Exploring the Relationship between Listening to Music and Academic Productivity in IB Diploma Students: A Primary Research

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ABSTRACT

In pursuit of academic excellence, students often seek various strategies to enhance their productivity. One contender in this quest is music, a ubiquitous companion in the lives of students of this era. But does Music genuinely bolster academic performance or is it a delightful distraction? This study tries to decipher the intricate relationship between listening to music and academic productivity, focusing on IB diploma and high school students. With 100 student participants, this study explored the impact of music, gender differences, and different music genres on concentration and recall. Surprisingly and country to common belief, the results revel that listening to music did not significantly correlate with scholastic performance. Gender, it seems is no determinant of this outcome and even the diverse tapestry of music genres did not have any significant effect on concentration. The findings of this study challenge conventional belief, urging further inquiry into the intriguing interplay of music and academic performance.

Table of Contents

List of Tables

Introduction

In today's fast paced and demanding society, there is one omnipresent respite used by everyone – Music. The rise of streaming platforms has made music more accessible to listeners than ever before. Spotify alone has over 500 million active users worldwide (Shepherd, 2023) and not surprisingly, music listening has been seen to peak among older teens and young adults, ages 16-24 (Delmonte, 2018). While the music industry is booming amongst the teens, they also form the cohort under immense pressure to achieve academic excellence. Music holds a unique and enduring place in the lives of many teenagers through their academic journey, as a source of relaxation or motivation and recently, as a means of enhancing focus. The impact of music on cognitive processes has been widely recognized and studied, however, the relationship between listening to music and academic productivity remains a subject of both fascination and debate. YouTube channels and influencers, like Lofi Girl, are popping up around the world with videos and ideas that promote listening to music while studying and have garnered millions of followers in the name of increasing productivity amongst the student population (Social Blade, 2023). But does it really work?

The “Mozart effect”, the claim that listening to Mozart’s music can increase intelligence or IQ, was a popular and much believed notion in the 1990s (Rauscher et al., 1993). The music industry boomed on this scientific discovery based on a 10-minute experiment on performance of a few college students on spatial and reasoning tasks after listening to a 10-minute piece of Mozart’s music that increased their performance by a few points as compared to others who listened to relaxation music or no music at all. Despite all limitations of this randomized controlled experiment, the world got sold on the idea of Mozart’s music for increasing IQ. The fad was such that the then Georgia’s Governor budgeted over 100,000 $ to make music available to all new-borns (Sack, 1998). However, researchers now know from failed replications and results of meta-analyses that there is no evidence for Mozart effect as described earlier (Pietschnig et al., 2010) (Chabris, 1999) (Wilson & Brown, 1997). With the current fad of listening to music while studying promoted social media influencers and music artists alike, the availability of mobile devices with a large teenage population, easy access to music streaming platforms coupled with the incessant burden of pursuit of academic excellence; are we again falling in the trap of a make belief notion?

To gain a more comprehensive understanding of the effects of music on productivity and recall, we must look at past studies on the topic and assess the gaps in literature. Numerous studies have investigated the impact of music on cognitive performance, memory, attention, and mood in various contexts and have shown both positive and negative interactions between the two. An experiment on exposure to music and cognitive performance in children and adults, found that exposure to different types of music enhances performance on a variety of cognitive tests across cultures and age groups (Schellenberg et al., 2007). At the same time, Gonzalez & Aiello (2019) concluded from their research that music generally impaired complex task performance, and this effect was moderated by the preference for external stimulation, suggesting that the effect of music and performance could depend on the music, on the task and on the performer. The potential therapeutic application of music has shown that Music may be able to increase memory capacity and reduce distractibility amongst the anxious and distractible populations, specifically in attention deficit disorders (Morton et al., 1990). It has been suggested that musical

elements, such as rhythm melody and harmony, provide the complex stimuli needed to enhance attention skills and facilitate attention switching (Thaut et al., 2014) (Thaut & Stephan, 2019). While there is a plethora of studies examining the effect of music on cognitive tasks, there have been few using academically relevant tasks to assess the effects of music on performance. Some studies that have used the reading comprehension assessments as an outcome measure demonstrated notable decline in academic performance in the presence of Music (Anderson & Fuller, 2010) (Doyle & Furnham, 2012).

The conflicting research results from the past studies and a lack of any research directly targeting the largest group of individuals that listen to and consume musical content and media in the 21st century- teens adolescents and students, highlights a gap in the research that this primary research aims to address. It is an endeavor to find evidence to back social prescriptive claims of increased productivity with listening to music while studying. It attempts to shed light on the complex dynamics between Music consumption and academic productivity within the context of IB diploma students. The IB diploma program is renowned for its curriculum rigor and the emphasis on critical thinking and IB diploma students have a demanding academic workload which requires sustained high levels of concentration, superior time management skills and innovative study strategies. In view of the students' diverse preferences and study habits, to explore how listening to music intersects with their academic pursuits becomes of importance.

Primary Objective

- To establish a clear and evidence-based understanding of the impact, positive or negative, of listening to music on academic productivity of IB diploma students.

Secondary objectives

- To identify the most conducive music genres, if any, to academic focus, and productivity.
- To highlight individual differences, such as personality traits, that may influence how music affects academic performance amongst IB students.

Methodology

Research Design

This study employed a cross-sectional research design to examine the association between listening to music and academic productivity in IB diploma students, specifically targeting the students from IB year 1 and 2, Grade 10 American high school and IGCSE students planning to pursue the IB diploma. By choosing a cross-sectional study design, data was collected at a single point in time and making it quicker, easier, and inexpensive to conduct (Kesmodel, 2018). This design helped establish the preliminary evidence and allowed recommendations for planning future advanced studies. In the context of this study, invites to participate in a survey were sent out to IB diploma (Year 1 and 2) students, Grade 10 high school students and IGCSE students attending schools in India and UAE and one hundred responses were collected from within the span of two weeks. In targeting the late Gen Z, we were able to consider the generational, evolutionary changes in adolescent populations.

Sample Selection

A carefully created random sample was crucial to ensure the representativeness of the target population, which consisted of individuals aged 16-19 enrolled in the International Baccalaureate (IB) Diploma or International General Certificate of Secondary Education (IGCSE) Programs. The inclusion of participants from these educational programs aimed to capture a diverse range of students who are typically immersed in rigorous academic settings.

For a more diverse sample, a stratified random sampling method was employed, dividing the target population into distinct strata based on key variables of age, gender, and type of education system.

Within each stratum, participants were randomly selected using a systematic approach. This approach ensured that every individual within a stratum had an equal chance of being selected, reducing selection bias, and enhancing the generalizability of the findings to the broader population of IB and GCSE students. To do this, students in each school selected were randomly numbered, and received a form for completion. Following this, a private link to fill out the survey was shared to the randomly selected students. Initially, there were approximately 150 students that were sent the form, but only 100 responded with the completed form. To enhance the response rate, reminders were sent to non-respondents at appropriate intervals.

By employing a stratified random sampling method, this study aimed to minimize selection bias and obtain a sample that closely represents the population of interest, allowing for a robust and generalizable analysis of the association between music and productivity among IB and GCSE students.

Data Collection Instrument

Data was collected through a structured questionnaire designed specifically for this research (appendix 1). The questionnaire consisted of eighteen questions with some yes or no answers, some 10-point Likert scale answers followed by short comment questions and was divided into the following sections:

i. Demographic Information: to collect data on age, gender academic year, subject choices, and school affiliation.

ii. Music Listening Habits: participants were asked to provide information regarding the music, listening habits. This included questions about the frequency of music, listening, preferred music, genres, and specific situations in which they typically listen to music while studying.

iii. Academic Productivity: to assess academic productivity, participants were asked to self-report their study habits, including study duration, focus levels during the study sessions, and perceived impact of music on their academic performance. Participants were not asked to provide their academic grades at any point as this may be sensitive data that not all participants may find comfortable to share.

iv. Music Preference: The categorization of participants' music preferences was also recorded. The importance of music classification in this study lies in its ability to capture the diverse range of music preferences expressed by the participants in a structured and meaningful manner. By categorising the reported music preferences, identification of prevalent patterns in individuals' listening habits and their correlations to their study habits and patterns could be ascertained. Genre classification also provided insights into the broad musical styles preferred by participants, including categories such as classical, pop, rock, jazz, and hip-hop, among others. Understanding these genre preferences allowed for comparisons between different musical styles and their potential impact on productivity.

v. Participants opinion: Participants were also asked to share their opinion on the relationship between type of music and productivity /recall to understand the effect of social prescription.

Data Collection Procedure

Shortlisted participants were sent the link for the questionnaire and were advised to fill out their responses independently in an area with minimum distractions to ensure consistency of response environment. The participants were encouraged to spend 20 to 30 minutes on completing the questionnaire.

Ethical Considerations

Since this was an observational study, informed consent was a fundamental aspect, and each participant was provided with detailed information about the purpose, procedures, and risks of the study. They were explicitly informed of their right to voluntarily fill out the form if and when they pleased and were given sufficient time to complete the steps, allowing them to consider all the aspects before doing it.
To ensure the confidentiality and anonymity of the participants, stringent measures were implemented. All collected data was completely anonymous, with no internet record of personal identifiers such as name or Email Address. In addition to this, the response data that were collected were stored securely on a single Excel sheet that was not stored in the cloud but was a hard copy with limited access, granted only to the researcher and their supervisor. By maintaining anonymity, the study aimed to protect the privacy of participants and prevent the disclosure of any sensitive information. Additionally, throughout the research process, the principles of beneficence and non-maleficence were upheld. Every effort was made to minimize any potential harm or discomfort to the participants. The study focused on non-invasive data collection methods, and participants were not exposed to any physical or psychological harm while filling out the study form.

Data Analysis

The collected data was sorted and stored initially in an excel sheet following which STATA, a statistical software for analysis was used to analyze the data. Descriptive statistics including mean, standard deviations, frequencies, and percentages were computer to summaries the demographic characteristics of the participants and their responses to the questionnaire items. Inferential statistics such as correlation analyses and chi -squares tests, were employed to explore associations between music listening habits and academic productivity.

Statistical Analysis and Results

Listening to Music and Concentration & recall:

Analysis aimed to explore the relationship between listening to music and concentration and recall abilities among the participants. The hypothesis posited that listening to music is positively correlated with recall and concentration, while the null hypothesis suggested no such correlation. Below are the results obtained from the data analysis:
Descriptive statistics:
The mean concentration and record score was found to be 7.58 (Standard deviation= 1.103) on a scale of one to 10 (ref table 1). In contrast, the mean score for the frequency of listening to music during study sessions was 3.16 (standard deviation = 0.896), also on a scale of one to

10. This descriptor statistics provide an initial review of the participants concentration and recall abilities and the music listening habits while studying.

Table 1: Descriptive Statistics

Descriptive Statistics			
	Mean	Std. Deviation	N
concentrate and recall	7.58	1.103	100
Listening Music	3.16	.896	100

Table 2: Statistical Corelation

Correlations			
		concentrate and recall	Listening to Music
Concentrate and recall	Pearson Correlation	1	-.003
	Sig. (2-tailed)		.977
	N	100	100
Listening Music	Pearson Correlation	-.003	1
	Sig. (2-tailed)	.977	
	N	100	100

Correlations:

To assess the relationship between listening to music and concentration and recall, a Pearson correlation analysis was conducted. The results of the correlation analysis indicate that there is essentially no statistically significant correlation between listening to music and concentration or recall (r= -0.003, p=0.977, two-tailed) (ref table 2) . There is lack of adequate evidence to reject the null hypothesis since the p-value is higher than the typically accepted significance threshold of 0.05. Therefore, it seems unlikely that listening to music while studying has any discernible effect on one's ability to focus or recall information. In other words, the data analysis does not support the hypothesis that listening to music improves focus and memory.
It is essential to interpret these results with caution, considering potential limitations, such as the self-report nature of the data, and the specific characteristics of the sample. Further research may be needed to explore this relationship in more depth, including potential moderating or mediating factors that could influence the impact of music on concentration and recall during study sessions.

Gender variation of association of listening to music and Concentration & Recall:

The descriptive data provides an overview of the average association between music listening

and concentration as well as concentration and recall across different gender groups. The key findings are enumerated below.

Listening to Music
The mean score for the frequency of listening to music during study sessions varied among different gender groups. For males it was 3.29; for females, it was 3.07; for gender fluid individuals, it was 3.33; and for non-binary individuals, it was 2.33. The overall mean for music, listening across all gender groups was 3.16.

Concentration and recall
Concentration and recall scores also differed by gender. The mean concentration and recall scores for males was 7.71, for females, it was 7.44, for gender fluid students it was 7.339, and for non-binary individuals it was 7.67. The overall mean for consideration and recall cross gender groups was 7.58. To explore whether there is a statistically significant difference in the relationship between music listening and concentration based on gender, an analysis of variance (ANOVA) test was conducted. The results of the ANOVA test are detailed in table 4 and are discussed below:
Results (ANOVA Test)

Table 3:ANOVA test descriptives

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Listening Music	Male	49	3.29	.890	.127	3.03	3.54	1	4
	Female	45	3.07	.863	.129	2.81	3.33	1	4
	Gender Fluid	3	3.33	.577	.333	1.90	4.77	3	4
	Non-binary	3	2.33	1.528	.882	-1.46	6.13	1	4
	Total	100	3.16	.896	.090	2.98	3.34	1	4
Concentration and recall	Male	49	7.71	1.041	.149	7.42	8.01	5	10
	Female	45	7.44	1.216	.181	7.08	7.81	4	10
	Gender Fluid	3	7.33	.577	.333	5.90	8.77	7	8
	Non-binary	3	7.67	.577	.333	6.23	9.10	7	8
	Total	100	7.58	1.103	.110	7.36	7.80	4	10

P-Value

The p- value obtained from the ANOVA test was 0.251. Since this p value is greater than the conventional significance threshold of 0.05, there is insufficient evidence to reject the null

hypothesis which stated that there is no corelation between listening to music and concentration based on gender. Consequently, based on the data analysed, it cannot be concluded that the relationship between listening to music and concentration significantly varies, depending on gender.

Table 4: ANOVA test results

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Listening Music	Between Groups	3.307	3	1.102	1.390	.251
	Within Groups	76.133	96	.793		
	Total	79.440	99			
concentrate and recall	Between Groups	1.916	3	.639	.518	.671
	Within Groups	118.444	96	1.234		
	Total	120.360	99			

Effect Size

The effect size measurement, Eta-squared, was calculated to be 0.042 for the relationship between music listening and concentration based on gender. This indicated that approximately 4.2% of the variation in the relationship can be attributed to gender. However, it is important to note that the confidence interval for the effect size was very wide, ranging from .0000 to 0.118, suggesting a considerable variability in the estimate.

Table 5: ANOVA Effect sizes

ANOVA Effect Sizes[a,b]				
			95% Confidence Interval	
		Point Estimate	Lower	Upper
Listening Music	Eta-squared	.042	.000	.118
	Epsilon-squared	.012	-.031	.090
	Omega-squared Fixed-effect	.012	-.031	.089
	Omega-squared Random-effect	.004	-.010	.032
concentrate and recall	Eta-squared	.016	.000	.065
	Epsilon-squared	-.015	-.031	.036
	Omega-squared Fixed-effect	-.015	-.031	.035
	Omega-squared Random-effect	-.005	-.010	.012
a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.				
b. Negative but less biased estimates are retained, not rounded to zero.				

In summary, based on the data and statistical analysis conducted, there is insufficient evidence to support the alternative hypothesis suggesting that the relationship between music listening

and concentration differs significantly based on gender. The effect size, while indicating a small percentage of variation attributed to gender, also exhibits a wide confidence interval, underscoring the need for further investigation and consideration of additional factors that may influence this relationship.

Type or Genre of music and concentration

This analysis aimed to investigate whether the type or genre of music significantly affects concentration levels while listening to music. The hypothesis proposed that there is a difference in concentration levels among individuals listening to different kinds of music (alternative hypothesis), while the null hypothesis posits that there is no such a difference.
The ANOVA test conducted towards this effect, showed the following results:

Music Listening: ANOVA result for listening music variable, shown in table 5, indicated between group sum of squares of 22.393, within group, sum of squares of 57.047, and the total sum of squares of 79.440. The F statistic is 1.047, with a corresponding value of 0.424.

Table 6: ANOVA test for genre of music

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Listening Music	Between Groups	22.393	27	.829	1.047	.424
	Within Groups	57.047	72	.792		
	Total	79.440	99			
concentrate and recall	Between Groups	35.320	27	1.308	1.108	.356
	Within Groups	85.040	72	1.181		
	Total	120.360	99			

Concentration and Recall: For the concentration and recall variable, the ANOVA result revealed a between group sum of squares of 35.320, within group sums of squares of 85.040, and the total sum of squares of 120.360. The F static was 1.108, with a corresponding p- value of 0.356(see table 5). Values obtained from ANOVA tests exceed the conventional significance threshold of 0.05. Consequently, there is insufficient evidence to reject the null hypothesis for both listening music and concentration recall saying that type or genre of music significantly affects concentration levels during music listening.

Effect Size Measurement

For the “listening to music” variable, the computed eta- squared was 0.282. This suggests that various types of music account for approximately 28.2% of the variability in concentration levels. Absolute square was 0.013, and omega squared was 0.0126 (fixed effect).

For the “concentration and recall” variable, the computed eta- squared was 0.293, indicating that music accounts for approximately 29.3% of the variability in concentration. Epsilon squared was 0.029 and omega squared was 0.0286 (fixed effect).

These effect size measurements demonstrate a substantial degree of variability attributed to the type of music. However, the lack of statistical significance in the ANOVA results implies that this variability may not be practically or reliably relevant.

Table 7: ANOVA effect size calculation

ANOVA Effect Sizes[a,b]				
			95% Confidence Interval	
		Point Estimate	Lower	Upper
Listening to Music	Eta-squared	.282	.000	.201
	Epsilon-squared	.013	-.375	-.098
	Omega-squared Fixed-effect	.012	-.370	-.097
	Omega-squared Random-effect	.000	-.010	-.003
concentrate and recall	Eta-squared	.293	.000	.218
	Epsilon-squared	.029	-.375	-.076
	Omega-squared Fixed-effect	.028	-.370	-.075
	Omega-squared Random-effect	.001	-.010	-.003
a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.				
b. Negative but less biased estimates are retained, not rounded to zero.				

In summary, the results of the statistical analysis do not provide support for the alternative hypothesis that different types or genres of music significantly affect concentration levels. While there is a substantial amount of variability explained by the type of music, the absence of statistical significance suggest that this variability may not to be practically significant or consistent. Therefore, based on the data analysis conducted, it may be concluded that the type of music does not have a significant impact on concentration levels.

Discussion

This primary research explored the potential correlation between listening to music and academic productivity, focusing on IB diploma and high school students. The null hypothesis posited no correlation, while the alternative hypothesis suggested a positive relationship. The results of this study based on the Pearson correlation analysis revealed no statistically significant correlation between listening to music and concentration and recall. This finding suggests that according to this dataset, listening to music did not appear to have a significant impact on academic productivity.
These results align with some previous research that has indicated mixed or inconclusive findings regarding the relationship between Music and academic performance. Perham and Currie (2014) concluded from their study on the effect of listening to preferred music on reading comprehension performance, that while participants believe that Music helped them concentrate, it did not lead to improved reading comprehension scores (Perham & Currie, 2014). Similarly, another study found that music can be as distracting as noise for certain individuals (Furnham & Strbac, 2002).Despite the contrary research findings, there is anecdotal evidence and small-scale studies suggesting that music can enhance cognitive functioning and mood (Kasuya-Ueba et al., 2020) (Muslimah & Apriani, 2020); this study did not provide robust evidence to support such claims within the context of IB diploma and high school students.

Students have reported listening to music while studying to help them concentrate, their mood determining their decision to listen to music (Kotsopoulou & Hallam, 2010).
However, the impact of music on productivity may come with its own set of drawbacks. Research has also highlighted potential challenges associated with music listening, particularly when engaging with increasingly complicated tasks. For instance, music with lyrics, especially popular songs in mainstream media, has been found to significantly interfere with highly cognitive tasks. A quantitative study on the effect of music on reading comprehension on junior high school students used Billboard Magazine’s (2006) top single hits as a condition following which their reading comprehension scores were compared with the control group that did not have any music intervention. The results showed that reading comprehension scores declined significantly when listening to the music and illustrated a profound detrimental effect on comprehension for students, showing the stronger preference for listening to music while studying (Anderson & Fuller, 2010).

In addition to this, the effects of music on productivity break the barriers of cognitive functions. Music has been proven to influence mood (Newbold et al., 2017), stress levels (Thoma et al., 2013), and emotional states (Bishop et al., 2009), all of which can have a significant impact on task performance (Lesiuk, 2010)For example, relaxing music has been found to induce a state of alleviation of stress, creating the most optimal environment for studying and working (Linnemann et al., 2015). Music with a higher tempo can increase alertness and engagement with one's task and surroundings, and is often related with anxiety inducing situations (Thoma , 2017).

It is important to note that there are individual differences that play a role in how one responds to a specific type of music while studying or working. Furthermore, an individual's preference and familiarity with certain types of music can and has had a large influence on an individual's

motivation and overall enjoyment which in turn has been proven to affect productivity (Rentfrow & Gosling, 2003).The emotional connection that an individual has with their music and their cultural background can also influence their cognitive engagement and information processing during tasks. If one is listening to music that they feel and have an large emotional connection to, they may be deterred from their task and more inclined to sing along or enjoy their music (Rentfrow , 2012).

While this study provides valuable insights into the relationship between Music and academic productivity, several limitations must be acknowledged. First, the use of self-reported data introduces the potential for a response bias. Future research could incorporate objective measures of productivity and observational methods. Additionally, our study focused on a specific population of IB diploma and high school students, which limits the generalizability of our findings to other age groups or educational contexts. Expanding the research to include a broader range of participants could yield more comprehensive results. Finally, the nuances of music, including tempo, lyrics, and individual preferences, were not extensively explored in the study. Emotional connection and cultural backgrounds may play a significant role in how students cognitively respond to music while studying or working, hence future research could delve deeper into these factors to get a more thorough understanding of the relationship between music and academic productivity. This study is also limited by its small sample size of 100 participants which may not fully represent the entire population of high schools in the IB Program. In addition to this, the study's cross-sectional design limits the ability to establish a direct relationship.

Conclusion

This research study aimed to investigate the relationship between listening to music and productivity among high schools in the International Baccalaureate (IB) Diploma program. By using a cross sectional design and a stratified random sampling method, we collected data from 100 students to gain insights in their music preferences and productivity levels, to see the potential correlation between the two.
Our analysis of the data revealed several findings on each of the 3 hypotheses. First, we explored the hypothesis that listening to music is positively correlated with recall and concentration. However, our statistical analysis revealed p values that indicated no significant relationship between listening to music and recall, although there is a weak one that could potentially be explored further with experiments testing on specific music types.

Next, we investigated whether the correlation between music and concentration differs based on gender. Our ANOVA test results showed that the p value was not significant, suggesting that there is no substantial variation in the association between music listening and concentration between different gender groups.
Finally, we explored the impact of different types of music on concentration levels. By employing ANOVA and effect size measurements, we effectively assessed the influence of different music genres on productivity. However, the results did not show any significant difference in concentration levels among individuals with different music preferences.

Overall, this study provides valuable insights into the complex relationship between music and productivity among high school students in the most rigorous academic program. While media and popular belief praise the benefits of music on cognitive performance, our findings suggest that the margins of effect, while positively existing, are statistically insignificant.

In conclusion, this study contributes to the existing body of literature by providing evidence that challenges the common perception of music as a productivity-enhancing tool. While music can undoubtedly impact mood and emotions, our findings suggest that its effects on concentration and recall among high school students may be minimal. As individuals continue to seek ways to optimize their cognitive performance, it is essential to consider the multifaceted nature of music's impact and make informed choices based on personal preferences and task characteristics.

References

Anderson, S.A. and Fuller, G.B. (2010) 'Effect of music on reading comprehension of junior high school students.', *School Psychology Quarterly*, 25(3), pp. 178–187. doi:10.1037/a0021213.

Bishop, D.T., Karageorghis, C.I. and Kinrade, N.P. (2009) 'Effects of musically-induced emotions on choice reaction time performance', *The Sport Psychologist*, 23(1), pp. 59–76. doi:10.1123/tsp.23.1.59.

Chabris, C.F. (1999) 'Prelude or requiem for the "mozart effect"?', *Nature*, 400(6747), pp. 826–827. doi:10.1038/23608.

Delmonte, R. (2018) *Music Consumption , The Overall Landscape 2018*, *Audio Monitor U.S.* Available at: https://musicbiz.org/wp-content/uploads/2018/09/AM_US_2018_V5.pdf (Accessed: 06 September 2023).

Doyle, M. and Furnham, A. (2012) 'The distracting effects of music on the cognitive test performance of creative and non-creative individuals', *Thinking Skills and Creativity*, 7(1), pp. 1–7. doi:10.1016/j.tsc.2011.09.002.

Furnham, A. and Strbac, L. (2002) 'Music is as distracting as noise: The differential distraction of background music and noise on the cognitive test performance of introverts and extraverts', *Ergonomics*, 45(3), pp. 203–217. doi:10.1080/00140130210121932.

Gonzalez, M.F. and Aiello, J.R. (2019) 'More than meets the ear: Investigating how music affects cognitive task performance.', *Journal of Experimental Psychology: Applied*, 25(3), pp. 431–444. doi:10.1037/xap0000202.

Kasuya-Ueba, Y., Zhao, S. and Toichi, M. (2020) 'The effect of music intervention on attention in children: Experimental evidence', *Frontiers in Neuroscience*, 14. doi:10.3389/fnins.2020.00757.

Kesmodel, U.S. (2018) 'Cross-sectional studies - what are they good for?', *Acta Obstetricia et Gynecologica Scandinavica*, 97(4), pp. 388–393. doi:10.1111/aogs.13331.

Kotsopoulou, A. and Hallam, S. (2010) 'The perceived impact of playing music while studying: Age and cultural differences', *Educational Studies*, 36(4), pp. 431–440. doi:10.1080/03055690903424774.

Lesiuk, T. (2010) 'The effect of preferred music on mood and performance in a high-cognitive demand occupation', *Journal of Music Therapy*, 47(2), pp. 137–154. doi:10.1093/jmt/47.2.137.

Linnemann, A. *et al.* (2015) 'Music listening as a means of stress reduction in daily life', *Psychoneuroendocrinology*, 60, pp. 82–90. doi:10.1016/j.psyneuen.2015.06.008.

Morton, L.L., Kershner, J.R. and Siegel, L.S. (1990) 'The potential for therapeutic applications of music on problems related to memory and attention', *Journal of Music Therapy*, 27(4), pp. 195–208. doi:10.1093/jmt/27.4.195.

Newbold, J.W. *et al.* (2017) 'Using nature-based soundscapes to support task performance and Mood', *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems* [Preprint]. doi:10.1145/3027063.3053214.

Perham, N. and Currie, H. (2014) 'Does listening to preferred music improve reading comprehension performance?', *Applied Cognitive Psychology*, 28(2), pp. 279–284. doi:10.1002/acp.2994.

Pietschnig, J., Voracek, M. and Formann, A.K. (2010) 'Mozart effect–SHMOZART effect: A meta-analysis', *Intelligence*, 38(3), pp. 314–323. doi:10.1016/j.intell.2010.03.001.

Rauscher, F.H., Shaw, G.L. and Ky, C.N. (1993) 'Music and spatial task performance', *Nature*, 365(6447), pp. 611–611. doi:10.1038/365611a0.

Rentfrow, P.J. and Gosling, S.D. (2003) 'The do re mi's of everyday life: The structure and personality correlates of music preferences.', *Journal of Personality and Social Psychology*, 84(6), pp. 1236–1256. doi:10.1037/0022-3514.84.6.1236.

Sack, K. (1998) *Georgia's governor seeks musical start for babies*, *The New York Times*. Available at: https://www.nytimes.com/1998/01/15/us/georgia-s-governor-seeks-musical-start-for-babies.html (Accessed: 07 September 2023).

Schellenberg, E.G. *et al.* (2007) 'Exposure to music and cognitive performance: Tests of children and adults', *Psychology of Music*, 35(1), pp. 5–19. doi:10.1177/0305735607068885.

Shepherd, J. (2023) *23 essential spotify statistics you need to know in 2023*, *The Social Shepherd*. Available at: https://thesocialshepherd.com/blog/spotify-statistics (Accessed: 06 September 2023).

Social Blade (2023) *Lofi Girl's youtube stats (summary profile) - social blade stats*, *Social Blade*. Available at: https://socialblade.com/youtube/c/lofi_girl (Accessed: 07 September 2023).

Thaut, C. and Stephan, K.M. (2019) 'Neurologic music therapy in sensorimotor rehabilitation', *The Oxford Handbook of Music and the Brain*, pp. 693–714. doi:10.1093/oxfordhb/9780198804123.013.27.

Thaut, M., Hoemberg, V. and Abiru, M. (2014) *Handbook of Neurologic Music therapy*. New York, NY: Oxford University Press.

Thoma, M.V. *et al.* (2013) 'The effect of music on the Human Stress Response', *PLoS ONE*, 8(8). doi:10.1371/journal.pone.0070156.

Wilson, T.L. and Brown, T.L. (1997) 'Reexamination of the effect of Mozart's music on spatial-task performance', *The Journal of Psychology*, 131(4), pp. 365–370. doi:10.1080/00223989709603522.

Appendix

Appendix 1

Data Collection Questionnaire

1. What is your age?
2. Gender?
3. What are your subject areas of study? §§(Specify HL/SL for IB)
4. On an average, how many hours per week do you spend studying for your classes?
5. How often do you listen to music while studying?
6. What type of music do you listen to while studying?
7. On a scale of 1 to 10, how productive do you feel by listening to music while studying?
8. Why do you feel that way?
9. On a scale of 1 to 10, how well do you recall the material you studied by listening to music?
10. Do you have any diagnose learning disabilities or attention disorders? If so, what?
11. Do you listen to music regularly outside of studying?
12. On an average, how many hours per week, do you listen to music outside of studying?
13. Do you enjoy studying?
14. One on average, how many hours of sleep do you get per night?
15. Do you typically study alone, or with others?
16. How often do you experience distractions while studying?
17. On a scale of 1 to 10, how confident are you and your ability to concentrate and record information?
18. Do you think that there is a relationship between the type of music unproductivity/recall? Why do you think so?