

What leads students to academic success?

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Objects

- Do you know the secret behind the academic success¹?
- Can we predict student's final grades by a linear function?



Source: <https://pixabay.com/photos/studying-exams-preparation-951818/>

Introduction

- To investigate what factors will affect students' academic performance, using the data was obtained in a survey of students' math and Portuguese language courses in secondary school from Kaggle website.
- For the sake of researching the different aspect of students' lives, some critical factors in the data are selected in this study:
 - ❖ age
 - ❖ parent's cohabitation status
 - ❖ weekly study time
 - ❖ family educational support
 - ❖ relationship status
 - ❖ workday alcohol consumption
 - ❖ current health status
 - ❖ second-period grade

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Methodology

- Make several vocalizational plots between each selected factor and student's final grade to check if each factor could make a difference in students' final performance.

Figure 1 Boxplot of final grade for different age

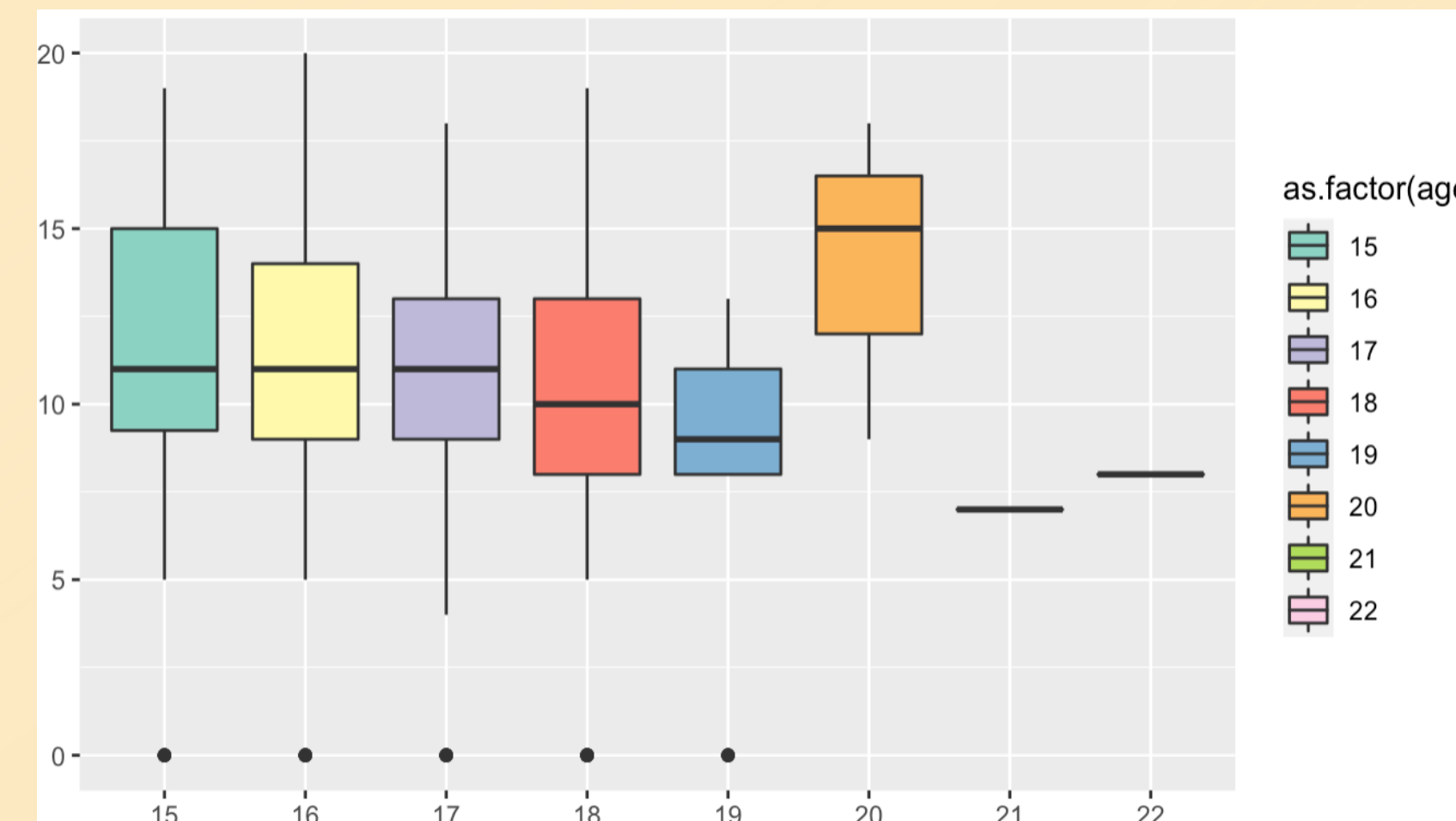


Figure 3 Boxplot of final grade for different weekly study time

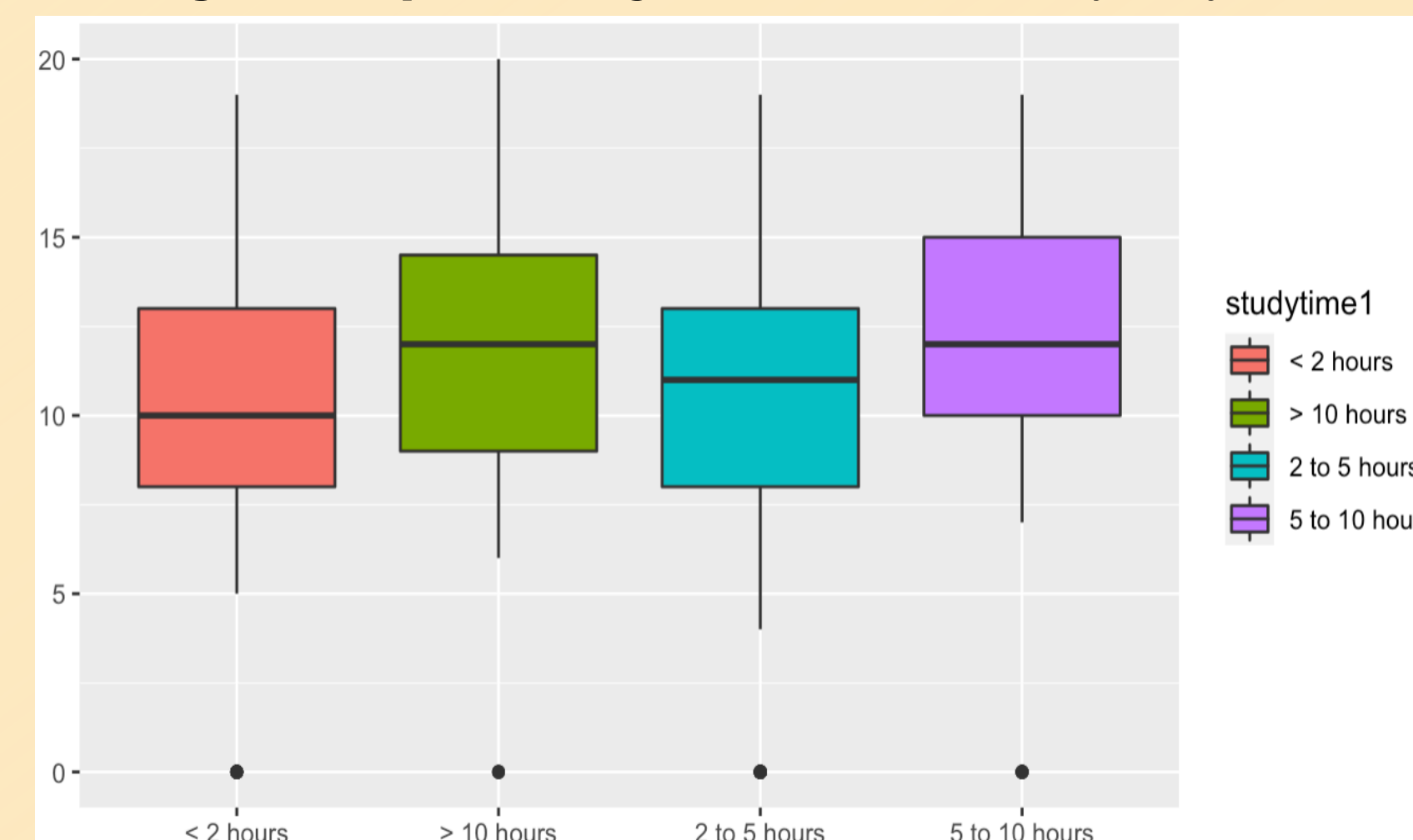


Figure 5 Boxplot of final grade versus relationship status

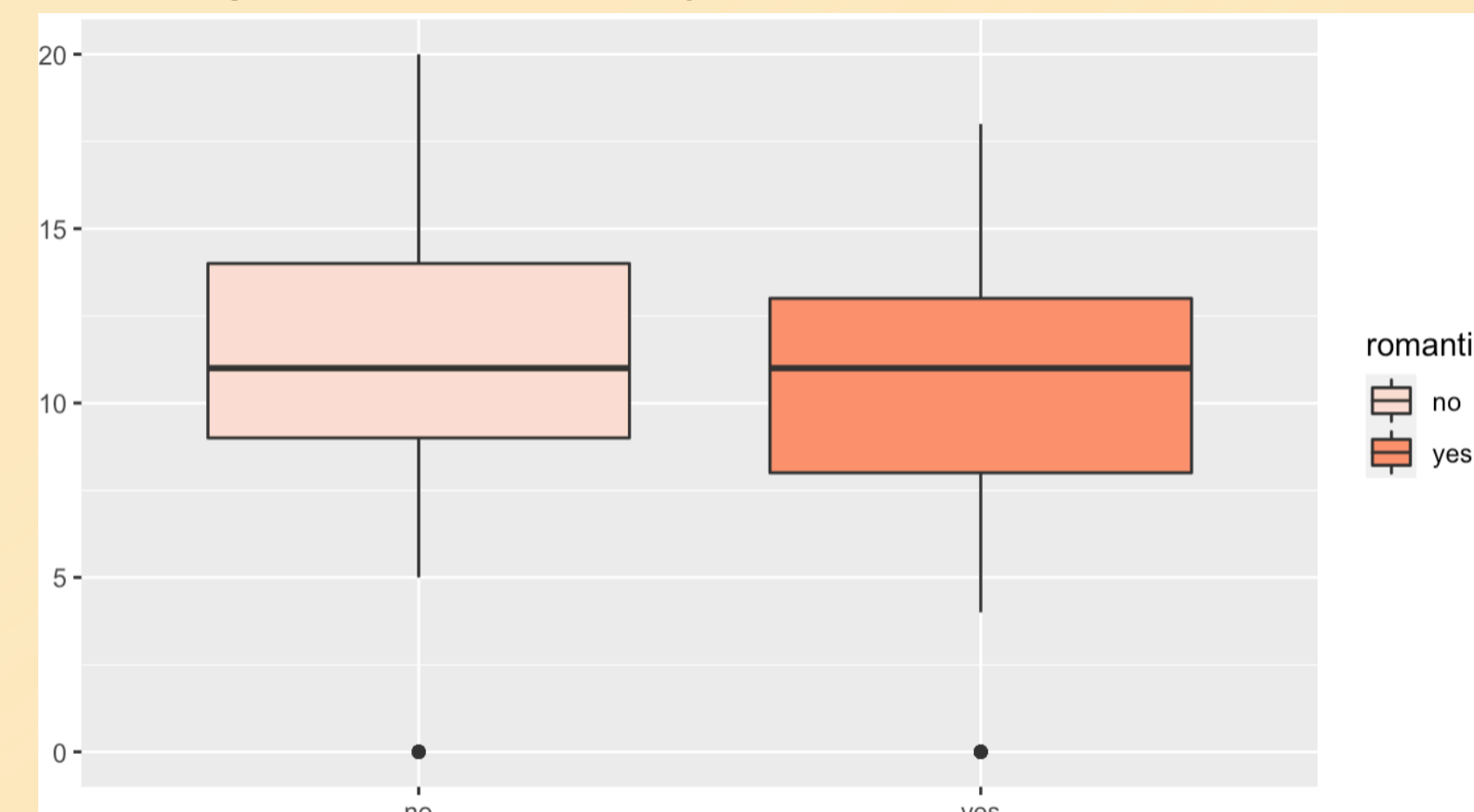


Figure 7 Histogram of final grade versus different health status

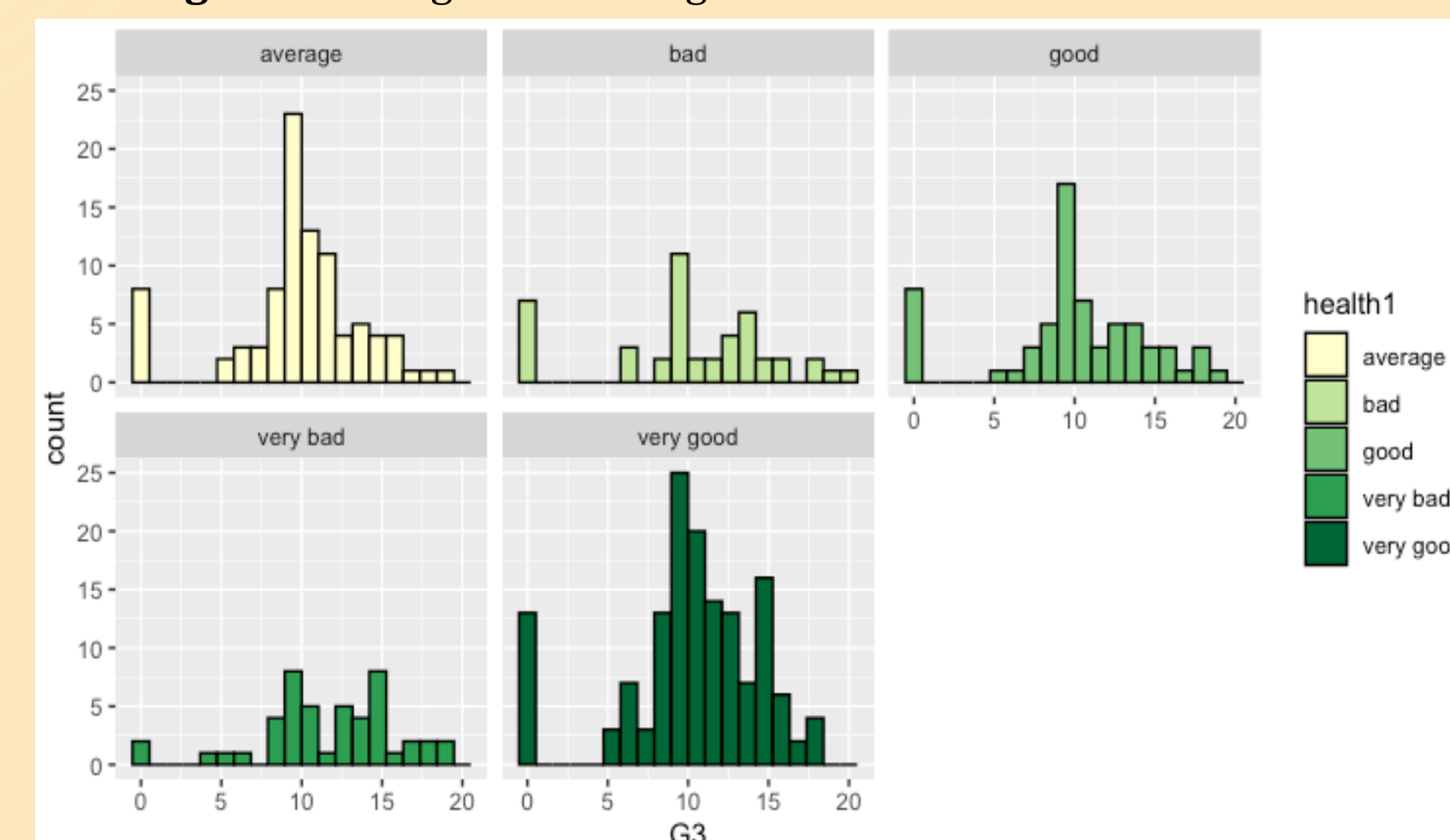


Figure 2 Boxplot of final grade for different parent's cohabitational status (A: apart; T: together)

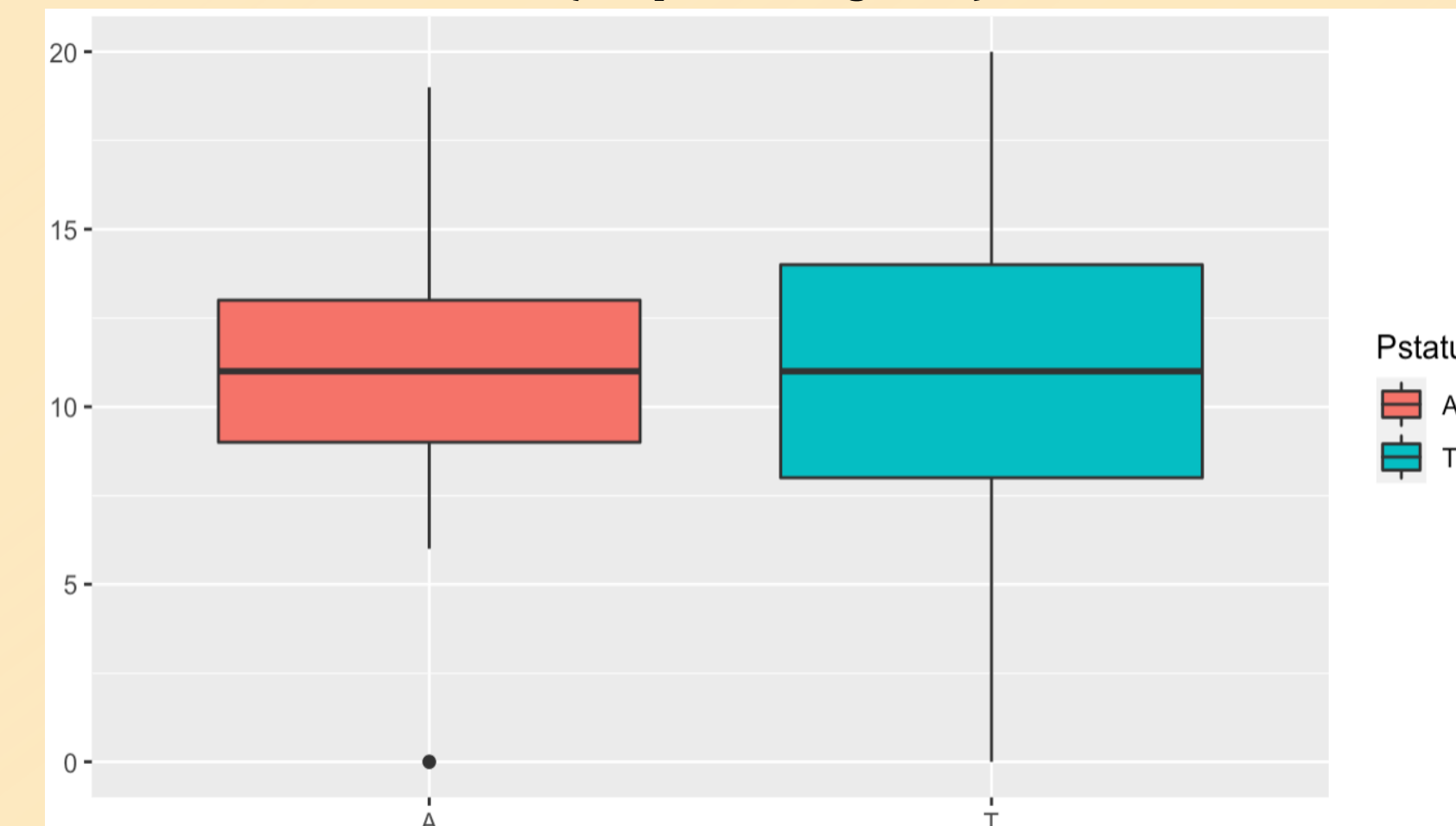


Figure 4 Boxplot of final grade versus family educational support

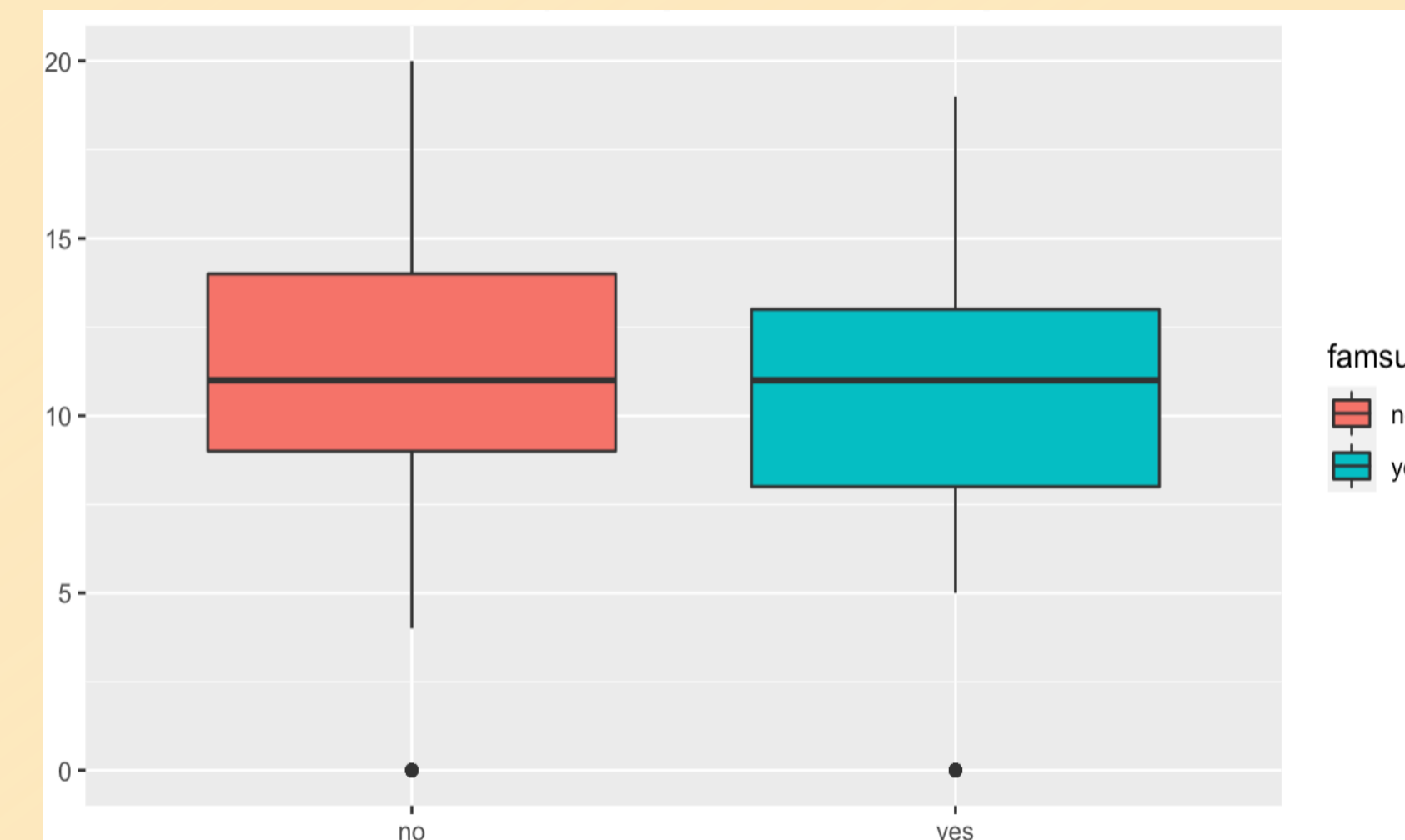


Figure 6 Boxplot of final grade versus workday alcohol consumption

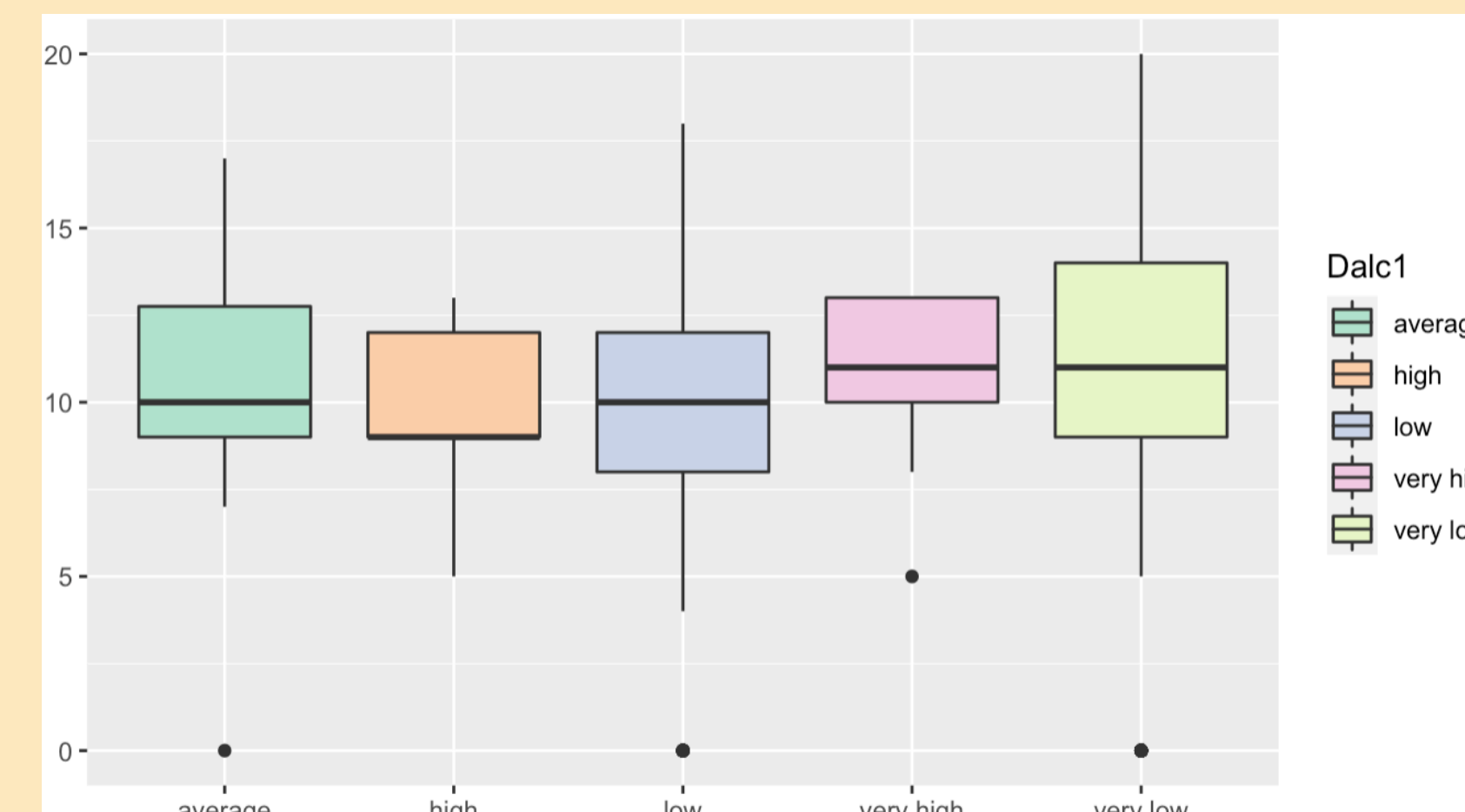
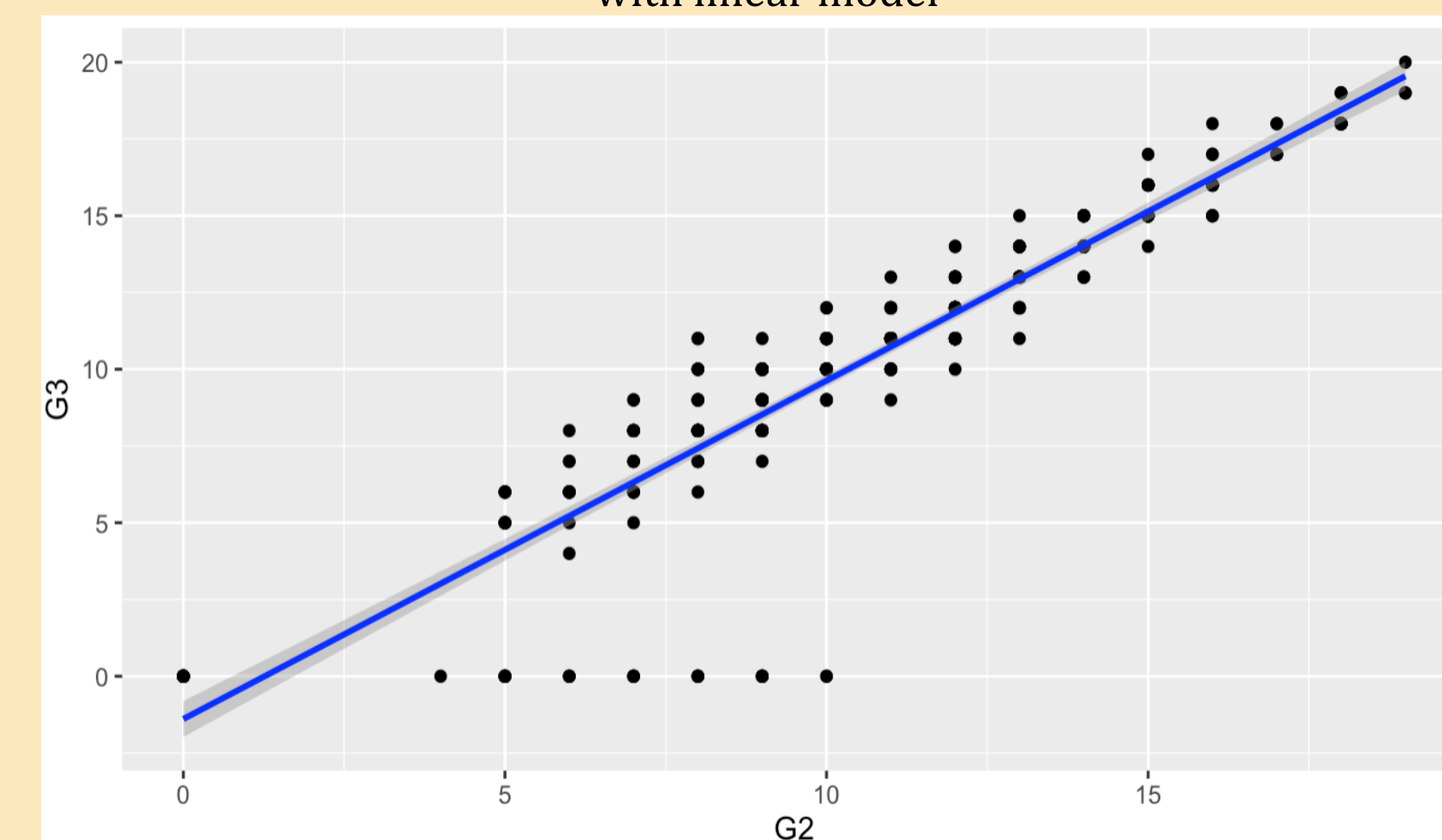


Figure 8 Scatter plot of final grade versus second-period grade fitted with linear model



- Run the suitable statistical test to check if our assumptions from visual plots are supported.
 - ANOVA test: check if different categories in each factor could statistically affect the final grade.
 - Linear regression: check if numerical factors are linearly correlated with the final grade.

Results

- From the visual graph, we can see some factors that may affect students' final grade, like:
 - ✓ students' grades decrease when their age goes up;
 - ✓ students with a better physical health condition tended to get a higher final grade;
 - ✓ student with 5-10 hours weekly study time seems to get a higher final grade.
- However, **the only significant statistical result is students' second-period grade and final grades are statistically correlated**, which is not beyond our usual assumption.

Conclusion

- After this study, we cannot give a statistical conclusion about which single factor could critically affect student's academic performance, nor creating a formula which could accurately predict students' final grade.
- Maybe this study needs to go deeper with not only statistical research but also experimental psychological data.

References

1. hely333. "What Is the Secret of Academic Success?," October 18, 2018. <https://www.kaggle.com/hely333/what-is-the-secret-of-academic-success>.
2. Learning, UCI Machine. "Student Alcohol Consumption." Kaggle, October 19, 2016. <https://www.kaggle.com/uciml/student-alcohol-consumption>.