Visualizing the Effects of Sleep and Sleep Disorders

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OUTLINE OF PRESENTATION

BACKGROUND AND DATA

ANALYSIS IN R AND VISUALIZATIONS

CONCLUSIONS

BACKGROUND AND DATA

PREVIOUS OBSERVATIONS AND QUESTIONS DERIVED OUR DATA SOURCE

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THE VALUE OF GOOD-QUALITY SLEEP

- Poor sleep increases the risk of heart disease, stroke, obesity, and high blood pressure.
- Sleep deficiency is linked to depression and rates of suicide.
- Sleepiness is a factor in about 100,000 car accidents each year, resulting in about 1,500 deaths.

https://www.nhlbi.nih.gov/health/sleep-deprivation/health-effects

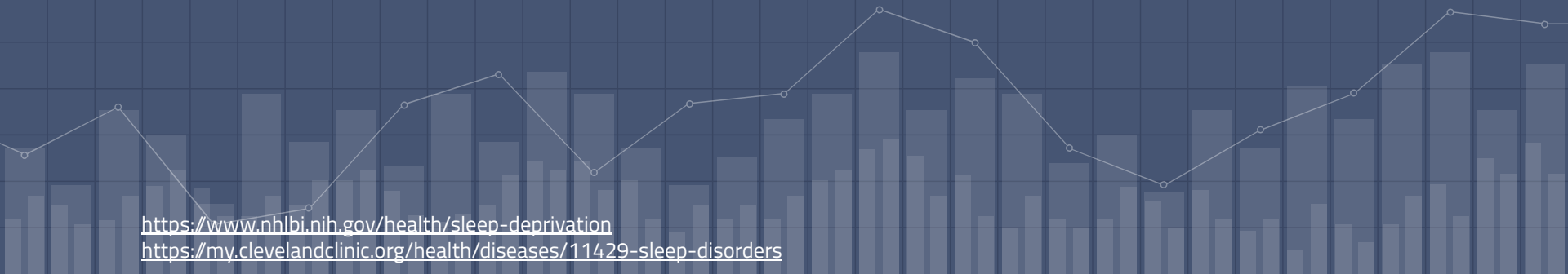
SLEEP DISORDERS AND SLEEP DEFICIENCY

About **50-70 million** Americans have chronic or ongoing sleep disorders.

1 in 3 adults report not receiving enough sleep every day.

Common types of sleep disorders

- Insomnia
- Sleep Apnea
- Narcolepsy
- Restless-leg syndrome



https://www.nhlbi.nih.gov/health/sleep-deprivation
https://my.clevelandclinic.org/health/diseases/11429-sleep-disorders

INVESTIGATION AND DATA SOURCE

We wanted to use data to explore how **sleeping disorders** impacts an individual's quality of sleep and physical health.

We used a sleep and lifestyle dataset that sampled 374 individuals across 11 occupations on their metrics for sleep, lifestyle, cardiovascular health, and sleep disorders.

QUESTIONS:

How does the presence of sleep disorder impact the duration and subjective quality of sleep?

What is the relationship between sleep and cardiovascular health and activity?

Sleep Disorders we are interested in:

- Sleep Apnea (breathing repeatedly stops and starts)
- Insomnia

ANALYSIS IN R AND VISUALIZATIONS

EXPLORATORY DATA AND PLOTS OF VARIABLES RELATED TO SLEEP DISORDERS AND PHYSICAL HEALTH

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Coding

- Dataset Cleanup
- ggplot to generate boxplots and histograms
- Add annotations of key statistics onto the figures

Sleep Durations: Healthy People

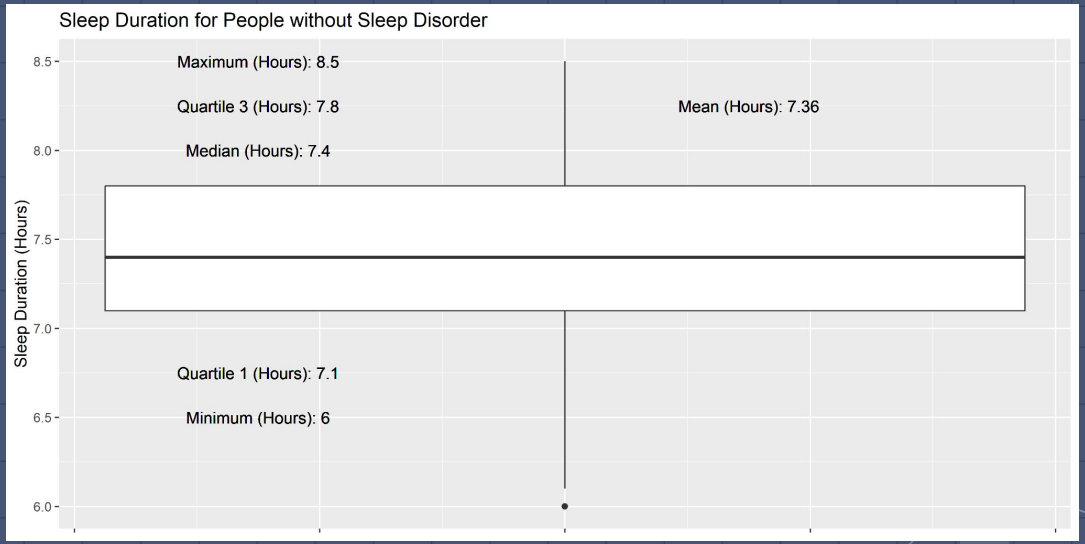


Figure 1: Boxplot of Sleep Durations of People WITHOUT Sleep Disorder.

The boxplot is generated by ggplot. We could see that the average sleep duration is around 7.5 hours, and there is not much variation within the middle 50% of data. Sample Size: 219

Sleep Duration: Sleep Apnea

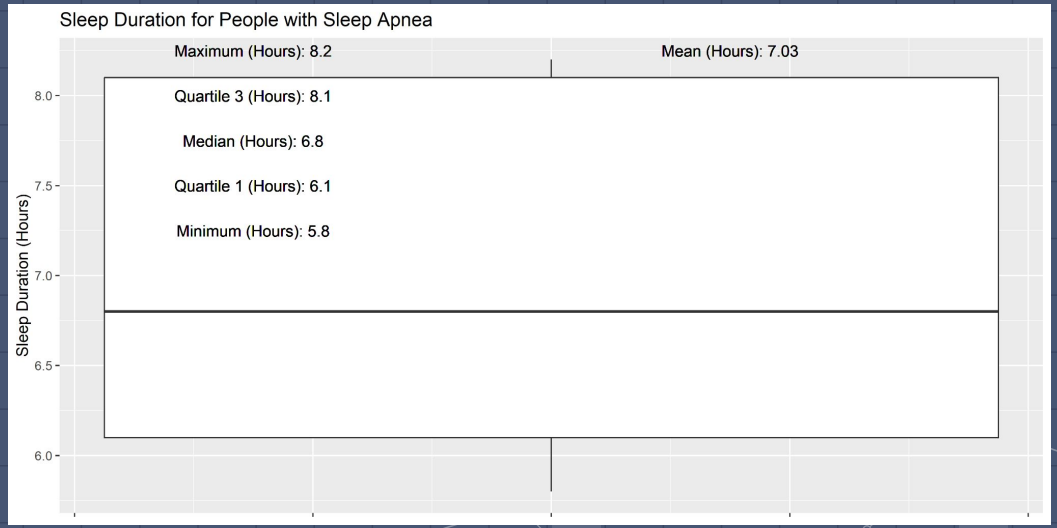


Figure 2: Boxplot of Sleep Durations of People with Sleep Apnea.

The boxplot is generated by ggplot. We could see that the average sleep duration is around 7 hours, and there is a lot of variation within data (no outliers, though). Sample Size: 78

Sleep Duration: Insomnia

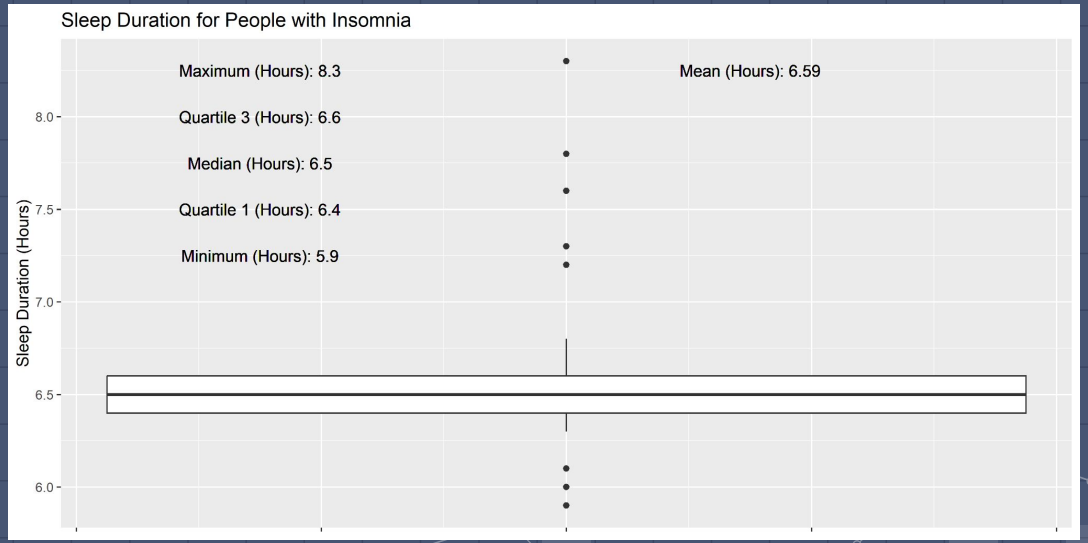
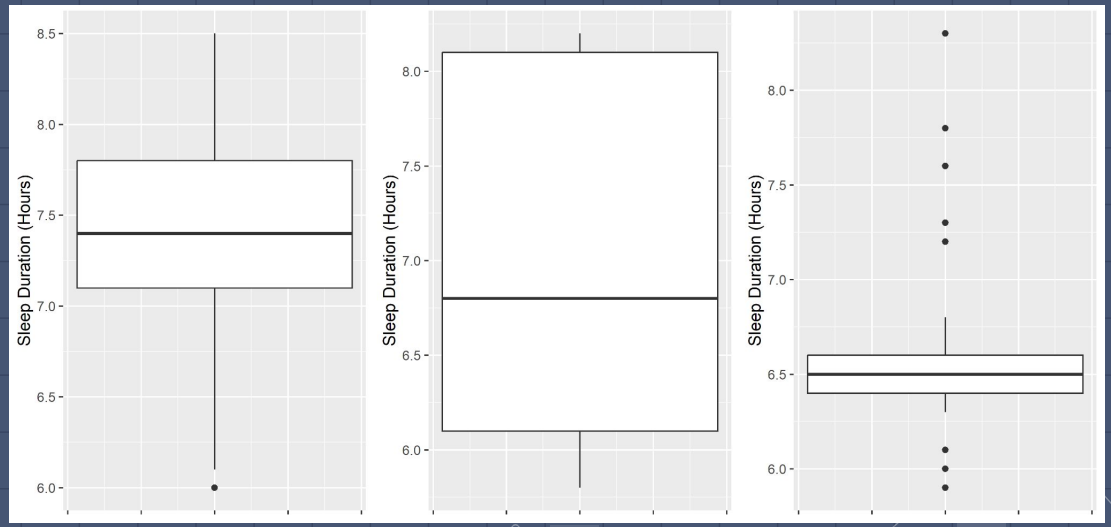


Figure 3: Boxplot of Sleep Durations of People with Insomnia.

The boxplot is generated by ggplot. We could see that the average sleep duration is around 6.5 hours. Although most of the data is close to the median, there are a couple outliers on both directions. Sample Size: 77

Comparison of Sleep Duration



Normal Sleep Apnea Insomnia

Figure 4: Side-by-Side Comparisons of Boxplots.

The comparison reveals that people without sleep disorders have the highest average sleep duration, as well as less variability in their sleep behaviors. People with sleep apnea has a slightly lower average, while also have a more variable distribution. People with insomnia sleeps the least amount of time on average, but there are also high/low outliers present.

Comparisons of Sleep Quality (Subjective)

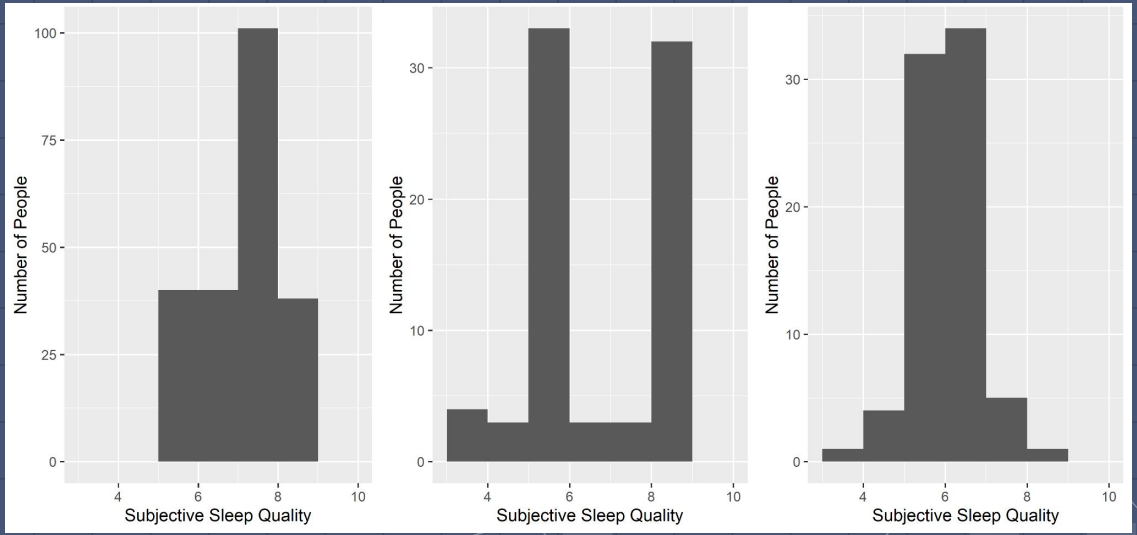
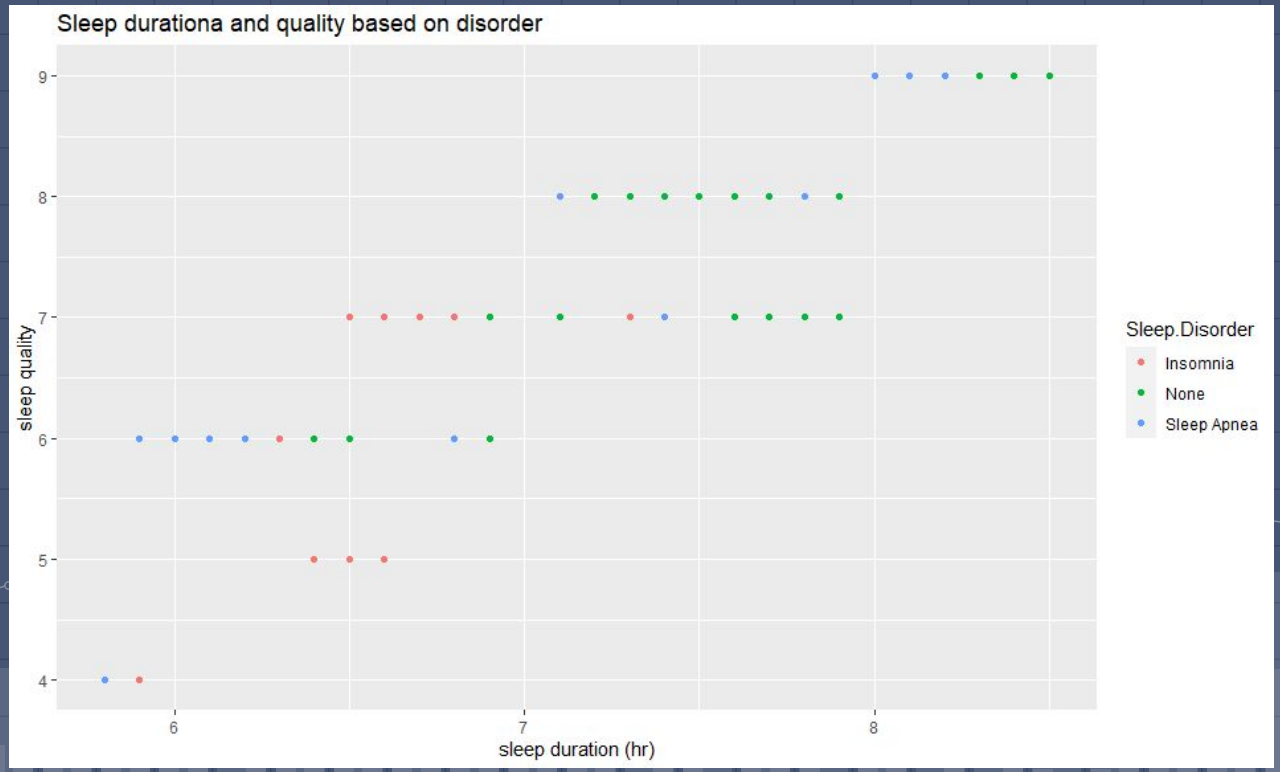


Figure 5: Side-by-Side Comparison of Histograms of Sleep Quality generated by ggplot. For a general overview, it could be concluded that people with no disorder has a higher rating, while people with insomnia have a significantly lower rating. Nothing significant could be deducted about people with sleep apnea as peaks are present at both a high and a low value.

Normal Sleep Apnea Insomnia

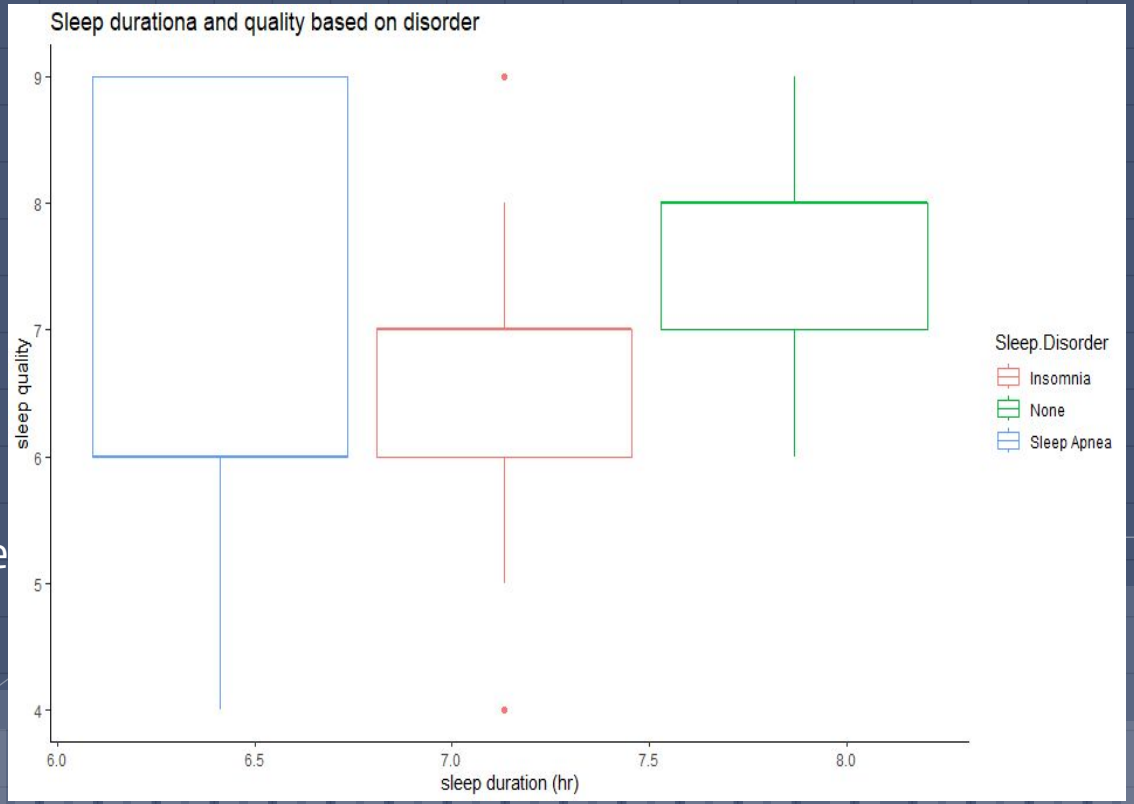
Quality vs Quantity of sleep With relation to the Sleeping Disorders

The scatterplot created using ggplot2 depicts the relationship between sleep duration, quality, and sleep disorders. Each point represents an observation between the relationship between the quality and quantity of sleep, with the color indicating the type of sleep disorder.



Quality vs Quantity of sleep With relation to the Sleeping Disorders: Box Plot

The boxplot created illustrates the distribution of sleep duration and quality based on different sleep disorders providing a clear insight into the variations in sleep patterns and quality based on disorder. From this plot we can see that those with no sleep disorders have the most sleep, while those with Insomnia have less and worse sleep, with people who have Sleep Apnea getting the least amount of sleep.



How are the amount of hours you sleep and your heart rate affected by your BMI or vice versa?

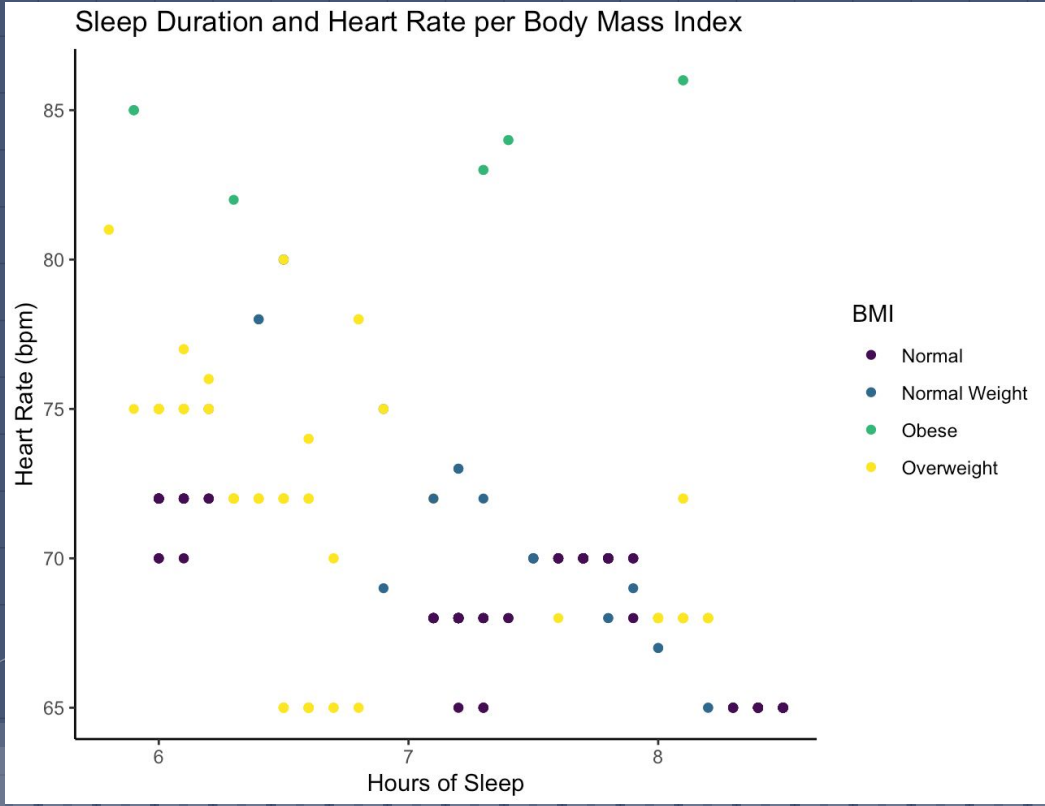
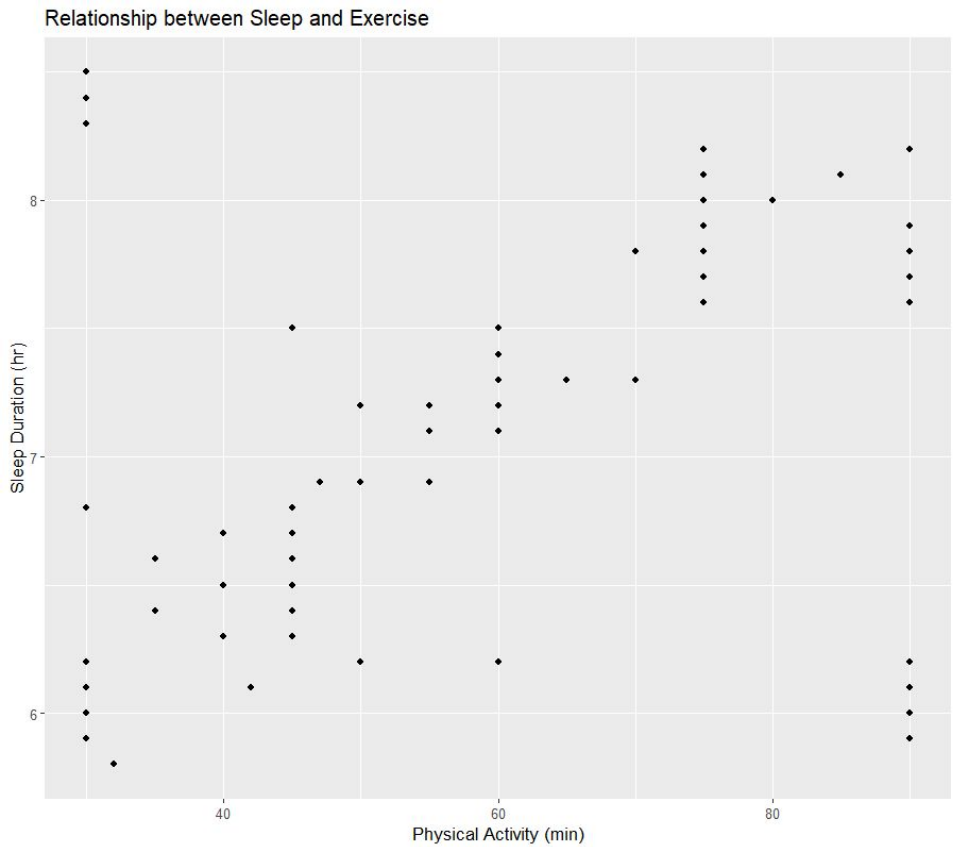


Figure 6: People who had a normal BMI did vary slightly in the hours of sleep they got, but more them seemed to get above 7 hours of sleep. All of the people with a normal BMI had lower heart rates (all except 1 were below 75 bpm). People who are considered overweight by BMI tended to get lower amounts of sleep (most were less than 7 hours), and had higher heart rates than people with normal BMIs. People who were considered obese by BMI varied in the amount of sleep they got, but all of them had high heart rates (all of their heart rates were above 80 bpm).



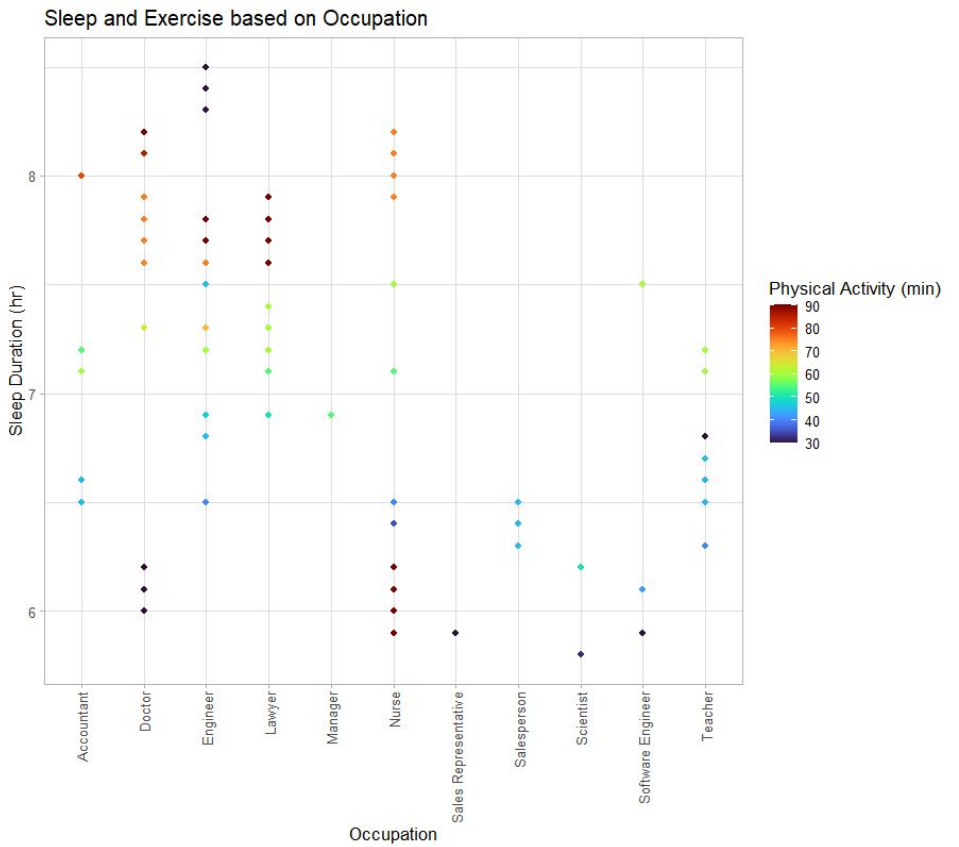


Figure 7: Looking at the amount of sleep and physical activity individuals obtain by occupation.

CONCLUSIONS

WHAT WE LEARNED FROM OUR EXPLORATION

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GOOD SLEEP MATTERS

People who have Sleep Disorders generally slept for less time and had worse quality sleep when compared to the group who did not have sleep disorders.

Individuals who received more sleep generally also had better physical health metrics in BMI, physical activity, and heart rates.

THANK YOU