NON-PARAMETRIC PROJECT

Student Mental Health Analysis

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Introduction

Mental health is a state of mental well-being that enables people to cope with the normal stresses of life, realize their abilities, learn and work well, and contribute to their community.
It is a basic human right.

For students, this state of well being is critical to their entire educational journey and development, acting as the foundation for academic success, social integration, and personal resilience

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OBJECTIVE

1 To assess the monotonic relationships between key psychological indicators such as depression, anxiety, isolation, and academic pressure.

2 To examine the association between demographic and contextual variables.

3 To identify lifestyle and environmental factors that are significantly associated with mental–health outcomes.

4 To provide a statistical framework for interpreting patterns in student mental health data using non–parametric approaches that are robust to outliers and non normal distributions.
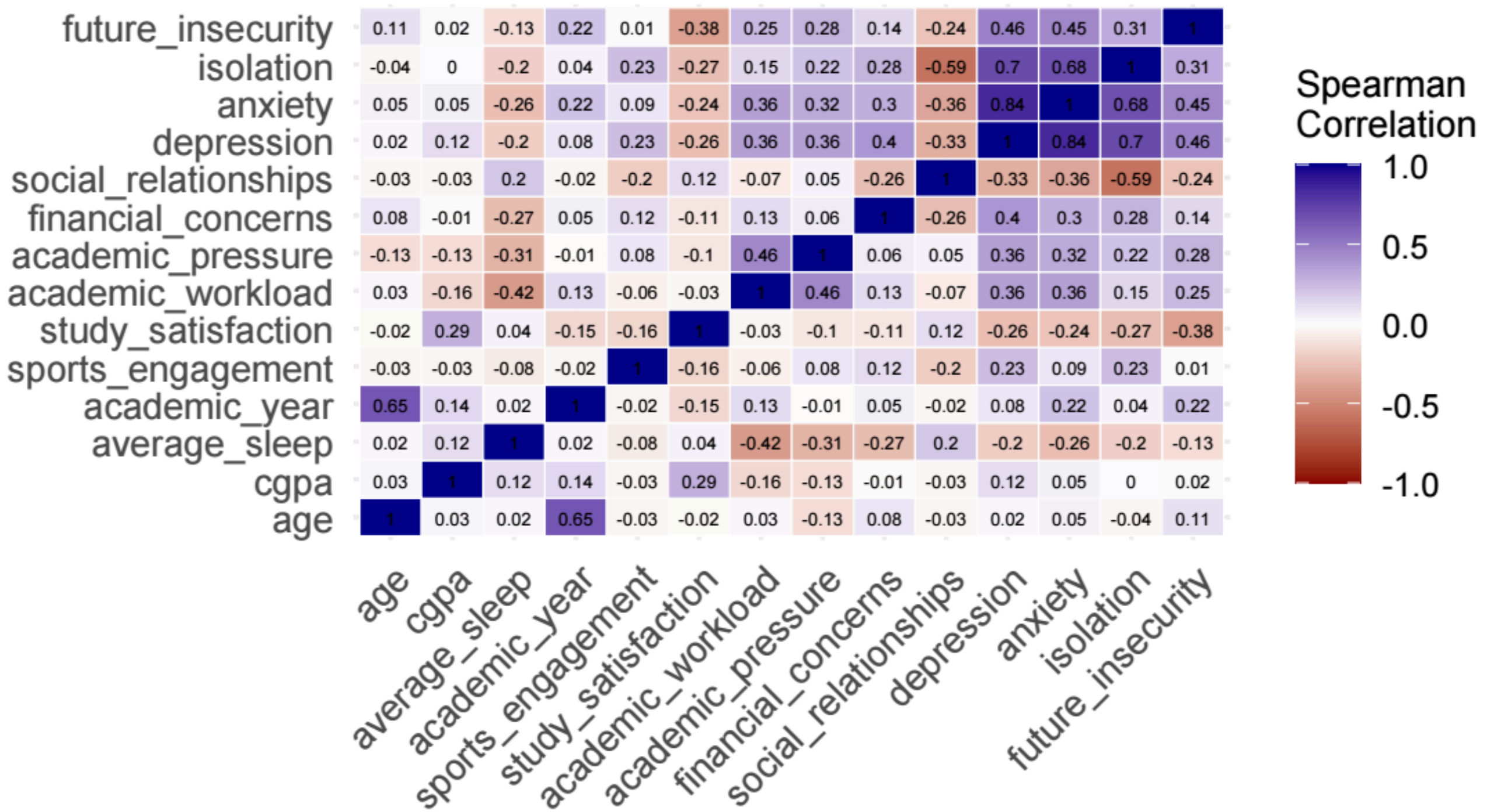
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Dataset Features

GENDER
AGE
ISOLATION
ANXIETY
DEPRESSION

FUTURE INSECURITY
CGPA
UNIVERSITY
STRESS RELIEF ACTIVITIES

RESIDENTIAL STATUS

CAMPUS DESCRIMINATION
SPORTS ENGAGEMENT

ACADEMIC YEAR

DEGREE MAJOR
DEGREE LEVEL

SOCIAL RELATIONSHIPS

FINANCIAL CONCERNS
STUDY SATISFACTION

AVERAGE SLEEP
ACADEMIC PRESSURE

ACADEMIC WORKLOAD

We begin by examining whether our dataset is randomly distributed, ensuring that it meets the assumptions of randomness and independence required for our analysis.

The **Run test** was applied to assess whether the sequence of observations in each numeric variable follows a random pattern.

Key Finding

The dataset exhibits a structured demographic pattern alongside random psychological variation. This confirms that independence and randomness assumptions required for non–parametric analysis are satisfied.

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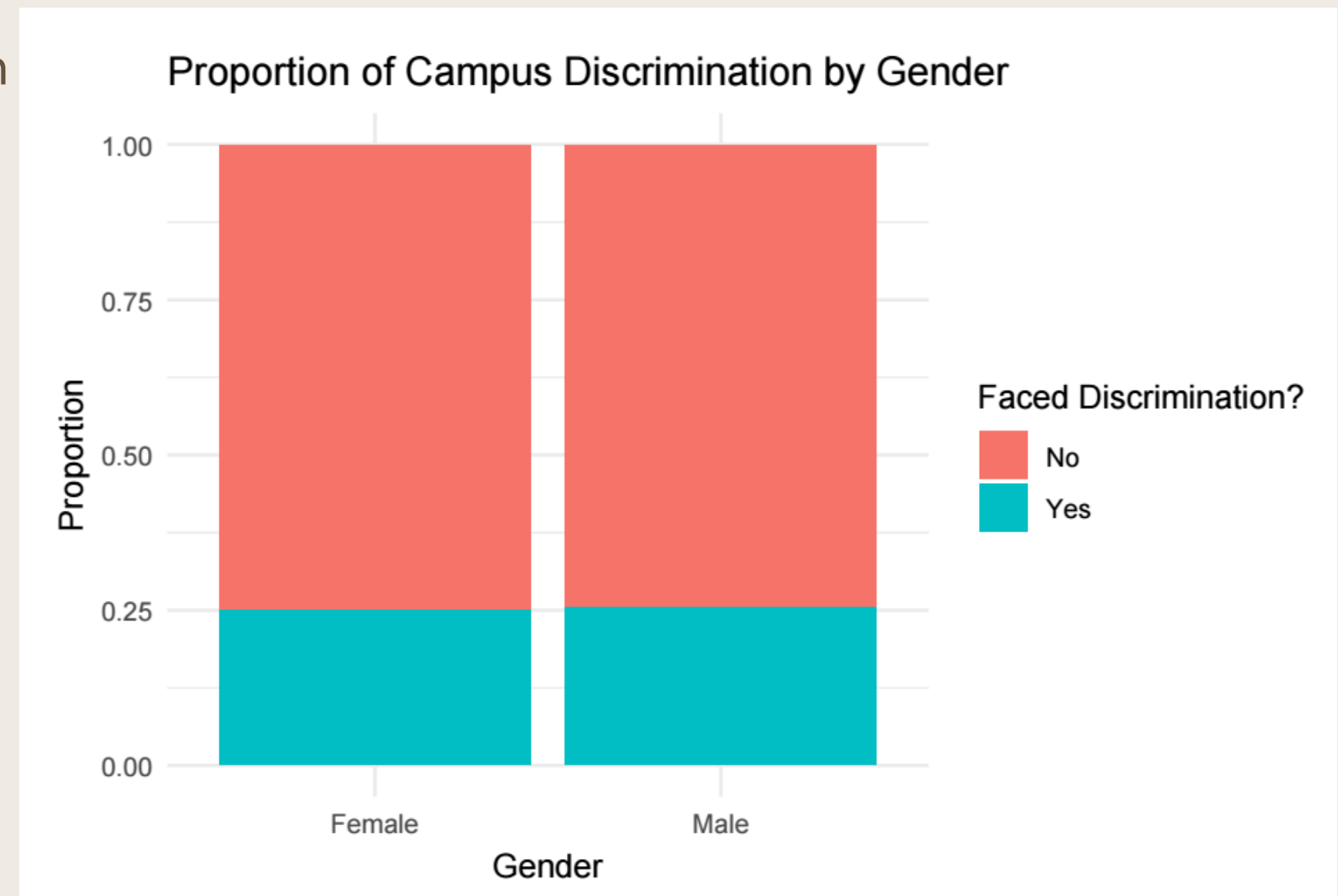**Visualizing Monotonic Relationships Among All Data Features using Spearman Rank Correlation**

Highlights

- **Strongly connected**
  Depression, anxiety, and isolation
- **Moderate connections**
  Academic pressure, financial concerns, and workload
- **Independent**
  Lifestyle and demographic variables

Does gender-based discrimination truly remain invisible within university campuses or have we simply not been asking the right questions?

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- A Chi-Square Test of Independence was applied to examine the relationship between gender and campus discrimination.
- The test produced a p-value of 0.796, indicating no statistically significant difference between male and female students' experiences of discrimination.
- Both genders reported similar proportions of discrimination experiences, suggesting that, within our sample, gender-based discrimination is not statistically evident.
- However, the absence of statistical significance doesn't confirm the absence of bias —issues like underreporting and social desirability may mask true experiences.
- Future studies could adopt indirect response methods to capture more honest and nuanced insights into gender-related discrimination.

Does the level of study (Undergraduate vs Postgraduate) significantly influence the likelihood of experiencing campus discrimination?

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- A Chi-Square Test of Independence was conducted to examine the association between degree level and campus discrimination.
- The test produced a χ^2 value = 11.54 (d.f = 1) with a p-value = 0.00068, which is below the 0.05 significance level.
- Therefore, we reject the null hypothesis (H_0) and conclude that degree level and campus discrimination are not independent.

Degree Level	No (Did Not Face Discrimination)	Yes (Faced Discrimination)
Undergraduate	42	27
Postgraduate	7	11

- Postgraduate students (11 out of 18) reported experiencing discrimination at a higher rate than undergraduate students (27 out of 69).
- This suggests that academic level may influence one's exposure or sensitivity to discriminatory experiences—possibly due to differing roles, visibility, or social dynamics within universities.
- The result provides empirical evidence that degree level significantly affects the likelihood of facing discrimination, warranting further qualitative investigation.
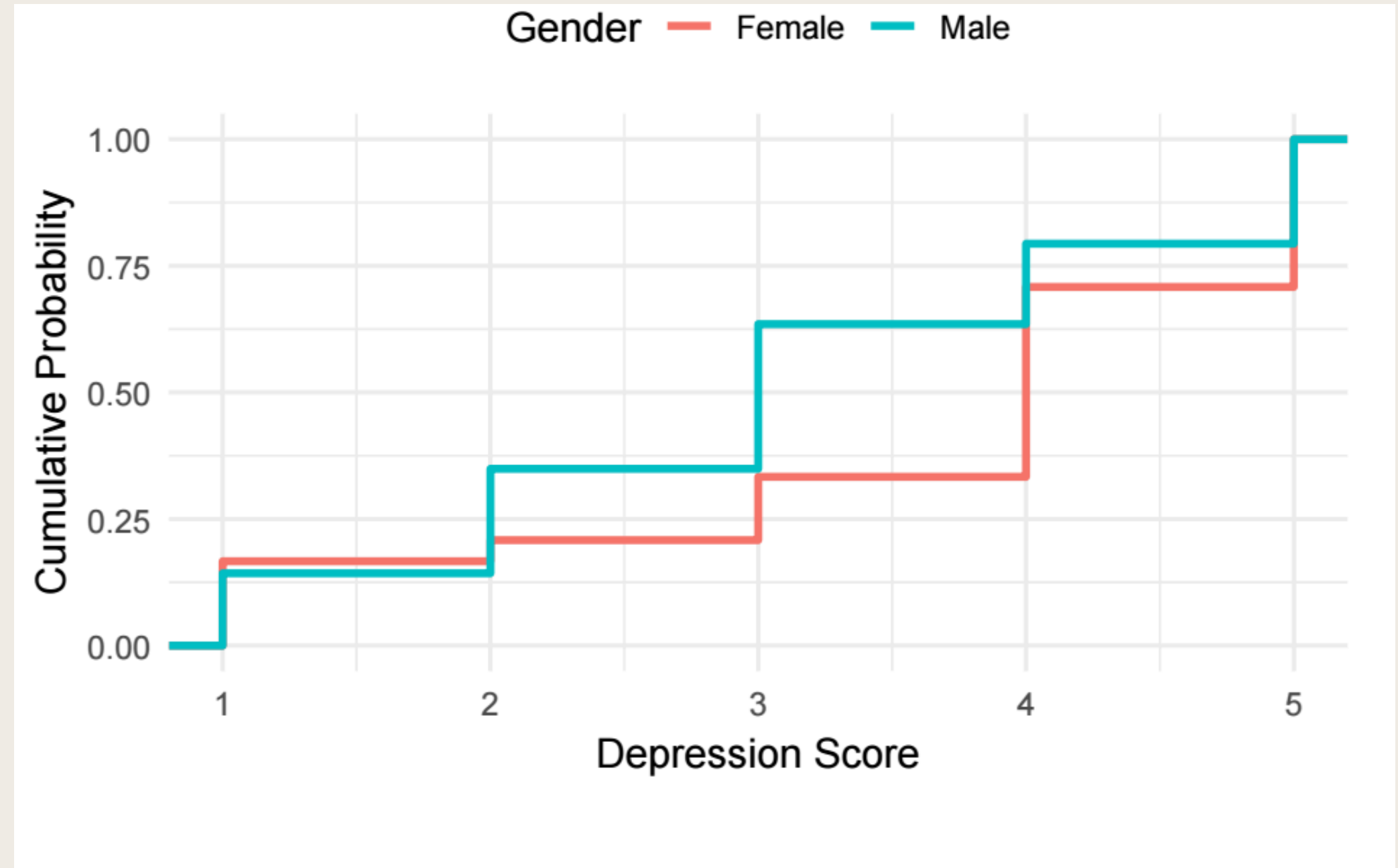
Is there a significant difference in the distribution of depression levels between male and female students?

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- A two-sample Kolmogorov–Smirnov (K–S) test was used to compare the distribution of depression scores between male and female students.
- The test yielded a statistic of D = 0.3016 with a p-value = 0.0255, which is below the 0.05 significance level.
- Therefore, we reject the null hypothesis (H_0) and conclude that the distribution of depression levels differs significantly between male and female students.
- This indicates that gender influences how depression levels are distributed, rather than merely affecting the average score.
- The ECDF plot further supports this, showing clear divergence between male and female cumulative distributions — implying that both genders experience depression in distinct patterns.
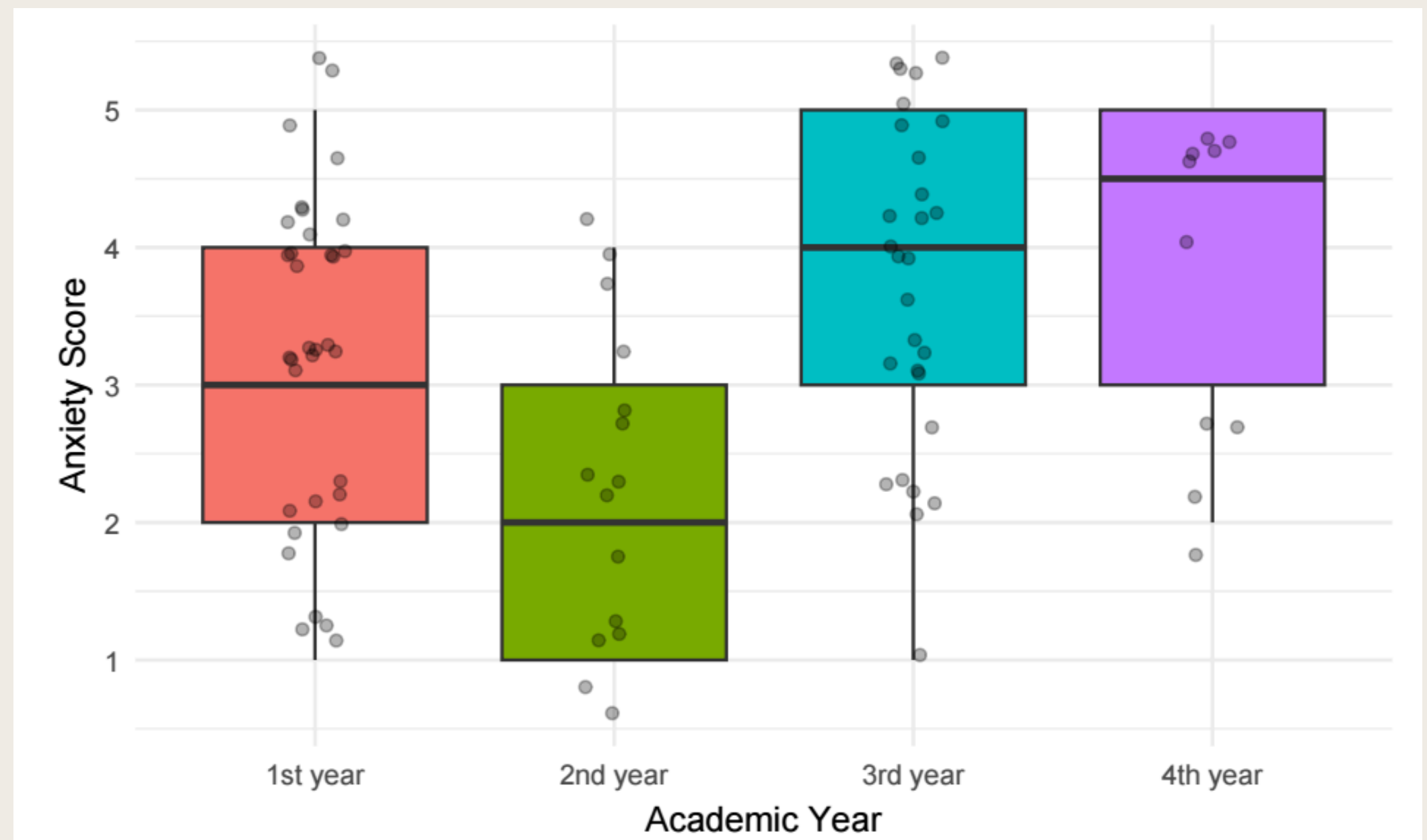
Does the level of anxiety among students significantly differ across different academic years?

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- A Kruskal–Wallis Rank Sum Test was applied to examine whether anxiety levels differ significantly across academic years.
- The test produced a result of χ^2 = 12.992 with a p–value = 0.004654, indicating a significant difference at the 1% level of significance (p < 0.01).
- Therefore, we reject the null hypothesis (H_0) and conclude that students' anxiety levels are not uniformly distributed across academic years.
- From the boxplot, 2nd–year students tend to report lower anxiety levels, while 3rd and 4th–year students show higher anxiety scores.
- These results suggest that academic progression is associated with increasing mental stress, likely due to greater workloads, project demands, and post–graduation concerns.
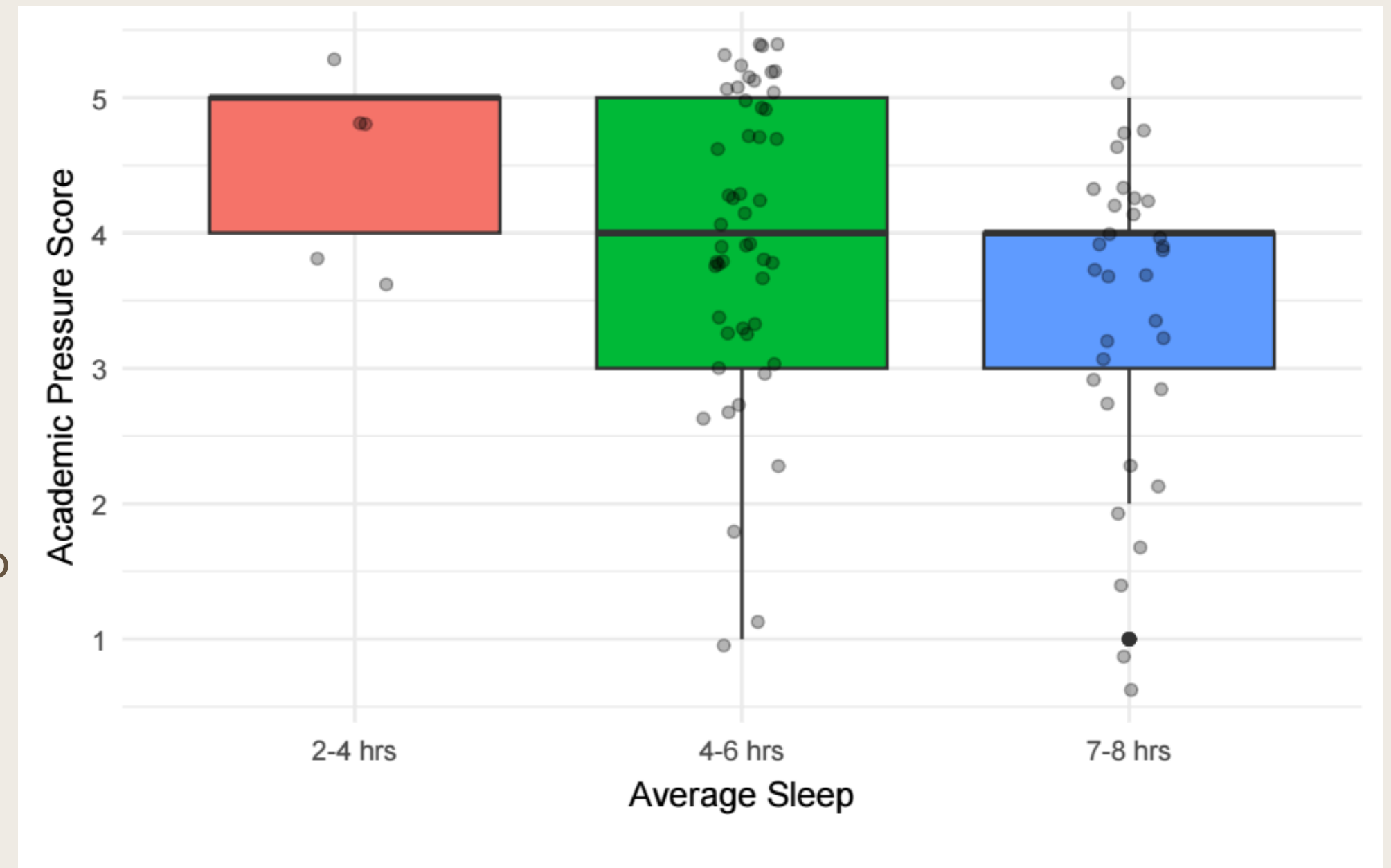
Does average sleep duration have a significant effect on perceived academic pressure among students?

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- A Kruskal–Wallis Rank Sum Test was used to evaluate whether academic pressure varies across different levels of average sleep duration.
- The test yielded a statistic of χ^2 = 17.671 with a p-value = 0.00141, which is less than 0.05, indicating a statistically significant difference.
- Hence, we reject the null hypothesis (H_0) and conclude that academic pressure significantly differs based on students' average sleep duration.
- The boxplot shows that students with shorter sleep durations experience higher levels of academic pressure, while those who sleep adequately report less stress.
- This suggests a clear negative relationship between sleep and academic stress, emphasizing that sufficient rest helps students manage academic demands more effectively.
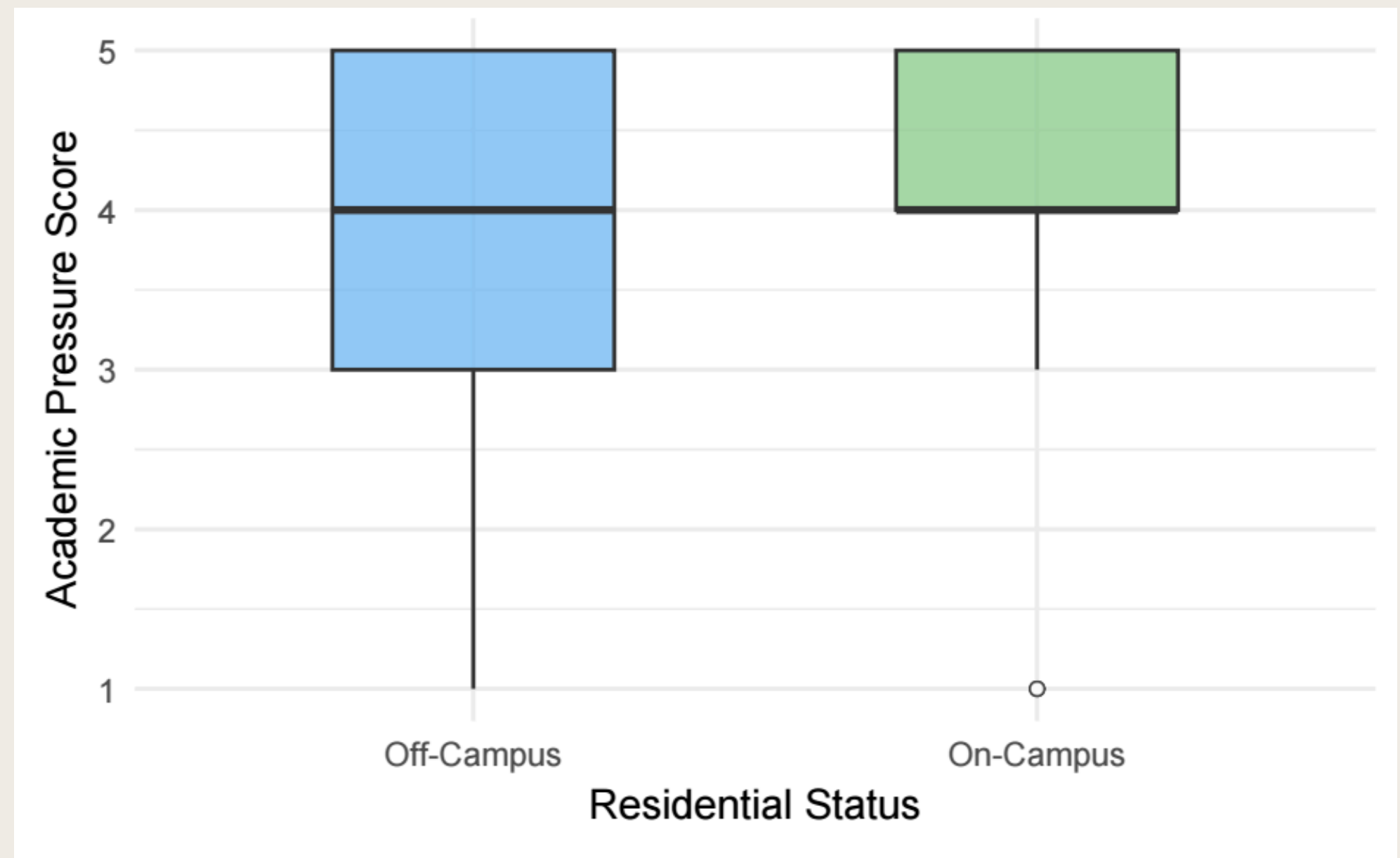
Does residential status (hosteller or day scholar) significantly influence the level of academic pressure experienced by students?

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- A Mann–Whitney U test (Wilcoxon rank–sum test) was conducted to assess whether academic pressure levels differ between hostellers and day scholars.
- The test yielded a result of W = 602.5 with a p–value = 0.2527, which is greater than the 0.05 significance level.
- Therefore, we fail to reject the null hypothesis (H_0), concluding that residential status does not have a statistically significant influence on students' academic pressure.
- Both on-campus and off-campus students exhibit comparable levels of academic stress, with only minor median differences.
- This suggests that factors beyond living arrangements — such as academic workload or psychological variables — may play a more dominant role in shaping students' stress levels.

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Final Conclusions

- The analysis revealed that academic, lifestyle, and mental health factors are closely interlinked among students.
- Sleep duration and academic year significantly influence academic pressure and anxiety levels, showing that study-related stress increases with workload and inadequate rest.
- Degree level was found to have a significant association with campus discrimination, while gender-based discrimination was not statistically evident.
- Depression and anxiety distributions differ across genders, indicating distinct emotional patterns.
- Residential status (hosteller vs. day scholar) showed no significant effect on academic pressure.
- Overall, findings highlight that academic and emotional stressors are key drivers of student well-being, emphasizing the need for mental health awareness, balanced workloads, and supportive university environments.

The End of Presentation

THANK YOU