Final Report

2025-03-17

I am the title

ABSTRACT

### INTRODUCTION

DATA

variables:

- Sleep Disorder: The presence or absence of a sleep disorder in the person (None, Insomnia, Sleep Apnea).
- Quality of Sleep (Scale: 1-10): A subjective rating of the quality of sleep, ranging from 1 to 10.
- Stress Level (Scale: 1-10): A subjective rating of the stress level experienced by the person, ranging from 1 to 10.

VISUALIZATION

This project uses a **t-test** because it is a statistical method specifically designed to **compare the means of two groups** and determine whether the observed differences are statistically significant. Since our goal is to analyze whether **sleep quality and stress levels differ between individuals with and without sleep disorders (None, Sleep Apnea, Insomnia)**, the t-test is an appropriate choice. It allows us to test the null hypothesis that the means of two groups are equal, while accounting for variability in the data. By using the **p-value and confidence intervals**, we can assess whether the differences we observe are due to chance or represent a meaningful pattern in sleep health.
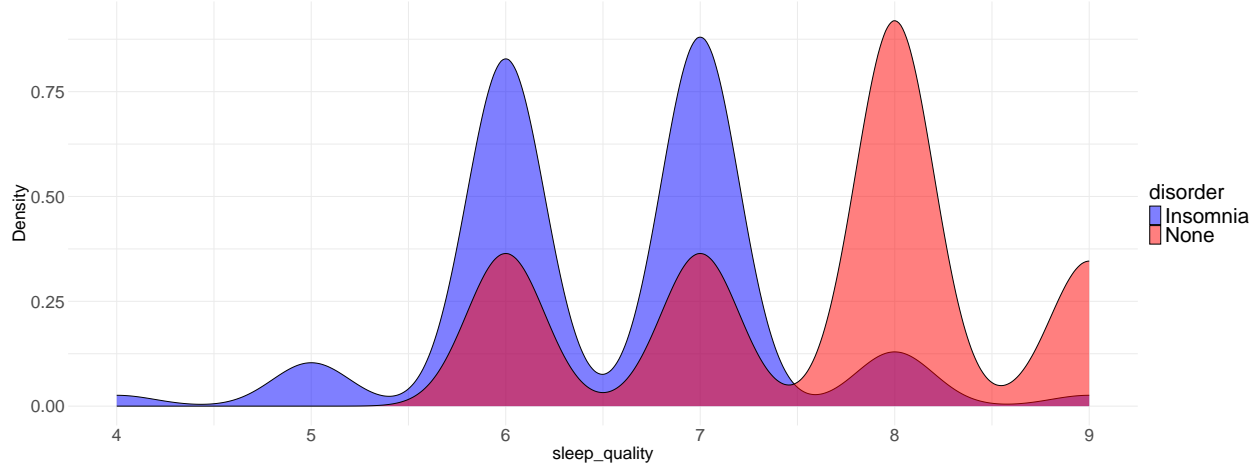
Density plots for 6 tests:
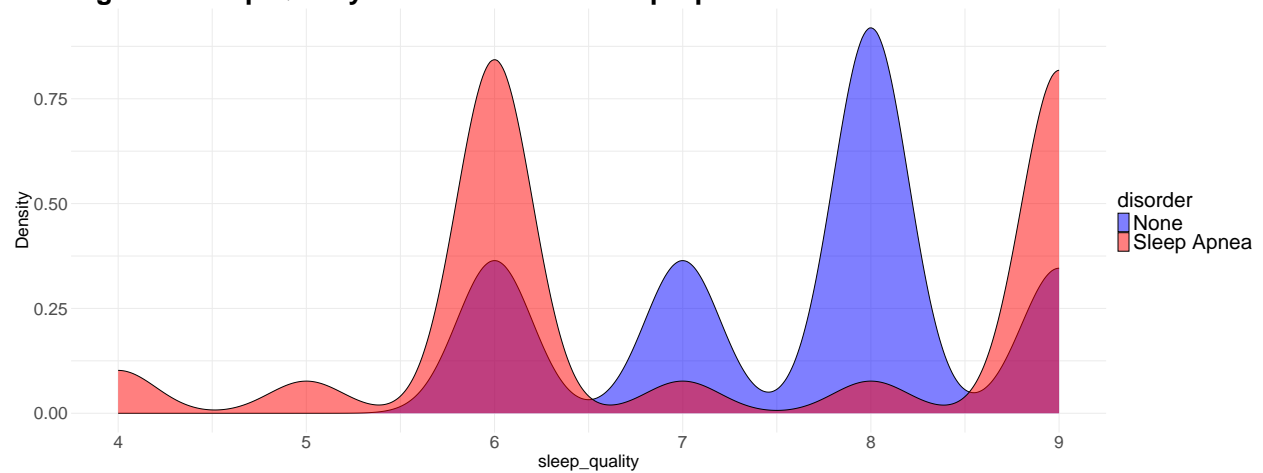
Figure1: Sleep Quality: Sleep Apnea vs. Insomnia
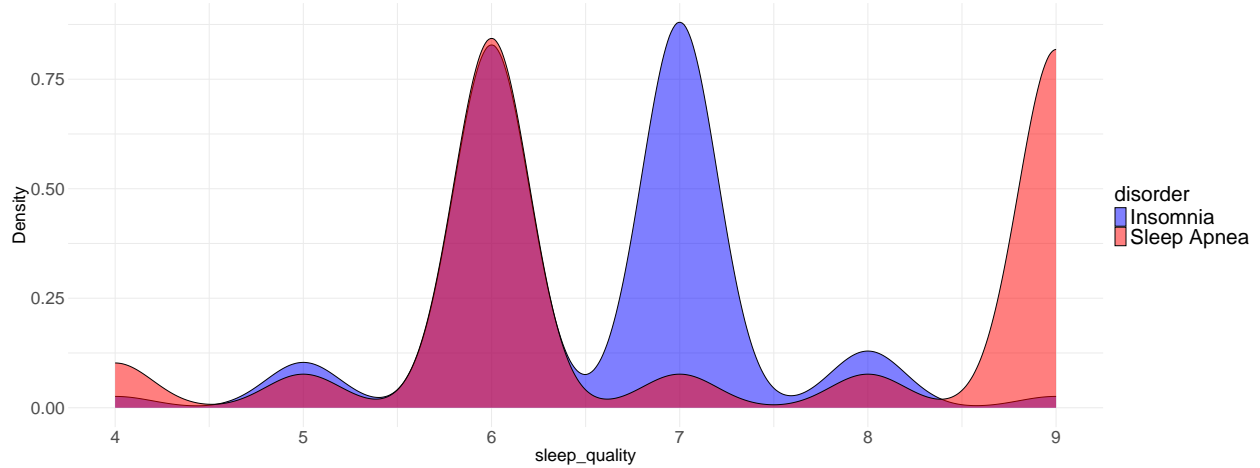
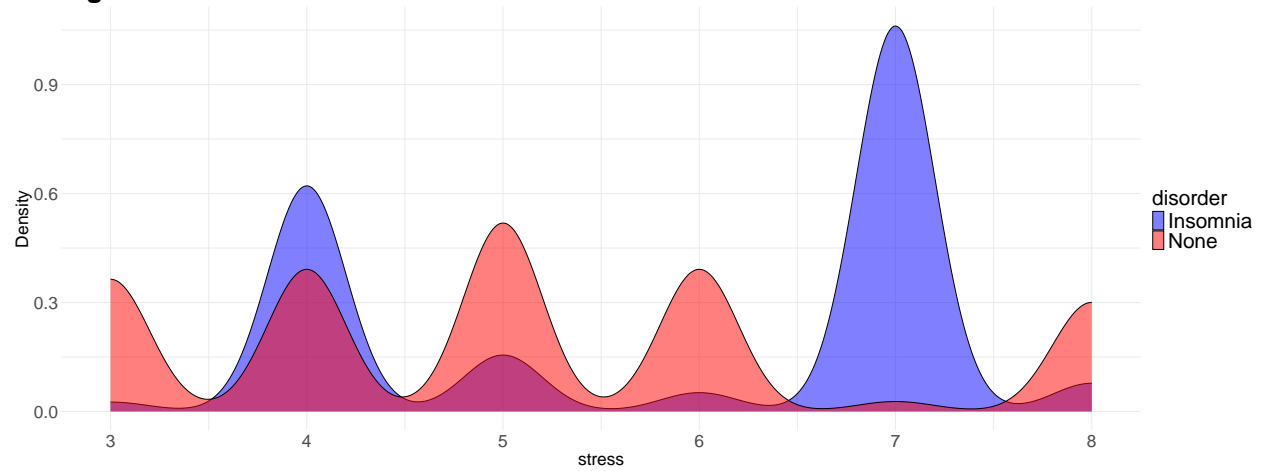

Figure2: Stress Level: Sleep Apnea vs. Insomnia
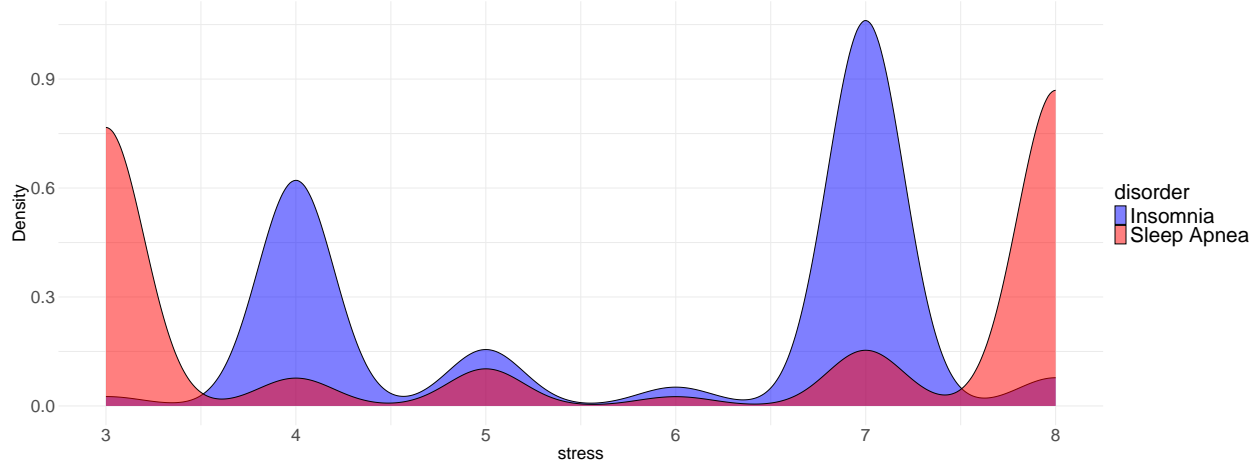
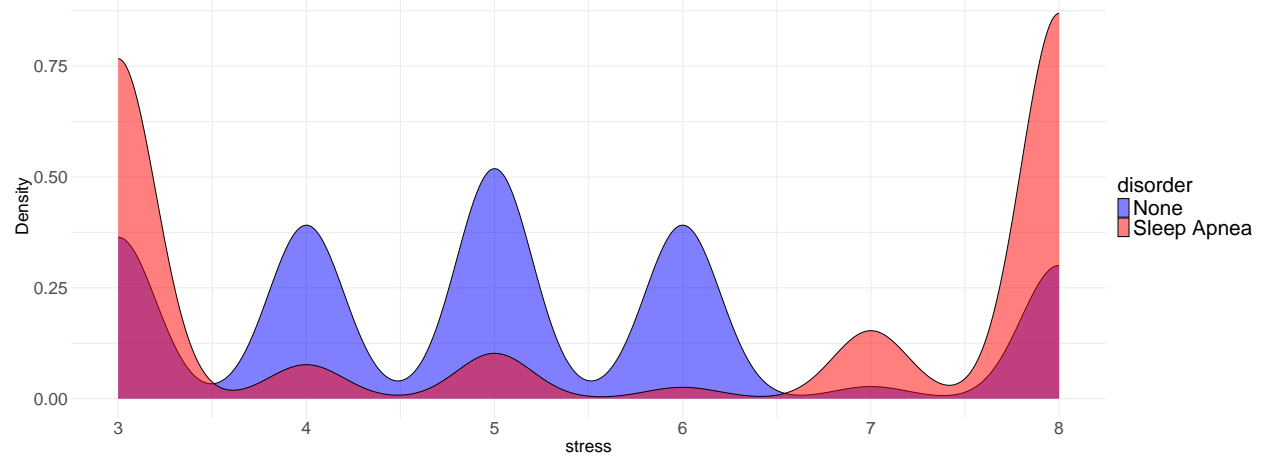## Figure3: Sleep Quality: No Disorder vs. Insomnia

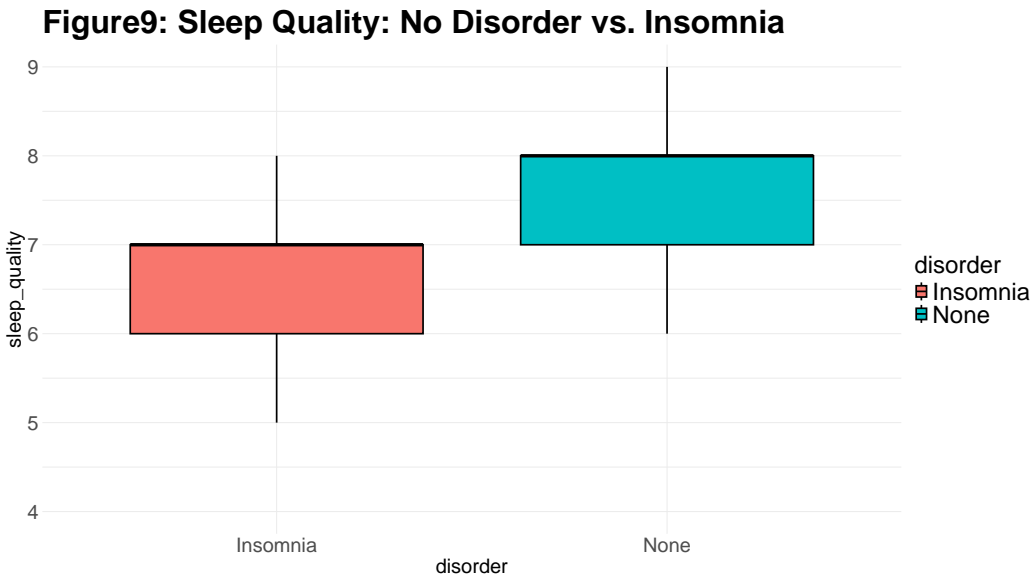**Figure4: Sleep Quality: No Disorder vs. Sleep Apnea**

Figure5: Stress Level: No Disorder vs. Insomnia

Figure6: Stress Level: No Disorder vs. Sleep Apnea

Box plots for the 6 testsd

Figure7: Sleep Quality: Sleep Apnea vs. Insomnia

Figure8: Stress Level: Sleep Apnea vs. Insomnia

Figure9: Sleep Quality: No Disorder vs. Insomnia

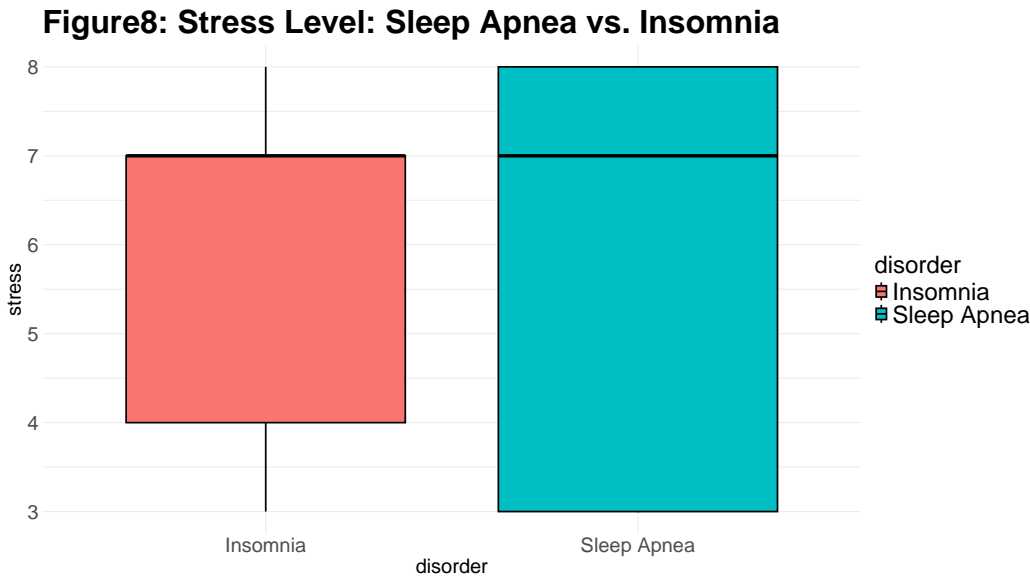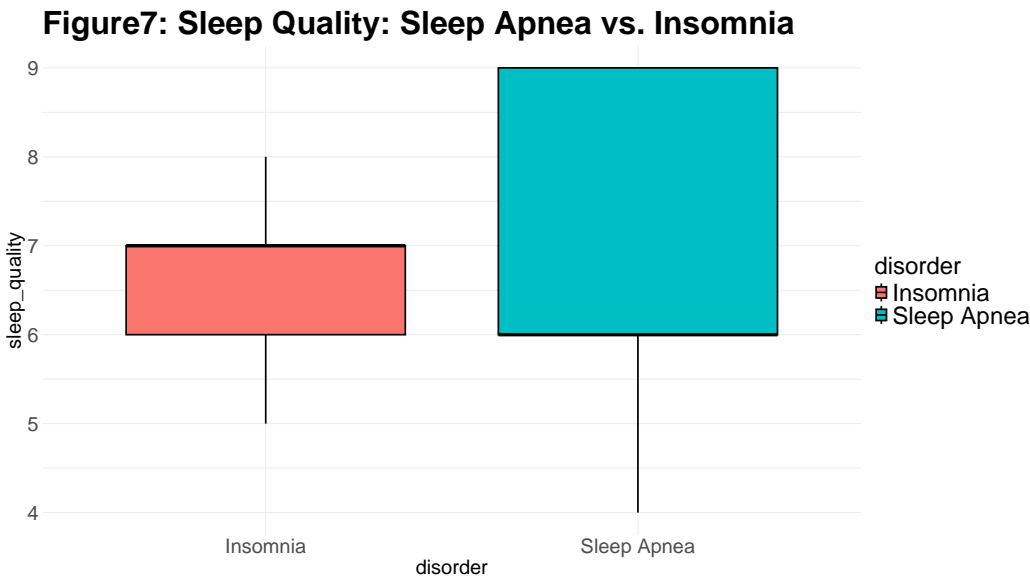**Figure10: Sleep Quality: No Disorder vs. Sleep Apnea**

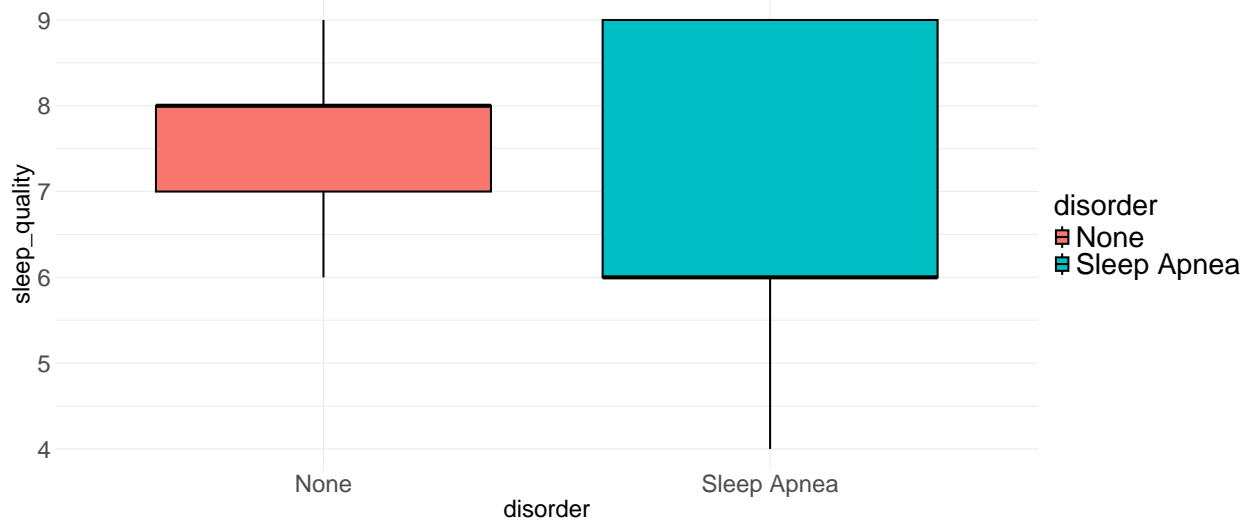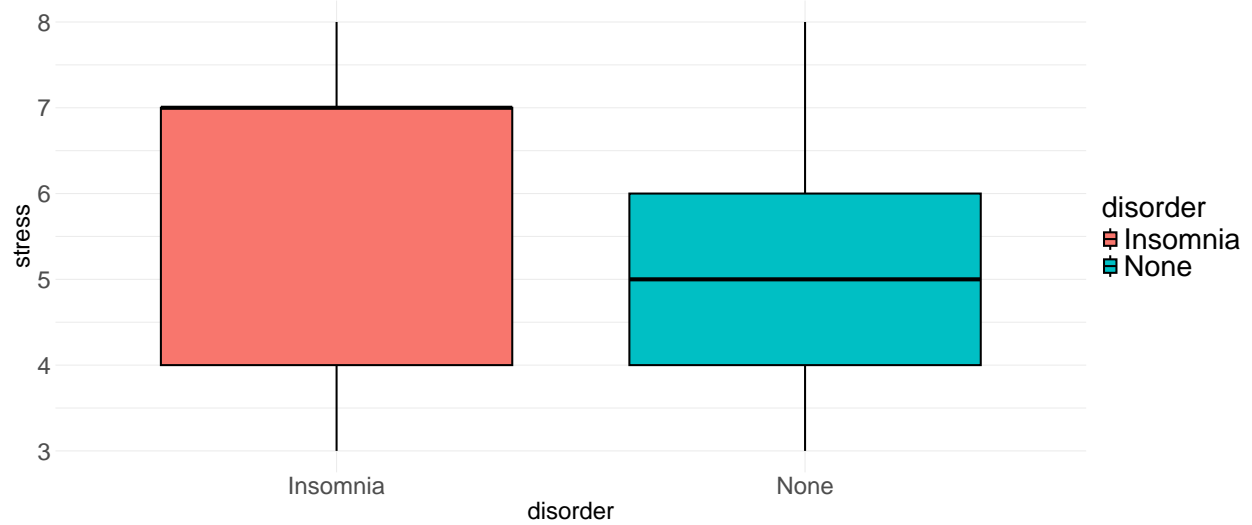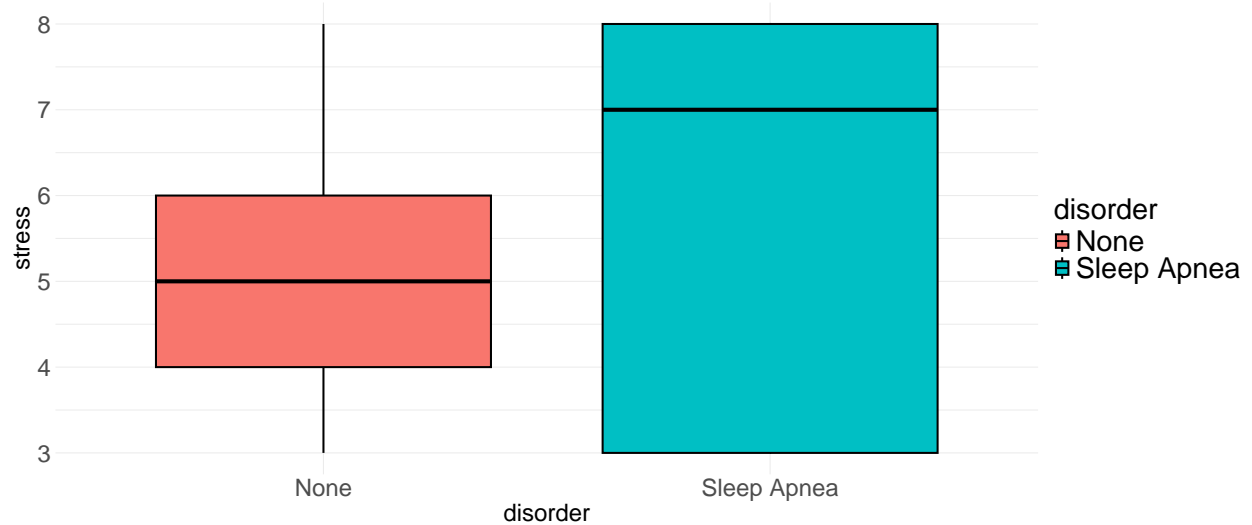**Figure11: Stress Level: No Disorder vs. Insomnia**

Figure12: Stress Level: No Disorder vs. Sleep Apnea

Four-quadrant distribution chart

Four–Quadrant Distribution of Stress & Sleep Quality
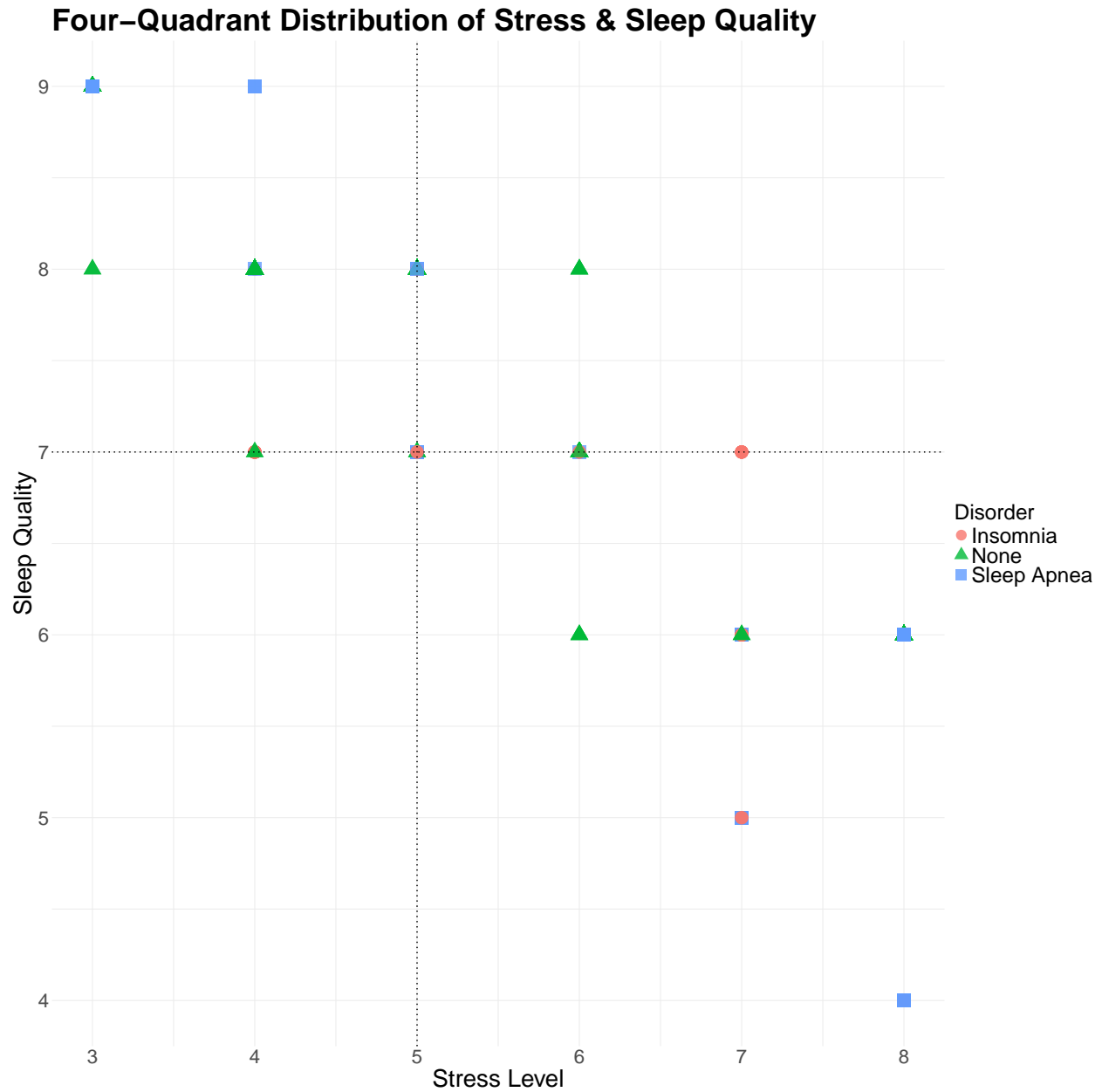
ANALYSIS

Analyzing the t-tests

Analyzing the box plots

The box plots provide a visual comparison of sleep quality and stress levels across different groups based on sleep disorder status. By examining the distribution of values within each group, we can observe key differences in central tendency and variability.

Analyzing the four-quadrant distribution chart

The four-quadrant plot visually maps individuals based on their stress levels (x-axis) and sleep quality (y-axis), with each point representing a response and colored according to their sleep disorder category. The median values of sleep quality and stress serve as reference lines, dividing the graph into four quadrants. Median is less sensitive to outliers and skewed data, and it also divides the dataset into two equal halves, making it useful for visualization.

- Top-Left Quadrant (High Sleep Quality, Low Stress):

  This area is predominantly occupied by individuals with **Sleep Apnea**. Their placement suggests that while they experience a diagnosed sleep disorder, their self-reported sleep quality remains relatively high, and their stress levels are relatively low.

- Bottom-Right Quadrant (Low Sleep Quality, High Stress):

  Individuals with **Insomnia** are concentrated in this quadrant. This indicates that they generally report poorer sleep quality and higher stress, reinforcing previous findings from the box plots.

- Top-Right Quadrant (High Sleep Quality, High Stress):

  Some individuals, particularly from the **None** group, appear in this section. This suggests that not all individuals without a sleep disorder experience low stress—some may still have high stress despite reporting good sleep quality.

- Bottom-Left Quadrant (Low Sleep Quality, Low Stress):

  This area contains no responses. This suggests the correlation of sleep quality and stress level is positive, which as the sleep

CONCLUSION