

# Comprehensive Analysis Report

## Introduction

This report delves into two interconnected datasets: an exam schedule spanning multiple semesters and Spotify streaming data. The purpose of the analysis is twofold: first, to uncover patterns within each dataset, and second, to explore potential relationships between academic stress—as reflected by exam schedules—and music listening habits. By combining visualizations and statistical analyses, this report offers a comprehensive understanding of how temporal and contextual factors influence behavior.

Examinations are pivotal events in academic settings, shaping students' routines and stress levels. The exam schedule dataset provides insights into how these assessments are distributed across semesters, weeks, and days. This temporal distribution serves as a foundation for understanding periods of heightened academic activity.

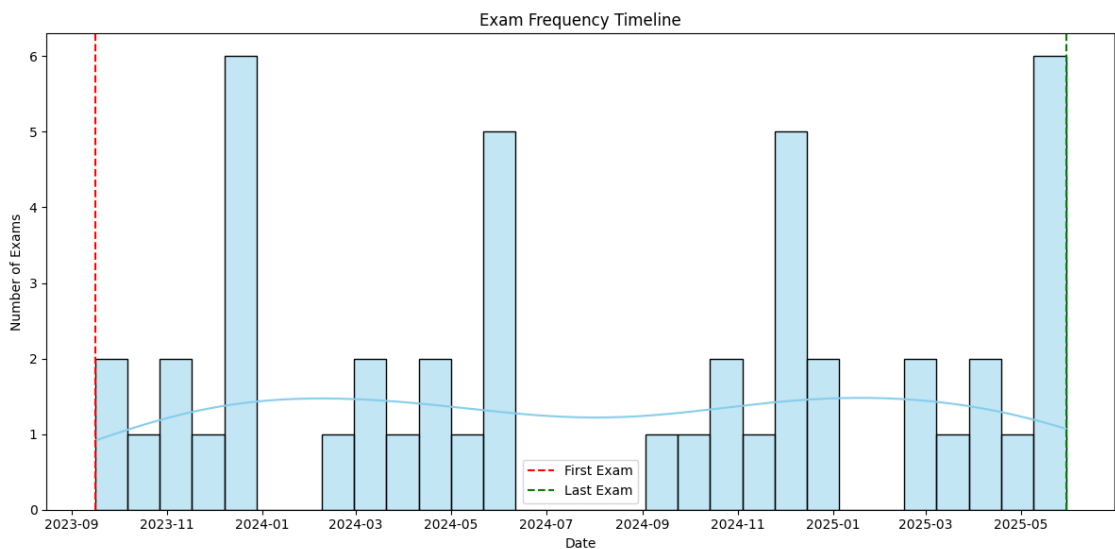
Simultaneously, music has long been recognized as a tool for emotional regulation and focus, making it a potentially significant factor during high-pressure periods such as exams. The Spotify dataset captures daily music listening habits over an overlapping timeframe, providing a lens through which to examine behavioral stability or changes during academic stress.

The analysis in this report is supported by multiple visualizations, including bar charts, heatmaps, and scatter plots, to present findings in an accessible and intuitive manner. The results are structured into sections detailing the exam schedule, Spotify data trends, and their interactions, culminating in actionable conclusions and insights.

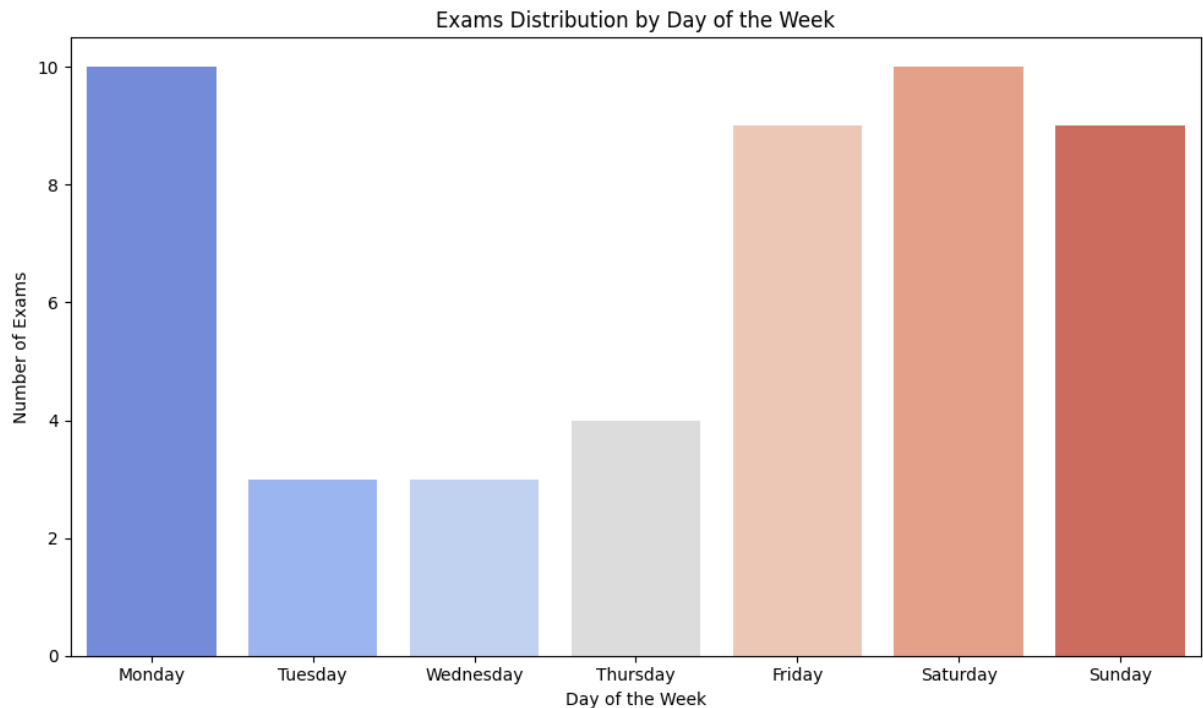
## Exam Schedule Data Analysis

The exam schedule dataset spans from September 16, 2023, to May 30, 2025, covering 622 days. During this period, examinations are distributed unevenly, with discernible peaks aligning with midterm and final evaluation periods.

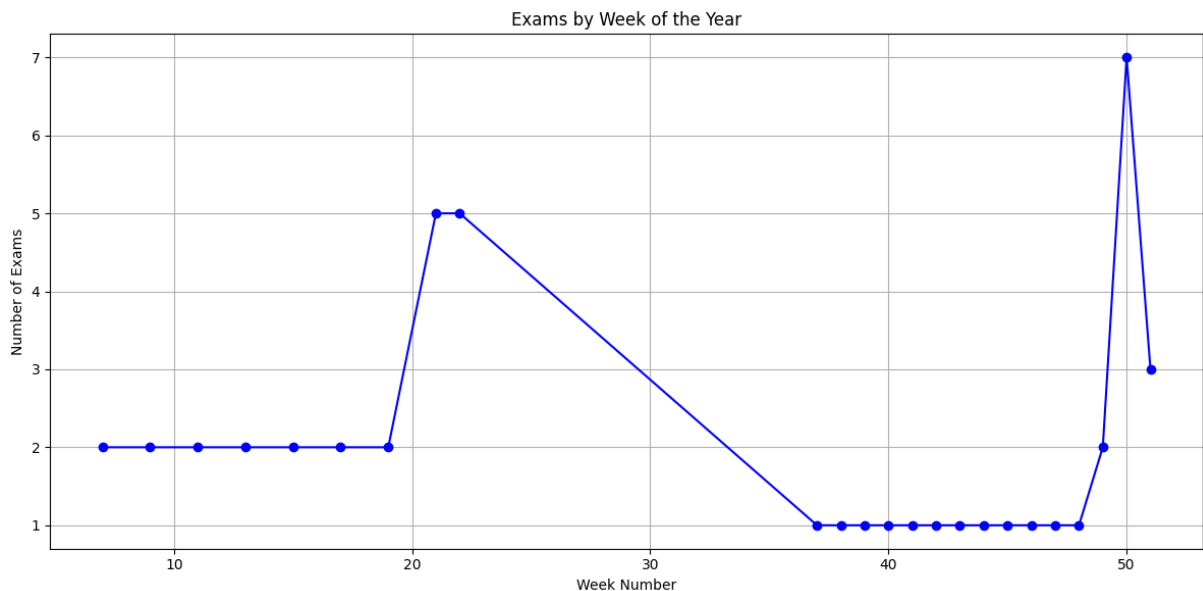
The **Exam Frequency Timeline** chart visualizes these trends, showing concentrated periods of exam activity in December and May. These months correspond to the end of fall and spring semesters, highlighting predictable cycles in academic planning.



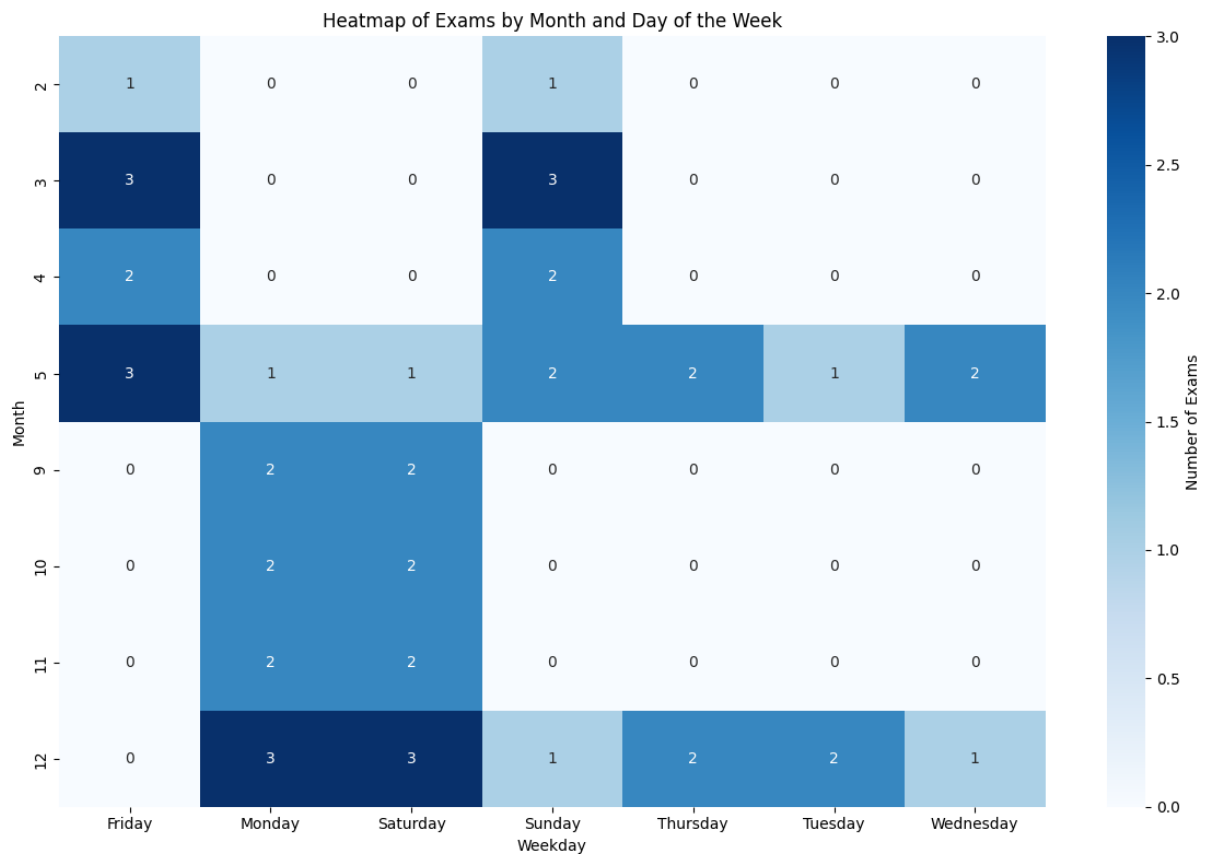
Further analysis of the **Exams Distribution by Day of the Week** chart reveals an institutional preference for Mondays and weekends. This uneven distribution may be driven by logistical considerations, such as class schedules and resource availability.



Exam timing is further dissected in the **Exams by Week of the Year** chart, which underscores the clustering of exams in specific weeks. These trends reflect academic policies aimed at standardizing evaluation periods across semesters.

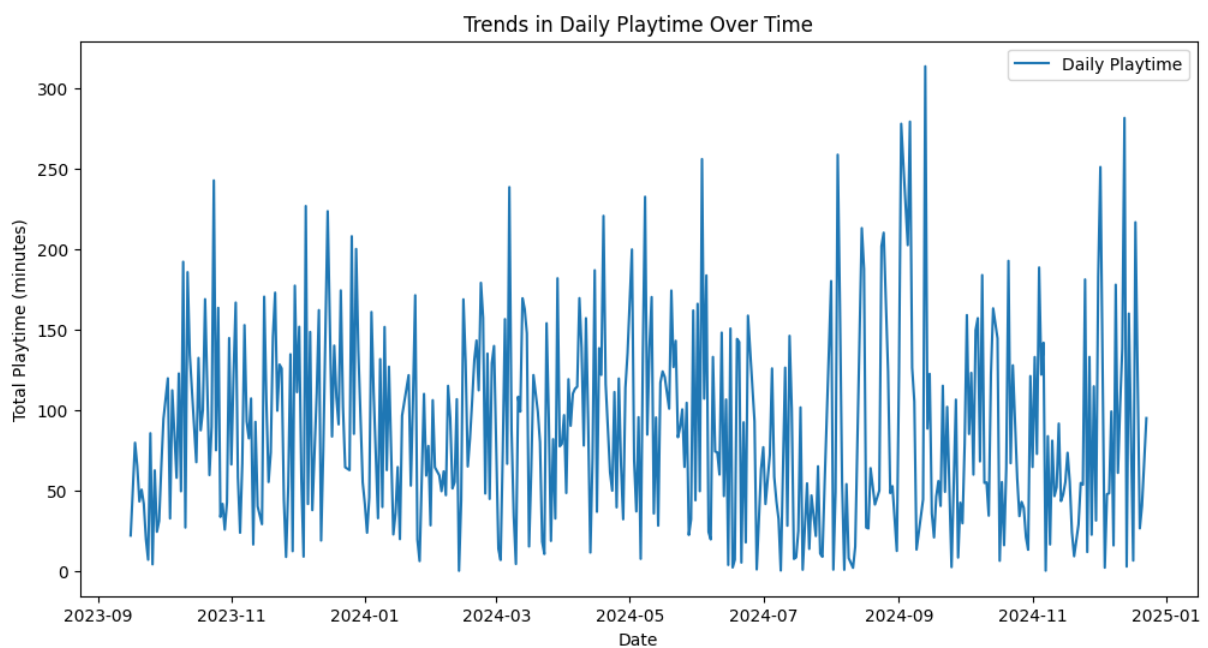


A heatmap analysis of exam timing across months and weekdays adds depth to these observations. The **Heatmap of Exams by Month and Day of the Week** reveals that certain days, such as Fridays in December, experience a higher density of exams.

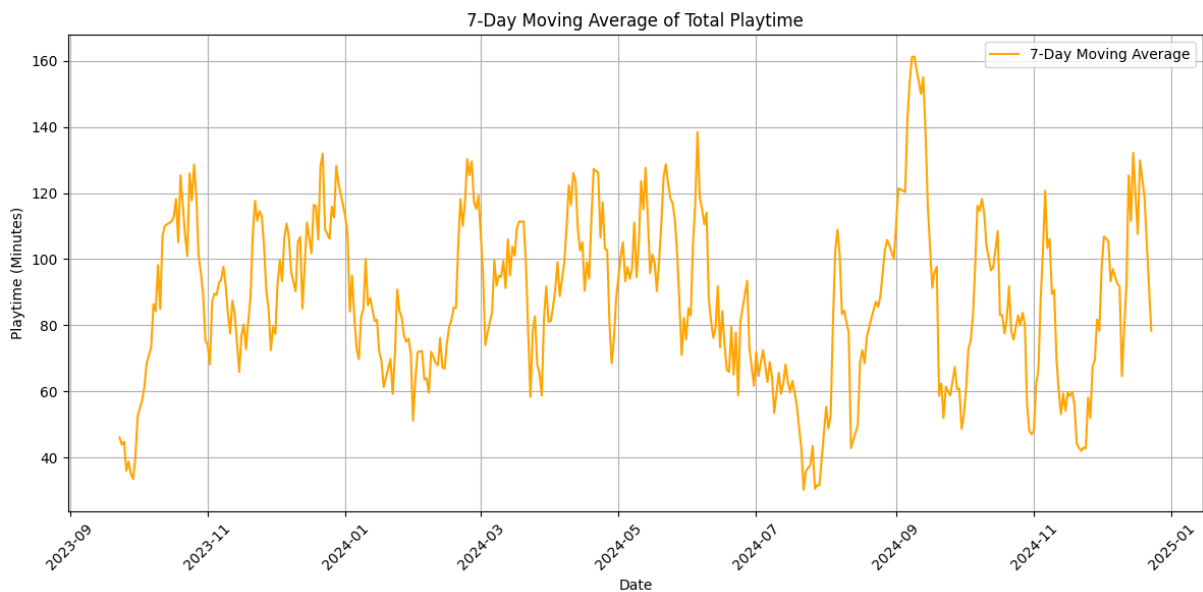


## Spotify Data Analysis

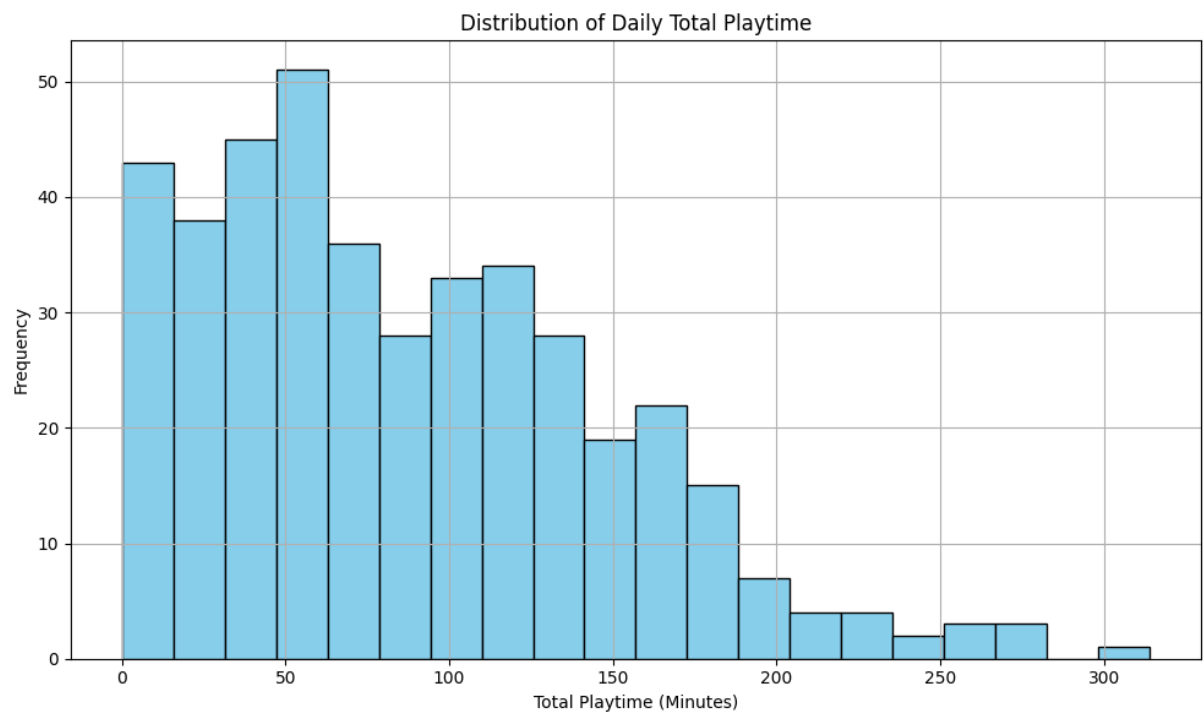
The Spotify dataset offers a detailed view of daily music listening habits, with data points capturing total playtime, average listening duration, and engagement trends. Despite minor fluctuations, daily total playtime exhibits remarkable consistency, as visualized in the **Trends in Daily Playtime Over Time** chart. This stability suggests that music listening is a deeply ingrained routine, unaffected by external pressures.



To smooth short-term variations, a 7-day moving average is applied, revealing broader trends in engagement. The **7-Day Moving Average of Total Playtime** chart highlights periods of sustained listening activity, offering insights into how habits evolve over time.



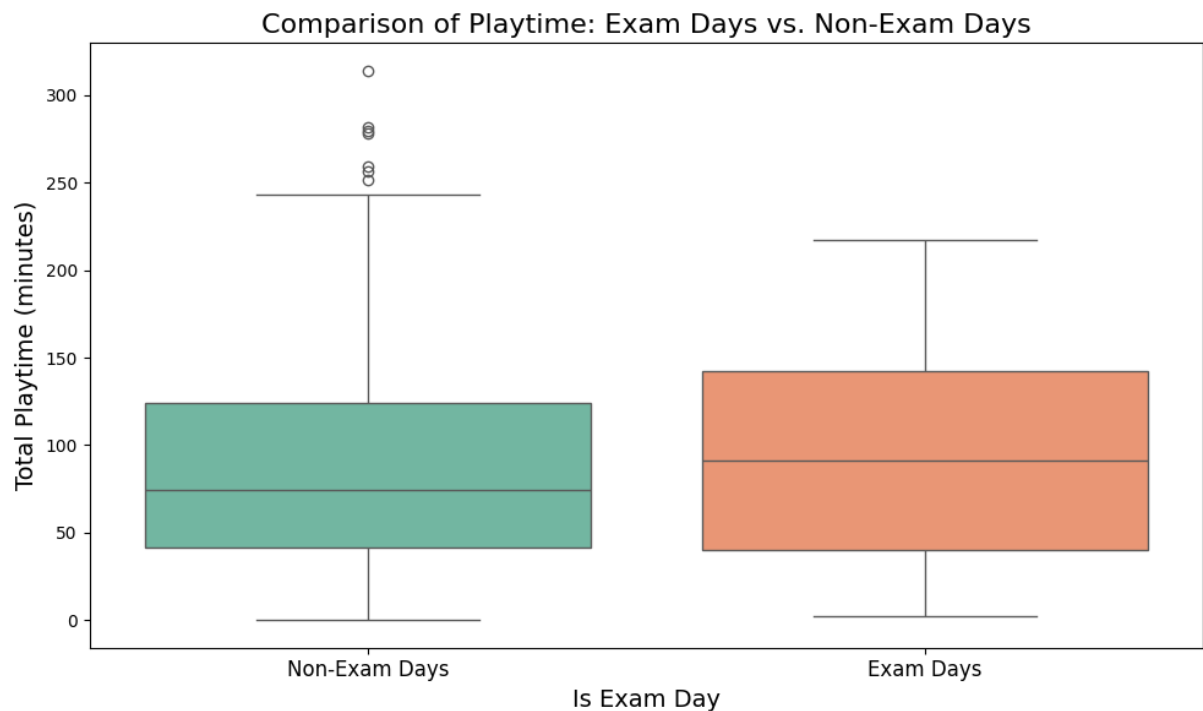
Further examination of the distribution of daily total playtime reveals variability among users. The **Distribution of Daily Total Playtime** histogram shows that while most users exhibit moderate listening habits, there is a subset of heavy listeners.



**Exam Day vs. Non-Exam Day Analysis**

To assess the impact of exams on listening behavior, playtime is compared between exam days and non-exam days. The **Comparison of Playtime: Exam Days vs. Non-Exam Days** boxplot illustrates that

there are no substantial differences in total playtime. This finding is corroborated by statistical tests, including t-tests and chi-square tests, which confirm the absence of significant variations.



### T-Test Analysis and Interpretation

The t-test was conducted to determine whether there is a statistically significant difference in average playtime between exam days and non-exam days.

#### Results

- **T-Statistic:** 0.6792
- **P-Value:** 0.4974
- **Conclusion:** Since the p-value (0.4974) is greater than the standard significance level of 0.05, we fail to reject the null hypothesis. This indicates that there is no statistically significant difference in the mean playtime between exam days and non-exam days.

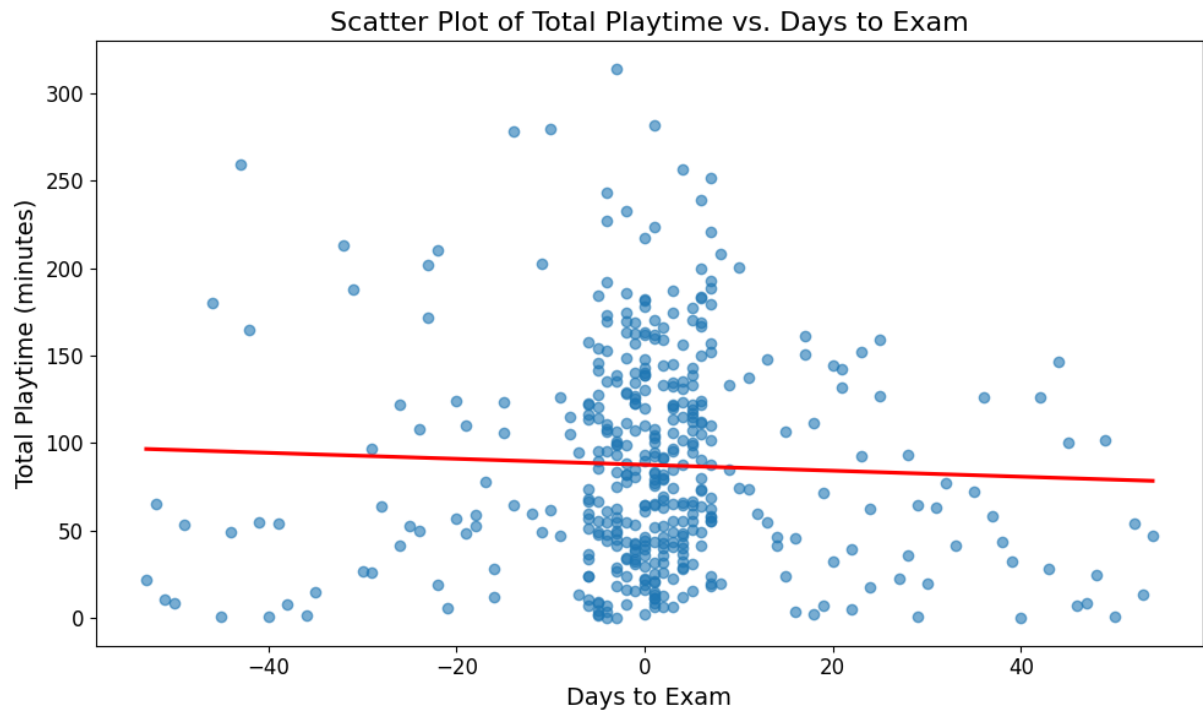
### Chi-Square Test Analysis and Interpretation

The Chi-Square test was conducted to assess whether there is a statistically significant association between exam days and playtime categories ("High" or "Low").

#### Results

- **Chi-Square Statistic:** 0.0359
- **P-Value:** 0.8497
- **Degrees of Freedom:** 1
- **Conclusion:** Since the p-value (0.8497) is much greater than the standard significance level of 0.05, we fail to reject the null hypothesis. This indicates that there is no significant association between exam days and whether the playtime falls into the "High" or "Low" category.

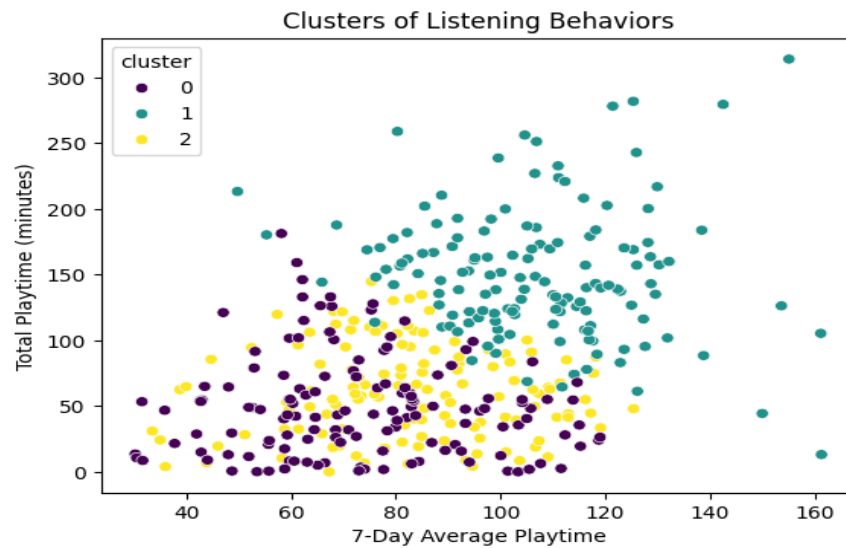
A scatter plot further explores the relationship between exam proximity and total playtime. The **Scatter Plot of Total Playtime vs. Days to Exam** demonstrates a weak negative correlation, indicating that exam proximity has minimal impact on listening habits.



Cluster analysis provides additional context, grouping users into categories based on their listening behaviors. The **Clusters of Listening Behaviors** chart reveals three distinct groups: low, moderate, and high engagement listeners. This segmentation offers insights into how different user profiles interact with music during exam periods.

## Results

- **Correlation Coefficient:** -0.0444
- **P-Value:** 0.3664
- **Conclusion:** Since the p-value (0.3664) is greater than the standard significance level of 0.05, we fail to reject the null hypothesis. This indicates that there is no statistically significant correlation between exam days and total playtime.



## Conclusion

The analysis reveals that while exam schedules introduce predictable patterns in academic activity, their influence on music listening habits is minimal. Spotify data demonstrates remarkable stability in daily playtime, underscoring music's role as a consistent component of users' routines, even during periods of heightened academic stress.

This report highlights the value of integrating behavioral data with contextual factors to gain a holistic understanding of human habits. Future research could explore specific genres or emotional responses to music during exam periods, offering deeper insights into the psychological interplay between stress and entertainment.