

Influence of Background Music on Study Performance



TU Wien

Introduction

- Research Question: Does genre of background music affect study performance?
- - Hypothesis: Instrumental music improves focus and performance.
- - Motivation: Students often listen to music while studying.

Conclusion & Recommendations

- - Instrumental music aids studying
- - Avoid lyrical music for focus tasks
- - Suggest controlled experiments in future studies

Survey Design

- - Online survey with 3 key questions:
 - 1. Type of music used
 - 2. Self-rated focus (1–10)
 - 3. Task completion time
- - Demographics: Gender, Age, Education Level
- - Tools: R, dplyr, ggplot2, broom

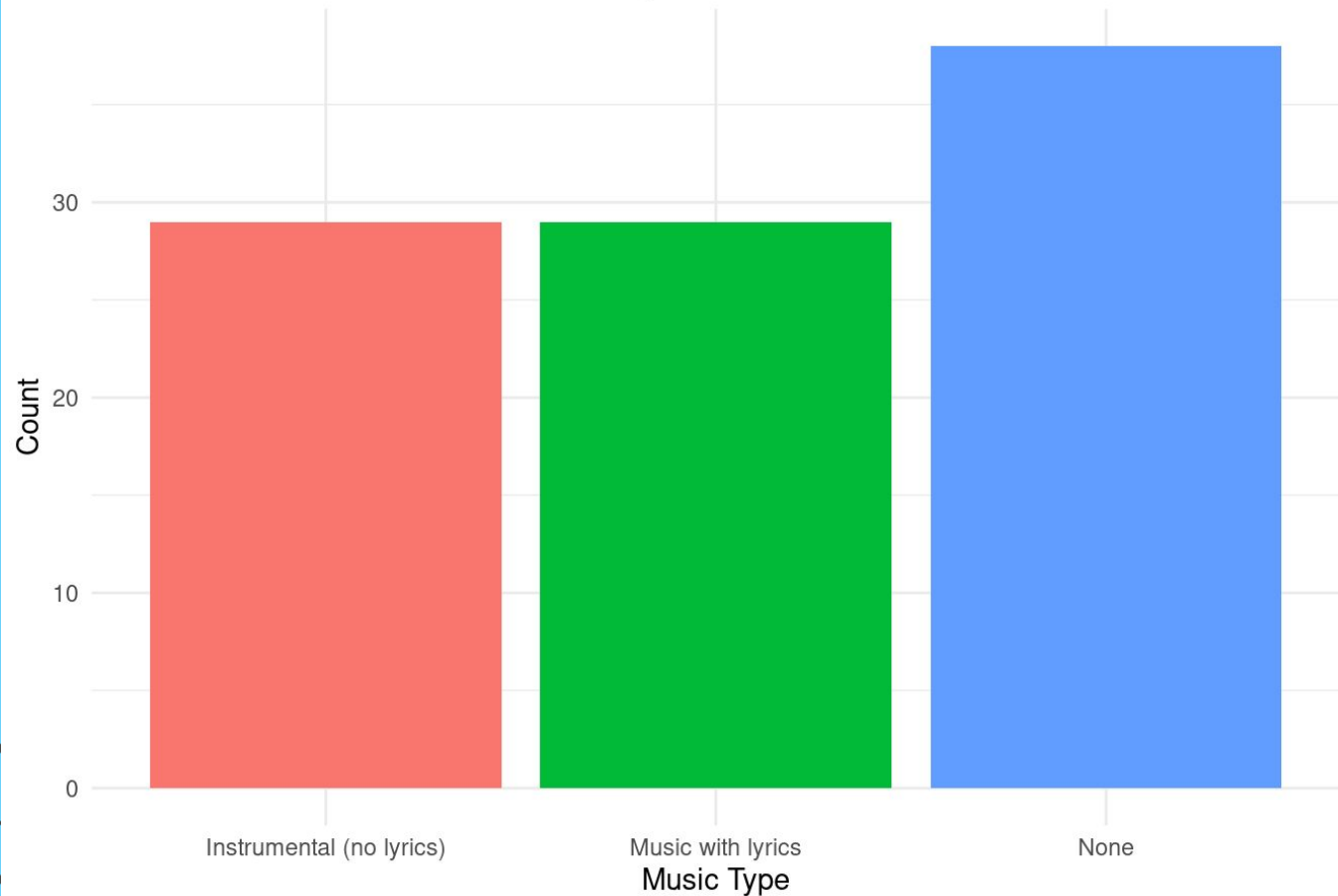
Data Cleaning

- - Removed rows with missing MusicType
- - Excluded unrealistic times (> 6 hrs, e.g., 999999999)
- - Converted ranges (e.g., '10–15') to numeric values

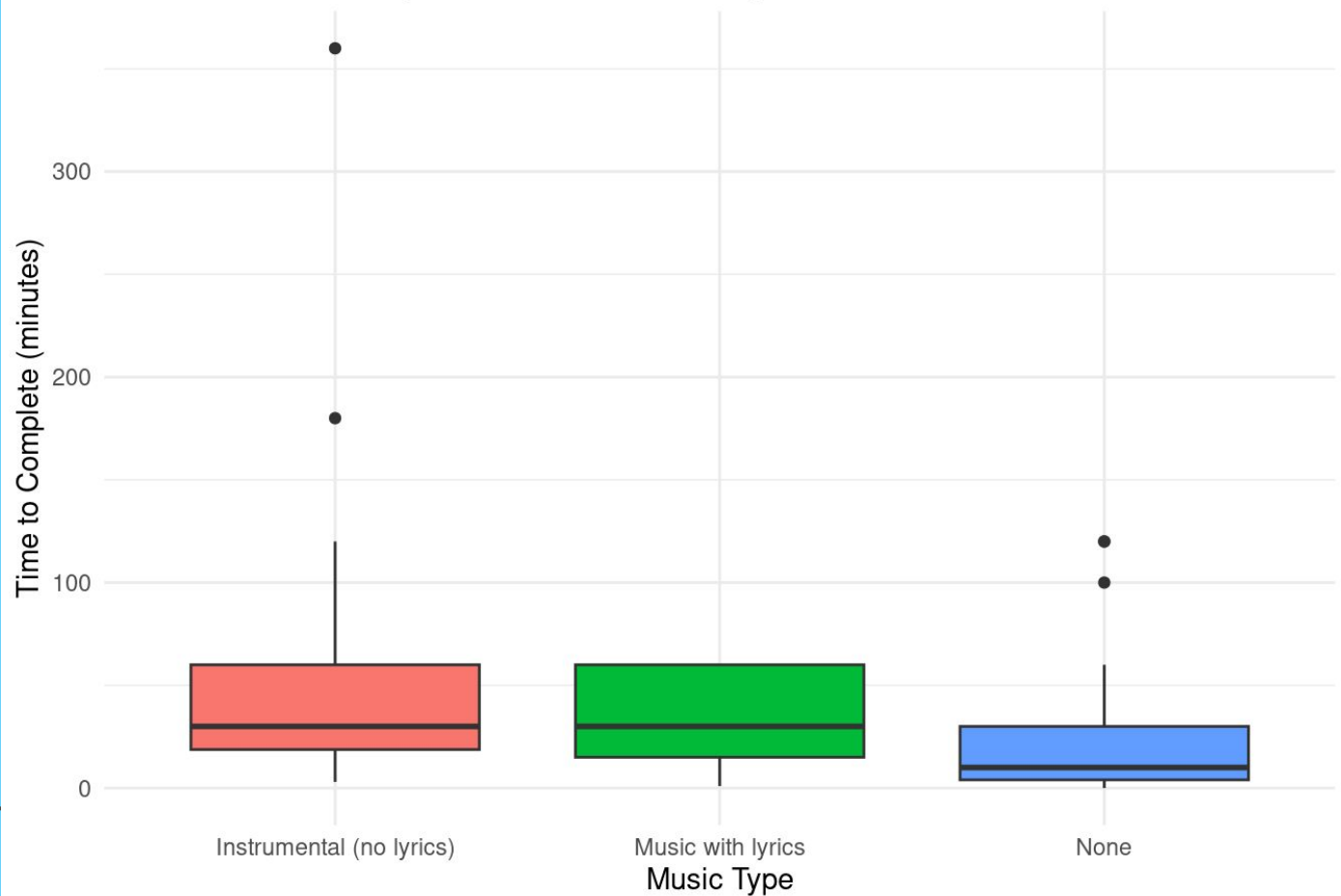
Exploratory Data Analysis

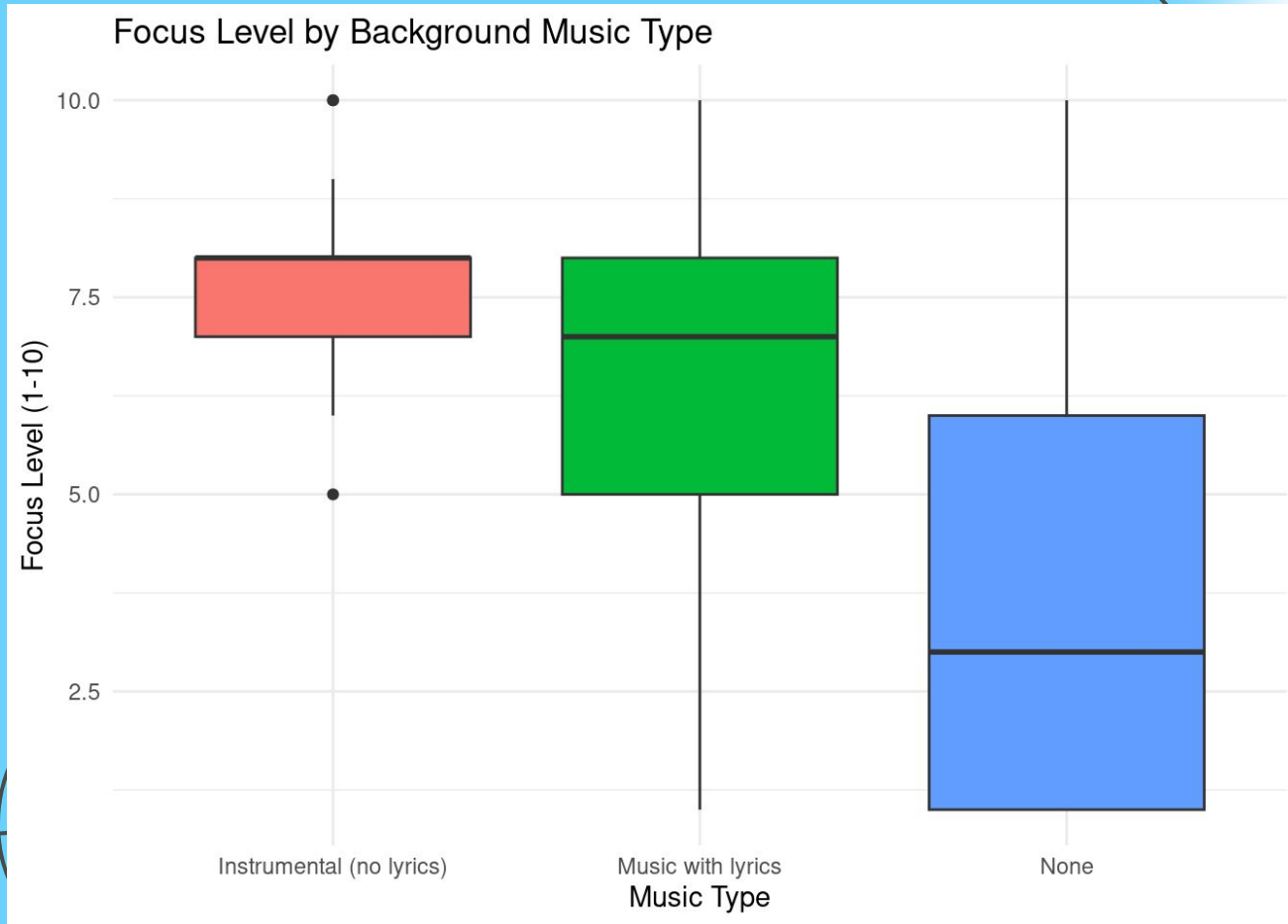
- - Plots: Music type distribution, Focus & Time boxplots
- - Insights:
 - - Instrumental music => higher focus
 - - No music => Lower task time

Distribution of Background Music Types

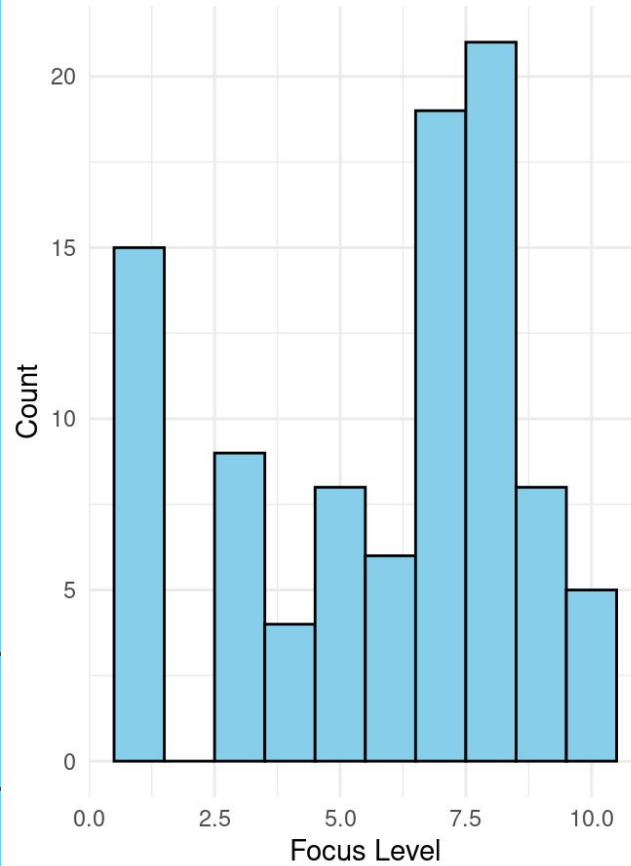


Completion Time by Background Music Type

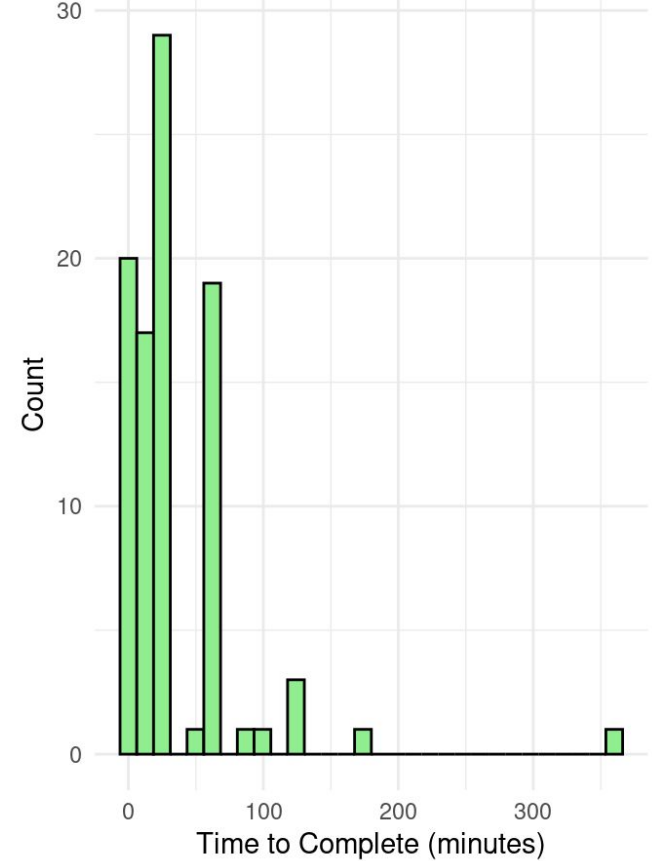




Distribution of Focus Level



Distribution of Time to Complete



Descriptive Statistics

- - Instrumental: Higher mean focus, lower mean time
- - Silence: Longer average completion time

MusicType	N	Mean_Focus	SD_Focus	Median_Focus	IQR_Focus	Mean_Time	SD_Time
Instrument	29	7.79	1.15	8	1	52.6	71.2
Music	29	6.72	2.15	7	3	33.1	21.6
None	38	3.68	2.69	3	5	24.2	32.9

Assumption Checks

- - Normality checked via QQ plot
- - Levene's Test: $p > 0.05 \Rightarrow$ Equal variances assumed

ANOVA Test

- - Compared task time across music types
- - Result: Significant difference ($p < 0.05$)

Kruskal-Wallis Test

Kruskal-Wallis Test:

Significant difference in completion time across music types

($\chi^2 = 11.54$, $df = 2$, $p = 0.0031$)

Post-Hoc (Dunn's Test, Bonferroni):

- None vs. Instrumental: $p = 0.0046$
- None vs. Lyrics: $p = 0.0372$
- Instrumental vs. Lyrics: $p = 1.0000$

Conclusion:

Studying in silence led to significantly slower task completion than with music.

No significant difference between instrumental and lyrical music.

Kruskal-Wallis Test

Significant difference in focus level across music types
($\chi^2 = 36.405$, $df = 2$, $p = 1.244e-08$)

Post-Hoc (Dunn's Test, Bonferroni):

None vs. Instrumental: $p = 2e-08$

None vs. Lyrics: $p = 0.00015$

Instrumental vs. Lyrics: $p = 0.29991$

Conclusion:

Studying with music (instrumental or lyrical) led to significantly lower focus levels compared to silence.

Summary Statistics: Mean/Median FocusLevel higher with "Instrumental" (7.79/8) and "Music with lyrics" (6.72/7) vs. "None" (3.68/3), aligning with boxplot showing higher median focus with instrumental music.

Kruskal-Wallis Test: Significant difference in FocusLevel ($\chi^2 = 36.405$, $df = 2$, $p = 1.244e-08$).

Dunn's Post-Hoc Test: None vs. Instrumental ($p = 2e-08$), None vs. Lyrics ($p = 0.00015$), Instrumental vs. Lyrics ($p = 0.29991$); indicates lower focus with music.

Explanation: Higher means may reflect skewed distributions/outliers; rank-based tests show lower focus with music vs. None.

Conclusion: Music presence lowers focus significantly compared to silence, with no difference between instrumental and lyrical music.

Conclusion

- music has a negative effect on both focus and task time
- According to statistical analysis the hypothesis is not true and student can focus and do their task better in silence