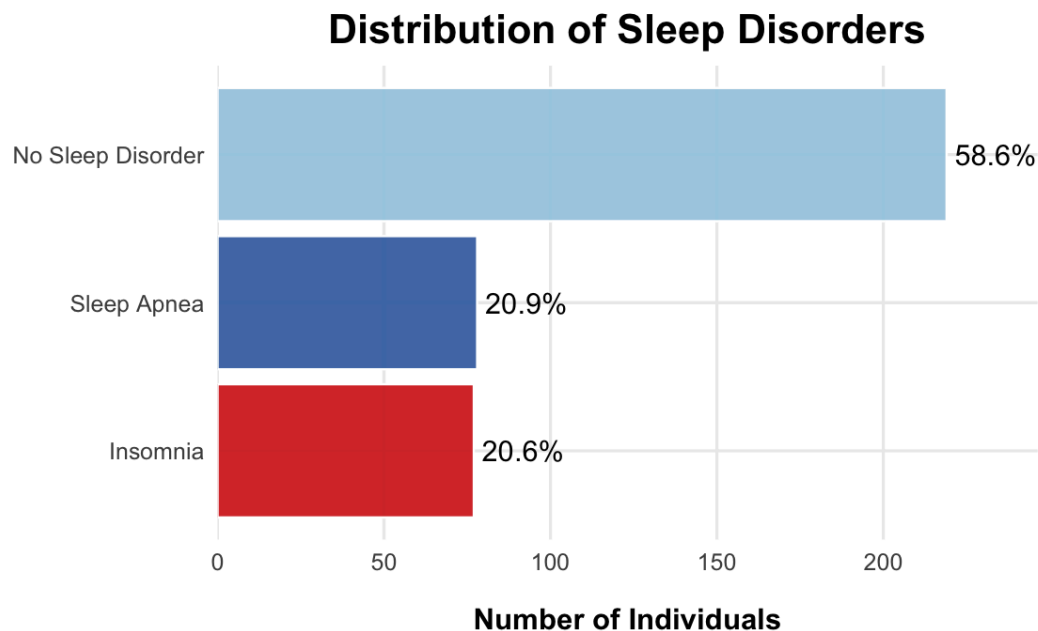


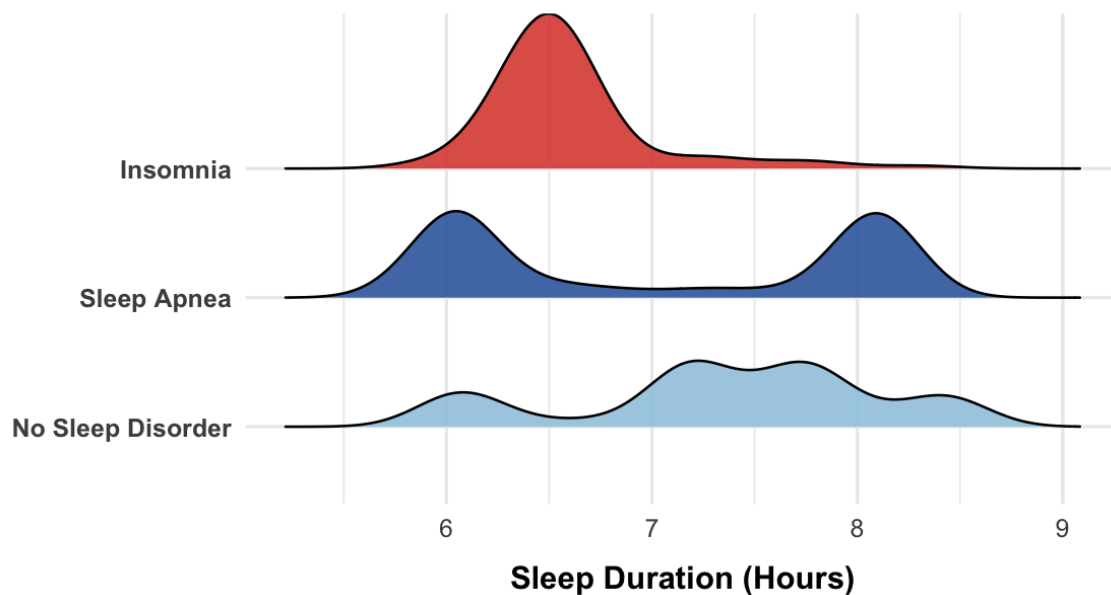
Data Visualization Midterm: Exploring Sleep Patterns Through Data

This analysis explores sleep patterns and health-related factors using a dataset of 374 individuals. The dataset includes variables such as sleep duration, sleep disorder diagnosis, BMI category, stress level, physical activity level, heart rate, and self-reported sleep quality. Initial exploration of this data examined the distribution of sleep disorders and sleep durations among individuals. Typical sleep durations appeared roughly random and potentially bimodal, but showed no clear visible pattern. As shown below, roughly 41% of respondents reported a form of sleep disorder, while the other 58.6% reported no sleep disorder. With a significant chunk of the population reporting a sleep disorder, I wanted to see if I could uncover patterns in how these disorders impact sleep duration, leading to a deeper data exploration into how different sleep disorders, BMI, and stress influence sleeping patterns.

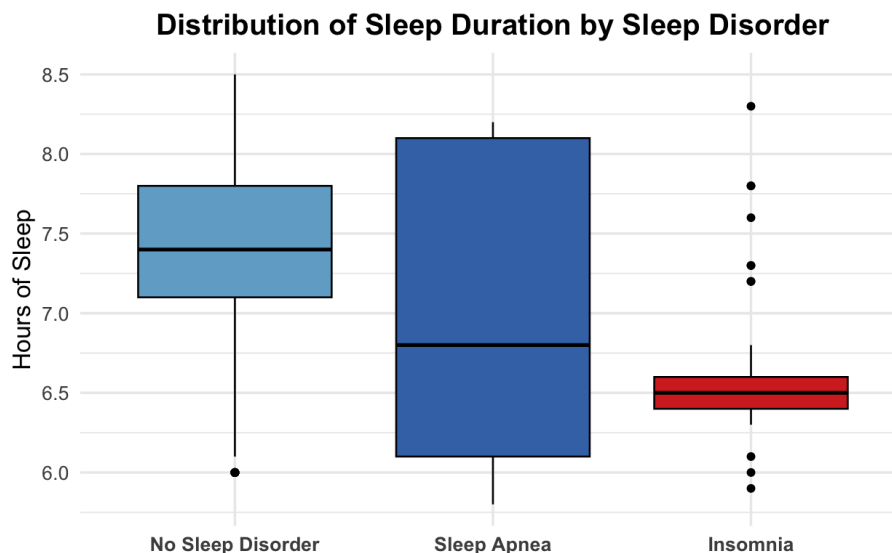


To explore a quantitative variable across groups of a categorical variable, I chose to examine sleep duration across sleeping disorders through a ridge density plot. The density distributions of each category are noticeably different. Insomnia has a strong right-skew, with most data points clustered on the low-end of the sleep duration scale around 6.5 hours. In the sleep apnea density ridge, we see a bimodal distribution appear. This may reflect the high variability in how sleep apnea impacts sleep duration. Both peaks appear on 'extreme' sides of the spectrum, roughly 6 and 8.5 hours. The No Sleep Disorder category appears very roughly normal, with most values between 7 and 8. There does not appear to be a strong pattern of sleep duration in this group, potentially suggesting more healthy sleep habits.

Sleep Duration Across Sleep Disorders



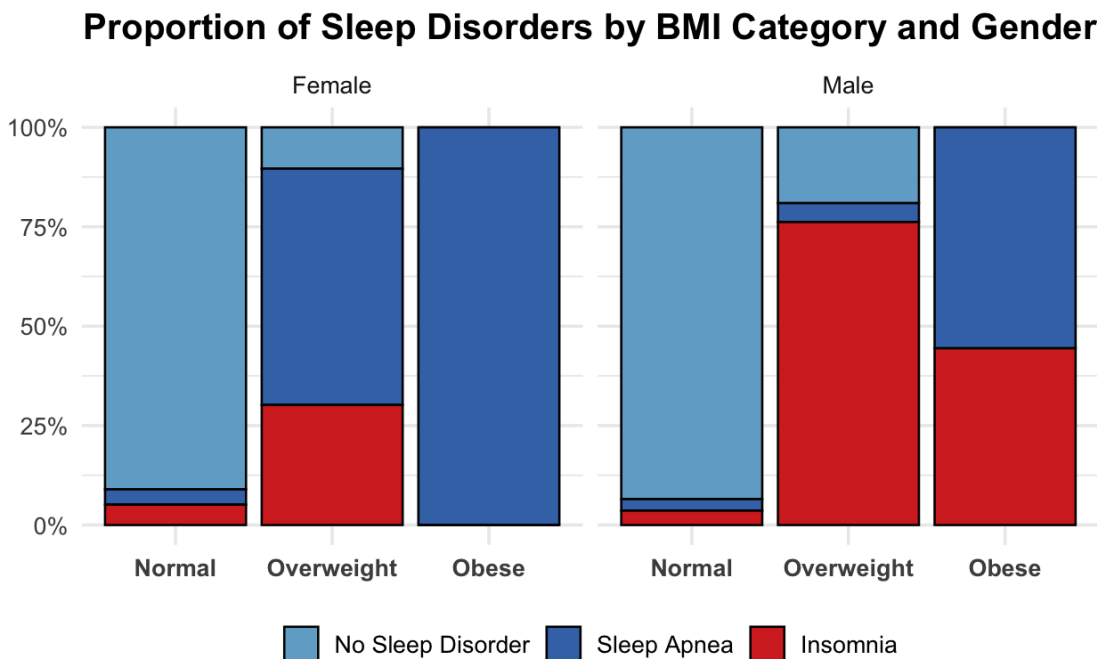
When we look at the corresponding boxplots, we get an even clearer picture of how sleep disorders affect individuals. Differences in median hours of sleep, variability, and outliers are highlighted. We see that almost all participants with insomnia get ~6-6.5 hours of sleep, below the generally recommended amount. However, those with no sleep disorder are centered right below 7.5 hours.



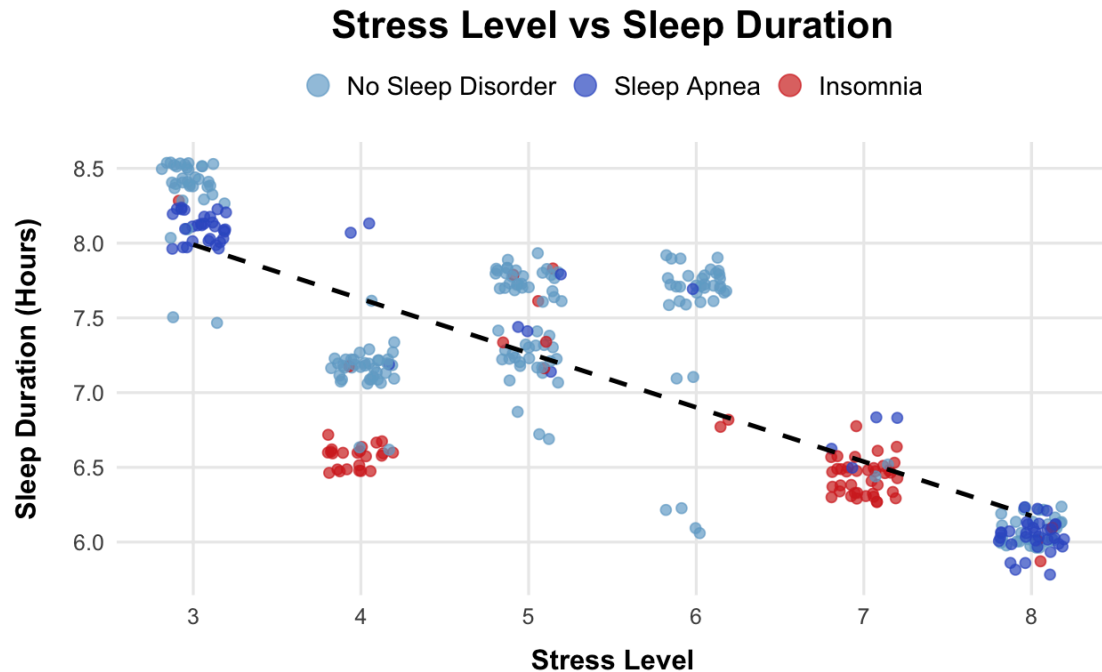
The ridge density, along with the corresponding boxplot, show that sleep disorders impact both the quantity and variability of sleep patterns. To further explore sleep disorders, I examined how they are distributed across different BMI categories, and if these results varied depending on one's gender. When

you examine sleep disorders by both gender and BMI category, the results look slightly chaotic at first. Upon closer look, a rough pattern seems to emerge. (Plot below). A majority of those with sleep disorders fall into the overweight or obese category. It appears that

overweight/obese women are more likely to suffer from sleep apnea. On the other hand, overweight/obese men appear to suffer from more insomnia, with some notable sleep apnea as well. In both categories, the normal BMI group shows minimal occurrence of sleep disorders. This graph suggests that BMI and gender both impact sleep outcomes, with higher BMI associated with greater likelihood of a sleep disorder.



After exploring how BMI can affect sleep duration and disorder, I wanted to explore what other factors may impact sleep. The following graph explores the relationship between stress level & sleep duration. There is a clear negative relationship between the two. It appears that as stress increases, an individual's sleep duration will likely decrease. The colors represent the prevalence of a sleep disorder. This trend is particularly noticeable in the insomnia group, with data points tightly grouped and on the lower spectrum overall. Almost all the potential outliers of group four, those getting significantly less sleep, are insomniacs. Even at lower stress levels, it appears insomnia may lead to less sleep. Sleep apnea is falling on either side of these extremes, with most points clustered at either low stress, or low sleep duration, mirroring the bimodal trend seen earlier. Individuals with the lowest level of reported stress, three, average sleep durations of ~8.25 hours. In contrast, those who report stress levels seven and eight average sleep durations of 6-6.5 hours. The graph shows that data is heavily clustered at stress levels, but this is due to stress levels being measured discreetly. The graph shows variation across stress levels, but overall shows that higher levels of stress lead to lower sleep durations, on average.



This analysis found several interesting patterns in sleep behavior across different demographic, health, and behavioral variables. Individuals with insomnia showed the lowest sleep duration; sometimes even regardless of other factors. Individuals with sleep apnea also reported more extreme sleeping patterns. Those without a sleep disorder consistently showed somewhat, almost normal behavior with variability. Sleep disorders appear to have a strong impact on the variability and duration of sleep. We found that stress showed a clear negative relationship with hours of sleep. Other influences of sleep metrics found were BMI and gender. These also appeared to have a relationship with sleep disorders: they were significantly more prevalent in those who were overweight or obese. This analysis highlighted meaningful relationships between sleep and other health metrics.