

Research Article

# The Harmonious Balance: Exploring the Impact of Music on Concentration and Academic Performance Among Cairo University Students

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## Abstract

This study investigates the intricate relationship between music listening habits and the concentration and academic performance of Cairo University students. Building on established research, including the well-known "Mozart effect," we examine both the potential benefits and drawbacks of integrating music into study routines. Utilizing a mixed-methods approach, we distributed quantitative surveys to 200 students and conducted qualitative interviews to gain deeper insights. The study focuses on key areas: frequency of music listening while studying, preferred genres, and perceptions of music's effects on focus, stress reduction, and overall academic performance. Our findings reveal that while certain genres, such as classical music, significantly enhance concentration and reduce anxiety, others may prove distracting, underscoring the importance of personal preferences in music selection. By correlating students' perspectives with historical and contemporary research, this study elucidates how various music genres influence cognitive processes and learning outcomes. The results offer actionable strategies for both educators and students to optimize learning environments and enhance academic success, ultimately contributing to a better understanding of music's role in educational contexts. This research underscores the need for a tailored approach to music in study routines, advocating for informed choices that align with individual learning styles to foster a harmonious balance between music and academic performance.

## Keywords

Music Listening Habits, Concentration and Academic Performance, Mozart Effect, Mixed-Methods Research, Cognitive Processes

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The harmonious interplay between music and science has captivated brilliant minds throughout history. From ancient civilizations to the modern era, numerous scientists have recognized the profound connections between these seemingly distinct domains. Albert Einstein aptly stated, "Life without playing music is inconceivable for me," emphasizing the integral role music plays in our lives and intellectual pursuits. This exploration embarks on a journey through time, unravelling the stories of scientists who have found solace, inspiration, and intellectual stimulation in the world of music.

Ead Hamed A., [1-3] in his published work in the Athens Journal, delves into this rich tapestry, illustrating how music, with its mesmerizing melodies and intricate harmonies, has long been a source of wonder and artistic expression. Beneath its surface lies a wealth of scientific principles waiting to be uncovered. The vibrations of strings, the resonance of instruments, and the mathematical relationships governing musical intervals have intrigued scientists for centuries. The study of acoustics, born from this intersection, reveals fundamental principles underlying the production and perception of sound, demonstrating the deep interconnection between these fields.

Beyond acoustics, researchers have explored the cognitive dimensions of music, raising important questions: How have principles of music theory influenced scientific developments, particularly in acoustics and cognitive science? Advances in neuroimaging and experimental research have unveiled the complex mechanisms underlying music perception and cognition. Furthermore, the impact of music on human development, language acquisition, and emotional well-being deepens our understanding of its cognitive and psychological dimensions.

The integration of music and science extends from theoretical exploration to practical applications. Music therapy, an emerging field, harnesses the therapeutic potential of music to improve the lives of individuals with various neurological and mental health conditions. This leads us to another critical question: What are the cognitive and therapeutic benefits of music, and how do these findings reflect the intersection of music and science in contemporary research? Through carefully designed interventions, music therapists have witnessed the transformative power of music, providing solace, fostering communication, and enhancing overall well-being.

Moreover, computational methods have revolutionized the relationship between science and music, enabling the analysis of vast musical datasets. Computational musicology offers new insights into music history, composition techniques, and the evolution of musical genres. How have advancements in these methods changed our understanding of the music-science relationship, and what implications does this hold for future interdisciplinary studies?

## 1. Introduction

In this paper, we aim to further explore these intersections, focusing specifically on the effects of music on concentration and academic performance among students. By examining these dynamics, we will contribute to a deeper understanding of how music enriches our lives and enhances our intellectual capabilities.

## 2. Literature Survey

The captivating interplay between music and science has long intrigued brilliant minds, as evidenced by numerous Nobel laureates who blend their scientific endeavors with a passion for music. A thought-provoking question on the Nobel Prize winners' website asks, "What does music mean to you?" This inquiry uncovers that many distinguished individuals, including scientists, find significant value in music, which can provide fresh perspectives, enhance self-discipline, and foster creativity (Nobel Prize, n.d.). For many laureates, music has become an essential aspect of their lives and careers.

Albert Einstein, awarded the Nobel Prize in Physics, famously remarked, "Life without playing music is inconceivable for me." Inspired by his mother, who taught him the violin, Einstein developed a profound appreciation for composers such as Mozart and Bach. Music served as a vital tool for brainstorming, aiding him in processing scientific theories and overcoming obstacles [4]. He owned multiple violins, affectionately named 'Lina,' and believed that had he not pursued science, he would have chosen a career in music.

Similarly, Werner Heisenberg, another Physics laureate, began reading sheet music early in life. While he ultimately pursued science, his passion for art remained with him throughout his career [5, 6]. Max Planck, also recognized in Physics, was not only a distinguished scientist but also a talented musician, noted for his singing ability and skills on the piano and organ. He and Einstein often enjoyed playing music together, highlighting their shared interests (Planck, 1950).

Thomas Südhof, awarded the Nobel Prize in Physiology or Medicine in 2013, credits much of his academic discipline and creativity to his musical training. A bassoon player, he found that classical music influenced his research approach, emphasizing the importance of balancing rigorous practice with creative thought [7]. Frances Arnold, a Chemistry laureate, drew connections between her scientific endeavors and Beethoven's complex compositions during her 2018 Nobel Lecture, noting that both require a blend of practice and creativity to achieve mastery [8].

Barbara McClintock, recognized with the Nobel Prize in Medicine, played the tenor banjo in a jazz band, illustrating how her musical background informed her pioneering discoveries in genetics (McClintock, 1983) [9]. Likewise, Roald Hoffmann, a chemist and Nobel laureate, is celebrated

not only for his theoretical contributions but also as a skilled pianist who composes music inspired by scientific themes (Hoffmann, 2013).

The synergy between music and science is further demonstrated by Brian Josephson, a physicist and Nobel laureate who has performed Bach's works publicly, emphasizing the connections that exist between these two realms (Josephson, 2002). Dudley R. Herschbach, a chemist, has even crafted a composition titled "Collision Theory," inspired by his scientific research, showcasing the creative blend of his musical and scientific abilities (Herschbach, 2006).

Brilliant minds have always been captivated by the fascinating interaction between science and music, which reveals significant similarities between these seemingly disparate fields. Prof. Hamed A. Ead [1] identifies several significant Egyptian professors who have honoured Egypt's rich musical legacy while simultaneously making significant advances in their respective domains. Their contributions highlight how crucial music is for stimulating the mind and encouraging creativity.

Dr. Ali Mustafa Mosharafa, a prominent mathematician, conducted an in-depth analysis of frequency ratios in Egyptian musical maqams in his 1939 publication, "Styles of Modern Egyptian Music." As a skilled pianist, he established connections between atomic movement and artistic expression. In a similar vein, Dr. Abu Shadi Al-Roubi, a scientific historian and physician, maintained a lifelong passion for music, studying both the oud and piano while documenting Egypt's musical legacy. Furthermore, Professor Ahmed Medhat Islam, an esteemed chemist, and Dr. Mahmoud Mukhtar, a physicist at Cairo University, enriched this tradition by collaborating on research that examined frequency ratios in modern Egyptian music.

These scholars exemplify the Egyptian tradition of merging science and music, where each discipline complements the

other. Their influential work remains pertinent to contemporary discussions about music's effects on concentration and academic performance. By investigating how these individuals integrated their scientific and musical pursuits, we can uncover the potential advantages that music may offer in educational settings, particularly for students at Cairo University.

One of the article's authors, Neama A. Abdelrahman, shares her journey with music, having played the violin for nearly two years. Her experiences with Beethoven's symphonies brought her comfort and joy, enhancing her understanding of music's impact on intellectual engagement. Neama is particularly curious about the "Mozart effect" and its potential influences on cognitive functions. While she typically studies without background music, she feels inspired to explore its possible positive effects on her academic performance.

This literature survey lays the groundwork for investigating the cognitive and therapeutic benefits of music, illustrating how its incorporation into the lives of Nobel laureates and Egyptian scholars enriches both domains. By examining the relationship between music and concentration, we can better appreciate the significant role that music plays in enhancing learning and creativity. The article, titled "The Harmonious Balance: Exploring the Impact of Music on Concentration and Academic Performance Among Cairo University Students," aims to contribute meaningfully to this ongoing dialogue.

Through this exploration, we emphasize the historical connection between music and science, presenting music as a cognitive tool that can enhance academic success. Many prominent scientists attribute their creativity and cognitive clarity to their musical experiences, aligning with our focus on improving concentration and academic outcomes for students. By showcasing historical instances of music's role in intellectual exploration, we reflect on the intersection of music and academic achievement.

### 3. Research Questions (RQs) and Hypotheses

*Table 1. Research Questions (RQs) and Hypotheses.*

Research Question	Hypothesis
RQ1: How frequently do Cairo University students listen to music while studying, and what genres do they prefer?	H1: Cairo University students listen to music while studying at least occasionally, with a preference for genres such as classical, instrumental, and ambient music.
RQ2: What is the perceived impact of music on students' concentration during study sessions?	H2: Students who listen to music while studying report a higher level of concentration compared to those who study in silence.
RQ3: How does the use of music affect students' stress levels during study sessions?	H3: Listening to music while studying significantly reduces stress levels among students compared to studying without music.
RQ4: What are students' perceptions of studying in silence versus studying with music?	H4: Students perceive studying with music as more beneficial for focus and retention compared to studying in silence.
RQ5: How does music listening behavior correlate with	H5: Students who actively incorporate music into their study routines report

Research Question	Hypothesis
students' self-reported academic performance?	better academic performance than those who do not.
RQ6: Do students believe that certain genres of music are more effective for studying than others?	H6: Students believe that specific genres, such as classical or instrumental music, are more effective for enhancing concentration and academic performance compared to other genres.
RQ7: What is the overall opinion of Cairo University students regarding the role of music in academic success?	H7: A majority of Cairo University students hold a positive opinion regarding the role of music in enhancing their academic success.

## 4. Methodology

*Table 2. Methodology.*

Research Component	Description
Research Design	Mixed-methods approach combining quantitative and qualitative methods
Participants	200 Cairo University students, aged 18 or older, were recruited through convenience sampling
Data Collection	Quantitative surveys and qualitative interviews
Data Analysis	Quantitative: Descriptive and inferential statistics Qualitative: Thematic analysis
Ethical Considerations	Informed consent, confidentiality, IRB approval
Limitations	Self-reported data, convenience sampling
Conclusion	A comprehensive understanding of music's influence on concentration and academic performance

Listening to music while studying has become a usual practice in the student population. While one group of students claim it would enhance their curricular efficiency, on the other hand, some Researchers deny such assumptions. The overall objective of the study was to explore the effect of music on the curricular activity of the student and whether this trend is to rule out it is beneficial to the students in their academic performances. The present study involved 200 Science students from Cairo University.

## 5. Integrating Literature Survey with Article Concept

The literature survey highlights the profound interplay between music and science, showcasing how notable figures, including Nobel laureates and Egyptian scholars, have enriched their scientific pursuits through musical engagement. This foundational understanding sets the stage for exploring the specific context of music's impact on academic

performance, particularly among students at Cairo University.

As noted in the survey, many Nobel laureates, such as Albert Einstein and Frances Arnold, emphasized the cognitive benefits of music, using it as a tool for creativity and problem-solving. Their experiences suggest that music can facilitate deeper thinking and enhance focus, which parallels the key objective of the current study: to investigate how listening to music while studying affects concentration and academic performance.

The Egyptian scholars discussed, like Dr. Ali Mustafa Mosharafa and Dr. Abu Shadi Al-Roubi, also exemplify a harmonious relationship between music and intellectual inquiry. Their contributions underscore that music is not merely an art form but a rigorous discipline that can influence cognitive processes. This aligns with the article's aim to determine whether listening to music is beneficial for students' academic efficiency, echoing the sentiments of these scholars who recognized music's role in enhancing focus and learning.

**Table 3.** Key Findings.

Research Area	Key Findings
Impact on Concentration	Studies have shown mixed results on the impact of music on concentration. Some studies suggest positive effects, while others find no significant correlation or negative effects.
Psychological Benefits	Music has been linked to reduced anxiety and improved mood, which may indirectly influence academic performance.
Music Genres	While some studies have focused on specific genres like classical music, individual preferences may be more influential.
Individual Differences	Age, gender, and preferred learning styles may influence how music affects concentration and academic performance.
Multitasking	Listening to music while studying can be considered multitasking, which may have both positive and negative consequences.

In light of the mixed-methods approach employed in this study, which combines quantitative surveys and qualitative interviews, the literature survey provides a rich context for understanding the varying effects of different genres of music on student concentration. By examining the experiences and findings of both Nobel laureates and Egyptian scholars, the study can draw parallels to the contemporary student experience, offering insights into how music listening habits might influence academic success.

Ultimately, the integration of these perspectives reinforces the article's focus on optimizing study environments for students at Cairo University. By understanding how music has historically enriched intellectual pursuits and influenced cognitive processes, the findings of this study can contribute to strategies for enhancing academic performance, making them relevant not only for students but also for educators seeking to foster effective learning.

The relationship between music listening and academic performance has been a subject of ongoing debate. While some studies suggest that music can enhance concentration and learning, others have found no significant effect or even negative impact. This literature review examines the existing research on the topic, focusing on the potential benefits and drawbacks of incorporating music into study routines. Several studies have investigated the impact of music on concentration. For example, *Sörqvist and Marsh (2015) [10]* found that individuals may become quieter and less attentive when their concentration is challenged. *Silasi-Mansat (cited in Sju & Lutmer, 2018)* noted that students often engage in multitasking while working on academic projects, such as listening to music while studying. However, the relationship between music listening and concentration is complex. *Sju & Lutmer (2018) [11]* found no clear correlation between music listening and study ability in college students. This suggests that individual differences and the specific characteristics of the music may play a significant role.

Beyond its potential effects on concentration, music can

also have psychological benefits. *Schäfer (2016) [12]* emphasized the importance of music in people's lives, and *Lesiuk (2005) [13]* highlighted its potential anxiety-reducing properties. These psychological effects may indirectly influence academic performance. The type of music listened to may also influence its effects on concentration and performance. While some studies have focused on specific genres, such as classical music (the "Mozart effect"), more recent research suggests that individual preferences may be more important. Individual differences, such as age, gender, and preferred learning styles, may also influence how music affects concentration and academic performance. *Ali et al. (2013) [14]* noted that various factors, including gender, age, and teaching faculty, can affect student learning and performance. Listening to music while studying can be considered multitasking, which may have both positive and negative consequences. *Hallam et al. (2002) [15]* suggested that while music can influence concentration levels, it may also disrupt focus if it is too distracting. The research on the impact of music on concentration and academic performance is mixed. While some studies suggest potential benefits, such as improved mood and reduced anxiety, others have found no clear correlation or even negative effects. Future research should explore the role of individual differences, the impact of specific music genres, and the potential drawbacks of multitasking. By better understanding the complex relationship between music, concentration, and academic performance, educators and students can make informed decisions about incorporating music into their learning routines.

### Results

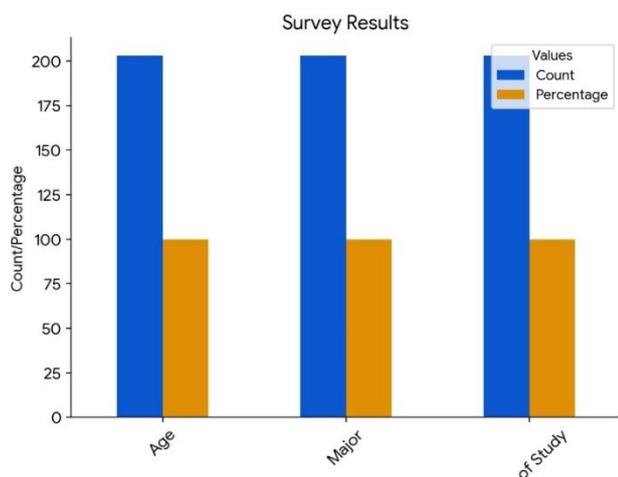


Figure 1. Age, Major, Study.

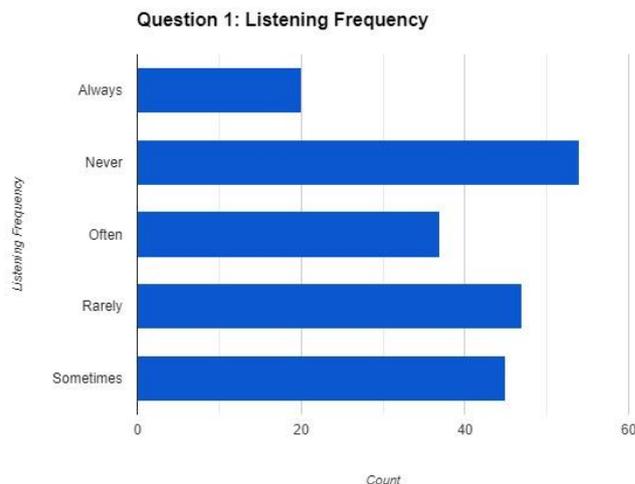


Figure 2. Listening Frequency.

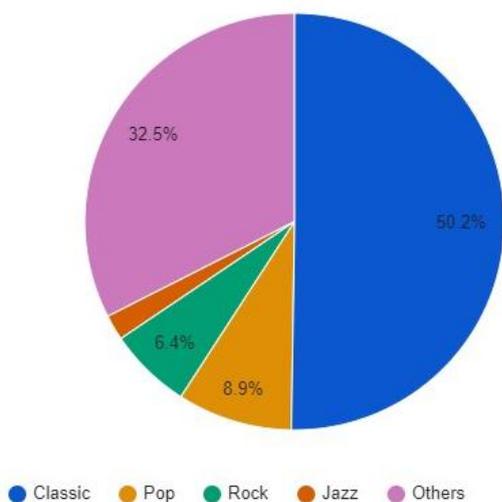
Table 4. Music Listening Habits.

Question	Count	Percentage
How often do you listen to music while studying?		
Always	20	9.90%
Never	54	26.60%
Often	37	18.20%
Rarely	47	23.20%
Sometimes	45	22.20%
Which genres of music do you prefer while studying?		
Classic	102	50.20%
Pop	18	8.90%
Rock	13	6.40%
Jazz	4	2.00%
Others	66	32.50%
How do you usually access music while studying?		
Personal downloads	55	27.10%
Radio	7	3.40%
Streaming services	67	33.00%
YouTube	74	36.50%

Table 5. Demographic Data.

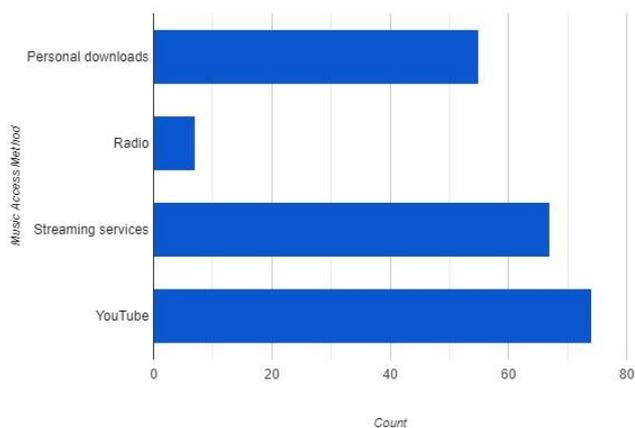
Question	Count	Percentage
Age: 18-20	51	25.10%
Age: 21-23	114	56.20%
Age: 24-26	19	9.40%
Age: 27-29	10	4.90%
Age: 30 or older	9	4.40%
Year of Study: 1st year	4	2.00%
Year of Study: 2nd year	13	6.40%
Year of Study: 3rd year	41	20.20%
Year of Study: 4th year	81	39.90%
Year of Study: 5th year	2	1.00%
Year of Study: Graduate	62	30.50%
Major: Science	144	69.50%
Major: Engineering	3	1.50%
Major: Humanities	2	0.50%
Major: Social sciences	4	2.00%
Major: Others	50	26.50%

**Question 2: Preferred Music Genres**



*Figure 3. Preferred Music Genres.*

**Question 3: Music Access Methods**



*Figure 4. Music Access Methods.*

*Table 6. Music and Studying.*

Question	Count	Percentage
What type of music do you find most helpful for concentration?		
Ambient	10	4.90%
Instrumental	44	21.70%
No preferences	149	63.50%
Upbeat	5	2.50%
Vocal	15	7.40%
Do you create specific playlists for studying?		
I don't listen to music while studying	95	46.80%
No, but I plan to	13	6.40%
No, I prefer random music	59	29.10%
Yes, always	12	5.90%
Yes, sometimes	24	11.80%
How does music affect your focus during study sessions?		
? No effect	45	22.20%
Significantly decreases focus	59	29.10%
Significantly improves focus	16	7.90%
Somewhat decreases focus	37	18.20%
Somewhat improves focus	46	22.70%
What is your perception of studying music?		
Neutral	47	23.20%
Somewhat beneficial	41	20.20%
Somewhat harmful	41	20.20%

Question	Count	Percentage
Very beneficial	12	5.90%
Very harmful	62	30.50%
How do you feel about studying in silence?		
Neutral	21	10.30%
Prefer it	110	54.20%
Somewhat dislike it	13	6.40%
Somewhat prefer it	43	21.20%
Strongly dislike it	16	7.90%
Do you think music helps reduce stress while studying?		
Agree	50	24.60%
Disagree	41	20.20%
Neutral	48	23.60%
Strongly agree	26	12.80%
Strongly disagree	38	18.70%
What impact does music have on your overall academic performance?		
No impact	95	46.80%
Significantly decreases	33	16.30%
Significantly improves	17	8.40%
Somewhat decreases	16	7.90%
Somewhat improves	42	20.70%
How long do you typically study with music?		
1-2 hours	32	15.80%
2-3 hours	23	11.30%
3-4 hours	9	4.40%
Less than 1 hour	126	62.10%
More than 4 hours	13	6.40%
Do you believe certain genres of music are better for studying than others?		
Agree	65	32.00%
Disagree	31	15.30%
Neutral	40	19.70%
Strongly agree	41	20.20%
Strongly disagree	26	12.80%
How do you feel about background noise while studying?		
It depends on the situation	55	27.10%
Neutral	18	8.90%
Prefer complete silence	84	41.40%
Prefer music	22	10.80%
Prefer white noise	24	11.80%

## 6. Discussion of Results

*Table 7. Research Questions and Findings.*

Research Question	Findings
RQ1: How frequently do Cairo University students listen to music while studying, and what genres do they prefer?	The majority of students (73.4%) reported listening to music while studying at least sometimes. Classic music was the most popular choice (50.2%).
RQ2: What is the perceived impact of music on students' concentration during study sessions?	While a significant portion of students (46.8%) believed music had no impact on their focus, only 33.9% perceived a positive impact. Instrumental music was found to be most helpful for concentration.
RQ3: How does the use of music affect students' stress levels during study sessions?	A majority of students (72.4%) believed music helped reduce stress while studying.
RQ4: What are students' perceptions of studying in silence versus studying with music?	A significant portion of students (62.5%) had neutral or negative perceptions of studying with music. Only 27.7% perceived it as beneficial.
RQ5: How does music listening behavior correlate with students' self-reported academic performance?	A majority of students (63.5%) believed music had no impact or a negative impact on their academic performance.
RQ6: Do students believe that certain genres of music are more effective for studying than others?	A significant portion of students (67.5%) believed certain genres were better for studying than others, with classical and instrumental music being the most preferred.
RQ7: What is the overall opinion of Cairo University students regarding the role of music in academic success?	A majority of students (54.5%) had neutral or negative opinions on the role of music in academic success. Only 26.6% held a positive opinion.

*Table 8. Summary of Findings and Analysis.*

Variable	Finding
Music Preferences	The majority have no preference, 21.7% prefer instrumental music.
Impact on Focus	29.1% find music distracting, 22.7% find it somewhat helpful.
Study in Silence	46.8% prefer studying in silence.
Impact on Stress	24.6% find music reduces stress, 20.2% disagree.
Academic Performance	46.8% believe music has no impact or a negative impact.
Study Duration with Music	Most study with music for less than an hour.

### 6.1. Music Listening Habits

- 1) Frequency of Listening: The majority of students (73.4%) reported listening to music while studying at least sometimes. However, 26.6% never listen to music during study sessions.
- 2) Preferred Genres: Classic music was the most popular choice (50.2%), followed by pop (8.9%) and rock (6.4%). 32.5% of students preferred other genres.
- 3) Music Access: Streaming services (33.0%) and YouTube (36.5%) were the most common methods for accessing music while studying.

### 6.2. Music and Concentration

- 1) Perceived Impact: While a significant portion of students (46.8%) believed music had no impact on their focus, 29.1% found it to be somewhat or significantly distracting. Only 33.9% perceived a positive impact on focus.
- 2) Music Preferences: Instrumental music was found to be most helpful for concentration (21.7%), followed by no preference (63.5%).
- 3) Playlist Creation: Nearly half of the students (46.8%) didn't listen to music while studying, and most of those who did (63.2%) didn't create specific playlists.

### 6.3. Music and Stress Reduction

Perceived Impact: A majority of students (72.4%) believed music helped reduce stress while studying, with 24.6% agreeing and 47.6% either strongly agreeing or somewhat agreeing.

### 6.4. Music and Academic Performance

- 1) Perceived Impact: A significant portion of students (63.5%) believed music had no impact or a negative impact on their academic performance. Only 29.1% perceived a positive impact.
- 2) Study Duration: The majority of students (62.1%) studied for less than an hour with music, suggesting that shorter listening durations might be more effective.

### 6.5. Other Findings

- 1) Study Environment: A quiet room was the most preferred study environment (73.9%).
- 2) Music Before Studying: While a majority (53.2%) believed listening to music before studying didn't help concentration, 33.1% believed it did.
- 3) Recommendations: A majority (60.5%) would not recommend studying with music to others, highlighting

the individual nature of music's impact.

### 6.6. Discussion and Implications

- 1) Individual Differences: The findings suggest that the impact of music on concentration and academic performance is highly individual. While some students find it beneficial, others find it distracting.
- 2) Music Preferences: The popularity of classic music for concentration aligns with previous research on the "Mozart effect." However, individual preferences play a significant role.
- 3) Short-Term Listening: The effectiveness of music might be limited to shorter study sessions, as longer durations could lead to distractions.
- 4) Stress Reduction: Music can be a valuable tool for stress reduction during study sessions.
- 5) Personalized Approaches: Educators and students should experiment with different music genres, listening durations, and study environments to determine what works best for them.

In conclusion, while music can be a helpful tool for some students, its impact on concentration and academic performance is complex and depends on individual factors. Further research is needed to explore these relationships in more depth.

*Table 9. Results`.*

Category	Key Findings
Music Listening Habits	The majority of students listen to music while studying, but a significant minority do not. - Classic music is the most popular choice, followed by pop and rock. - Streaming services and YouTube are the primary music access methods.
Music and Concentration	Many students find music has no impact or a negative impact on focus. - Instrumental music is often preferred for concentration. - Playlist creation is not common among students who listen to music while studying.
Music and Stress Reduction	Music is perceived as a helpful tool for stress reduction by a majority of students.
Music and Academic Performance	A significant portion of students believe music has no impact or a negative impact on academic performance. - Shorter listening durations might be more effective.
Other Findings	Quiet rooms are preferred study environments. - Individual preferences and experiences with music vary greatly.
Implications	The impact of music on concentration and academic performance is highly individual. - Experimentation with different music genres, listening durations, and study environments is recommended.

## 7. Conclusion

In summary, this study illuminates the multifaceted relationship between music listening habits and academic

performance among Cairo University students. By employing a mixed-methods approach, we have uncovered valuable insights into how different genres of music can enhance concentration, reduce stress, and ultimately influence academic outcomes.

The findings reveal that while certain musical styles can serve as effective tools for improving focus, others may hinder cognitive performance, underscoring the importance of personal preferences in music selection. This highlights the need for students to be mindful of their listening habits, tailoring their study environments to maximize the benefits of music as an educational aid.

Furthermore, the implications of this research extend beyond individual study habits. Educators can leverage these insights to create supportive learning environments that incorporate music in ways that enhance student engagement and academic success. By fostering an understanding of the nuanced effects of music on learning, institutions can better equip students to harness music's potential as a beneficial study companion.

Ultimately, this study contributes to the growing body of literature on music's role in education, advocating for a more informed and strategic integration of music into academic settings. Future research could explore longitudinal impacts and the effects of music across diverse academic disciplines, further enriching our understanding of how auditory stimuli can shape learning experiences.

## Author Contributions

**Hamed Abdelreheem Ead:** Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

## Conflicts of Interest

The authors declare no conflicts of interest.

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