

# The Impact of Music on Student Concentration: Exploring Genre and Productivity

By Audrey Wang

## Author Biography

Audrey Wang is a senior in Fulton Science Academy in Georgia. She is interested in developmental psychology as a future major as well as conducting more projects in these fields in the future.

## Abstract

Concentration is one of the most important factors in determining a person's efficiency and work ethic. There has not been much study done on the manipulation of concentration to determine its direct effects on efficiency. Listening to music while studying has also become prominent in Generation Z. This paper strives to explore the correlation between listening to music and adolescents' concentration levels. A literature review was conducted using Google Scholar and a study was conducted on 25 high school students from the same school in Georgia. The Mozart effect and Arousal Mood hypothesis were explored within the literature review to help understand why music affects people. The results indicated that those with higher productivity tend to listen to music less. This negative finding as obtained from the study does not support the current trend of listening to music while studying. This study enriches the research on music and sparks necessary future investigations on specifics such as genre. These specifics would deepen our understanding which could make music an even more powerful tool.

*Keywords: Music, Concentration, Mozart effect, arousal mood hypothesis, Attention, study habits, learning, cognitive performance*

## Introduction

Music is a universal language that connects people from all backgrounds. As both a source of entertainment and a tool for treatment, it has played a core role in our world. Music can activate the hippocampus which functions in the generation of attachment-related emotions giving music the ability to support social attachment. (Koelsch, 2014) It also encompasses different genres, each contributing a unique role in music. Every unique genre has a different structure and characteristic that appeals to various audiences, leading to other effects. It is debated whether music positively or negatively affects high school and college students' concentration and attention span. As "listening to music can make studying more enjoyable, psychologists from the Department of Psychological & Brain Sciences have found that this popular study habit is more distracting than beneficial." (Mercer, 2021) Throughout this conducted survey, the relationship between music and concentration is explored, given the high prevalence of music listening among students. Researching and assessing this relationship is critical to improving student concentration and their skills for the future. Additionally, the study aims to identify potential benefits or drawbacks of listening to music, acknowledging that the impact on concentration can vary greatly among individuals due to various factors, particularly different cultural backgrounds, which lead to genre differences. Because much of the evidence from other research papers and this study is inconclusive, further research should be conducted on this topic in the future.

## Literature Review

Concentration is an important skill needed for students to be successful in school. (Fassbender, 2021). Concentration not only aids in the memorization of complicated concepts in the short and long term, but it also reduces distractions and enhances the depth at which students process information. Additionally, it improves students' time management skills which are not only needed for high school and college but also in the workplace and beyond. Improved time management skills lead to less procrastination which also reduces stress levels of students, something of high prevalence in this generation. (DiTullio, 2021) Exceptional performance in these skills directly

correlates to higher grades and important lifelong skill development. (Stehle, 2019)

According to Business of Apps, music streaming apps generated \$47.7 billion in revenue in 2023, a 10.1% increase from the year prior. With an increased usage of electronic devices among teenagers and the availability of streaming services such as Spotify and Apple Music, listening to music is a lot more accessible for students. The increasing advancements in listening devices, such as AirPods and Bluetooth headphones have added to this availability as well. As more people listen to music, the social standards of listening to music have become more popular, leading to more conformity to listening to music. While 39% of respondents aged 77 and older reported they listen to music while studying, 58% of Gen Z reported they listen to music while studying. This 19% percent increase is significant as many more people listen to music when working in today's generation. (Steinberg, 2022). Due to these advances in music technology and the popularity of listening to music, learning with background music has received more and more attention over the last decade. Therefore, the relationship between listening to music and high school and college students' academic concentration is worth studying to further understand its correlation and can potentially aid in more helpful and effective ways for students to study. In the current study, we want to bridge the research gap in finding the effects of listening to music on high school and college students' academic concentration.

Various studies from the past suggest both positive and negative effects of music on concentration. Studies also explored the effects of different genres and the value of listening to different genres. Different theories that involve music and concentration were also introduced, such as the Mozart effect, the arousal-mood hypothesis, and the cognitive load theory.

## Previous Studies on Music and Concentration

### Positive Effects of Music on Concentration

Mori, F, et al. (2014) conducted a study to investigate the impact of music on concentration levels. They compared the effects of silence, music

that the subject liked, and unfamiliar music on the performance of 12 undergraduates. The results revealed that the fewest mistakes were made when subjects listened to music they liked, indicating that preferred music positively influenced concentration more than silence or unfamiliar music. The temporal changes in performance were also measured in this study. Graphs demonstrated the relationship between trial ID and time it took for subjects to complete that trial. The trend demonstrated illustrated changes in performance level in which the temporal change under the situation that the subject liked the music was roughly constant while it increased in both silent and unfamiliar conditions (Mori, 2014). A greater change in temporal change demonstrated worsening performance in the tests. The study results demonstrate a crucial positive interaction between music concentration and performance. (Fassbender, 2021)

Additionally, Kumar et al., (2016) conducted a cross-sectional study to examine the effect of listening to music on the concentration and performance of students. The findings showed a positive relationship between listening to background music and test scores; Background music reduces levels of stress “as evidenced by significantly higher scores in the overall examination under the influence of background music.” The effect of background music has proven to be effective in reducing the number of teacher prompts needed for academically weak students in the curricular activities. The study was split into survey and experimental parts. In the questionnaire study, 96% of the 200 student participants agreed that music helps them concentrate compared to the 4% of students who did not agree with it. This significant gap is important to understanding the relationship between the amount of people who listen to music and their beliefs that it helps them concentrate. It’s worth noting that the leading type of music preferred to listen to while studying was pop, with 82% of subjects reporting it as their main genre while instrumental was followed by 70% of subjects. According to the experimental study, the score of correct answers on tests was highest when soft music was played during the test. However, the group of students who did not listen to music was asked for the reason not preferred to which 97.5% of them responded that listening to music while studying would distract their concentration. (Kumar, 2016)

Diving deeper into genres,

electroencephalogram (EEG) sensor data were used to determine that engineered soundscapes were found to be the best at increasing participant’s focus levels. Classical music was the best model for high focus while hip-hop and pop produced lower focus scores. (Haruvi, 2022)

### **Negative Effects of Music on Concentration**

According to Tze., et al (2010), the performance of a cognitive task can be affected by the type of background music. In a one-way factorial ANOVA study, hip hop had a significant effect on reading performance compared to the control group of no music. These findings were similar to those of Haruvi (Haruvi, 2022). Surprisingly, the classical music group performed worse than the control group. The attention drainage effect is also introduced which is when “a distraction causes the attention capacity of a person to be unconsciously reduced or ‘drained’ while they are performing a single cognitive task.” (Tze, 2010) Knowing this, it is deduced that because hip hop has stronger sounds and faster tempos, it has a higher intensity which drains a lot more attention from the participants of the study. Because classical music lacks that high intensity but still has catchy melodies that could reel the listeners’ attention, the mean score of this group was still lower than the control group but higher than the group listening to hip hop.

### **Mixed Findings and Varying Results**

Other studies have shown that the use of popular background music does not affect test scores. Findings found that there were no significant differences between the groups that took the test while listening to music in the background and the group that took the test without music. According to Janina Lehmann and Tina Seufert, they did not find a mediation effect between background music and arousal or mood on learning outcomes (Lehmann, 2017). However, they did find a direct relationship between background music and working memory (He, 2017). This finding, while not specific to concentration, has led to a trend of positive effects of listening to music on different aspects of a student’s habits to studying from concentration to performance to memory capacity.

## Theories on Music and Cognitive Performance

Different theoretical perspectives give good insight into why background music can positively influence learning and cognitive abilities.

### Mozart Effect

The most well-known theory is known as the Mozart effect which is when listening to Mozart's sonata K448 produces a small increase in spatial-temporal performance. (Jenkins, 2001.) This effect was drawn from a study in which some participants listened to a Mozart Sonata while others did not. Afterward, they completed a task that measured spatial abilities, and it was found that listening to Mozart's sonatas had a direct positive influence on spatial abilities (Eerola, 2017). Music does make the brain more active and specifically targets the temporal, prefrontal cortex, and parietal areas of our brains. Brain areas that are concerned with spatial reasoning include the prefrontal and temporal regions which explain the correlation between Mozart's sonatas and our spatial abilities. (Jernigan, 2021) More specifically, positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) have illustrated rhythm and pitch discrimination are processed mainly in the left hemisphere of the brain, while timbre and melody are processed in the right hemisphere. These specific findings suggest that listening to music primes the prefrontal, temporal, and precuneus regions, which are associated with spatial reasoning (Kumar, 2016). This neural activation indicates a complicated interaction between different brain regions when engaging with various musical elements.

### Arousal-Mood Hypothesis

While the Mozart effect was used to explain the direct relationship between listening to music and spatial abilities, the Arousal Mood Hypothesis was introduced to create an argument against this effect. It criticized that listening to music does not directly affect cognitive functioning but rather affects it indirectly, also known as the mediation effect; Individuals' emotional reactions play a critical role in determining the effects of music listening on cognitive function rather than direct improvement in cognitive functioning. The Arousal Mood Hypothesis expands

the idea that listening to music not only influences spatial abilities but also cognitive performance (Eerola, 2017). This idea heavily emphasizes that music listening represents only one stimulus influencing a subject's arousal level, which in turn leads to enhanced performance on cognitive abilities. It also introduces the concept of the positive valence of emotional reactions, which refers to the anticipated satisfaction of attaining a particular goal or outcome (APA, 2018). The Arousal Mood Hypothesis enhances cognitive functioning suggesting that certain background music could improve concentration and performance. The hypothesis states that any moderately arousing similar that induces positive moods could affect performance on various cognitive tasks. This is important since the hypothesis explains why some individuals benefit from listening to music and the benefits they receive from listening to music when studying, while others do not. This hypothesis also repels the Mozart effect in that the individuals' emotional reaction determines its effect on cognitive performance and aids in potentially providing more effective music exposure to high school and college students in the future. (Ritter, 2017)

## Methodology

### Research Design

A correlational study was used to explore the correlations between listening to music and high school and college students' concentration levels. A correlational study is a non-experimental, quantitative research method that looks at the relationships between two or more variables. (Cherry, 2024). A literature review was also used to aid in the exploration of the correlation. Approximately 20-30 former research articles were pulled from Google Scholar and reviewed. Keywords such as academic productivity, elicit emotions, neurological effects, and concentration were used.

### Participants

Participants were 25 high school students aged 13 to 18 years old collected from a random sample. Participants voluntarily took part in this study and were asked to complete a short online questionnaire. Recruitment occurred at a high school in the southern part of the United States in April of 2024.

## Data Collection Methods

This study was conducted using an online questionnaire. Using a questionnaire allowed the researcher to effectively capture student beliefs and perceptions of listening to music while studying. After organizing all the data, it is easier to find trends and correlations between the two variables. Implementing a questionnaire to high schoolers also allows us to better understand potential impurities in why students choose to or not to listen to music when studying. The questions asked in the survey were structured to explore students' music listening habits, the types of music they listened to, their self-reported concentration levels, and perceived benefits and drawbacks of listening to music when studying.

## Survey Structure

To begin the survey, basic demographic questions such as student's assigned sex at birth and grade level were asked to group the subjects during data analysis to identify grade-level trends. Additionally, it serves to create a diverse group of subjects for lower variability. There were questions in the survey to assess the subjects' music listening habits such as how often they listen to music and if they listen to music when they study. The genres of music were also assessed to find relationships between lyrics, tempo, and volume. Collecting data on genre allows us to determine if specific genres or characteristics of music have distinct effects on concentration. The last question asked on the questionnaire was to view the students' perception of listening to music and its effect on productivity and efficiency in completing schoolwork.

## Procedure

The survey was created on Google Forms and distributed in school through links. The survey was open for approximately three days with results collected from a sample of N=25. Anonymity was ensured through anonymous submissions to Google Forms with no data or information being submitted.

## Results

### Limitations of the Study

#### Sample size and generalizability

Because the sample size of N=25 is relatively small, and considering all data were surveyed from students within a specialized STEM high school, results are not fully representative of the total high school population.

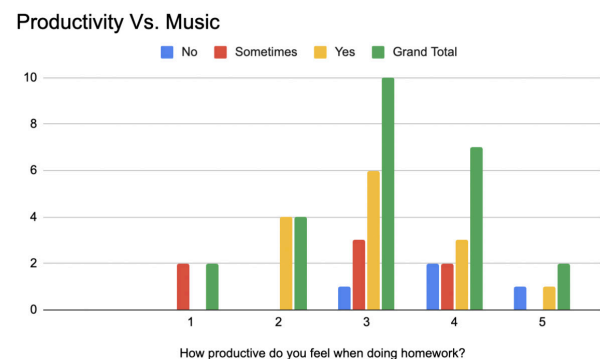
### Potential biases or confounding variables

The difficulty of cognitive tasks is a confounding variable to the results of the study. Subjects being given more difficult tasks could render the effects of music ineffective as then it would be a capability and skill issue rather than the type of music listened to. Additionally, according to the arousal-mood hypothesis, where emotion was the main focus, a subject's emotional state can confound the results of the study. Depending on current mood and stress levels, certain types of music will have different strengths and types of effects. Additionally, if the individual is a musician themselves, they may be more likely to focus on the music rather than the task at hand.

### Data Analysis

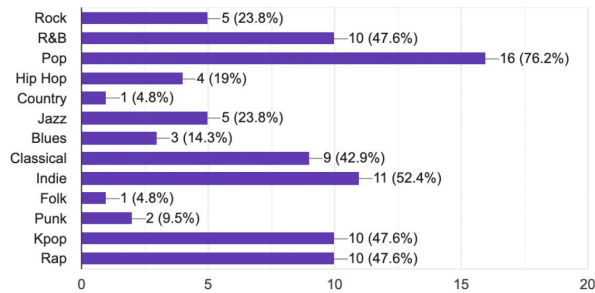
Both quantitative and qualitative data were collected through the questionnaire on 25 subjects. While data across all four grades were questioned, there did not seem to be a correlation between time spent listening to music and grade level.

Figure 1



In the pivot table deduced from the survey results, there is a relationship between students' productivity levels and how often they listen to music. The bars represent the answers to the question, "Do you listen to music when you study?" The x-axis represents people rating their productivity on a scale of 1-5 and the y-axis represents the number of responses.

The ratio between those who responded ‘yes’ to the question, “Do you listen to music when you study” and ‘no’ gets smaller as the productivity increases. This demonstrates the relationship that as productivity increases, the amount of music that people listen to decreases.



According to the questionnaire, most people listen to pop, with indie music following close behind it. Student perception was measured with 44% of the subjects responding ‘sometimes’ that listening to music when studying will help with schoolwork while 20% responded ‘no’.

Table 1

	Grade	Do you feel that you have trouble concentrating when doing homework or studying?	How productive do you feel when doing homework?	How often do you listen to music?
Grade				
Do you feel that you have trouble concentrating when doing homework or studying?	0.26			
How productive do you feel when doing homework?	-0.20	-0.25		
How often do you listen to music?	-0.01	0.04	0.02	
Do you listen to music when you study?	0.12	0.27	-0.37	0.27

A correlational data analysis was also run between all of the variables of the study in Excel. While many of the variables have no correlation, the variables with the strongest correlation are between how productive a subject feels when doing homework and if they listen to music when studying.

Absolute Magnitude of the Observed Correlation Coefficient	Interpretation
0.00–0.10	Negligible correlation
0.10–0.39	Weak correlation
0.40–0.69	Moderate correlation
0.70–0.89	Strong correlation

(Schober, 2018)

The more productive a subject feels, the less likely they are to listen to music; Based on Table 2 (Schober, 2018), with  $r=-0.37$ , a weak negative correlation is shown.

## Discussion

### Interpretation of Results Explanation of Key Findings

For those who reported that they don’t listen to music when studying because it is hard to concentrate, there is much evidence of the truth behind it. The cognitive-capacity hypothesis states that “prior knowledge used in a cognitive task uses capacity in the same limited capacity active processing system that is used to process the ongoing task.” (Cockerton, 2004) The negative impacts of music can be explained by this hypothesis in which background music can disrupt cognitive tasks since human brain capacity is only so much and can be overstimulated. (He, 2017)

### How Results Align with or Differ From Previous Studies

Based on the study done by Tze., et al, (2010) the results of the study seem to make sense. Because pop was the main genre listened to and encases a lot of high-intensity sounds, it would make sense that as productivity increases, the amount of music listened to decreases.

## Implications

### Practical applications for students and educators

Furthering our understanding of the impact of music on student concentration can help students make better study habits and decisions. Based on the findings, the best option for students would be not to have outside noise or music playing in the background. However, if students want to listen to music, the next best alternative would be calmer, less fast-tempo music to decrease the intensity of music so more of their focus can be spread to their cognitive tasks.

## Future Directions

### Areas needing further investigation

To further use the negative correlation found between music and concentration to help students, more experiments between the genres of music should be conducted. Most studies limited their studies to only focus on the main types of genres of pop, classical, and hip-hop. While it is understood that music with higher intensities has more negative effects on concentration, exploring the effects of other genres more in-depth can allow a more comprehensive understanding of genres of music and concentration. Furthermore, in-depth exploration of more genres can help find specific tempo and rhythm patterns that may affect students' concentration while listening to music. Most of the studies also focus on short-term effects where subjects listen to music for 10-15 minutes and take cognitive tests directly after. More longitudinal studies should be conducted to examine the effects of consistent exposure to music and if that affects performance over time.

Suggestions for improving study design  
With a larger sample size, less variability can be recorded and can be generalized to the general population. Correlations will be more accurate when using larger sample sizes.

## Conclusion

### Summary of Findings

Based on all the correlations that were run, the strongest correlation found was between listening to music when studying and how productive the subject feels when studying. Therefore, the survey showed that those with higher productivity tend to listen to music less. Because this was a survey, no causation can be inferred but future experiments can be implemented to determine causation. Additionally, the genre of music was also tracked. It was seen that pop was the most popular among students who listened to music while studying. According to Tze et. al (2010), higher-intensity music drains a lot more attention from the subjects. In this survey, this statement is also found to be true; a negative correlation was found between listening to music and productivity, and deduced that pop music was the most popular genre listened to among the sample. So, this genre could have possible associations for the negative correlation.

## Final Thoughts

Because everyone interprets music differently, understanding individual differences in responses to music can help create more personalized study settings for students. When the different genres of music and how they affect concentration are fully explored, students can personalize their music listening experience in a way that allows them to optimize their overall academic performance and concentration levels.

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