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Abstract

This study investigates the relationship between listening to music and studying ability in college students. This study was conducted by utilizing a convenience sampling technique to have participants partake in the study. Each participant was randomly assigned to either a control or one of two experimental groups based on block-random assignment. The individuals in the first research group listened to a brief segment of a hit song while studying a list of uncommon words and definitions before being tested on their ability to recall this information. The individuals in the second research group listened to a brief segment of the instrumental version of the same hit song as the first research group while studying the same list of words and definitions before being tested. The individuals in the control group studied the same list of uncommon words and definitions without the music stimulus and were then tested on their ability to recall the information. The data for each participant was kept anonymous as it was analyzed. Each participant was a student at a small, midwestern university. The null hypothesis for this study is that there is no relationship between listening to either lyrical or instrumental music and studying ability. Following a statistical analysis, I fail to reject the null hypothesis as there was not a significant difference in the posttest scores for the participants in each group. Due to the convenience sampling technique utilized, the results cannot be generalized to a larger population. Further research needs to be performed to determine if there is a relationship between listening to both lyrical and instrumental music and effective studying ability in college students.

Keywords: music, studying, multitasking

The Impact of Music on Studying Ability in College Students

Students often attempt to multitask when they are working on academic projects, including studying. One of the most common forms of multitasking is listening to music while either studying or completing a homework project (Silasi-Mansat, 2017). Student's genre preferences vary greatly, including which types of music they prefer to listen to when studying. Research has displayed conflicting results when examining the impact of multitasking on studying versus the impact that listening to music has on studying. Research has further investigated this idea by specifically analyzing the impact of lyrical versus instrumental music (Crawford & Strapp, 1994). This study aims to evaluate the relationship between listening to both lyrical and instrumental music and studying ability in college students. This information can hopefully then be used and applied to develop the most effective and efficient studying models and methods for students in college.

There are a large variety of ways in which a student can multitask while they are attempting to study. However, research is conflicting as to whether one can actually consider this multitasking, or whether a person is simply attending to other distractions while studying. In 2014 a study was conducted on college campuses of multiple potential distractions over a 3-hour long homework and study session (Calderwood, Ackerman & Conkman, 2014). These distractions included things such as listening to music, conversing with friends by cell phone, social media usage, as well as internet usage. Unobtrusive recording measures were utilized and displayed that long distractive breaks were quite harmful to a student's ability to retain information, while short breaks were actually beneficial and increased a student's intensity of studying. This suggests that multitasking can be beneficial if done in the correct doses.

There are varying levels of support for specifically listening to music while studying and its potential harm on memory and retaining information. Another study in 2011 displayed that listening to

music does not have a negative impact on studying as a whole (Johannson, Holmqvist, Mossberg & Lindgren, 2011). Students who listen to music while studying tend to listen to the genre or style of music that calms them or that they prefer when they are studying (Silasi-Monsat, 2017). This would limit the distractions of other potential music that they do not particularly enjoy and the other factors that this would bring. These ideas are supported in this study as the college students who were studied showed no significant differences in studying ability while listening to their preferred genre of music. However, while listening to a genre that they do not prefer, the students performed significantly worse on their testing. This provides a middle ground perspective on the issue and furthers the debate.

The argument for music and other distractions not having an impact on participants ability to retain information and study is based on an individual's attention. In 2017, one study displayed that it is our ability compensate for the influence of distractions by using a selective-attention approach to place a greater focus on the most important information (Middlebrooks, Kerr, & Castel, 2017). This argument has existed for decades as in 1952, Freeburne and Fleischer came to the same conclusion in that when listening to music, individuals are capable of placing an increased attentiveness to the more valuable sensory input (Freeburne & Fleischer, 1952). This approach argues that we are capable of effectively attending to the most valuable information and that there is not a negative impact on memory. This argument stands true for a great majority of distractions, including both instrumental and lyrical music.

The debate as to whether listening to music can be helpful or harmful is further intensified by the comparison of instrumental and lyrical music. The comparison of these two types of music can mimic the comparison of preferred or nonpreferred music that a participant listens to while attempting to perform a task. Some studies, such as that by Johannson, Holmqvist, Mossberg & Lindgren (2011) do display that listening to any kind of music does not hinder comprehension ability. However, one study in 2004 displayed that listening to music actually increased comprehension and performance ability in cognitive tasks (Crust, Clough, & Robertson, 2004). This study furthered their research by separating

lyrical from instrumental music and displayed that instrumental music significantly increased participants abilities to complete cognitive tasks.

There are other studies whose research shows that music is harmful in general. A study was conducted in 2009 that analyzed the differences that listening to instrumental music versus vocal music would have on studying ability (Kantner, 2009). The instrumental listening group performed slightly better, however, the difference between the groups was not significant. Both groups performed significantly worse on the testing portion of the study furthering the researchers claim for the irrelevant speech effect. These results are corroborated by another study conducted in 2014. This study also displayed that there was no difference between lyrical and instrumental music in harming a participant's performance. However, these individuals did perform significantly worse than those who did not listen to music (Perham & Currie, 2014). Finally, in 2015, a study was conducted that compared young adults and older adults with the impact that music had on their ability to focus (Reaves, Graham, Grahn, Rabannifard & Duarte, 2015). They found that based on a visual assessment, older adults performed significantly worse on the task when exposed to any kind of music. This supports the idea that our cognitive attentive ability becomes more selective and less capable as we age. Although there did not prove to be a difference in the ability of college students, each participant labeled the music as very distracting during the task. The research performed so far appears to represent a continuum of whether listening to music has no impact on a student's ability to study, or whether it is harmful to their ability. This is the foundation for this study.

This study examines the relationship of multitasking, specifically listening to music, on a student's ability to study and retain information. I attempted to find a relationship between listening to lyrical music, instrumental music, or not listening to music and a student's ability to retain information regarding definitions to specific words provided. I analyzed students listening to music and students who did not listen to music while they were studying the information provided. The average amount of

information (number of definitions) correctly retained for both music listening groups and the non-music listening group will be analyzed in comparison to one another. The null hypothesis in this experiment is that there will be no difference in a participant's ability to retain information whether they are listening to lyrical music, instrumental music, or not listening to music at all. However, based on prior research, I expect the students who listened to lyrical music while studying will retain less information that they studied than the individuals who did not listen to music; while individuals who listen to instrumental music will retain approximately the same amount of information as those who do not listen to music. Data will be collected and analyzed in an attempt to find a more clear understanding of the impact that listening to music can have on a student's ability to study and retain information.

Methods

Design

I conducted a study of 30 undergraduates at a small, midwestern liberal arts college. The 30 participants were acquired through a convenience sample and were randomly assigned to the independent variable levels of study using block random assignment. The participants were assigned to a popular music listening group, an instrumental music listening group, or a control group.

Individuals who were placed in the popular music listening group were given headphones and instructed to adjust them as needed for sizing. They then were exposed to 10 seconds of the song "Glad You Came" by The Wanted to test the volume of the headphones. The participants could then adjust the volume accordingly so that it was at a comfortable volume. Following these adjustments, the participants were exposed to 1 minute of "The Middle" by Zedd; a song that belongs in the dance or electronic genre. I began the song at 0:29 and continued playing it until 1:29. During this time, a sheet of paper is set in front of the participant with 10 words and their corresponding definitions for 1 minute. The participant is instructed to study these words and to attempt to remember the correct definitions

for each. Following the 1 minute period of listening to the music and studying the definitions, the song is stopped and the sheet with the vocabulary words is removed from in front of the participant. The participant is then instructed to relax and sit in the chair for 1 minute. Following the 1-minute period, the participant is given a 10-question, multiple choice quiz on each of the vocabulary words studied in an attempt to see how many definitions the participant can correctly remember.

Individuals who were in the instrumental music listening group were also given headphones and instructed to adjust them for sizing as needed. They were then exposed to 10 seconds of the instrumental version of “Glad You Came” by The Wanted to test if the volume was at a comfortable level for participants. The volume could be adjusted if necessary. Participants are then exposed to a 1 minute excerpt of the instrumental version of “The Middle” by Zed. I began the song at the same mark (0:29) as the popular music listening group. As the music starts playing a sheet of paper is set in front of the participants with the same list of 10 words and definitions as the popular music listening group. The participant is instructed to study these 10 words and definitions for the 1 minute while the music is playing. As the 1 minute concludes, the music is stopped and the vocabulary study sheet is removed from in front of participants. The participant is then instructed to relax and sit in the chair for 1 minute. Following the 1 minute period, the participant is given a 10-question, multiple choice quiz on each of the vocabulary words studied in an attempt to see how many definitions the participant can recall. This quiz is the same quiz provided to the individuals in the popular music listening group.

Participants who were placed in the control group had a sheet of paper with the same vocabulary words and definitions as the music listening group placed in front of them. These individuals were told they had 1 minute to study and attempt to remember the words and their definitions. Following the 1-minute period, the sheet was removed from in front of the participant and the participant was then instructed to relax and sit in the chair for 1 minute. Following the 1-minute period,

the participant is given a 10-question, multiple choice quiz on each of the vocabulary words studied to see how many definitions the participant can correctly recall.

Participants

I analyzed 30 participants in this study. Of these 30 participants, 14 were male and 16 were female. Each participant is a student at a small, private midwestern university as is between the ages of 18-22.

Materials and Questions

The words and definitions utilized on the study sheets and quiz were taken from an online version of the Oxford Dictionary. The words utilized were designed to be uncommon words that participants likely were unfamiliar with and that did not utilize commonly known prefixes, suffixes, or word roots. The words provided to the participants to study were: anfractuous, boffola, cacoethes, concinnity, dwaal, nacarat, paludal, sangoma, zetetic, and noyade. The headphones that were used for each participant in the music-listening group were Bose over-ear headphones that were rented from the Saint John's University Alcuin library. These headphones were plugged into an HP Envy laptop utilizing Google Play Music. Google Play Music was used to play "Glad You Came" by The Wanted and "The Middle" by Zedd, along with the instrumental versions of both songs. "The Middle" was selected for the music choice as it was the most popular song on the Google Play "top hits" chart at the beginning of the experiment that did not include explicit lyrics.

Results

I utilized the SPSS data analytics program to evaluate and interpret the results of the study conducted. The instrumental music listening group (M= 7.7, SD= 1.16) scored higher than the lyrical music listening group (M= 7.6, SD= 1.43) and control group on average (M= 7.2, SD= 1.55). Based on a

one-way ANOVA, there was not a significant effect for listening to either instrumental or lyrical music, $F(2,27) = .363$, $p = .699$, as none of the groups scored significantly higher than the others.

Discussion

When analyzing the test scores for individuals in both the control and experimental groups, the data suggests that there is no relationship between listening to music and ability to study. There is not a significant difference between the average test scores of individuals who listened to lyrical or instrumental music while studying and individuals who did not listen to music while studying. These results display that listening to music neither improves nor harms one's ability to study and retain information, on average. The mean scores suggest that there may be a slight increase in studying ability if one is listening to music as the experimental groups have a slightly higher average test score. However, this study does not have the power necessary to confidently support this theory. Based on this analysis we fail to reject the null hypothesis that there is no relationship between listening to music while studying and studying ability.

This study does not have external validity. The participants were chosen based on a convenience sample originating from students in on Research Methods class as well as the peers of the researcher at a small, Midwestern university. Due to the nature of the sampling technique, we do not have a representative sample of the population and therefore we do not have external validity. The construct validity of this study is intact. The individuals in the experimental group each went through the exact same procedure with the exact same materials. The individuals in the control group also went through the exact same procedure with the exact same materials. Each participant looked at and studied the same 10 words and definitions. The test following the rest time examined the participant's ability to remember the definition for each of the 10 definitions. The only threat to the construct validity is that

the posttest was of a multiple-choice design so there is a 25% chance on any given question that a participant could guess the correct answer to a question even if they do not know the answer.

This same aspect is the only credible threat to the statistical validity of the study. Because of the small chance that an individual guesses correctly on a question, the average score of each participant may be slightly higher than a score that actually represents their knowledge and ability to study the 10 words and definitions. However, outside of this aspect, the statistical validity of this study is intact. The calculations were performed accurately while testing for a potential significance value below the threshold of $p < .05$. However, no significance values neared this threshold, decreasing the likelihood that any type 2 errors were made.

My research somewhat supports the ideas of those referenced in the introduction. The evidence is largely inconclusive as to whether a relationship exists between listening to music and studying ability exists, and if one does exist, as to which direction the relationship travels. The results of my study do not align with the findings of the study performed by Kantner (2009), by Reaves, Graham, Grahn, Rabannifard, and Duarte (2015), or Perham and Currie (2014). The results of my study suggest that there is no relationship, unlike their findings and claims that listening to music is harmful to one's ability to retain information. The results of my study also do not align with the findings of Calderwood, Ackermann, and Conklin (2014), or Crust, Clough, and Robertson (2004) in that listening to music is helpful for short periods while studying.

My results align most consistently with that of Johansson, Holmqvist, Mossberg, and Lindgren (2011), as well as Middlebrooks, Kerr, and Castel (2017) and Freeburne and Fleischer (1952) in that listening to music does not increase a student's ability to study and retain information; however, it also does not hinder a student's ability to retain information. My study supports the theories established by these studies in that individuals are able to selectively attend to the more important information that is

being experienced. Participants were able to place a greater amount of attention on the vocabulary worlds and definitions that were studied than on the music that they were also being exposed to at the same time. This holds true most often when a student's preferred type of music is listened to; I chose the most popular song in the United States at the time of the study, increasing the likelihood of this being the case. The results of other studies in this area have been inconsistent and inconclusive in their findings. This is reflected in my study as there was no relationship found with the lack of power in my study.

The primary limitation of my study was the sampling technique used as well as the number of participants. The small number of participants established a very low power level for this study which provided a much smaller opportunity to achieve statistical significance. The sampling technique utilized did not provide a representative sample which does not allow me to externalize any conclusions that I may reach. A second limitation of my study is the time constraint to perform the study. Due to the short time to perform the study I was only able to study my independent variable at 2 levels. I was also limited in the information that I was able to test participants on as each individual test had to be done in a constrained period of time. For further research I would sample a representative population on more extensive studying material, as well as include more independent variable levels to include more genres of music. Along with these adaptations I would expand the time frame for each aspect of the testing sections. These potential opportunities would allow for greater analysis of this interaction. The results of my study display that there is no interaction between listening to music and studying ability, however, further investigation is required in order to confirm this conclusion.

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