the regression graph like I did in lab 7, and I'm certain it is due to the way I used the variables with regression. The bounds for each variable are not consistent and the regression was done for the first 2 graphs and then the variables were reused for this one. However, when I attempted to make changes and redo the regression variables, other graphs were heavily affected, and thus I decided to not mess up my other graphs any further. However, while not conclusive, I feel that it could still be interpreted to show that as sleep and social hours increase, there is a negative correlation in comparison to GPA. To reiterate, however, this should not be included when making final arguments, but I felt there was reason to at least make a few notes about it.

In conclusion, there is evidence to suggest that by continuously increasing hours of social time, there is a negative correlation with GPA. I learned that while it is certainly important to engage in social time, as there are clearly health benefits, maintaining a good balance is key. I also learned that sleep alone is not key to maintaining a good GPA. While keeping a healthy sleep schedule is important for personal health, it is not directly correlated with a good GPA. Factors such as study time are absolutely necessary as well. If I were to further continue investigating this dataset, I would likely incorporate study hours as well as stress level, as I feel that a balance of social hours, sleep, and study time are massively important in maintaining stress levels. I would be interested to see the breakdown in what contributes the most to stress, and how that itself could impact gpa as well.