The Modulatory Effects of Music Genre and Exposure Duration on Cognitive Focus

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Literature Review

- Meta-analyses and reviews suggest that the "**Mozart effect**"—a temporary boost in spatial-reasoning ability after listening to Mozart's Sonata K. 448 for about ten minutes—is short-lived and **likely driven by momentary increases in mood and arousal**, rather than any lasting improvement in intelligence (Jenkins; Cheah et al. 33).
- Laboratory studies show that musical tempo and individual listener characteristics jointly influence cognitive performance: **fast-tempo music generally increases processing speed, while slow-tempo music reduces it** (Lin et al. 9). In young adults with ADHD, personally preferred background music can improve focus, though **overly arousing or complex tracks may still impair accuracy** (Lachance et al. 12).
- Complementary meta-analytic **data on older adults reveal that upbeat, happy-sounding music reliably lifts working memory** and mood, suggesting that **age-tailored musical environments can optimize cognitive focus** across the lifespan (Sella et al. 209).

Research Question

As individuals increasingly turn to music to enhance concentration, manage mood, or promote relaxation, its influence on attention and stress has become a key area of interest. This is especially relevant for students and working professionals who often listen to music during tasks requiring sustained mental focus.

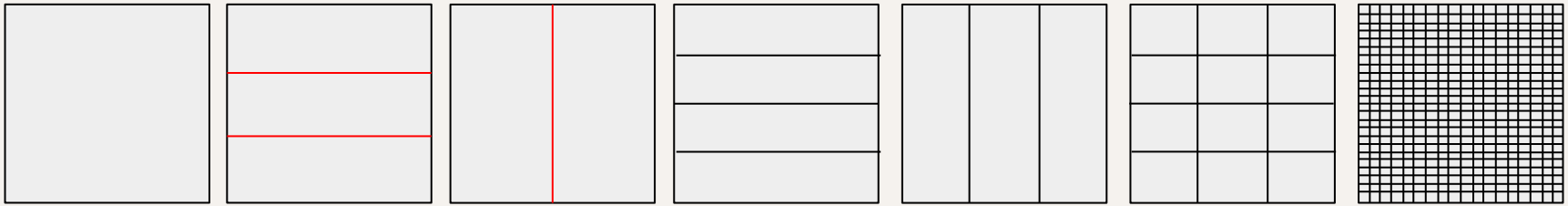
Our research question is as follows:

What are the main and interactive effects of music genre (classical, country, dance, heavy metal) and listening duration (10, 20, 30 minutes) on attention?

Design

We employed a two-factor ANOVA design with blocking to control for potential confounding variables related to age and gender.

- Response Variable: Change in the number of misses on an attention test (post-music listening minus pre-music listening)
- Factor 1: Type of Music (Classical, Country, Dance, Heavy Metal)
- Factor 2: Listening Duration (10 minutes, 20 minutes, 30 minutes)
- Blocking Variable 1: Age Group (18–30, 31–44, 45 and above)
- Blocking Variable 2: Gender (Male, Female)
- Interaction of Interest: Music Type × Listening Duration (resulting in 12 treatment groups)



Benchmark
df = 1

Block (Age)
df = 2

Block (Gender)
df = 1

Music Type
df = 3

Listening Duration
df = 2

Interaction
df = 6

Errors
df = 201

Sampling Methods

We employed a multistage sampling approach consisting of three stages:

- Stage 1: Randomly select an island (Ironbard) and a town within that island (Hofn).
- Stage 2: Randomly select a household within the chosen town.
- Stage 3: Randomly select one individual from the selected household, stratified by age group and gender.

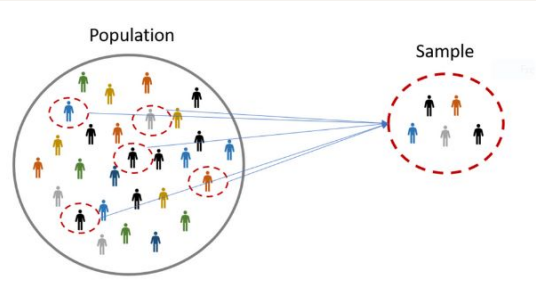
This process was repeated until we reached a total of 216 participants.

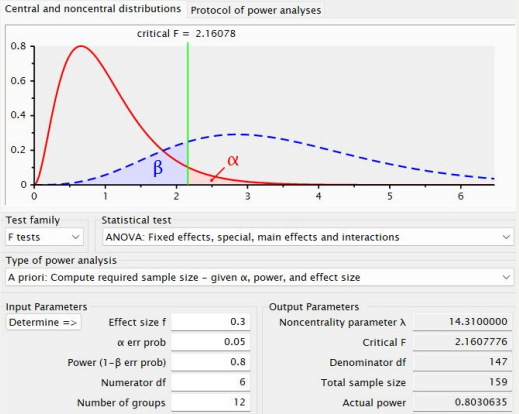
Sample Size Determination

To ensure sufficient statistical power, we used the following parameters in G-Power:

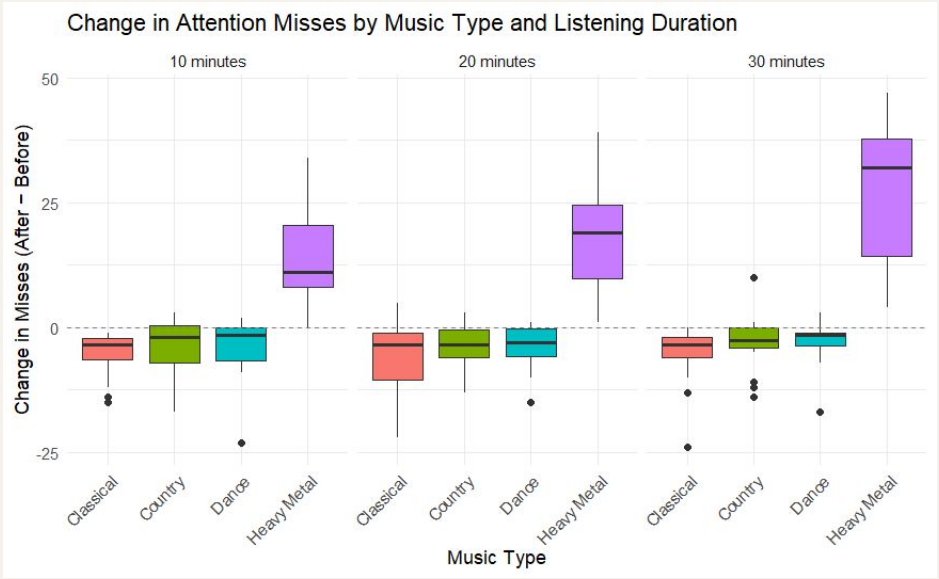
- Power: 80%
- Alpha: 0.05
- Effect Size: 0.3

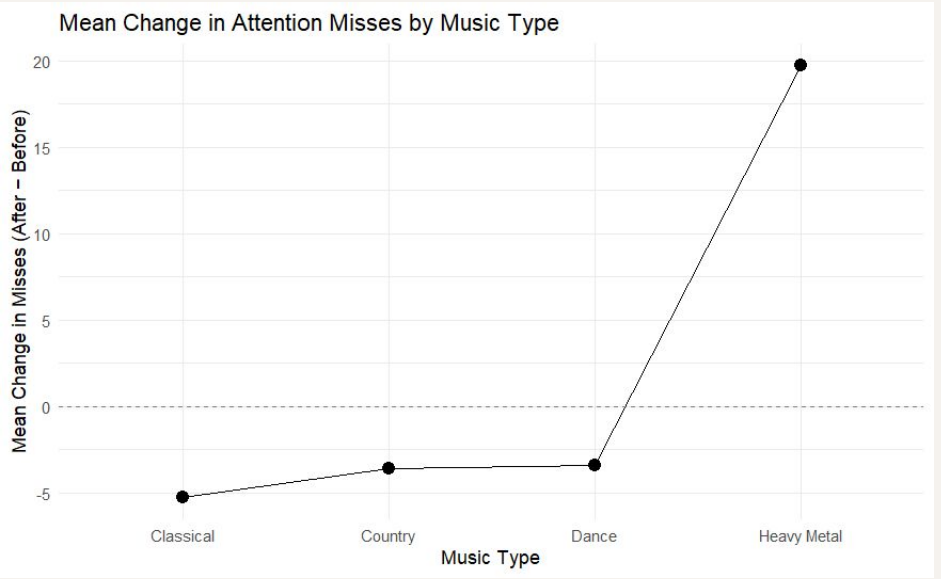
G-Power estimated a required sample size of 159 participants.



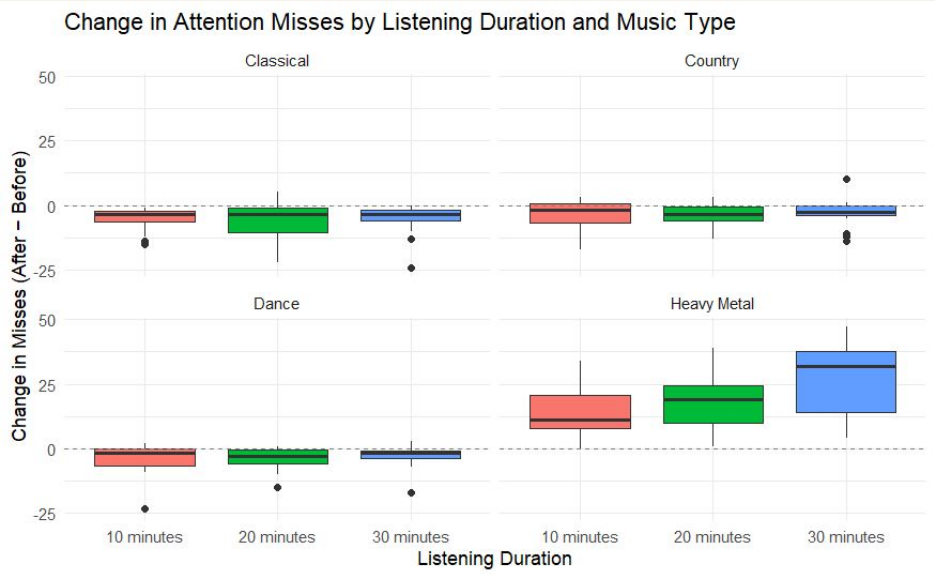


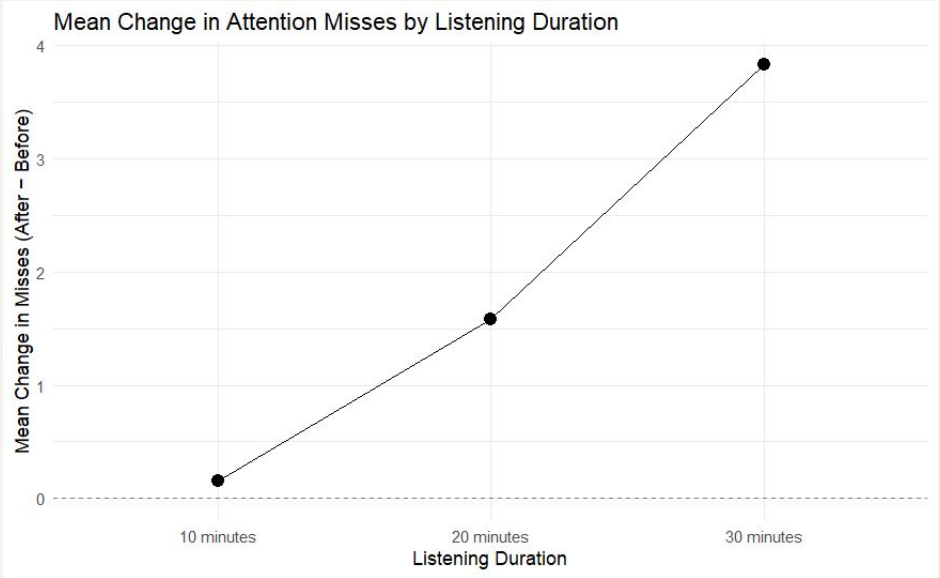
Comparison Between Music Types



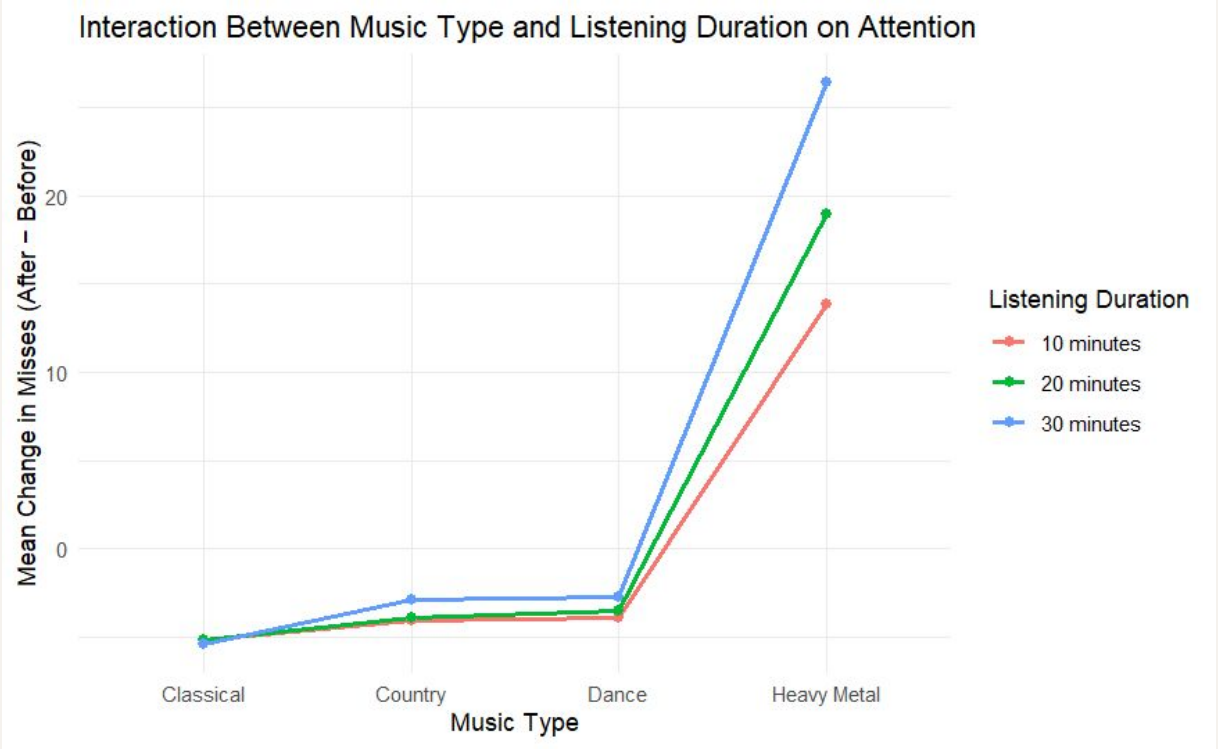


Comparison Between Listening Durations





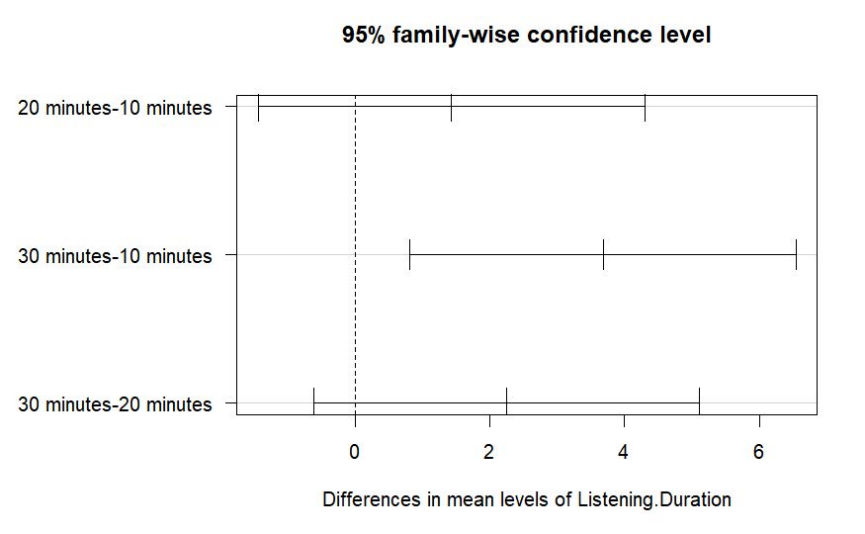
Interaction Plot

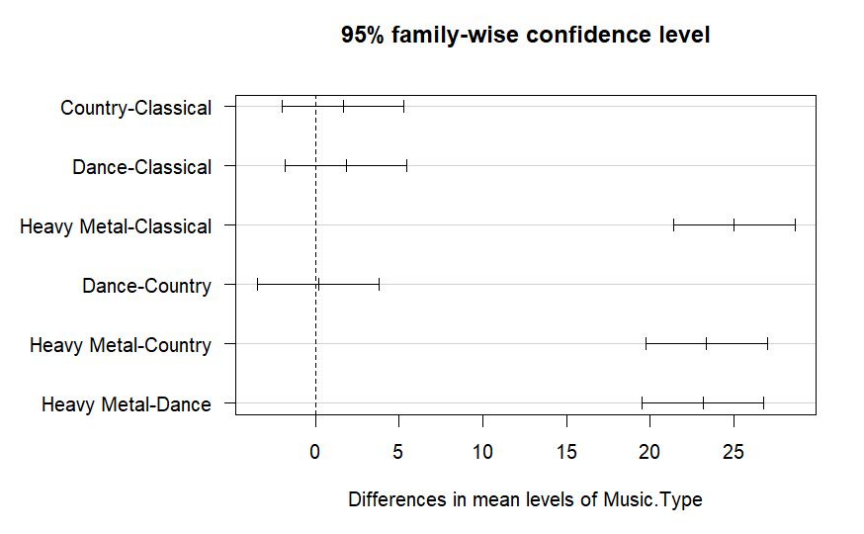


ANOVA Results

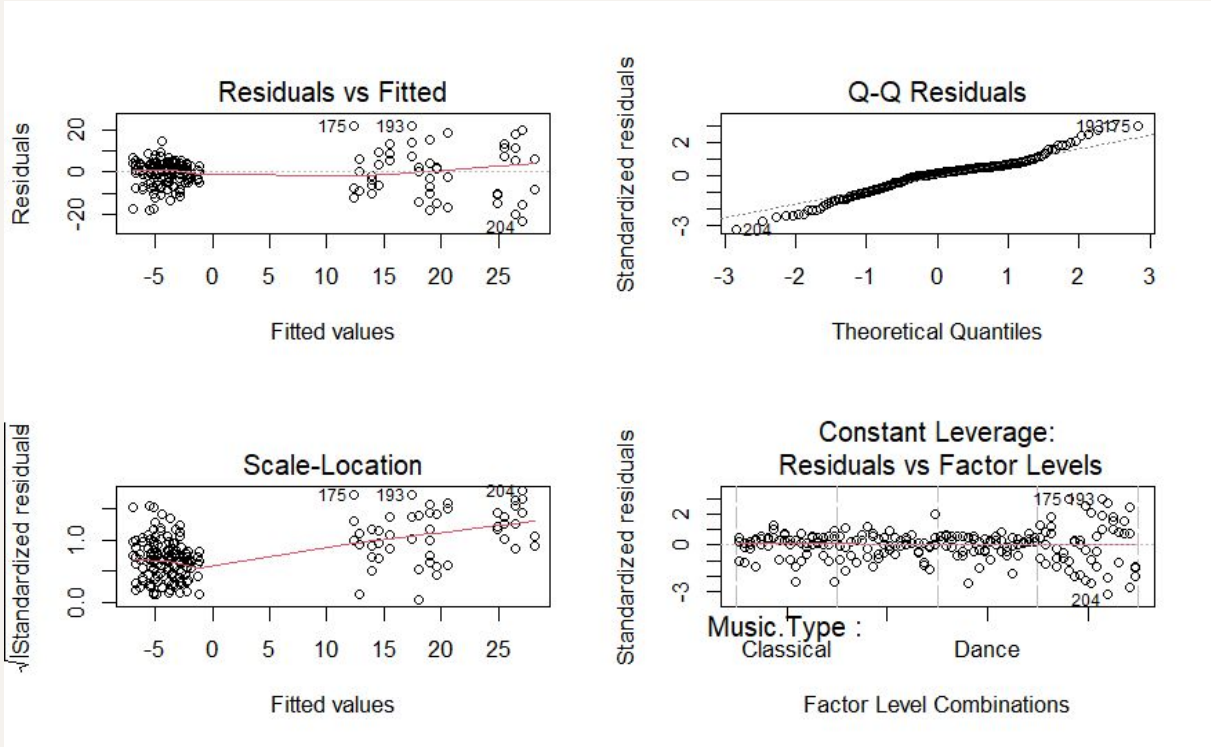
	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Music.Type	3	23141.31	7713.77	137.28	0.000
Listening.Duration	2	495.73	247.87	4.41	0.013
Age.Group	2	93.79	46.89	0.83	0.436
Gender	1	138.56	138.56	2.47	0.118
Music.Type:Listening.Duration	6	980.56	163.43	2.91	0.010
Residuals	201	11294.60	56.19	NA	NA

Tukey HSD


95% family-wise confidence level
20 minutes-10 minutes
30 minutes-10 minutes
30 minutes-20 minutes
0
2
4
6
Differences in mean levels of Listening.Duration


95% family-wise confidence level
Country-Classical
Dance-Classical
Heavy Metal-Classical
Dance-Country
Heavy Metal-Country
Heavy Metal-Dance
0
5
10
15
20
25
Differences in mean levels of Music.Type

Residual Plots & Model Assumptions



Conclusions

Assuming a significance level of $\alpha = 0.05$, we find that **Music Type** ($p < 2.06e\text{-}48$), **Listening Duration** ($p = 1.33e\text{-}02$), and their **interaction** (Music Type × Listening Duration, $p = 9.66e\text{-}03$) have statistically significant effects on changes in attention, as measured by the number of missed responses. This indicates that both the genre of music and the duration for which it is played independently, as well as jointly, influence attentional performance.

In particular, **classical, country, and dance music were associated with reduced attention misses**, suggesting improved focus, whereas **heavy metal was linked to an increase in misses**, indicating diminished attention. These findings suggest that careful selection of both music genre and listening time may enhance focus in environments such as academic study or professional work.

Future Research Questions

- How does the timing of music exposure (during vs. before a task) influence its effect on attention levels?
- Does an individual's personal preference for a music genre amplify or reduce its impact on attention?
- Can certain music genres be used therapeutically to support individuals with ADHD or other attention-related disorders?
- Are the observed effects of music on attention consistent over time, or do they diminish with repeated exposure?

References

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Thank You!