

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

Audrey Wang \*

## Abstract

Concentration is one of the most critical factors in determining a person's efficiency and work ethic. However, limited research has been conducted on how manipulating concentration can directly impact efficiency. Listening to music while studying has also become commonplace 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 posits cognitive benefits from classical music, while the Arousal Mood Hypothesis emphasizes emotional mediation to help understand why music affects people. The results indicated that those with higher productivity tend to listen to music less. This finding contradicts the current trend of listening to music during study sessions. This study contributes to existing research on music and highlights the need for further investigation into variables such as genre and individual preferences. These specifics could deepen our understanding potentially making music an even more powerful tool for enhancing concentration and productivity.

## 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 plays a role in generating attachment-related emotions, thereby enabling music to support social attachment [1]. 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. Although "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" [2]. Throughout this conducted

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\*Senior Student, Fulton Science Academy.  
Contact: awang@fultonscienceacademy.org

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 developing essential 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, including cultural differences that influence genre preferences. 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 a crucial cognitive skill for academic success, particularly when evaluating the effects of external stimuli such as music [3]. 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 leads to less procrastination and lower stress levels, an issue highly prevalent among this generation [4]. Exceptional performance in these skills directly correlates to higher grades and important lifelong skill development [5]. According to Business of Apps (2023), music streaming apps generated \$47.7 billion in revenue, 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 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. For example, while 39% of respondents aged 77 and older reported listening to music while studying, 58% of Gen Z reported doing so—a significant 19% increase [6]. 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 better understand

its correlation and can potentially aid in more helpful and effective ways for students to study. This study aims to bridge the gap in existing research by examining 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. These studies have also examined the impact of different genres and their varying effects. 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 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 changes in performance levels over time. When subjects listened to music they liked, temporal changes in performance remained roughly constant, while performance levels fluctuated under both silent and unfamiliar music conditions [7]. Additionally, a greater change in temporal performance was associated with worsening test results. The study results demonstrate a crucial positive interaction between music concentration and performance [3]. 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." However, it is important to note that correlation does not imply causation. While higher scores might suggest increased concentration, this improvement may not directly result in lower stress levels. Other factors, such as familiarity with the test material, individual preferences for music, or unique auditory responses, could also contribute to the

outcomes. The study found that background music was particularly effective in reducing the number of teacher prompts needed for academically weak students during 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 [8]. Diving deeper into genres, electroencephalogram (EEG) sensor data engineered soundscapes were the most effective at increasing focus levels. Classical music was also highly effective for promoting focus, whereas hip-hop and pop music produced lower focus scores [9].

#### **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 music had a significantly negative effect on reading performance compared to the control group with no music. These findings were similar to those of Haruvi [9]. Unexpectedly, participants in the classical music group also performed worse than those in the control group. The study introduced the concept of the attention drainage effect, which occurs when “a distraction causes the attention capacity of a person to be unconsciously reduced or ‘drained’ while they are performing a single cognitive task” [10]. This suggests that hip-hop’s stronger sounds and faster tempos create a higher intensity, which drains more attention from participants. In contrast, while classical music lacks the high intensity of hip-hop, its catchy melodies may still capture the listener’s attention. As a result, the classical music group’s mean score was lower than the control group but higher than that of the hip-hop group.

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

Other studies have shown that popular background music does not significantly affect test scores. Findings indicated no significant differences in performance 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 [11]. However, they did find a direct relationship between background music and working memory [12]. Although this finding is not specific to concentration, it highlights the positive effects of listening to music on various aspects of students' study habits, including concentration, performance, and 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 related to music and cognitive enhancement is the Mozart Effect. This theory proposes that listening to Mozart's sonata K448 produces a small increase in spatial-temporal performance [13]. This effect was drawn from a study in which some participants listened to a Mozart Sonata while others did not. Subsequently, they completed a task measuring spatial abilities, and it was found that listening to Mozart's sonatas had a direct positive influence on these abilities [14]. Music does make the brain more active and specifically targets the temporal, prefrontal cortex, and parietal areas of our brains. Music activates the brain and specifically stimulates the temporal, prefrontal cortex, and parietal areas. Brain regions involved in spatial reasoning include the prefrontal and temporal areas, which helps explain the correlation between Mozart's sonatas and spatial abilities [15]. 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 [8]. This neural activation underscores a complex 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 as an argument against this effect. It asserts that listening to music does not directly affect cognitive functioning but rather influences it indirectly through a mediation effect. Specifically, individuals' emotional reactions play a critical role in determining the impact of music listening on cognitive performance rather than directly improving cognitive functioning. The Arousal Mood Hypothesis expands the idea that listening to music not only influences spatial abilities but also cognitive performance [14]. 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 derived from attaining a particular goal or outcome [16]. According to The Arousal Mood Hypothesis, this enhances cognitive functioning suggesting that certain background music could improve concentration and performance. The hypothesis proposes that any moderately arousing stimulus that induces positive moods could enhance performance on various cognitive tasks. This is significant as it explains why some individuals benefit from listening to music and the benefits they receive from listening to music when studying, while others do not. It also contrasts with the Mozart Effect by emphasizing that the emotional reactions of individuals, rather than the music itself, determine its impact on cognitive performance. This understanding aids in identifying potentially more effective types of music exposure for high school and college students in the future. While the Arousal Mood Hypothesis offers a nuanced understanding of how music can affect cognitive performance by emphasizing emotional mediation, there remains a gap in research regarding the specific types of music or their particular characteristics (e.g., genre, tempo, and volume) that most effectively enhance concentration and performance.

## **Methodology**

### **Research Design**

A correlational study was used to explore the correlations between listening to music and high school and college students' concentration levels. This research method involves a non-experimental, quantitative approach that examines the relationships between two or more variables [17]. A literature review was also used to aid in the exploration of the correlation. Approximately 20 to 30 previously published research articles were sourced from Google Scholar and analyzed. Keywords such as "academic productivity," "elicit emotions," "neurological effects," and "concentration" were used to identify relevant studies.

### **Participants**

Participants included 25 high school students, aged 13 to 18, from a single STEM-focused high school. Participants voluntarily took part in this study and were asked to complete a short online questionnaire. Recruitment took place 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 students' beliefs and perceptions of listening to music while studying. Organizing the data made it easier to identify trends and correlations between the two variables. Administering a questionnaire to high school students also provided insights into potential factors influencing their decision to listen to music or not while studying. The survey questions in the survey were designed 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, this demographic

data helped create a diverse group of subjects, reducing 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 musical genres allowed researchers to examine whether specific genres or characteristics of music have unique effects on concentration. The final question asked students' perception of listening to music and its impact on productivity and efficiency in completing schoolwork.

### **Procedure**

The survey was created on Google Forms and distributed in school through links. The survey remained open for three days. 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 that impacts the results of the study. When subjects are given more difficult tasks, the effects of music could become negligible, as it may then reflect a capability and skill issue rather than the type of music listened to. Additionally, according to the arousal-mood hypothesis, which emphasizes emotion as a key factor, a subject's emotional state can confound the results of the study. Depending on their current mood and stress levels, certain types of music will have different strengths and types of effects. Additionally, individuals who are musicians themselves may be more likely to focus on the music rather than the task at hand, further complicating the results.



## 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.

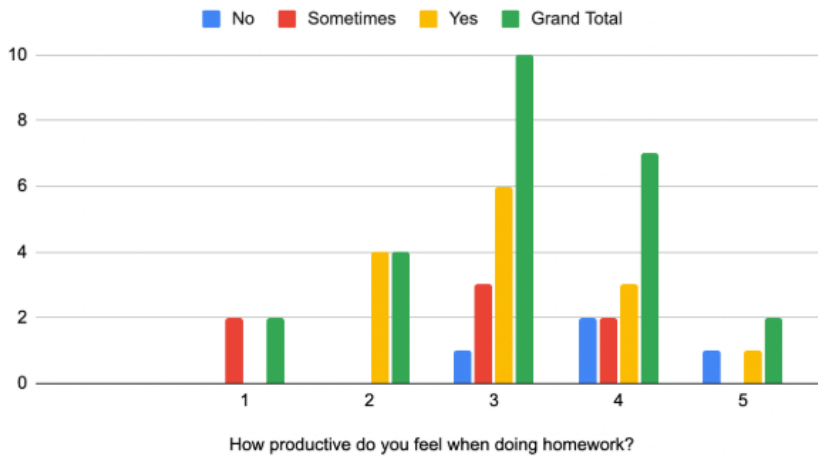


Figure 1: Productivity vs. Music

In the pivot table 1 derived from the survey results, there appears to be 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 self-reported productivity ratings 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 those who responded 'No' decreases as productivity increases. 'no' gets smaller as the productivity increases. This demonstrates that as productivity levels rise, the frequency of listening to music while studying tends to decline.

According to the questionnaire (see figure 2), the majority of participants listen to pop music, with indie music following close behind it. Student perceptions were measured with 44% of the subjects responding 'sometimes' that listening to music when studying will help with schoolwork while 20% responded 'no.'

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,

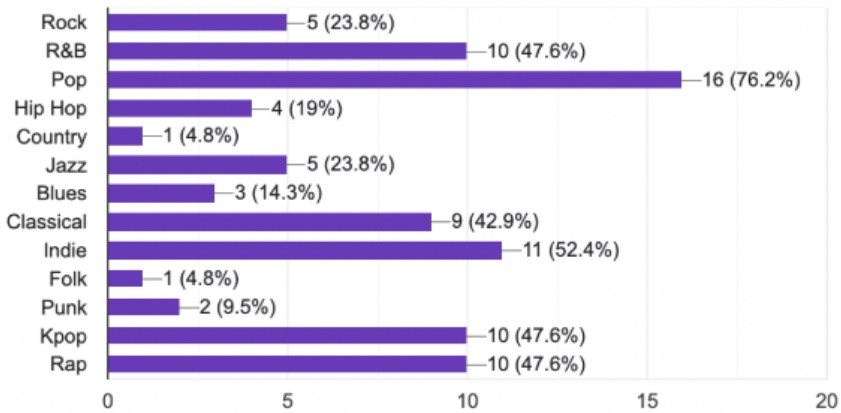


Figure 2: Genre Questionnaire Results

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?
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

Figure 3: Correlational Analysis Results

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
0.90–1.00	Very strong correlation

Figure 4: Correlation Coefficient Interpretations

the variables with the strongest correlation are between how productive a subject feels when doing homework and if they listen to music when studying [18].

The more productive a subject feels, the less likely they are to listen to music; based on Table 2, with  $r=-0.37$ , a weak negative correlation is shown [18].

## **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 asserts 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" [19]. 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 [12].

#### **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 develop better study habits and make better decisions. Based on the findings, the optimal choice for students is to study without any background noise or music. However, for those who prefer to listen to music, the next best alternative would be calmer, slower-tempo music, as it reduces intensity and allows for greater focus on cognitive tasks.

## **Future Directions**

### **Areas Needing Further Investigation**

To better use the negative correlation found between music and concentration in helping students, more experiments on the effects of different genres of music should be conducted. Most studies are limited to mainstream genres such as 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. Additionally, identifying specific tempo and rhythm patterns that influence concentration could offer actionable insights for students who prefer to study with music. Most studies focus primarily on short-term effects, with subjects listening to music for only 10-15 minutes before completing cognitive tests. 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. The survey results indicated that individuals who report higher productivity tend to listen to music less frequently while studying. Because this was a survey, no causation can be inferred. Future experiments should be conducted to establish potential causal relationships. 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. This aligns with the findings of this survey, which demonstrated a negative correlation between listening to music and productivity. The popularity of pop music among respondents suggests it

could play a role in this negative correlation. Future research could further investigate the specific characteristics of pop music, such as intensity and tempo, that may influence concentration and productivity.

### **Implications of the Argument**

The findings of this study have several important implications for students, educators, and future research. For students, these results emphasize the value of understanding how music affects concentration, enabling them to make more informed choices about their study environments. Specifically, recognizing that music preferences significantly influence whether background music is beneficial or distracting highlights the importance of self-awareness in study habits.

### **Limitations of the Study**

While the study provided valuable insights into the relationship between music and concentration among high school students, several limitations must be acknowledged. Firstly, the sample size of 25 students is relatively small, which restricts the generalizability of the findings. Moreover, the specific demographic makeup of the participants may not adequately represent the broader high school or college student population, further limiting the applicability of the study's results across diverse schools, grade levels, or cultural backgrounds. Additionally, the study is inherently subject to biases as it relied on self-reported data from an online questionnaire.

### **Final Thoughts**

Because everyone interprets music differently, these variations in responses can help create more personalized and effective study environments for students. Further exploration of different music genres and their effects on concentration could enable students to tailor their music-listening experiences to optimize both academic performance and focus.

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