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ISyE 2028 – Basic Statistical Methods - Fall 2015  
Bonus Project: “Big” Data Analytics  
Proposal (or Final Report)

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# Student Academic Success With Respect to Sleep

## Introduction

As a cultural stigma, it is believed that college students stay up all night and receive very little sleep on a regular basis. It’s also generally accepted that more sleep makes for a healthier, happier life. In order to understand the effects of sleep on student performance, I collected data about the sleeping habits of college students, broken down into groups by gender and GPA range. I then used statistical analysis to attempt to draw a conclusion that shows correlation between sleep and academic success.

## Data Collection

I collected my data through an online, anonymous poll. I used a Google Form, which I shared on several Georgia Tech Facebook groups. These groups included the “Georgia Tech Class of 2019” and the “Industrial Engineering” groups. I believe this to be an effective collection method because of its anonymous nature and brevity. I do recognize, however, that this does not necessarily reflect a random sample of Georgia Tech students. There is most likely a high portion of Industrial Engineers and 2<sup>nd</sup> year students.

## Data Analysis

### 1. Sleep Averages

Sleep Metrics by Gender		
	Mean Sleep	Variance of Sleep
Female	6.55 Hours	0.831 Hours <sup>2</sup>
Male	7.11 Hours	1.473 Hours <sup>2</sup>

The table above shows the collected averages and variances for male and female student participants. The data in the table shows a significant difference in the sleeping habits of male and female in the study. Female students consistently sleep less than their male counterparts. Not only did female participants report significantly less sleep times, but also were more consistent in their responses (more female participants’ responses were closer to the mean response than males). Male participants slept longer than female participants but their sleep times were much more varied.

## 2. Sleep Compared to GPA

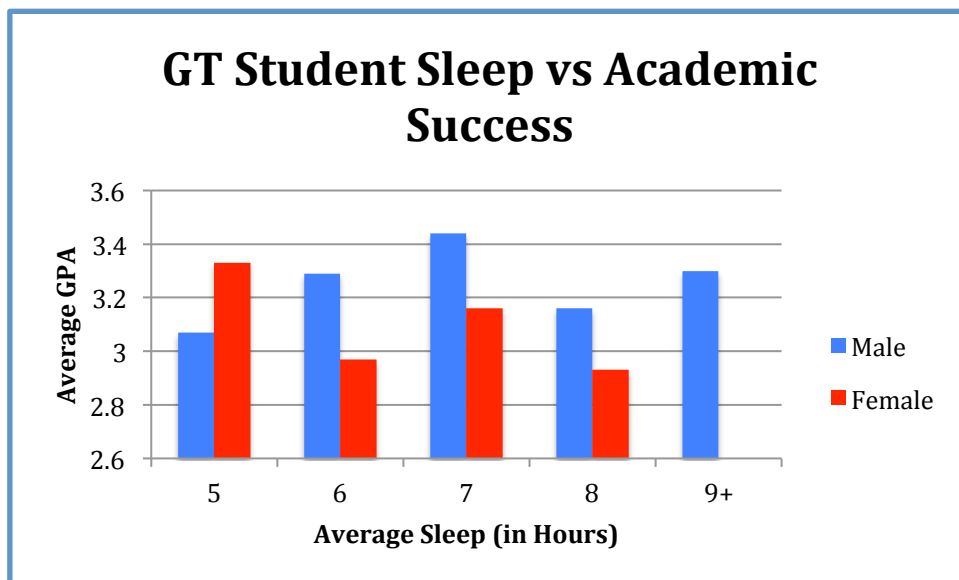
Academic Success Related to Sleep Patterns		
Average Hours of Sleep	Mean GPA ( $\bar{x}$ )	Standard Error ( $SE_{\bar{x}}$ )
5	3.2	.073
6	3.15	.024
7	3.3	.017
8	3.08	.026
9+	3.04	.121

The above table shows the breakdown of responses for all participants. The data suggests that the optimal average sleeping time for students is 7 hours. Students who reported sleeping an average of 7 hours per night not only reported the highest average GPA among participants, but also were most consistent in their responses. The data also suggests that the farther past 7 hours average sleep a participant receives, the lower his or her GPA.

These trends hold when looking at GPA broken down by gender as well as sleep averages.

Male Academic Success Related to Sleep Patterns		
Average Hours of Sleep	Mean GPA ( $\bar{x}$ )	Standard Error ( $SE_{\bar{x}}$ )
5	3.07	.154
6	3.29	.037
7	3.44	.028
8	3.16	.035
9+	3.3	.05

Female Academic Success Related to Sleep Patterns		
Average Hours of Sleep	Mean GPA ( $\bar{x}$ )	Standard Error ( $SE_{\bar{x}}$ )
5	3.33	.154
6	2.97	.056
7	3.16	.041
8	2.93	.077
9+	N/A*	N/A*



## Conclusions

From the data, there is not necessarily a strong correlation between average sleep and academic success. However, the study does suggest that students who receive an average of 7 hours of sleep per night tend to have higher average GPAs than those who sleep other amounts. Many people believe that 7-8 hours of sleep is optimal for students. The data from the study would tend to agree with this belief.

Furthermore, the data reveals that students do generally receive a fair amount of sleep per night. This goes against many cultural stigmas and thoughts about college students receiving very little sleep at night. Since this data was pulled from Georgia Tech Facebook pages, it mainly contains responses from Georgia Tech engineering students who use Facebook. This does limit the sample and does not necessarily reflect a perfect random sample. However, there is no reason to believe that average sleep has an effect on GPA that is unique to this sample. Therefore, it is reasonable to assume that the results in this study generally reflect the effect of sleep on GPA for all Georgia Tech students.

## Accuracy and Improvements

Due to the anonymous nature of the poll, it should be believed that participants responded honestly and to the best of their ability. The study does however have some room for error. One of the biggest problems with the study is that it required students to estimate their average time spent sleeping per night. This can be difficult if students sleep times vary greatly. Students may sleep significantly less during busy times of the year or close to exams. They may also sleep significantly more during periods of light workloads. This makes estimating average time spent sleeping very difficult.

Another source of error in the study is the sample size. Although it is not necessarily a small sample size ( $n = 61$ ), it could be much larger. Particularly with the responses that were farther from the mean responses, there were not enough samples to have conclusive evidence. In order to produce an average that better represents the population mean for each grouping, more samples would need to be collected.

## Notes:

The poll included an option for participants to select "other" as their gender. There were 2 participants who fit this description and their responses were included in the general analysis but were omitted in the gender breakdowns.

There was also an option for "prefer not to answer" for GPA. One participant chose this option and her response was included in the results for sleep averages but was omitted in the section regarding GPA averages.