

Project #2

Sleep Patterns and Psychological Well-being: An In-depth Analysis of College Students

Introduction

This report presents an in-depth examination of sleep patterns and psychological well-being among college students. The utilized “SleepStudy” dataset consists of 253 student observations spanning 27 variables and can be accessed at <https://www.lock5stat.com/datapage3e.html>. This dataset offers insight into the sleeping habits, psychological states, and lifestyle specifics of college students.

The primary objective of this analysis is to examine a set of research questions through a thorough examination of the dataset. These questions are geared towards illuminating diverse aspects of college students’ sleep behaviors, academic achievements, emotional health, and lifestyle preferences. The findings of this analysis provide significant insights into the variables influencing students’ sleep patterns and psychological wellness and the resultant consequences. This analysis serves as a solid foundation for subsequent research and interventions aimed at enhancing the holistic well-being and academic success of students.

The following research questions are addressed in this report:

- 1. Is there a significant difference in stress scores between male and female college students?*
- 2. Is there a significant difference in the average number of classes missed between students with high versus normal stress levels?*
- 3. Do students with high stress levels have significantly more drinks compared to those with normal stress?*
- 4. Is there a positive correlation between the number of drinks and the number of classes missed in a semester?*
- 5. Is there a positive correlation between depression scores and the number of classes missed in a semester?*
- 6. Is there a positive correlation between anxiety scores and the number of classes missed in a semester?*
- 7. Do Larks or Owls have a better average GPA?*
- 8. Are depression scores, anxiety scores, and stress scores related to each other in some way?*
- 9. Is there a significant difference in the DAS Scores between those with different levels of alcohol use?*
- 10. Do students with higher DAS Scores have lower levels of happiness?*

Analyzing these inquiries unveils a thorough comprehension of college students’ sleep patterns and psychological wellness, ultimately assisting in the improvement of overall health and success for this demographic.

Data

The methodology for the analysis involves R code to generate various graphs and conduct descriptive statistical analyses on a dataset consisting of 253 student observations spanning 27 variables. The dataset includes the following variables:

Gender, ClassYear, LarkOwl, NumEarlyClass, EarlyClass, GPA, ClassesMissed, CognitionZScore, PoorSleepQuality, DepressionScore, AnxietyScore, StressScore, DepressionStatus, AnxietyStatus, Stress, DASScore, Happiness, AlcoholUse, Drinks, WeekdayBed, WeekdayRise, WeekdaySleep, WeekendBed, WeekendRise, WeekendSleep, AverageSleep, and AllNighter.

Below is a brief overview of the methodology steps:

- **Data Collection:** Data extracted from the accurate Lock5 sourced Excel file, which includes information concerning 253 student observations, forms the basis for the report’s analysis. It is important to note that some observations may have had incomplete data.
- **Data Cleaning:** Prior to analysis, the dataset underwent a data cleaning process involving handling missing values appropriately and addressing outliers that could skew the results.
- **Descriptive Graphs & Statistical Methods:** The methods encompassed data tables, box and whisker plots, two sample t-tests, scatter plots, central line of tendency, correlation coefficients

and matrix, and mean. Various graphs and visualizations were created to represent the findings, aiding result interpretation and allowing for increased accessibility.

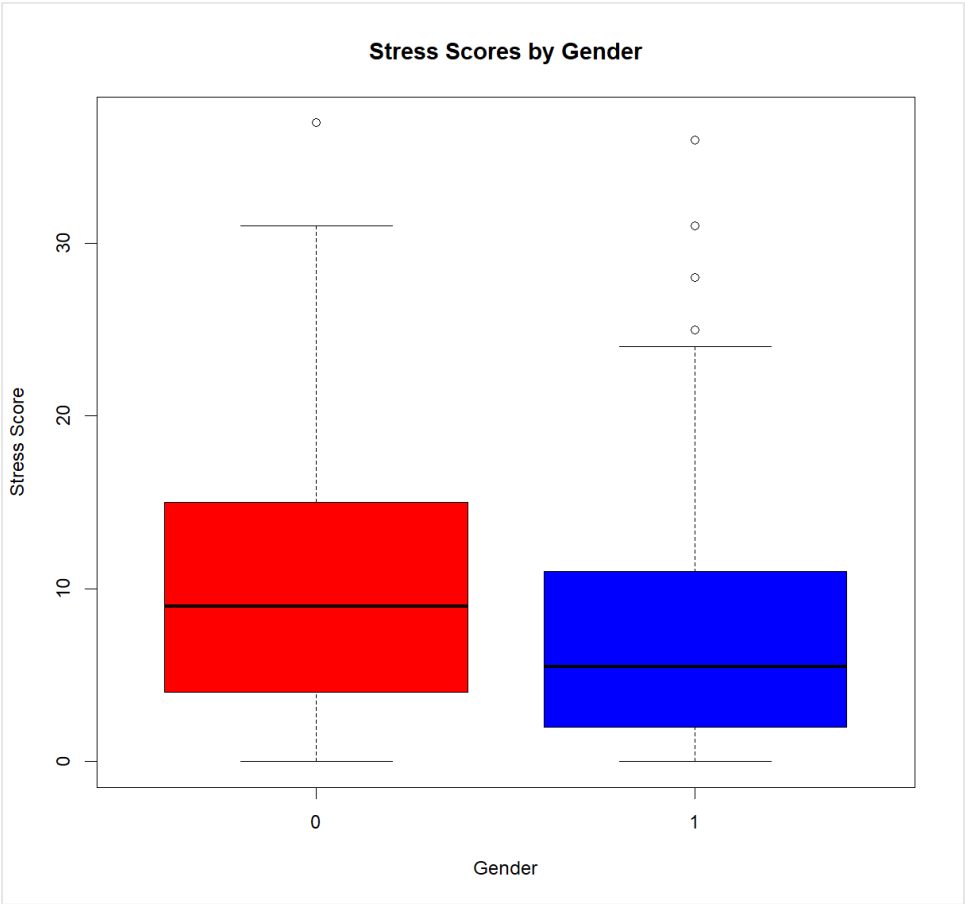
Analysis

1. Is there a significant difference in stress scores between male and female college students?

A Welch’s t-test was conducted to assess potential differences in stress scores (StressScore) between male and female college students (Gender). The results, supported by a high t-value of 2.9552, a low p-value of 0.003457, and a non-zero confidence interval, indicate a significant difference. This conclusion is further illustrated by a boxplot, where the stress scores for female students and male students are visually compared. The boxplot reveals one outlier among the female students and four outliers among the male students. Additionally, the whiskers proportionally extend higher and only slightly lower, reflecting the distribution of the data. The box midpoint for female students is positioned near the center, whereas the box midpoint for male students is slightly shifted down from the center.

On average, female students had a higher stress score (mean = 10.65) compared to male students (mean = 7.72). This significance suggests that gender (Gender) plays a significant role in understanding the variation in stress levels (StressScore) among college students.

Welch Two Sample t-test	
data: female_scores and male_scores	
t = 2.9552, df = 225.43, p-value = 0.003457	
alternative hypothesis: true difference in means is not equal to 0	
95 percent confidence interval:	
0.9773598 4.8892809	
sample estimates:	
mean of female	mean of male
10.649007	7.715686



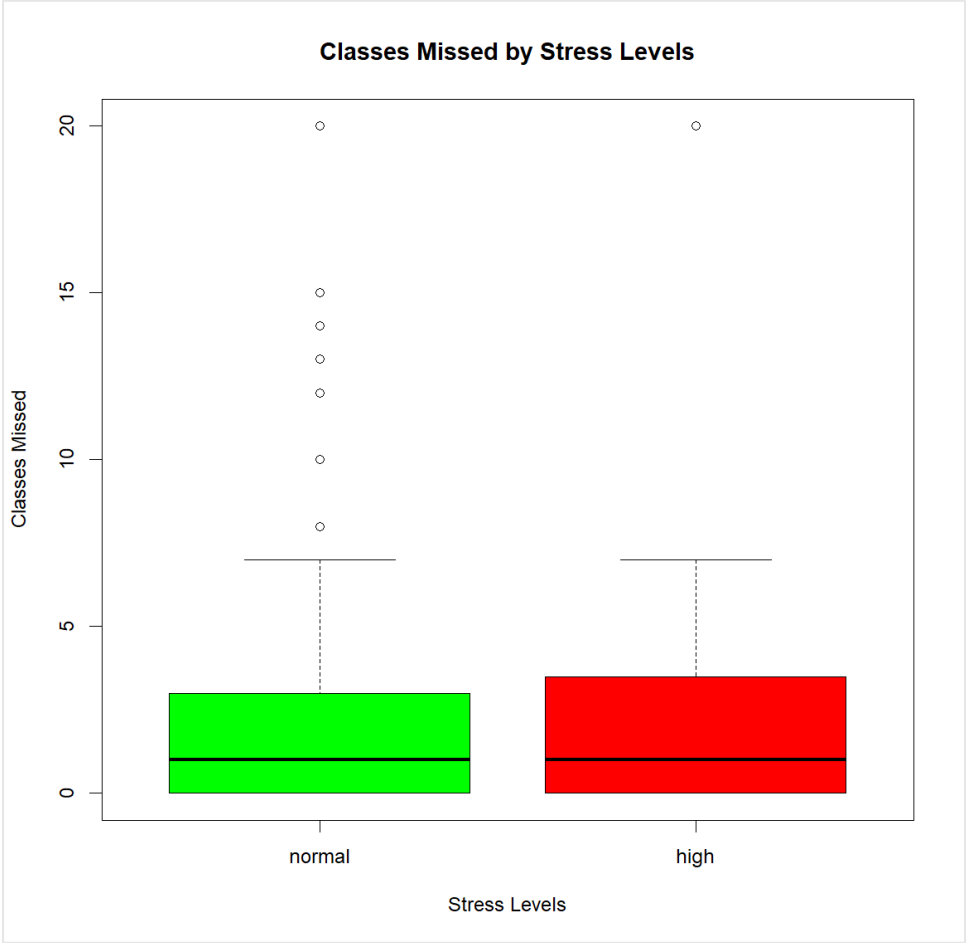
2. Is there a significant difference in the average number of classes missed between students with high versus normal stress levels?

A Welch's t-test was conducted to evaluate potential differences in the average number of classes missed (ClassesMissed) between students with normal stress levels and those with high stress levels (Stress). The results, characterized by a low t-value of -0.29305, a high p-value of 0.7702, and a confidence interval that includes zero, indicate no significant difference. This conclusion is further illustrated by a boxplot, where the number of classes missed by students with normal stress levels and those with high stress levels

is visually compared. The boxplot shows the normal group with seven outliers, while the high group with one outlier. Both groups have whiskers that extend only above the box, and they are of similar size, with the normal group's whiskers appearing slightly larger. The box distribution line for the normal group is slightly below the center, while the high group's box distribution line is positioned much lower from the center.

On average, students with high stress levels missed an average of 2.177665 classes, while students with normal stress levels missed an average of 2.321429 classes. The insignificant results suggest that stress levels (Stress) do not significantly impact the variation in the number of classes missed (ClassesMissed) among students.

Welch Two Sample t-test	
data: normal_stress_missed and high_stress_missed	
t = -0.29305, df = 88.966, p-value = 0.7702	
alternative hypothesis: true difference in means is not equal to 0	
95 percent confidence interval:	
-1.1185256 0.8309984	
sample estimates:	
mean of normal	mean of high
2.321429	2.177665



3. Do students with high stress levels have significantly more drinks compared to those with normal stress?

A Welch's t-test was executed to explore the differences in the number of drinks (Drinks) between students with normal and high stress levels (Stress). The results, as evidenced by a t-value of -1.5348, a high p-value of 0.1282, and a confidence interval including zero, do not suggest a significant difference. This outcome is further clarified by a boxplot, which illustrates the distribution of drinks for the two stress groups. The normal stress group and the high stress group each have two outliers. The boxes depict a slight distribution shift, with the normal stress group's box line positioned closer to the center, and the high stress group's box line placed lower. Both groups have whiskers that extend predominantly upwards, with the normal group's whisker extending approximately double the length compared to the lower end, while the high stress group's whisker extends slightly more above than below.

On average, students with high stress levels consumed approximately 4.857143 drinks, while students with normal stress levels consumed around 5.771574 drinks. These results suggest that stress levels do not have a significant impact on the number of drinks consumed by students. On the contrary, it is

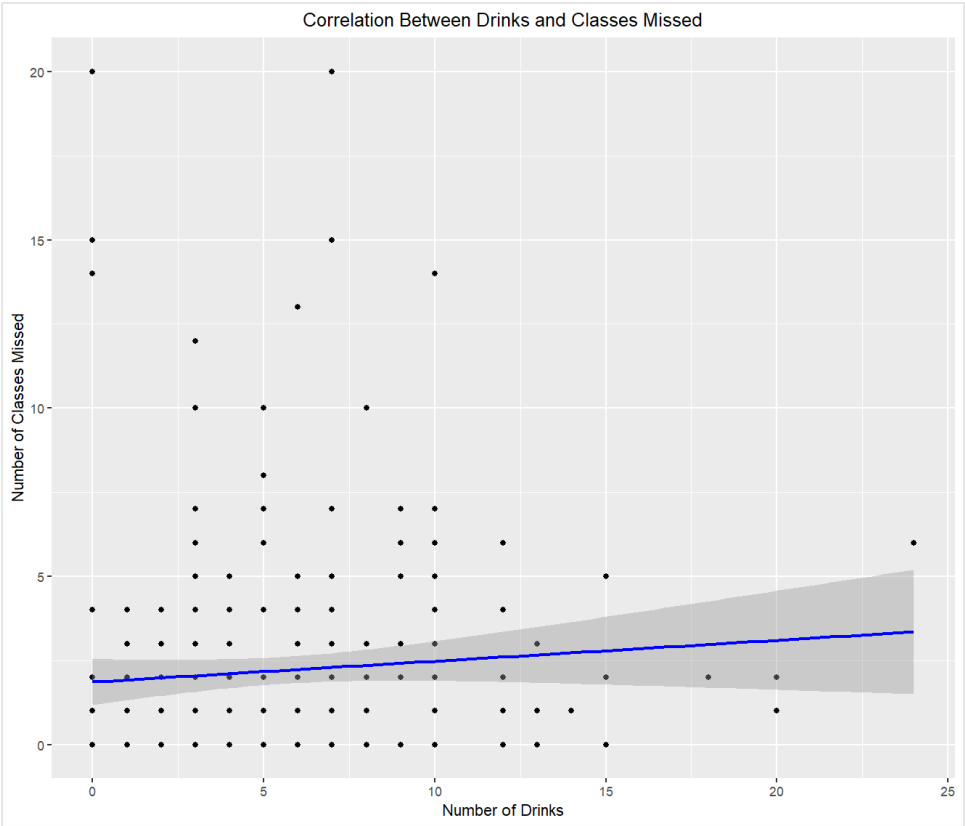
observed that, on average, students with high stress levels tend to consume fewer drinks than students with normal stress levels.

Welch Two Sample t-test	
data: high_stress_drinks and normal_stress_drinks	
t = -1.5348, df = 93.828, p-value = 0.1282	
alternative hypothesis: true difference in means is not equal to 0	
95 percent confidence interval:	
-2.0973922 0.2685307	
sample estimates:	
mean of normal	mean of high
5.771574	4.857143



4. Is there a positive correlation between the number of drinks and the number of classes missed in a semester?

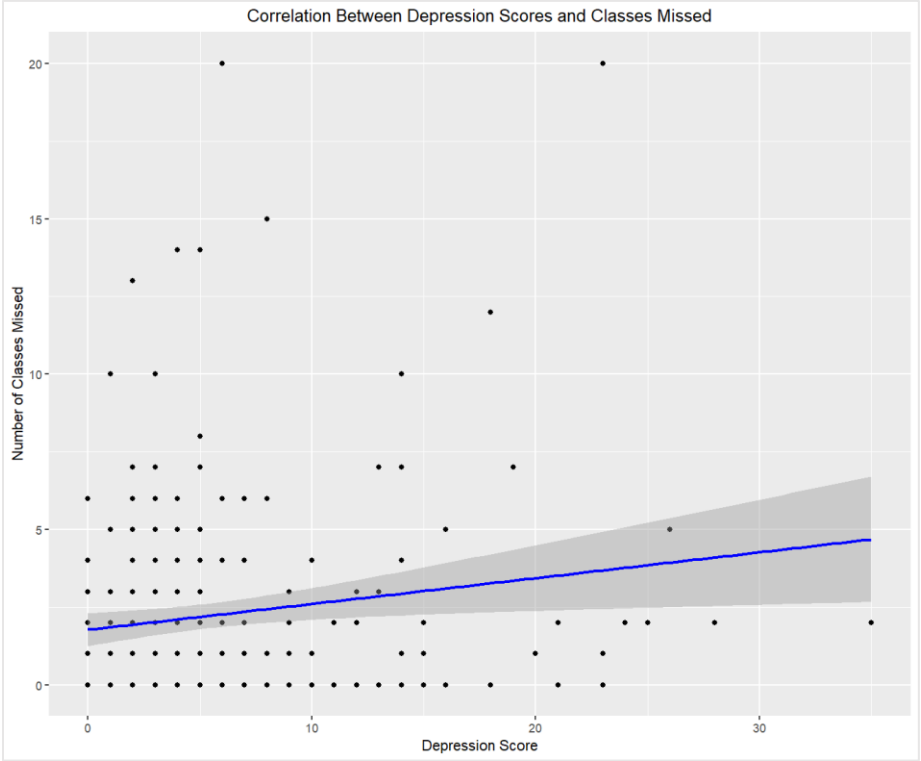
A correlation analysis was conducted to examine the relationship between the number of drinks (Drinks) and the number of classes missed in a semester (ClassesMissed). The correlation coefficient, computed as 0.07830198, suggests a very weak positive correlation between these two variables. This indicates that there is a slight tendency for students who consume more drinks to miss slightly more classes, although the relationship is not strong. The scatter plot used to visualize this correlation further supports the notion of a weak positive association, with data points scattered with no distinct pattern. While there is a positive correlation, its strength is minimal, suggesting that the number of drinks and the number of classes missed are not strongly linked.



Correlation Coefficient: 0.07830198

5. Is there a positive correlation between depression scores and the number of classes missed in a semester?

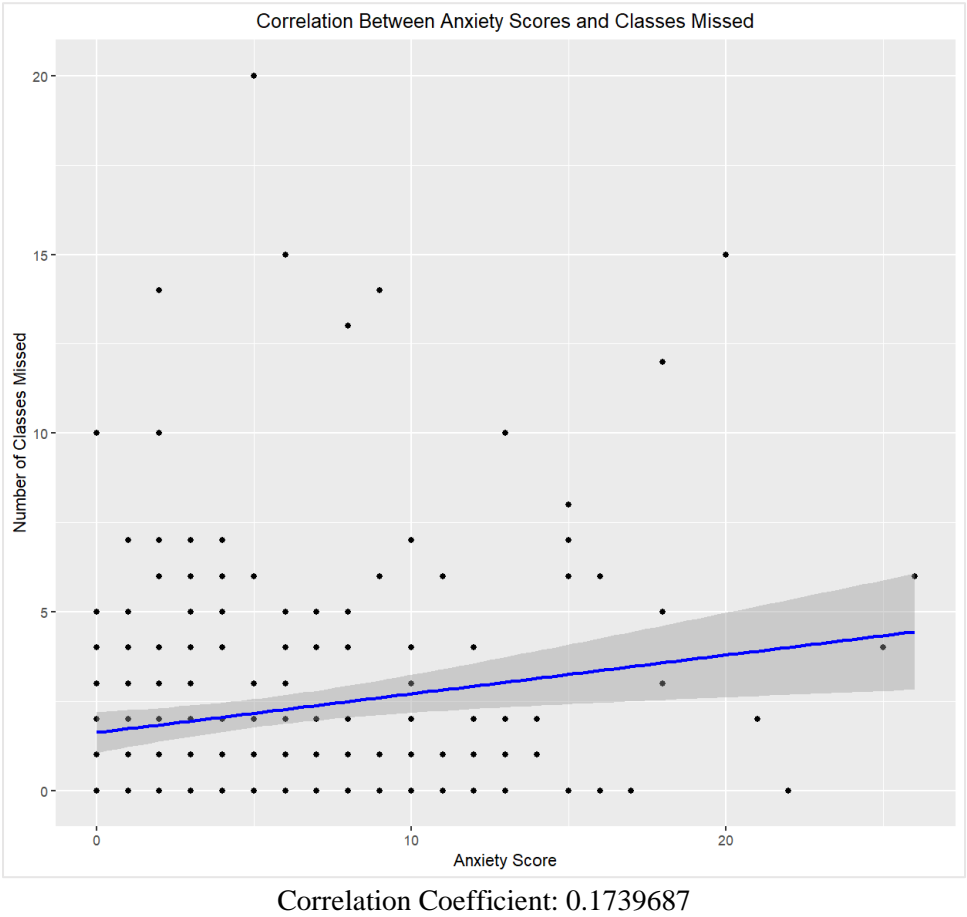
A correlation analysis was performed to assess the relationship between depression scores (DepressionScore) and the number of classes missed in a semester (ClassesMissed). The obtained correlation coefficient of 0.1539396 suggests a weak positive correlation between these variables. This implies that there is a slight tendency for students with higher depression scores to miss a slightly higher number of classes, although the relationship is not substantial. The scatter plot visualization reinforces this weak positive association, with data points scattered without a distinct pattern. In summary, there is a positive correlation, but it is relatively weak, indicating that depression scores and the number of classes missed are not strongly linked.



Correlation Coefficient: 0.1539396

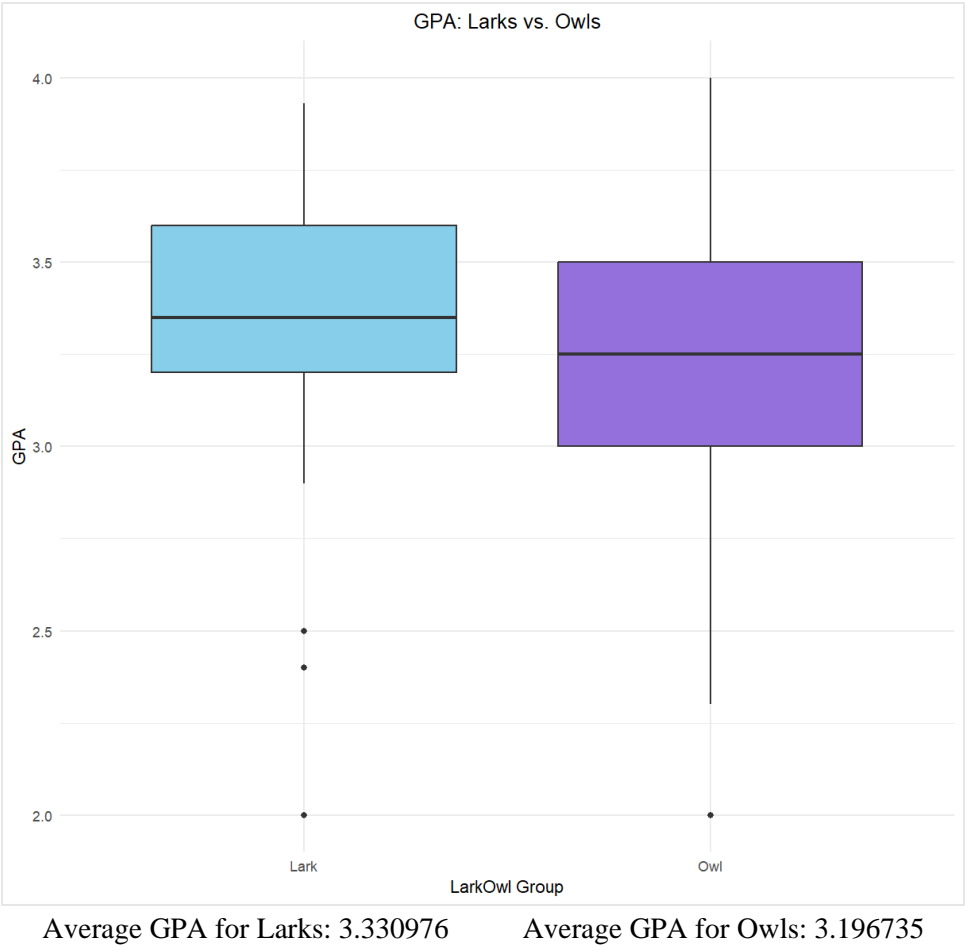
6. Is there a positive correlation between anxiety scores and the number of classes missed in a semester?

A correlation analysis was conducted to investigate the relationship between anxiety scores (AnxietyScore) and the number of classes missed in a semester (ClassesMissed). The correlation coefficient, computed as 0.1739687, indicates a very weak positive correlation between these two variables. This suggests a slight tendency for students with higher anxiety scores to miss slightly more classes, although the relationship is not strong. The scatter plot used to visualize this correlation further supports the idea of a weak positive association, with data points scattered with no clear pattern. While there is a positive correlation, its strength is minimal, implying that anxiety scores and the number of classes missed are not strongly linked.



7. Do Larks or Owls have a better average GPA?

To compare the average GPA between Larks and Owls (LarkOwl), a boxplot analysis was performed. The boxplot shows a clear distinction between the two groups. The average GPA for Larks is 3.330976, while for Owls, it is 3.196735. Larks exhibit a slightly higher average GPA than Owls. The boxplot further illustrates this difference. Larks have three outliers, and Owls have one outlier, suggesting variations in individual performances within both groups. The boxplot also highlights that the distribution of GPAs for both Larks and Owls is quite similar. The whiskers for both groups extend nearly equally above and below the boxes, indicating a comparable spread of data. However, there is a slight shift in the box distribution line, with Larks' line slightly lower than the center and Owls' line appearing closer to the center. In summary, Larks tend to have a slightly better average GPA compared to Owls, as indicated by both the average GPA values and the boxplot analysis, which reveals a difference in the distribution of GPAs between the two groups.



8. Are depression scores, anxiety scores, and stress scores related to each other in some way?

To examine the relationships between depression scores (DepressionScore), anxiety scores (AnxietyScore), and stress scores (StressScore), a correlation matrix and scatter plots were employed.

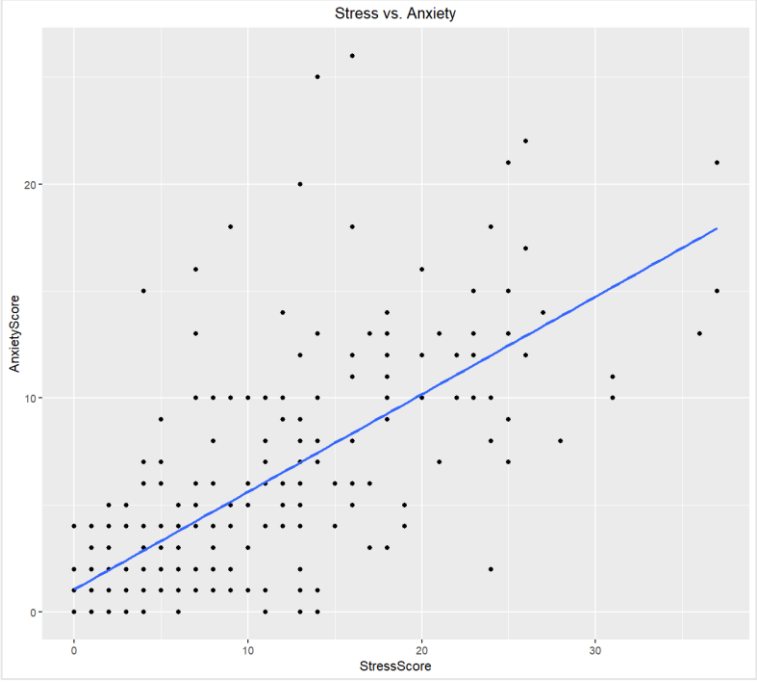
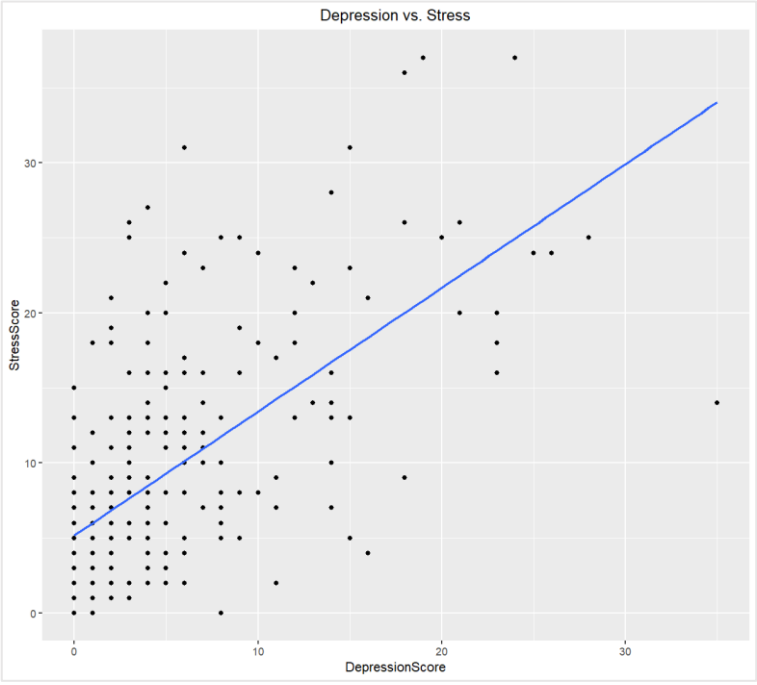
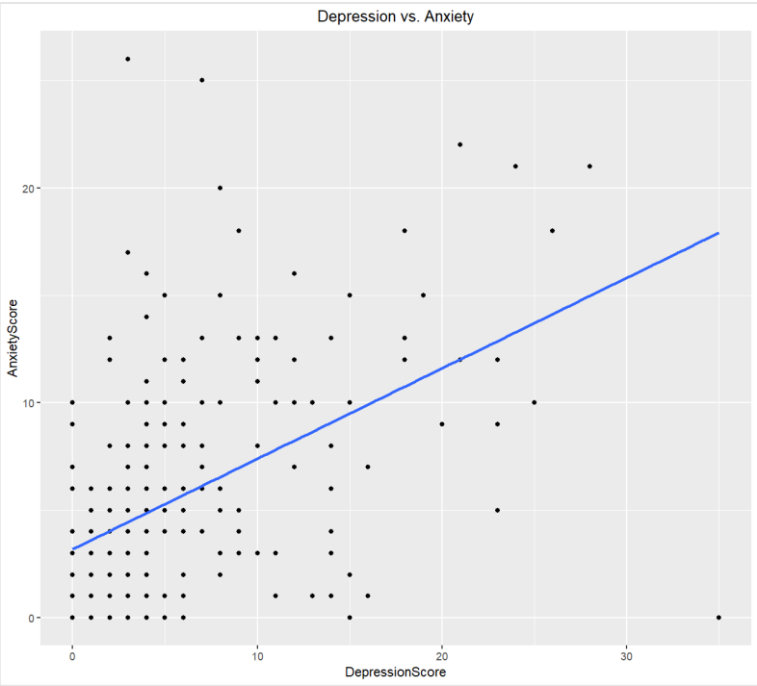
The correlation matrix reveals the following relationships:

- DepressionScore and AnxietyScore exhibit a positive correlation of approximately 0.622, indicating that as DepressionScore increases, AnxietyScore tends to increase as well.
- DepressionScore and StressScore also display a positive correlation of about 0.622, suggesting that higher DepressionScore corresponds with higher StressScore.
- AnxietyScore and StressScore demonstrate a relatively stronger positive correlation of approximately 0.698, implying that increased AnxietyScore is associated with higher StressScore.

These correlations indicate that there are positive relationships among DepressionScore, AnxietyScore, and StressScore. When one of these scores is higher, the others tend to be higher as well.

The scatter plots with correlation lines further visualize these relationships, confirming the patterns indicated by the correlation matrix. In summary, the analysis reveals that DepressionScore, AnxietyScore, and StressScore are interconnected and positively related. An increase in one of these scores often accompanies increases in the others.

	DepressionScore	AnxietyScore	StressScore
DepressionScore	1.0000000	0.6219619	0.6219619
AnxietyScore	0.6219619	1.0000000	0.6980524
StressScore	0.6219619	0.6980524	1.0000000



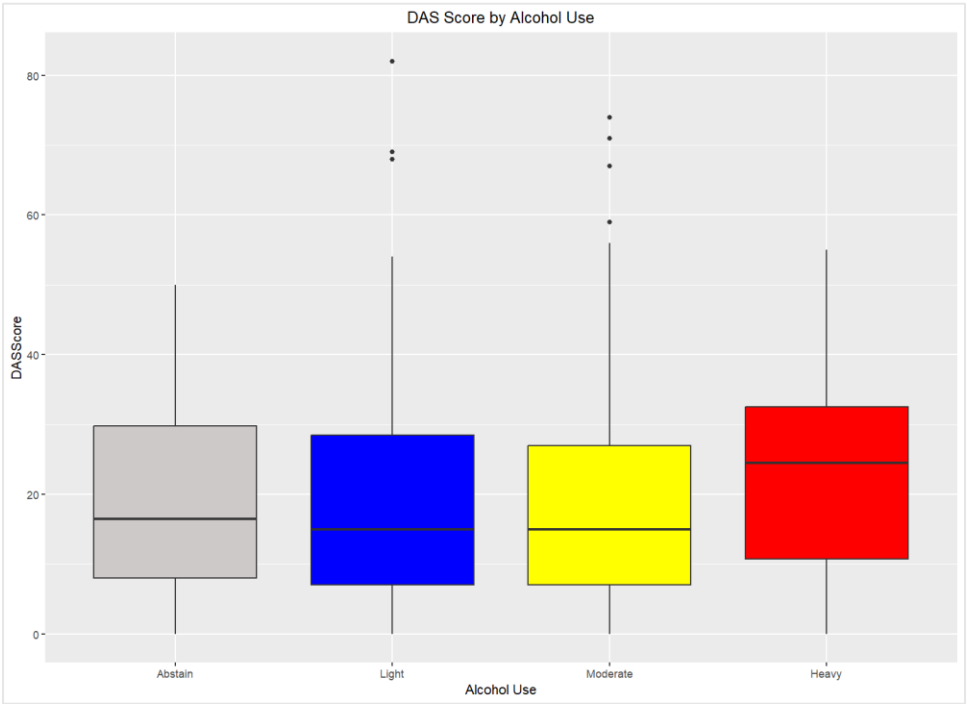
9. Is there a significant difference in the DAS Scores between those with different levels of alcohol use?

To investigate the potential differences in DAS Scores (DASScore: Depression, Anxiety, and Stress Score) among individuals with varying levels of alcohol use (AlcoholUse), a comprehensive analysis was performed, involving both a mean table and a boxplot.

The boxplot visually represents these differences. The boxplot shows that Abstain, Light, and Moderate categories have similar distributions, with their bottom whiskers at the same height and top whiskers gradually increasing. However, Heavy alcohol users have a longer bottom whisker, suggesting more variability in DAS Scores, while the top whisker is about the same height as the others. Additionally, the central line for Abstain, Light, and Moderate groups is slightly below the center, while for the Heavy group, it is notably higher from the center. The number of outliers varies among the groups, with Abstain having none, Light having 3, Moderate having 4, and Heavy having none.

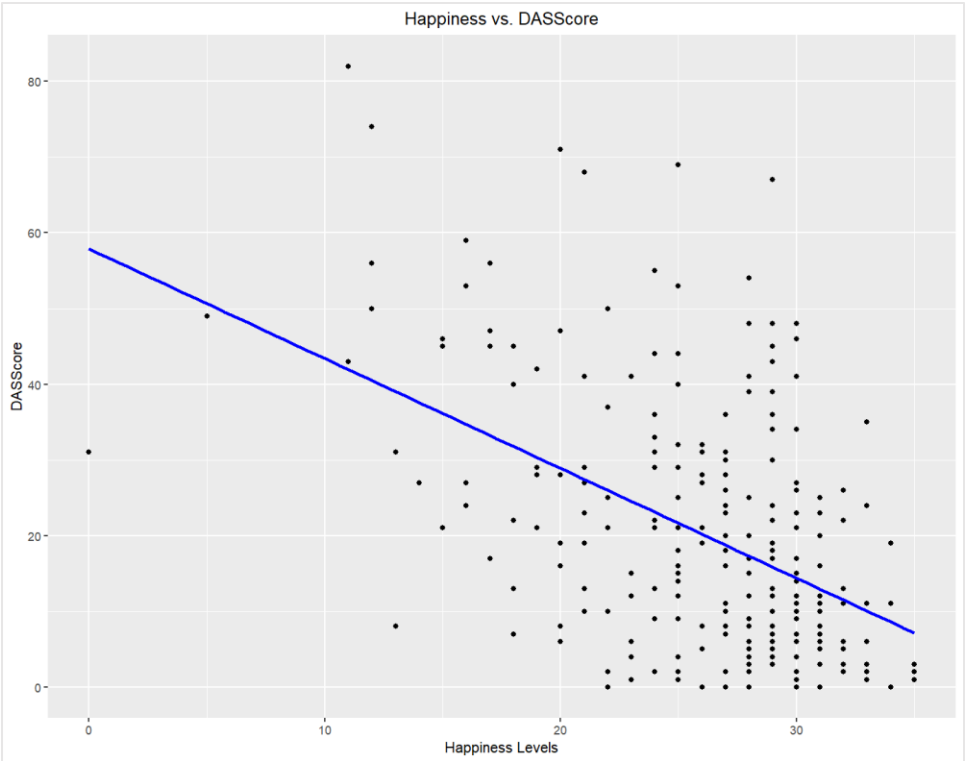
Overall, the analysis reveals variations in DAS Scores based on alcohol use. The Heavy alcohol use category stands out with higher mean scores, a different central line position, and the absence of outliers. These observations suggest that there might be a significant difference in DAS Scores among individuals with different levels of alcohol use, particularly highlighting the Heavy alcohol use category as having the highest scores.

Mean DAS Score			
Abstain	Light	Moderate	Heavy
19.6176	20.08434	19.65000	23.62500



10. Do students with higher DAS Scores have lower levels of happiness?

To explore the relationship between DAS Scores (DASScore) and happiness levels, a correlation analysis was conducted. The correlation coefficient of -0.481063342783106 reveals a moderate negative correlation. This implies that as DAS Scores increase, happiness levels tend to decrease. In other words, there's a tendency for individuals with higher DAS Scores to have lower happiness levels. The closer the correlation coefficient is to -1, the stronger the negative correlation. In this case, the -0.481 coefficient indicates a moderate strength of the relationship. In summary, the data indicates a moderate negative correlation between DAS Scores and happiness levels, with higher DAS Scores corresponding with lower happiness levels.



Correlation Coefficient: -0.481063342783106

Summary

Question 1, Gender and Stress Scores: The analysis revealed a significant difference in stress scores between male and female college students, with females exhibiting higher stress levels on average. This suggests that gender plays a crucial role in understanding variations in stress levels among college students.

Question 2, Stress Levels and Classes Missed: There was no significant difference in the average number of classes missed between students with high and normal stress levels. This implies that stress levels do not strongly impact the number of classes missed by students.

Question 3, Stress Levels and Alcohol Consumption: Stress levels were not significantly associated with the number of drinks consumed. In fact, students with high stress levels tended to consume fewer drinks on average than students with normal stress levels.

Question 4, Drinks and Classes Missed: A very weak positive correlation was found between the number of drinks consumed and the number of classes missed, indicating a slight tendency for students who consume more drinks to miss slightly more classes. However, this relationship is not strong.

Question 5, Depression Scores and Classes Missed: A weak positive correlation was observed between depression scores and the number of classes missed, suggesting that students with higher depression scores tend to miss slightly more classes, although the relationship is not substantial.

Question 6, Anxiety Scores and Classes Missed: Similarly, a weak positive correlation was found between anxiety scores and the number of classes missed, indicating a slight tendency for students with higher anxiety scores to miss slightly more classes, but the correlation is weak.

Question 7, Larks vs. Owls and GPA: Larks had a slightly better average GPA compared to Owls, as indicated by the boxplot analysis. This suggests that individuals who consider themselves Larks tend to have a slightly higher GPA on average.

Question 8, Depression, Anxiety, and Stress Relationships: The analysis revealed positive correlations between depression scores, anxiety scores, and stress scores, indicating that when one of these scores is higher, the others tend to be higher as well.

Question 9, DAS Scores and Alcohol Use: Individuals with varying levels of alcohol use showed differences in DAS Scores, with Heavy alcohol users having the highest scores. This suggests a potential link between alcohol use and psychological distress, with heavy alcohol users reporting higher distress levels.

Question 10, DAS Scores and Happiness: A moderate negative correlation was found between DAS Scores and happiness levels, indicating that individuals with higher DAS Scores tend to have lower happiness levels. This suggests that psychological distress is associated with reduced happiness.

In conclusion, this study has thoroughly explored a variety of critical research questions, revealing an overall understanding of the intricate dynamics that shape college students' well-being and academic performance. The findings underscore the interaction between sleep patterns, depression, anxiety, stress, mental health, and lifestyle choices within this demographic. Gender has been identified as a significant influencer of stress levels, with female students experiencing higher stress on average. Stress levels,

however, do not appear to directly correlate with class attendance or alcohol consumption, indicating the nuanced nature of these relationships. The interconnectedness of psychological distress, as denoted by DAS Scores, demonstrates that high levels of distress are associated with lower levels of happiness. Furthermore, sleep preferences and alcohol use exhibit distinct relationships with psychological distress. Collectively, these insights underscore the need for a comprehensive approach to student well-being. To optimize students' experiences and outcomes, future research and interventions must address the multifaceted nature of psychological well-being, acknowledge gender-specific needs, consider the impact of sleep patterns, and recognize the role of alcohol consumption in students' lives.

References

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