The Impact of Smoking Behavior on Sleep Quality

Team B, MIS 761, Spring 2023
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Executive Summary

According to the National Library of Medicine (2021), “Sleep quality is defined as an individual's self-satisfaction with all aspects of the sleep experience. Sleep quality has four attributes: sleep efficiency, sleep latency, sleep duration, and wake after sleep onset.”

The objective of this study is to examine how cigarette smoking habits affect a person's overall sleep quality. In this analysis, we focused on two important indicators of sleep quality, namely sleep duration and sleep efficiency.

By analyzing the Sleep Efficiency Dataset, our goal was to ascertain whether smoking behavior has any impact on the quality of sleep for individuals.

Research Question

Can a person's smoking status influence their overall sleep quality?

Variables

We have chosen the following three variables to evaluate the overall quality of sleep:

Smoking behavior
Indicates whether the individual engages in cigarette smoking.

Sleep duration
Refers to the duration of time the individual spends asleep, calculated by subtracting their wake time from their bedtime.

Sleep efficiency
Represents the percentage of time the individual spends asleep while in bed.

Effect of Smoking Behavior on Sleep Duration

Figure 1 presents a histogram illustrating the distribution of sleep duration among individuals. The dataset reveals that all individuals have sleep durations ranging from 5 to 10 hours. The most frequent sleep duration falls within the range of 7 to 8 hours, with the highest count observed at 154 for individuals who sleep for 7 hours. Based on the dataset, the maximum sleep duration recorded is 10 hours, while the minimum is 5 hours.

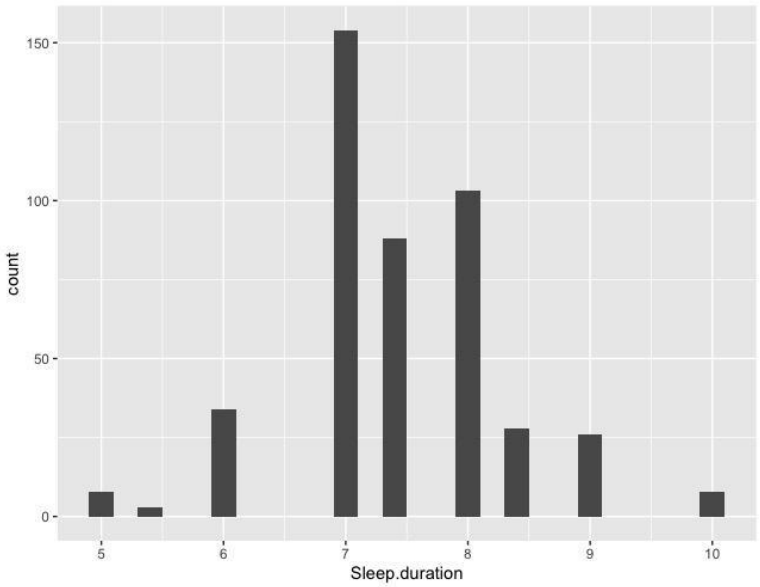

***Figure 1**: Histogram for Sleep Duration*

To normalize the distribution shown in Figure 1, we utilized R programming language to generate a new histogram (Figure 2). This revised histogram excluded outliers and restricted the sleep duration range to 6 to 9 hours, enabling more focused analysis.

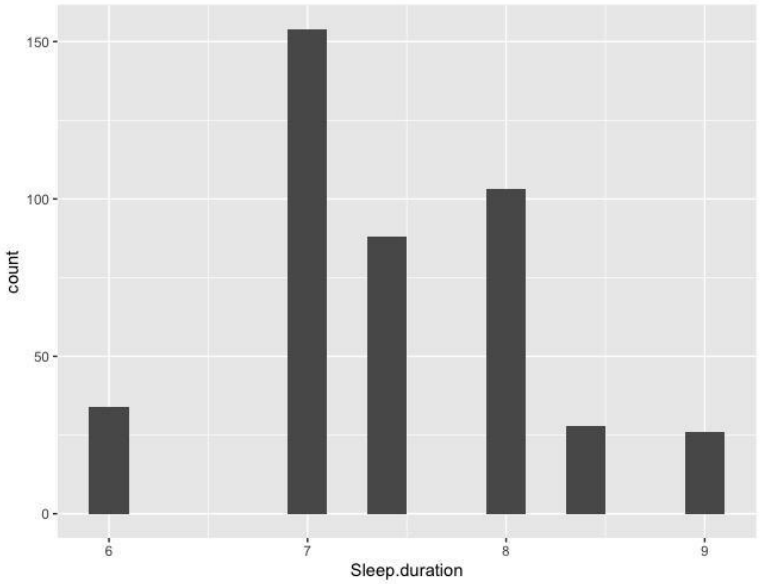

***Figure 2**: Histogram for Sleep Duration – Normalized*

To examine the influence of smoking on sleep duration among smokers and non-smokers, we employed a Boxplot. This visual representation enabled us to assess the impact of smoking on sleep duration. Figure 3 illustrates that both groups exhibit a median sleep duration of 7.5 hours, with the upper quartile at 8 hours and the lower quartile at 7

hours. This analysis indicates no substantial difference in sleep durations between smokers and non-smokers.

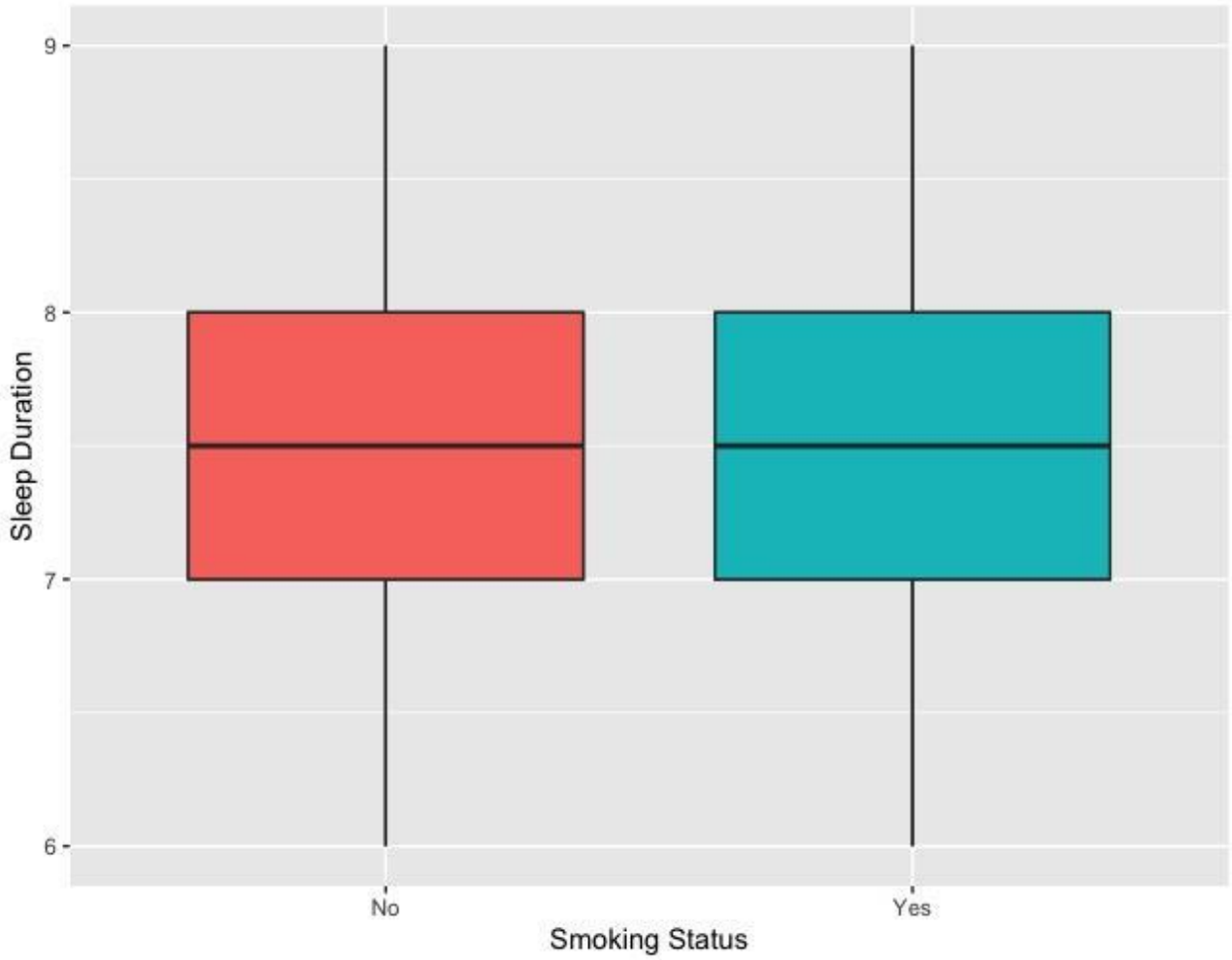

***Figure 3**: Boxplot for Sleep Duration based on Smoking Status*

Figure 4 presents the average sleep durations for individuals categorized as smokers and non-smokers. Although the mean sleep duration for smokers is slightly lower (7.45 hours) compared to the non-smoking group (7.5 hours), this difference does not indicate a significant impact of smoking on sleep duration. Further investigation is necessary to explore the effect of smoking on sleep efficiency.

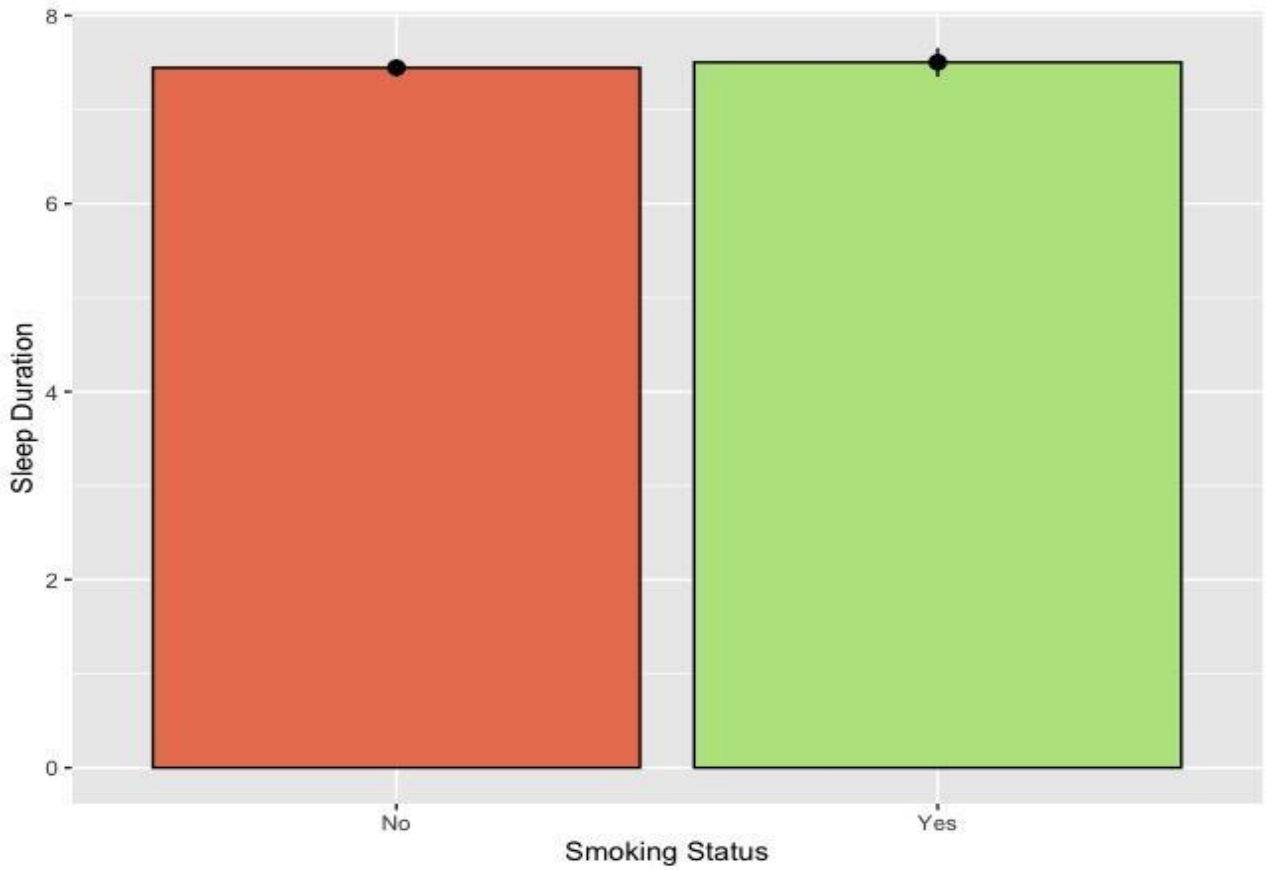

***Figure 4**: Mean Sleep Durations based on Smoking Status*

Effect of Smoking Behavior on Sleep Efficiency

Apart from examining the influence of smoking status on sleep duration, conducting further analysis to understand the impact of smoking on overall sleep quality necessitates an investigation into sleep efficiency as well. Figure 5 showcases a histogram representing sleep efficiency, which illustrates a range from 0.5 to 1.0, with the highest count observed at 0.9. The histogram graph displays a left-skewed distribution, indicating that most participants had high sleep efficiency scores.

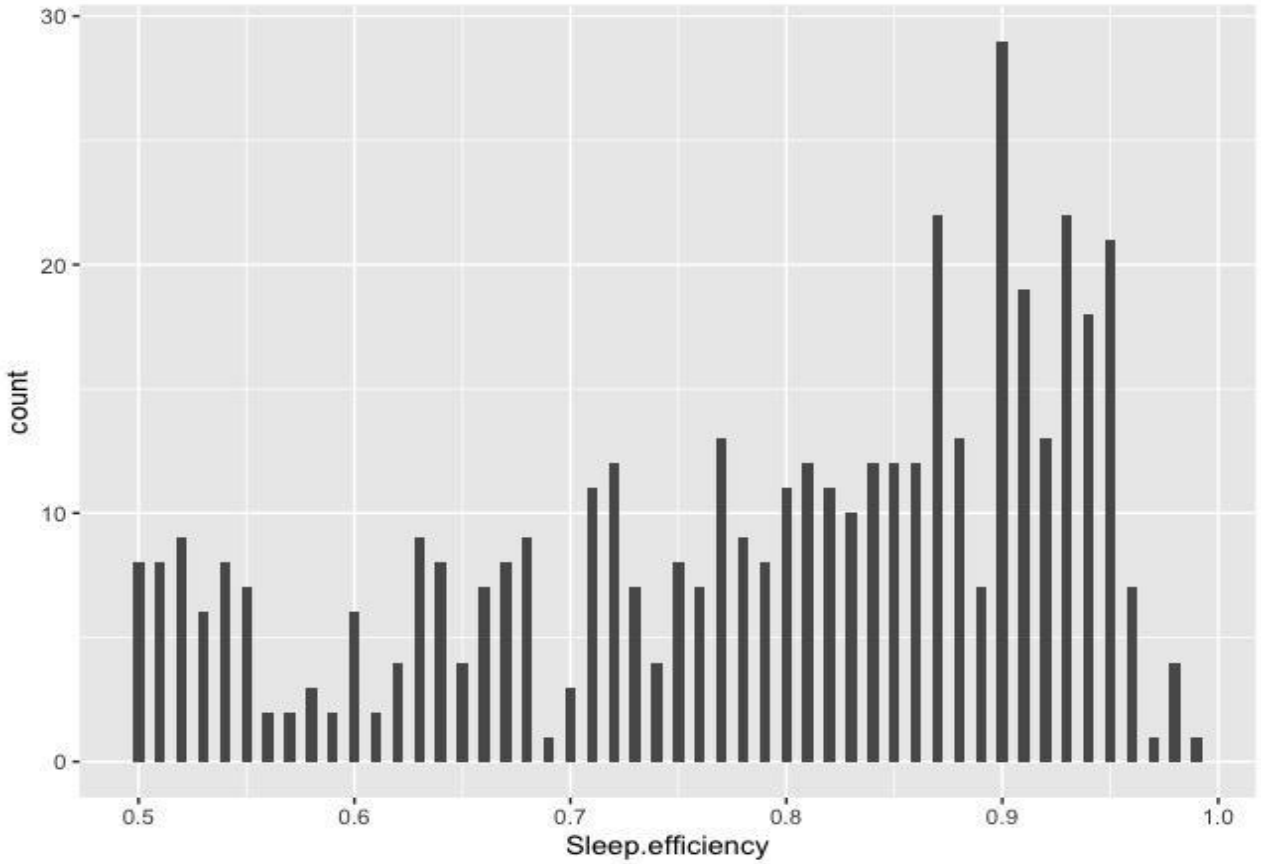

***Figure 5**: Histogram for Sleep Efficiency*

Unlike sleep duration, Figure 6 uncovers a noticeable impact of smoking behavior on sleep efficiency, indicating that non-smokers experience better sleep quality compared to cigarette smokers. The median sleep efficiency score for non-smokers is 0.84, surpassing the median for smokers at 0.77. Furthermore, the interquartile range for non-smokers, ranging from 0.74 to 0.91, is narrower in comparison to smokers, whose interquartile range spans from 0.55 to 0.88.

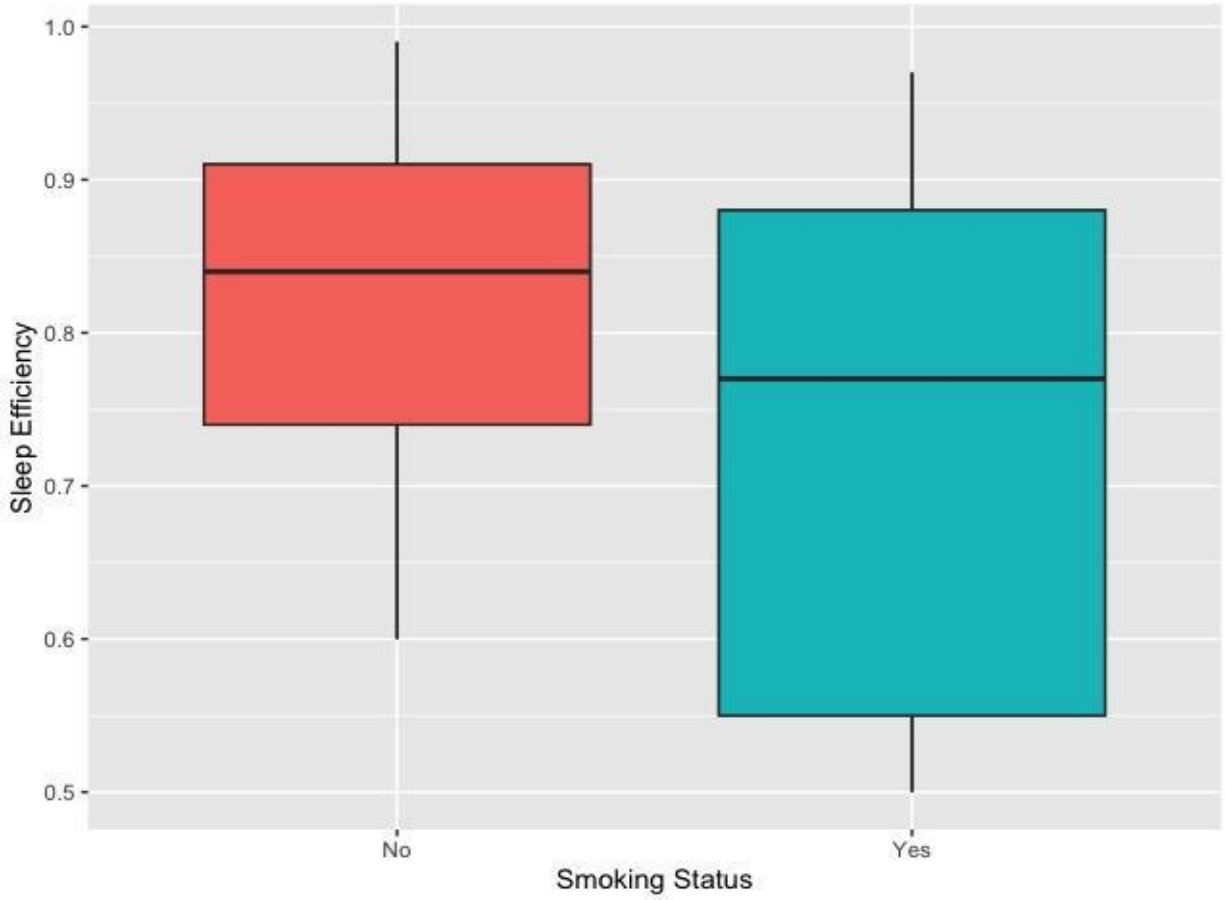

***Figure 6**: Boxplot for Sleep Efficiency based on Smoking Status*

The findings from the analysis of sleep efficiency reveal a significant disparity between smokers and non-smokers, indicating a connection between smoking behavior and sleep efficiency. Figure 7 illustrates the difference in means between the smoking and non-smoking groups, with non-smokers exhibiting a higher mean (0.82) compared to smokers (0.73). As a result, it can be concluded that smoking behavior does indeed influence sleep efficiency.

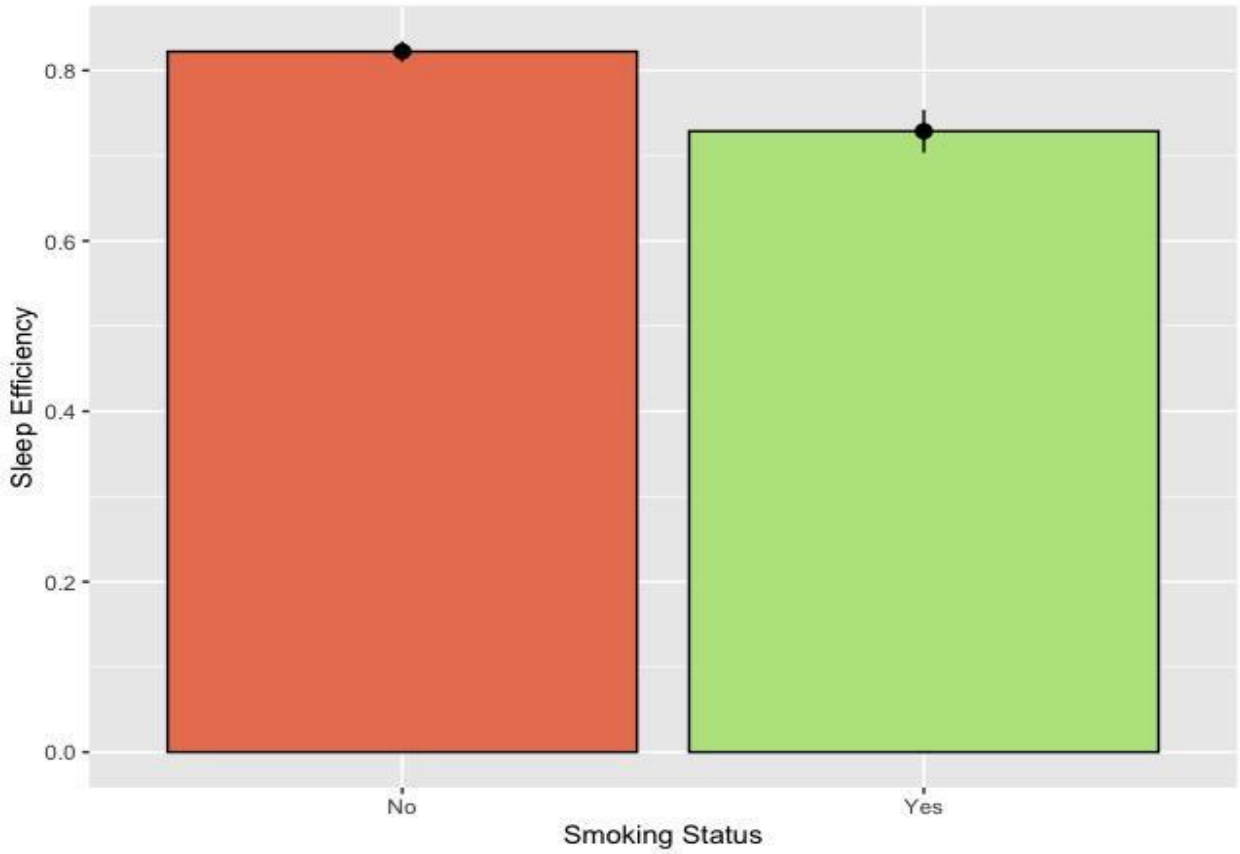

***Figure 7**: Mean Sleep Efficiencies based on Smoking Status*

Conclusion

Considering the aforementioned figures and analysis, the results do not indicate a significant impact of smoking behavior on sleep duration. However, they do reveal a notable effect of smoking behavior on sleep efficiency. Through a comprehensive examination of the Sleep Efficiency Dataset, we can conclude that an individual's smoking behavior affects sleep quality, particularly in terms of sleep efficiency, but not in terms of sleep duration. Therefore, this study suggests that individuals should consider quitting or reducing smoking to enhance their sleep quality, specifically in terms of sleep efficiency.

References

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