DURMS
Durham Undergraduate Research in Music & Science

To What Extent Are Specific Type(s) of Music Conducive to Effective Study and, therefore, High Academic Achievement?

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ABSTRACT

In recent years, there has been increasing awareness of the effect of music on students' work, study and consequent academic achievement (Hallam & Rogers, 2016). As no previous studies have investigated the relationship between listening to music and academic attainment in detail, the main objective of this research was to explore to what extent specific music genres can contribute to worthwhile study which, in turn, produces academic results of a high standard at A-level (or equivalent, omitted hereafter) in the UK. Two-hundred and seven participants completed an online questionnaire asking how often they study, what music they listen to whilst studying, and what grades they achieved in their year 13 examinations. Results suggest choral music, film music and jazz as the three study music genres with the highest probability of students subsequently scoring AAA or higher at A-level. Ultimately, listening to music whilst studying was found to be more effective than not listening to music, providing a strong framework for further research in this area.

1. INTRODUCTION

The concept of study music is an especially under-researched topic within music scholarship and, more specifically, the field of music psychology. Of the little research that has been done (primarily by Kotsopoulou & Hallam, Etaugh & Ptsanik, and Furnham & Bradley), it soon becomes evident these studies fail to explore the effectiveness of study music on actual public exam results. Therefore, by not considering participants' real scores from nationwide examinations in correlation to study habits, subject choices, and a wider range of music genres, a clear gap in research literature has emerged for my own investigation, as will be demonstrated below.

The first key study to my research was carried out in 2010 by Anastasia Kotsopoulou and Susan Hallam on 600 student participants from Japan, Greece, the UK and the USA, who were divided into three age groups: 12-13, 15-16, and 20-21 years old. The study explored how these adolescents use music in relation to their education overall, instead of collecting and correlating this to any examination results. The distribution of rating scale questionnaires asked how often the students listen to music (from 1 "not at all" to 5 "often"), as well as questions which asked when and why they listen to music, what they listen to, and subsequently how it makes them feel. Whilst these results were harvested most recently from both a culturally diverse and large sample of students, these findings leave ample space for a more detailed correlational study into music as a tool to achieve high academic results, whilst also providing scientific literature with a clear, contemporary perspective on the accessibility and effects of music on the attainment of school leavers. Firstly, the researchers found the extent to which music was listened to was low, with little difference between age groups. Japanese students were found to listen to music the least, yet overall, "music was most often played in the background when thinking followed by writing and least often when memorising texts or learning a foreign language" (Kotsopoulou & Hallam, 2010, p. 433).

Overall, most students agreed that music helped them to relax and alleviate boredom, however, the final conclusion was that "students do not play music while studying extensively and that they rarely play music while revising for examinations, memorising material or learning a foreign language and most often play music when thinking or writing" (Kotsopoulou & Hallam, 2010, p. 438). Despite this, I would argue that in 2021, a similar study would reveal vastly different results. This is due firstly to the advancement of technology since the study was carried out - students aged 13, 16, and 21 in modern society now have access to a plethora of both streaming services to choose their study music from, as well as more developed devices to listen to such music with. One of the most significant limitations of the study is that no examination or coursework results were taken from participants of any country, meaning that this research only explores personal preference, as opposed to discerning whether music is an effective study tool.

Further relevant research was carried out on 20 females and 20 males American college students by Claire Etaugh and Patricia Pstanik in 1982. Unlike the previous example, these participants were divided into four groups and asked to study a specific passage of writing, either listening to music at a moderate volume or in silence for ten minutes. Once completed each of the four groups were asked to either: 1) lie on the floor and gradually relax their body for 10 minutes ("relaxation condition"), or 2) read an unrelated article from "Newsweek" for 10 minutes ("activity condition"). Once all participants had completed a short five question comprehension test on the initial passage, results demonstrated that those who relaxed after studying performed significantly better than those in the "activity condition" groups. Music preference also contributed to the overall results, with students who specified regularly working in silence or with music performing better in their preferred scenarios. Although this experiment provides a good amount of data, it seems the most significant discovery of this study is actually surrounding the usefulness of relaxation techniques after a session of study, as opposed to the efficacy of study music on academic performance. As the subjects were not asked what *genre* or *type* of music they choose to study with, future research into relaxation and activity conditions after study might also consider the role of particular styles of music on learning in order to discern how this could affect a student's academic achievement overall.

The final study included in my literature review consists of an experiment conducted at the University College London from 1997. Researchers here "looked at the distracting effects of 'pop music' on [ten] introverts' and [ten] extroverts' performance on various cognitive tasks" (Furnham & Bradley, 1997, p. 445). Such tasks were completed either in silence, or with pop music playing in the background. Immediate results demonstrated the detrimental effect of background pop music on both groups' recall ability, yet after a 6-min interval, the introverts' ability to recall information was significantly lower than their extroverted counterparts and introverted peers who were tested in silence. Although these are interesting findings, the study has numerous shortcomings. Research focus here is given almost wholly to the personality type assigned to each individual after taking the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1984), rather than the effect of music on study. Ultimately, this study cogently answers the question of which personality type performed better after learning with or without pop music, yet doesn't explore other genres, or academic performance any further than a short test. In addition, research into the relationship between academic achievement and personality type carried out by Noel and Dorothy Entwhistle discovered that "students with good study methods" (Entwhistle & Entwhistle, 1970, p.132) were amongst the highest scores, regardless of their personality type - leading to the conclusion that asking participants to complete the Eysenck Personality Questionnaire would not benefit my own research.

In light of this, it is apparent that the concepts of study music genre and preference in relation to academic attainment measured over a significant period of study time (for example, two years at A-level) has not been truly focused upon in recent psychological research and therefore does not reflect the modern students' experience of academic study, thereby forming a strong basis for the below investigation. This research aims to correlate a range of music genres identified as study music by participants to their public examination results previously completed in the UK; something that has not been done before. My first hypothesis concerning the use of music as a study tool foreshadows most participants reporting to use music as a study tool regularly, if not on a daily basis. Secondly, with regard to music type, I hypothesise Classical music and Lo-fi will correlate to high examination scores amongst participants, as research recently completed by Goltz, Sadakata and others suggests contemporary styles such as Pop, Hip-Hop and RnB "tend to reduce performance more than instrumental and classical music" (Goltz & Sadakata, 2021, p. 2; Chou, 2010; Li et al., 2012; Perham & Currie, 2014).

As a result, the main aim of this study is to explore whether or not such genres can actually be used as a study tool, and whether this tool helps students to succeed academically. Ultimately, I am confident my research will present both the field of music psychology and the country as a whole with a truer picture as to the role of music in a teenager's academic career in the 21st century, and provide clear suggestions as to what music genre is most conducive to high academic attainment.

2. METHOD

Design. The first part of my research consisted of a questionnaire developed and hosted by Qualtrics, an online survey platform, which took around 7-10 minutes to complete. In order to discern whether music is conducive to effective study and, therefore, high academic achievement, the dependent variable (exam results) would consequently be correlated against the independent variable (study music choice) once answers had been collected. This benchmark of nationwide public examinations was used as all students are required to partake in these assessments in the last term of their school careers before going onto university, apprenticeships or paid work, and is therefore the last point at which participants can be compared fairly.

Participants. The Qualtrics questionnaire was disseminated amongst University students (music and non-music) from both Durham and other institutions, as well as other adults who have completed A-level examinations in the UK. This was shared on both my social media accounts and with other groups I am part of (e.g., National Youth Choir of GB, BBC Symphony Chorus). All responses were completed voluntarily and anonymous. Overall, 255 people responded to the online questionnaire - however, as some respondents did not fully complete all questions, the data were cleaned, leaving 207 responses that could be used to correlate academic achievement to study music. Of these, 94 respondents were male and 113 were female, demonstrating an unusually even 45% male to 54% female split. Participants ages ranged from 18-80+ years, as age categories of roughly 10 years (for example, 18-30 years) were used.

Procedure. The questionnaire was divided loosely into four sections, which were not displayed to participants. The first section asked two questions about age and gender, before moving onto whether they attended a private or state school, in order to make sure the data collected was as diverse in background as possible. Participants were then asked to record what style of examination they undertook in year 13 – options for A-level/IB/BTEC/Other were included, to make sure both academic and vocational qualifications (that often include practical work and academic study) were not excluded. If A-levels were chosen, participants were then asked to list their three highest scoring subjects. For other qualifications, participants were asked about which subjects were taken and the grade(s) or score(s) they achieved overall. Following on from this, the questionnaire asked participants if they were currently enrolled on (or had previously completed) a higher education course.

The third section of the questionnaire asked crucial questions about music related to study. The first of these asked how often participants study academic material, before asking if they considered themselves to be musical, or a musician. This question was asked due to the high volume of music students completing the survey, to see if this might affect their choices

and/or results. Participants were then asked how often they listen to music whilst studying and, most importantly, which genre of music they usually listen to**.** Only one option was available for this question, in order to make sure the information collected was specific to studying academic material. The next question asked participants why they think their choice of genre is effective for study, with the final section asking more general questions about streaming services, the use of study music by friends and family, and awareness of previous research.

3. RESULTS

To test my initial hypothesis predicting the widespread and frequent use of study music amongst participants, results from questions surrounding the overall prevalence and use of study music were analysed to produce bar graphs representing my findings. Subsequently, in order to discern whether Classical music and Lo-Fi would correlate to high examination results amongst participants, a scoring system was devised to map each participant's overall performance against their choice of study music in a pivot table, before using this to formulate a graph depicting the probability (and standard deviation) of achieving three A grades by music genre; all created using Microsoft Excel.

Figures 1 and 2 show how often participants usually study academic material, and if this revision was regularly accompanied by study music. It was learned that 77 participants reported to studying academic material 'every day', followed by 30 answering 'every other day', and 43 answering 'every few days'. As hypothesised, 84% of participants also reported listening to music whilst they study either always, nearly always, about half the time, or sometimes, with the remaining 17% studying without music.

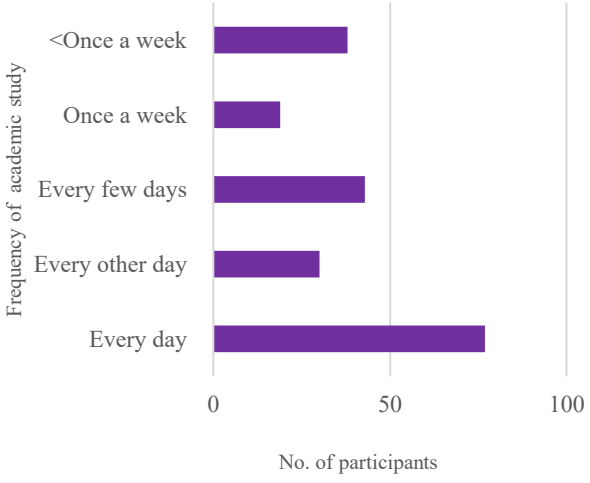

Figure 1. Frequency of academic study

Following on from this, 94% of participants answered to having undertaken A-levels at school, with the remaining 6% completing either Welsh Baccalaureate, IB, BTEC or Scottish Highers. In addition, 91% of participants were either enrolled

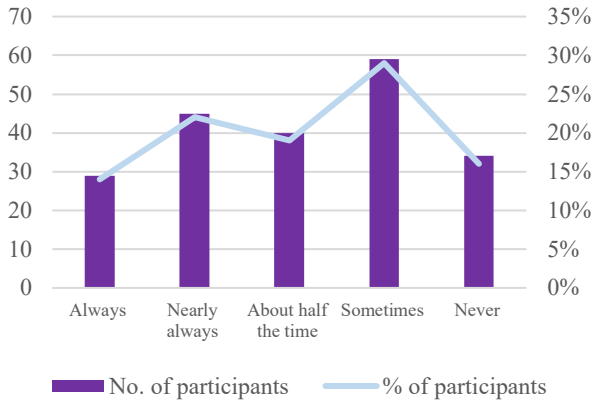

Figure 2. Frequency of music listening during study

in education course at the time of the questionnaire, or had previously completed a Higher Education course. The pie chart results shown in Figure 3 shows a varied selection of subjects taken by participants at Sixth Form level. 14% of participants took mathematics, making it the most popular subject choice; reflecting the general national trend (ONS, 2018-2020). Other STEM subjects such as Physics, Chemistry and Biology were also popular, with English, History and Music appearing as favoured choices in the humanities departments.

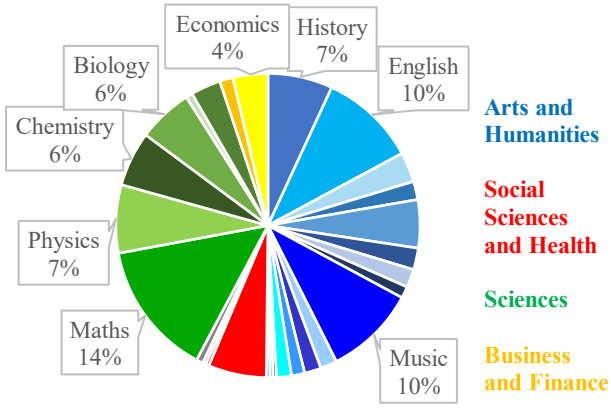

Figure 3. Participant's A-level subject choices

Participants were then asked the pivotal question: What genre of music do you usually listen to whilst studying? As demonstrated by Figure 4, Classical Music was found to be the most popular genre overall, with Pop Music and Lo-Fi beats in close pursuit – this, however, does not provide detail as to which genre of music is in reality the most effective for study, as the corresponding exam results were not compared here. Compellingly, participants reasons for listening to study music were found to be well balanced between two answers – 77 participants revealed that study music helps to relieve academic

stress or pressure, with another 77 participants reporting that it helps them to concentrate. The remaining answers included those such as "all of the above", "it helps me memorise material", and "it keeps me happy".

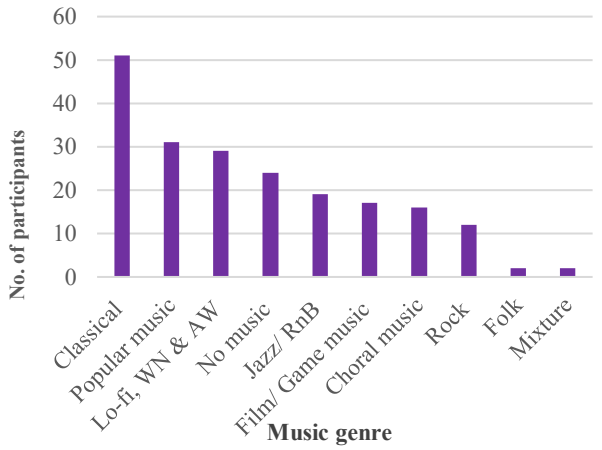

Figure 4. Genres chosen by participants to listen to whilst studying

Once A-level grades and study music choices had been collected, each participant was given a score out of fifteen, so that all participants' examination results were compared fairly. This was calculated so that an A* grade at A-level equalled 5 points, moving down the numerical scale meaning 1 point represented a D grade. The highest score one could achieve was therefore 15 points (3A* grades) with the lowest achievable score being 3 points (3D grades). A score was then calculated for each participant and organised into a pivot table, shown in Table 1. Overall, the category of Lo-Fi Beats, Alpha Waves and White Noise contained the most students scoring 15 (A*A*A*), although the higher number of participants in lower grade brackets ultimately brought down the grade average for that category. Other genres scoring highly in the top-grade brackets (15-12) were, Jazz, Choral, Pop, and Film Music.

Table 1. Participants' A-level Scores Against their Chosen Genre of Study Music

Music genre	A-level score												Grand Total
	15	14	13	12	11	10	9	8	7	6	5	4	3	
Choral music	2	3	3		1	5	1					1		16
Classical	1	1	6	14	5	4	7	6	1	2		3	1	51
Film music	3	2	1	1	4	2	1	2		1				17
Folk					1			1						2
Jazz	3	1	2	2	4	1	2	3				1		19
Lo-fi beats, AW & WN	5	2	5	5	4	6	2	3	1	2	1		2	38
Mixture		1						1						2
No music		3	2	3	5		5	1	2	2	1			24
Pop	2	2	2	4	5	3	2	1	1	3				25
Rock	1		2		2		3	2	1	1				12
Grand Total	17	15	23	29	31	21	23	20	6	11	2	3	5	206

The pivot table was then used to calculate the probability of a student achieving 12 points (AAA) or higher at A-level, should they listen to a particular genre of music. As evidenced by Figure 5, Choral Music has been found to correlate to both the highest overall grade average scored by participants in this study (11.5) as well as the highest probability of scoring AAA or better (43.5%). This was followed closely by Film Music at 40.6%, with the participants' grade average falling at 11.35. Thus, the top five most effective study music genres (as suggested by this research) in order are: Choral Music, Film Music, Jazz, Lo-Fi Beats, and Popular Music. The error bars represent the standard deviation for each music genre, ranging from 2.71 - 3.24.

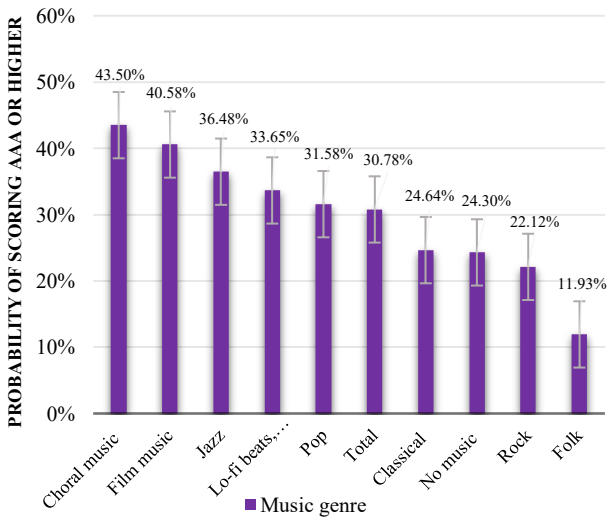

Figure 5. Probability of achieving AAA+ for each genre of study music

Most crucially, it was discovered that students who do listen to music whilst studying are more likely to score higher grades at A-level (or equivalent) than those who do not - an important finding helping to prove the initial impetus for this study, shown clearly in Figure 6. Those not using music as a study tool have only a 24.3% probability of scoring 12 or higher; the third lowest score when compared to other music genres; although it should be noted that the sample size for those studying without music made up a smaller portion of the overall participant group (17%).

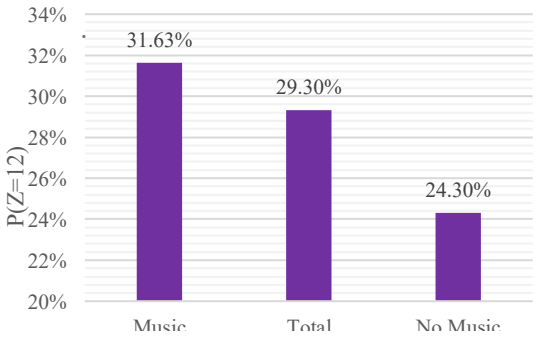

Figure 6. Effectiveness of studying whilst listening to music vs. studying with no music on A-level grades

Lastly, students who listen to music with words were found to have a higher probability of achieving ≥ 12 points (33.5%) than students who listen to music with no words (29.3%).

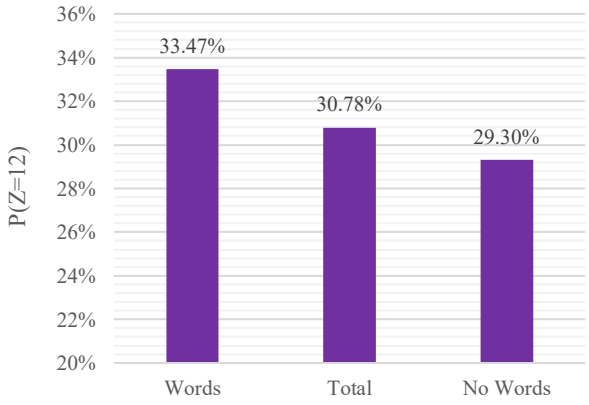

Figure 7. Effectiveness of music with words vs. music with no words on A-level grades

The last points of comparison explored which genres of study music were most popular with students studying in a particular field. Of the top five genres discovered to be most effective for study, Lo-Fi Beats, Classical, and Pop music were the most popular genres for Science students, whereas for Arts and Humanities students, Jazz, Choral and Film Music were significantly more popular. Business students largely favoured Classical Music, and Social Science students listened mostly to Lo-Fi and Classical Music; the genre most popular amongst all students. Finally, participants were asked if they considered themselves to be musical or a musician to account for the high number of music students taking part in this survey, however no significant anomalies were found when musician and non-musician groups were compared in terms of overall A-level score or music preference.

In summary, my earlier hypothesis which argued students would report to using music as a study tool regularly, if not on a daily basis, was largely supported by the results of this study. Some differences appeared as to which genre of study music is most effective, yet the overall findings strongly support the conclusion that music is conducive to both study and, therefore, high academic achievement. Well over half the participants (64%) in this sample were aged 18-30, which also helps to give an up-to-date picture of how modern students use study music.

4. DISCUSSION

Data collected from this sample set suggests that listening to music whilst studying increases your probability of scoring all A*-A grades at A-level in the UK. Within this, students who listen to Film Music, Choral Music, and Jazz whilst studying achieved the highest scores overall. Evidently, the large proportion of participants (83%) who reported to using music as a study tool suggests that modern students do in fact listen to music (as opposed to silence) whilst they study and have done for several years, strongly contrasting the findings of Kotsopoulou and Hallam's study (2010). On the other hand, participants responses did support their finding that music helps students to relax or alleviate boredom, as well as facilitating better concentration and memorising of material.

Moreover, these results compound Etaugh and Ptsanik's (1982) finding that preference plays a role in the overall success of study music, as all participants gave compelling reasons for choosing a particular genre which they use(d) when completing revision for examinations. My original hypothesis predicted that classical music and Lo-Fi Beats would score highly, which ultimately was not the case. Further to this, my prediction that music with words would not be as effective (as it may interfere with the phonological loop responsible for processing information) was disproved, as the probability of scoring 12 points or higher when listening to music with no words was 4% lower, although this may be within the margin for error. Despite most participants using study music, few were aware of any previous research, demonstrating both the novelty of this study as well as participants' intuitive awareness of the benefits of study music, with results achieved by comparing actual exam results to participants music, subject and study choices.

Besides this, one limitation of the study showed the 12-point (AAA) average to be higher than the national average from 2018-2019, however, a good number of participants were educated in both the private/state sector to ensure diversity in background & experience. Lastly, as this study was only available to consenting adults, there was no way of gathering evidence from those currently undertaking A-level or other examinations. By this, future research could use a between-participant design to observe small groups studying information over a period of time (e.g., 3 months, replicating long term exam revision) whilst listening to one of the top four study music genres from this research project, as well as some studying in silence. The results from a short test at the end of a 3-month period would provide further useful evidence as to which genre, and even individual music track, is most beneficial for study. In conclusion, when paired with little existing research, this study's novel discovery of music as an effective study tool provides the bedrock upon which further research may seek to explore the relationship between music and study and promote music as an aid to learning in future.

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