

DATE: November 18, 2021

TO: Dr. Doi

FROM: David Ballester, Alisa Krasilnikov, Edy Reynolds

SUBJECT: Time Management Project

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## Overview

For our third variable, we chose to measure the amount of time, in minutes, that we spent on our phones each day. We felt as though this would be a good variable to study because phone use is a major component of our lives, and many of us use it for communication, games, social media, etc. It is also a very convenient variable to measure as we were able to utilize the built-in “screentime” function in settings to track our daily phone use. For our data collection, we made an Excel sheet with three different sheets, one for each person. In the sheet, we had a column for each of our variables (Screen Time, Time Studying, Time Sleeping, Name, and NumDay) and our rows contained the data recorded for the dates that this project extended over. Every day, we kept track of how many minutes we spent on each of the three main variables: Studying, Sleeping, and Screen Time. The rest of the variables, name and number of day, were inputted before the project began, for convenience. Though we used phone tracking for both sleep and screen time, studying was a little bit trickier. For this, our group varied slightly in how we collected our minutes studying. For Edy and David, they noted what time they started studying and what time they ended studying throughout the day, and then added up the minute totals at the end. Alisa, however, started and stopped a stopwatch daily, which recorded the amount of studying done. At the end of the project, once everything was collected, we took the data from the individual sheets and compiled them into one sheet, turning that into one csv file. Because we included our name with our respective

data, this gave us the ability to iterate and group the data within the R code, without necessarily needing to import three sets of data.

While keeping the data, there were a couple of small issues that we ran into, which mostly revolved around maintaining accuracy of data. Though it was easy to keep track of sleep and screen time, as that was done automatically through software we had on our phone, studying minutes were a little harder to measure and record. It was especially difficult to describe what counts as studying and what does not. We initially decided that studying counts as anything that is academic, but does not take place within class times. However, we later ran into an ambiguous gray area, as some of us have asynchronous classes. In these instances, it was difficult for us to decide whether the work for these classes should be classified as studying time or class time. We quickly had to update our identification of “studying time” as anything academic that doesn’t take place during class time *or* during lecture, which resolved the issue for the most part. In a similar light, we also ran into a minor issue regarding classifying the process of inputting data for Time Management. This technically counts as schoolwork, and therefore the clock should be running as data was being inputted. However, since the time was still running as data was being inputted, we would never be able to accurately input time. But, this makes our data inaccurate by mere seconds, and so we felt that it was not important to account for this. Another issue was with human error. We tried to get as close to perfect in regards to how long we spent on each variable a day. But, getting it down to the exact minute was quite tricky. Other than that, we did not run into any other issues and enjoyed collecting and analyzing the data as a group.

## Analysis I

Figure 1

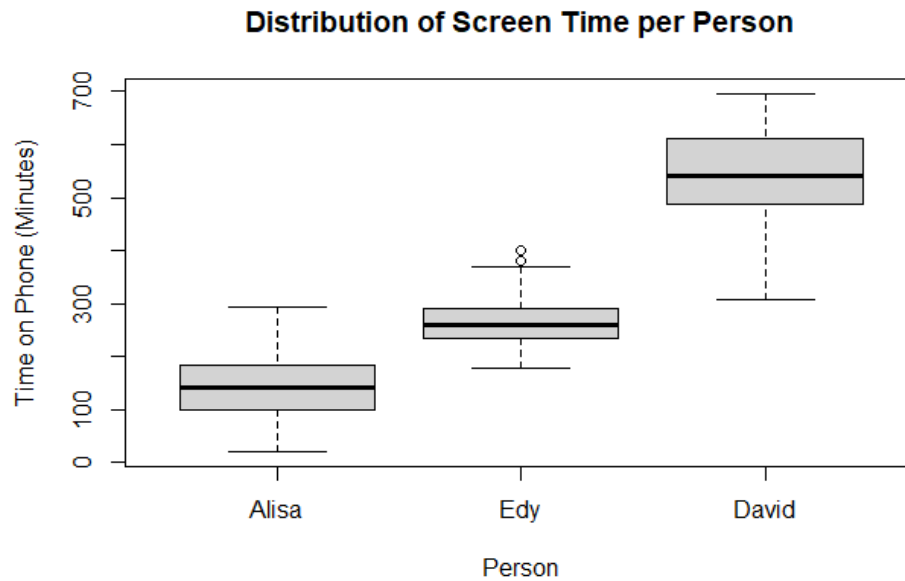


Table 1

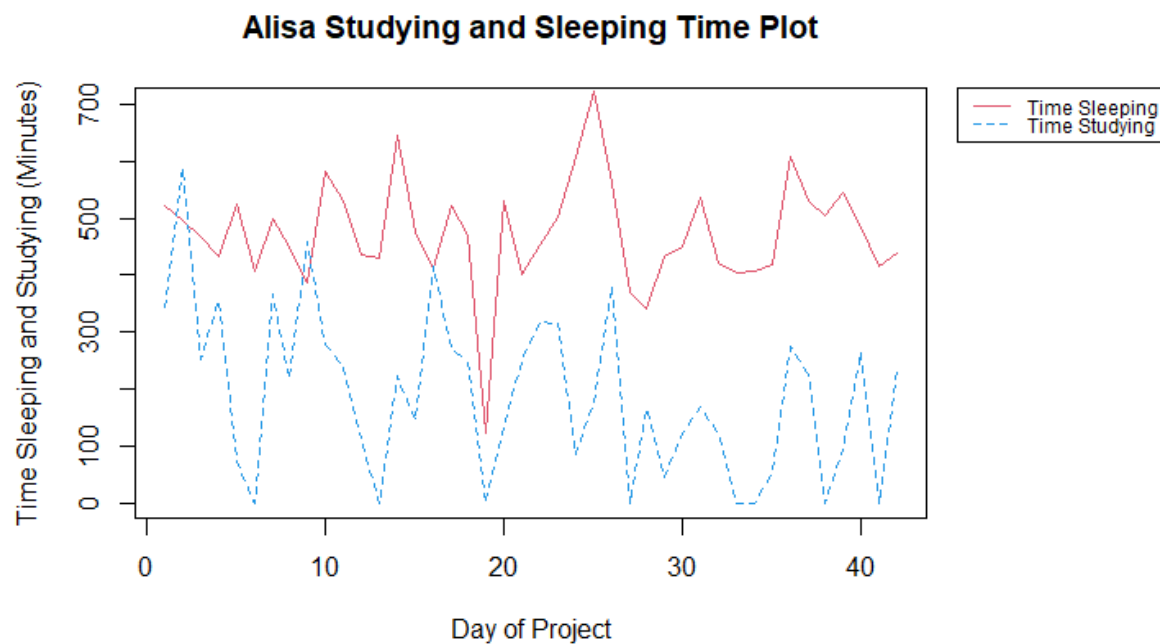
	Mean	Median	Standard Deviation	IQR
Alisa	150.9	143	65.8	82.3
Edy	266.2	259	29.3	55.3
David	539.0	540.5	104.5	121.3

When we analyzed our daily screen time per person, we discovered that the average screen time per person was wildly different. Even without looking at specific digits, we see in Figure 1 that the midlines of the boxplots for all three of us are nowhere near each other. From Table 1, we see that Alisa had a median of 143 minutes of screen time per day, which was less than Edy's median of 259 minutes per day, which was subsequently less than David's median of 540.5 minutes per day. All of the boxplots

in Figure 1 were roughly symmetrical, showing about even weight on both sides of the median line. Edy's distribution of daily screen time was the only one that included any outliers at approximately 350 and 370 minutes per day. All three graphs had varying spreads as well, which implies differences in variability. In Figure 1, we see that David has the widest graph, and Edy has the narrowest graph. Once again, Table 1 confirms our visual assessment. David's graph had an IQR of 121.3 minutes, which was a greater variation than Alisa's graph with an IQR of 82.3 minutes, and finally, Edy's graph had the lowest spread with an IQR of 55.3.

## Analysis II

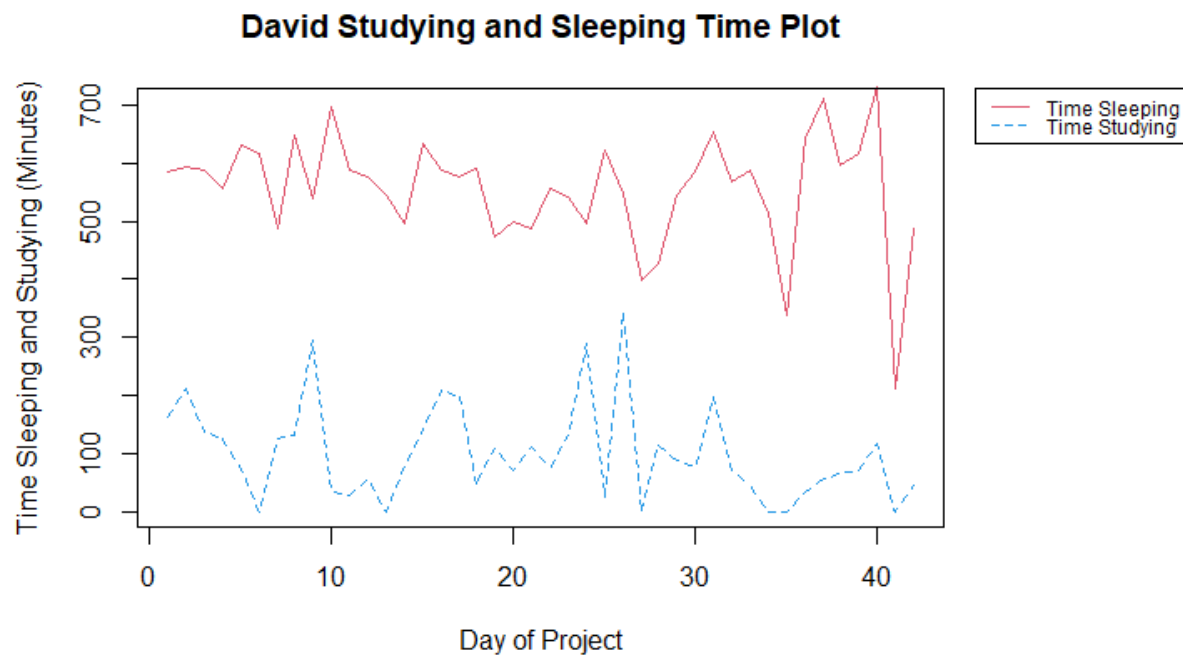
**Figure 2**



Alisa's distribution of time spent sleeping and studying over the course of this project is represented in Figure 2. Alisa does not study on Saturdays, and so there is a consistent drop signifying the stop and start of every week, which is convenient to use as a reference when assessing weekly patterns

throughout the course of the study. In general, her study patterns are fairly consistent. Almost every week shows a rise in minutes studied at the beginning, and then a minor drop in the middle of every week, before rising again towards the end of the week, and then falling to zero on Saturday. Though her weekly patterns are quite consistent, her day-to-day patterns show a larger level of variance, as points plotted next to each other differ wildly in height. On average, she studies about 198 minutes a day, with an IQR of 197.75 minutes per day. Her sleeping patterns are less consistent, and appear to follow no pattern, weekly or otherwise. There appears to be a slight decrease in sleep time on the weekends, however, as Alisa spends more time socializing, and subsequently, less time sleeping. There is a potential outlier at the 19-day mark, where she got 123 minutes of sleep. This is because, on this day, she had a sleepover at her dorm, and therefore spent the night staying awake with her friends. Also, when she did want to sleep, she was too uncomfortable to sleep, and so her hours were significantly lower. Over the course of the experiment, she had an average of 469 minutes of sleep a night, with an IQR of 109.8 minutes per night. It appears that there is a moderately strong relationship between minutes studied a day and how many minutes of sleep were obtained a day, as minutes studied and minutes slept per day tend to increase and decrease together. As the project continued, sleep patterns stayed relatively consistent. However, studying peaks began to decrease in size, showing that later on in the project, Alisa had the ability to study less. This correlates with the fact that, as the quarter progressed, Alisa got better at understanding what her professors wanted from her assignments and exams, and was, therefore, able to spend less time studying as material began to make more sense.

Figure 3



The relationship between David's time spent sleeping compared to time spent studying throughout this project is depicted in Figure 3. As seen in the graph, there appears to be a major difference in time spent sleeping compared to time spent studying, especially when compared to Edy's and Alisa's graphs. There is a clear dip in David's time studying about every 7 days, and this is due to the fact that he spends little to no time studying on Saturdays. This dip in studying is followed by a dip in time spent sleeping. This drop-off in sleep is because of David's routine of waking up 2 to 3 hours before usual in order to watch NFL Football. Over the course of the project, there appears to be a subtle decline in the amount of time spent sleeping. Through the course of the project, David spent an average of about 100 minutes studying, with a standard deviation of about 83.4. The median amount of time that David spent studying was just over an hour, at 75.5 minutes with an IQR of 84.8. Most of David's studying occurred on Tuesday and Wednesday, with very little to no studying happening on Saturdays. When comparing his average amount of studying per day with the amount of time he spent sleeping, there is a clear difference

between the two. David spent an average of 556.6 minutes sleeping per day over the course of the project, over five and a half times his average study time. He had a standard deviation of 95.8 minutes sleeping per night. He had a median of 577 minutes of sleep per night with an IQR of 108.5. David spent more time sleeping on weekdays than during the weekend. He especially spent less time on Sundays due to the fact that he wakes up early for football. Based on the data, it appears that he spends the most time sleeping on Wednesday, which may be because he doesn't have class until one in the afternoon on Wednesdays. There is a major outlier that occurred on day 41 of the project, where David only spent 213 minutes sleeping, a result of an upset stomach keeping him up almost the entire night. Based on the graph as well as the data, there does not appear to be a correlation between the number of minutes David spent studying compared to the amount of time he spent sleeping.

**Figure 4**

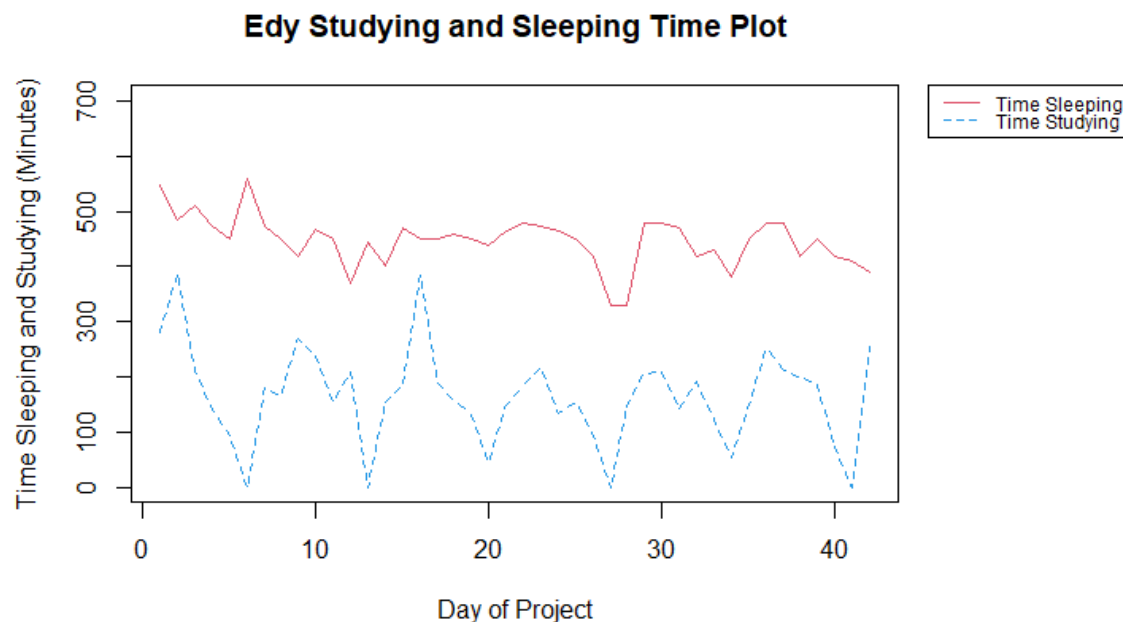


Figure 4 shows the time plot of Edy's time spent sleeping and studying over the course of 42 days. When analyzing time spent studying, there are obvious dips in the graph. These dips represent her

time spent studying on Saturdays. Four out of the six Saturdays of recorded data, Edy studied for zero minutes, but there were two Saturdays that she spent about 50 minutes studying. Edy's time plot of study time makes it very easy to distinguish each week. Edy's average time studying over the course of 42 days was about 165 minutes with a standard deviation of 88.3 minutes and an IQR of 75 minutes. There was some variation among study time each day, but besides the drop on Saturdays, Edy's time spent studying followed a similar trend each week, with Tuesday's average time studying being the highest at 280.33 minutes. Edy's average study time on Tuesday was the highest because she did not have class until 3:00pm, so she dedicated her mornings solely to studying. Edy's time plot of sleeping looks a little bit different. For one, there is much less variation throughout the 42 days, except on days 27 and 28 when Edy spent less time sleeping than normal. These two days were Friday and Saturday as her study time was also much lower. One reason why there is less variation among Edy's time spent sleeping is because she uses an alarm clock in the morning every day, so she woke up at the exact time of her alarm. Also, five out of the seven days of the week, Edy goes to bed sometime between 11:30 pm and 12:00 am which causes even less variation of her time sleeping. This trend is consistent with Edy's standard deviation of 46.08 minutes. The only deviations in Edy's sleep data are from the weekends, when she goes to sleep later but still wakes up at her regular weekday alarm time. Edy's average time sleeping over the course of 42 days was 447.5 minutes, with a median of 450 minutes and an IQR of 52 minutes.

When viewing all three time series plots, a direct relationship between time sleeping and time studying can be observed. When there was a decrease in time sleeping, there was usually a decrease in time studying and vice versa. However, David's data shows that he spends more time sleeping than Alisa and Edy, but Alisa spends the most time studying. This observation does not exactly correlate with the direct relationship between time sleeping and time studying. Also, even though Alisa spent the most time studying, she also had the highest study time variation, meaning her study time day-to-day fluctuated a lot. One similarity observed was that Alisa, David, and Edy all sleep less on the weekends and spend little to no time at all studying on Saturdays. When observing time sleeping, the time series plots displayed that



Edy's time sleeping fluctuated very little, so she maintained a consistent sleeping schedule. Alisa, David, and Edy's time series plots each display unique data and trends.