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Abstract

The current study seeks to understand how background music affects reading comprehension depending on the personality of the individual. According to Eysenck's theory of personality, extraverts perform better with high levels of outside stimuli compared to introverts. So far, support for this theory has been unclear. This could be because the tasks participants are being asked to complete are too easy, resulting in little competition between mental resources. In order to better understand whether or not task difficulty is important, this study uses both easy and difficult reading conditions. Participants listened to Alternative/Rock music with lyrics while reading easy or difficult reading passages, and then answered comprehension questions to the best of their ability. Based on previous research, the study hypothesized that in the easy reading condition introverts and extraverts would have similar scores, but for the difficult reading condition extraverts would perform better than introverts. There were no significant results for the interaction between extraversion and reading difficulty, however, a pattern did emerge to support this hypothesis. In addition, studying habit was measured to reveal that scores for participants who regularly listen to music while studying were not significantly different from scores of participants who do not regularly listen to music while studying. This was true for both easy and difficult reading passages.

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Background Music

There has been extensive research on music and its impact on cognitive ability. This area

is of interest to so many because music is used in a variety of settings, like school and work, to

increase productivity and motivation. Despite its popularity, music's impact on cognitive

performance remains unclear. Previous research has produced conflicting results, with some

studies finding no effect (Kämpfe, Sedlmeier & Renkewitz, 2011; Küssner, 2017), decreased

performance (Anderson & Fuller, 2010; Dobbs, Furnham, & McClelland, 2011; Furnham &

Strbac, 2002; Perham & Currie, 2014), or improved performance (Furnham & Allass, 1999) on

cognitive tasks. The broad variety of specifications used across these studies have made data

difficult to compare, yet a meta-analysis of 97 studies was conducted on the topic, to reveal a

global null-effect for background music's impact on performance (Kämpfe et. al, 2011). The

inconsistency of these results could depend on the complexity of the task being done. There is

reason to believe tests of reading comprehension, rather than short-term memory, will work best

in order to measure the impact music has on processing (Fiveash & Pammer, 2014; Furnham &

Strbac, 2002). Additionally, individual personalities might have a meaningful impact on

cognitive performance in the presence of background music. Previous research has suggested

that introverts tend to excel when outside stimuli, like background music, are at a minimum,

while extroverts perform the same or better with the inclusion of outside stimuli compared to

silence (Daoussis & McKelvie, 1986; Dobbs et. al, 2011; Furnham & Allass, 1999; Furnham &

Strbac, 2002). Understanding previous work on reading comprehension, personality, and

background music will help guide the direction of future studies in order to gain some clarity on this continuing topic.

Any student or employee who has to share an office space with others will agree that there are some individuals who need absolute silence to get any work done, while others need a noisy television or radio playing. It is hard to imagine how two people can get the same work done in such different environments, yet there is reason to believe personality factors, like level of extraversion, allows such individuals to function with varying degrees of outside arousal. A compelling study tested the impact of background noise and background music on school children ages 11-18 (Dobbs et. al, 2011). Participants experienced silence, classroom noise, or high tempo vocal music as they completed a test of perceptual reasoning, general cognitive ability, or verbal reasoning. Results indicated that in the noise condition, test performance of extraverts was unaffected, while introverts performed significantly worse than the extraverted group. Results in the music condition were unclear. This suggests that extroverts perform better than introverts when a background stimulus is present.

Additional studies have shown similar results. In a study of background music and reading recall, extraverts were found to perform better than introverts when music was present (Daoussis & McKelvie, 1986). Participants were 22 extravert and 26 introvert undergraduate college students. Two groups containing both introverts and extroverts were made, with one being in the experimental condition, and the other serving as a control group. In both conditions, these groups were asked to read a passage for about 10 minutes and then answer questions about the reading. The experimental group completed this task with rock music playing in the

background, while the control group completed the task with no music playing in the

background. Results demonstrated that extraverts performed equally well in both conditions,

while introverts did significantly worse when music was present. These results seem to suggest

that extraverts are able to handle distracting background music better than introverts. This study

also measured musical preferences, and although both groups enjoyed rock music, 50% of

extraverts reported listening to music regularly when studying, while only 25% of introverts

reported this habit. The current study will include a question on studying routines in order to

understand if listening habit influences scores on a reading comprehension task.

  Another compelling study on the matter conducted by Furnham and Allass (1999), sought

to understand the interaction between personality type and music that varied in complexity. This

study referenced Eysenck's theory of personality (as cited in Eysenck, 1967) to hypothesize that

introverts would perform worse than extroverts on cognitive tasks in the presence of simple

music, and increasingly worse in the presence of complex music. Meanwhile, it was predicted

that extroverts would do slightly better with simple music, and perform much better with

complex music, all based on their personality type's optimal level of arousal.

  Participants were 24 introverts and 24 extroverts, as determined by the Eysenck

Personality Questionnaire, who were undergraduate psychology students. Each participant

underwent one of three musical conditions; either silent, simple, or complex, with a different

cognitive task for each music condition, such that four extroverts and four introverts experienced

each combination. Cognitive tasks were a reading comprehension task, memory test, and a test of

observation and clear thinking. Results revealed an interaction between the type of background

music and extroversion for the memory and observation/clear thinking test. Extroverts did the

best in these tests when the music was comlex, and slightly worse with simple music. In contrast,

introverts performed significantly worse when the music was complex. This supports Eysenck's

theory of personality, and suggests that extroverts perform best with higher levels of arousal,

while introverts perform best with low levels of outside arousal. Interestingly though, no

significant effects were found for the reading comprehension task. This could have resulted from

such a small number of participants (four) being present in each condition. The current study will

test reading comprehension alone, and will include more than four participants in each condition.

Furnham and Strbac (2002) conducted a study to examine whether or not background

noise is as distracting as background music while looking at the personality of the participants.

The study included 38 introverts and 38 extraverts, according to the Eysenck Personality

Questionnaire, who were exposed to silence, garage music, or office noise while completing a

reading comprehension task, prose recall task, or mental arithmetic task. Each participant

experienced all three background stimuli conditions with a different cognitive task. Based on

Eysenck's hypothesis of the difference in optimum cortical arousal in introverts and extroverts,

they hypothesized that introverts would do worse on all three tasks in both noise conditions, but

would have results similar to extraverts in the silent condition. In addition, Furnham and Strbac

predicted that performance would be worse for everybody in the music and office noise

condition compared to silence. Results indicated that introverts did worse in the presence of

background music and noise, but only for the reading comprehension task. In both memory tests

and the observation test, extraverts performed the best with complex music compared to silence

and simple music. This seems to suggest that extraversion does have an impact on how detrimental background music is to task performance, at least to some extent.

Furnham and Strbac (2002) support Eysenck's theory and suggest that introverts perform better on cognitive tasks when arousal is low. The reading comprehension task could have been the only condition with significant results for introverts because the other two tasks were not complex enough. A task low in complexity does not require high levels of mental arousal, so introverts were not impacted any differently than extraverts even with the added background noise. The results from this study showed a significant difference in performance on a reading comprehension task dependent on the participant's personality, with introverts performing worse than extraverts in the presence of background stimuli. The current study seeks to replicate these results, with introverts performing worse on a reading comprehension task than extraverts when a background stimulus is present.

Another related study was conducted to test the performance of introverts and extraverts in varying music conditions (Avila, Furnham, & McClelland, 2012). Participants were 58 college students who took verbal, numerical, and logic tests. During each test a different music condition was present; either a familiar lyrical song, an instrumental familiar song, or silence. They hypothesized that introverts would do progressively worse on the task as the background condition progressed from silence to instrumental music, and finally to lyrical music. They anticipated the opposite effect for extroverts. The results of the study indicated that both introverts and extraverts did significantly better in the silent condition. However, contrary to the hypothesis and previous research, there was no significant interaction between performance and

personality type. This suggests that an individual's personality does not impact performance on a cognitive task in the presence of background music. These conflicting results seem to suggest extraversion alone will not predict performance.

It could be that task complexity plays a crucial role in the interaction between extraversion and performance when background music is present. Task complexity is important to consider for studies involving personality because according to Eysenck's theory of personality, introverts and extroverts have different optimal levels of cortical arousal. As cited by Küssner (2017), introverts have a higher baseline level, so they do not need much external stimulation in order to be functioning at an optimal level. Meanwhile, extraverts have a lower baseline, meaning they need additional external stimulation in order to reach optimal levels of cortical arousal. Even if an introvert's baseline arousal level is higher than an extrovert's, they may not reach their threshold regardless of their heightened baseline if the cognitive task itself is not arousing enough. To explore this idea further, the current study will manipulate task complexity by including both easy and difficult reading passages.

When assessing an individual's performance in concert with background stimuli, to see results the task itself must be complex. This idea is exemplified by Fiveash and Pammer (2014), who sought to differentiate the syntactic working memory and the phonological loop. They hypothesized that syntactically manipulated music would hinder performance only on tests of syntactic working memory, while tests that relied on the phonological loop alone would not be impacted by the manipulated music. They theorized that music and language both draw on the syntactic working memory, so there would be noticeable processing costs when syntax was being

used for both language and the musical stimuli. To test this hypothesis, a two by three within

subjects design was used on 61 adult participants, who were presented with either a word list, or

a complex sentence.

The word lists used in this study were only five items long, and each word contained one

syllable. Since word lists are not structured to contain syntax, this condition used the

phonological loop alone. Meanwhile, the complex sentences were between ten and 16 words

long and used both the phonological loop and syntactic working memory. The condition was

then paired with one of three music conditions. Each musical piece used was specifically created

for the experiment to ensure no one would be familiar with the tune, and was constructed by

combining chords of an acoustic guitar together on a computer program. As such, there were no

lyrics in any of the musical conditions. A "no manipulation" condition used the original version

of a piece, while the "syntactic manipulation" condition featured an out-of-key chord, and the

last "instrumental manipulation" condition replaced a chord of the guitar with that of a flute.

Participants were tested on their recall of the word list or complex sentence by verbally

producing as much of the stimulus as they could remember. Results supported the hypothesis, as

complex sentence recall, but not word list recall, declined in the presence of syntactically

manipulated music compared to the normal music condition. Fiveash and Pammer (2014)

suggest that complex sentence recall was impacted by the syntactically manipulated music, but

not word lists, because there is shared processing between music and language syntax within the

syntactic working memory. In other words, music and language both have syntactic components

that are processed in the working memory together. It is this shared processing cost that inhibits performance on cognitive tasks, like sentence recall, when music is present.

It is important to note that the working memory can store seven plus or minus two items, and the word list task used by Fiveash and Pammer (2014) only had five items, while the complex sentences had up to 16 items. Since the word lists were so short, it is hard to say whether or not the syntactic manipulation of the music really made a difference. In fact, many studies have revealed that music does not need to be syntactically manipulated in order to be harmful to a variety of cognitive tasks (Anderson & Fuller, 2010; Perham & Currie, 2014). More studies should be conducted in order to conclude whether or not the decline in scores came from the task itself, being either simple (word lists) or complex (syntax-containing sentences), or from shared processing in the syntactic memory alone. In order to find meaningful results, such a study might require a more complex task rather than relying on a very short monosyllabic word list. For this reason, the current study will utilize a reading comprehension task.

When examining the impact of background music on a cognitive task, a number of studies theorize that there is some aspect of shared processing that results in worse performance (Avila et. al, 2012; Fiveash & Pammer, 2014). A study by Atherton, et. al. (2018), sought to understand if musical information is processed by the phonological loop in order to see if there is some overlap occuring in the working memory. For their study, 99 college student participants heard a target stimulus which was either a word or musical cord. Next, they were exposed to an intervening stimulus which was silence, chordal tones, or words, depending on which condition they were in. Finally, they were asked to compare the initial stimulus to a reference word or

chord and determine if the two stimuli were similar or different. The intervening stimuli were

pivotal, since if there was an overlap between musical information and the phonological loop, the

interference of words compared to tonal chords would have the same impact on recall of the

initial stimuli. They hypothesized that if music and language share totally overlapping resources

in working memory, both the tonal and word intervening stimuli would hinder recall of the initial

stimulus equally. Results did not completely support this hypothesis, however, they did find that

mismatched conditions resulted in moderate interference, while matched conditions (a tone being

presented first, followed by a tone in the intervening phase) resulted in the most interference.

The silent condition resulted in the least amount of interference. This suggests that although

there might not be a complete overlap between language and music in the phonological loop,

they still draw on some of the same resources. This shared processing could contribute to poor

performance on language-based tasks when background music is playing. Taking this into

consideration alongside Eysenck's theory of personality, introverts do worse when background

music is present since they already have higher baseline levels and then need to further share this

cognitive space with additional stimuli.

A number of studies that investigate the impact background music has on cognitive

performance explore both lyric containing music, and non-lyic containing music. Based on the

work of Atherton et. al (2018) and Fiveash and Pammer (2014), both music and language draw

on some similar resources within the phonological loop. Therefore, when completing a reading

comprehension task, listening to lyric containing music might be more detrimental to

performance than non-lyric containing music. The reading comprehension task, the linguistic

component of lyrics, and the musical components of the song will all interact to draw on the

phonological loop's resources, and will result in poor performance. For this reason, the current

study will use lyric-containing music in order to increase complexity and increase the likelihood

of seeing a significant impact on reading comprehension scores.

In a different study, reading comprehension was tested for again, this time with

background music conditions including: disliked lyrical music, liked lyrical music, non-lyrical

music, and silence (Perham & Currie, 2014). Performance declined in all music conditions

compared with silence, however, participants did significantly worse in lyric conditions

compared to non-lyric conditions. Music with lyrics and the text from a reading comprehension

task may share similar processing (Atherton et. al, 2018; Fiveash & Pammer, 2014). This

competition between the written word and musically presented lyrics might be the reason why

students performed worse when listening to music compared to silence, regardless of their

preferences. It is worthwhile to include lyrics in a study of background music and reading

comprehension because of the competition for resources they create.

In a brief review of literature, Küssner (2017) acknowledges that research on personality

and background music is conflicting, with some publications indicating that extroverts do

perform better in the presence of background music compared to introverts, thus supporting

Eysenck's theory, while a number of studies show no effect, to create an overall null effect.

Comparisons between these studies can be difficult, since not all studies use the same kind of

music or the same evaluation measures. The current study will attempt to understand whether or

not personality type impacts how well a reading comprehension task can be completed in the

presence of background music during both the learning and evaluation phase. A reading

comprehension task will be used to evaluate performance, since it is more complex than a simple

memory test and should create shared processing of participant's mental resources (Fiveash &

Pammer, 2014; Furnham & Strbac, 2002). In addition, music will contain lyrics to capitalize on

the shared processing that occurs in the phonological loop between musical stimuli and

language-based stimuli (Atherton et. al, 2018; Avila et. al, 2012; Fiveash & Pammer, 2014).

Task complexity will be manipulated by including both difficult and easy reading passages in

order to understand how task complexity impacts performance.

The type of music being used in this study is designed to cause shared processing of

cognitive resources, so that all participants will experience a heightened level of cortical arousal.

According to Eysenck's theory of personality, this heightened arousal should be more detrimental

to test performance for introverts compared to extraverts. However, in addition to personality

factors, the task itself must be complex enough in order to significantly raise cortical arousal, so

that a difference might be observed between the introvert and extravert groups. For these

reasons, when the reading passage is easy, I hypothesize that introverts and exraverts will have

similar reading comprehension scores. In contrast, when the reading passage is difficult, I

hypothesize that this will raise cortical arousal significantly enough that we will see a difference

in scores between introverts and extroverts. Because their baseline levels of cortical arousal are

different, extroverts are expected to perform better in the difficult reading condition compared to

their introverted counterparts. In other words, the personality type of the listener will have a

significant impact on their comprehension scores when the cognitive task is especially complex.

Previous research has suggested that studying habit might contribute to how well participants are able to perform with background music. Intuitively, participants who regularly listen to music when studying will do better than those who regularly study without background music. However, because the current study is designed to create competition between mental resources, I hypothesize that habit will not have a strong enough effect to facilitate reading comprehension. That is, individuals who habitually study with background music will have similar scores to those who do not.

Method

Participants

This study included 13 introverts and 23 extroverts, based on their extraversion score on the short-scale Eysenck Personality Questionnaire, revised edition (EPQ-R). Each student was given intro to psychology course credit for taking part in this study. All genders participated in this study, with the majority of participants being female. Participants were undergraduate intro to psychology student at The college at Brockport, State University of New York.

Materials

To complete each component of the study, participants used Qualtrics, an online survey platform. As such, the test material was administered using two desktop computers, as well as standard external computer speakers. The songs used in this study were Alternative/Rock and included, "If It Means A Lot to You" by A Day to Remember, "Through the Glass" by Stone Sour, "Cigarette Daydreams" by Cage the Elephant, and "Remembering Sunday" by All Time Low. The study used the lyrical version of each song.

The test itself was made up of various reading passages and comprehension questions

coming from The Gray Oral Reading Test (GORT), fourth edition. For the purposes of this

study, "easy" passages and questions came from the 5th grade sections (stories 5 and 6) of both

form A and B, while the "difficult" passages and subsequent comprehension questions came

from the 12th grade section (stories 11 and 12) of both Form A and Form B. The easy passages

had an average flesch kincaid score of 3.8, while the difficult passages had an average flesch

kincaid score of 14.1. In addition, the study assessed each participant's level of extraversion

using the short-scale Eysenck Personality Questionnaire, revised edition (EPQ-R). For the

purposes of this study, only 24 out of 48 questions were administered (see Appendix).

Furthermore, only the 12 questions on the short-scale EPQ-R pertaining to extraversion were

scored, while the other 12 administered served as filler questions and were not scored. In

addition, participants were asked if they regularly listen to music while studying. The material

from the GORT and the EPQ-R were both modified from their original paper form to appear

online in Qualtrics.

Design

This study utilized a 2x2 mixed ANOVA design. The independent variable was the

difficulty of the passage, being either easy or difficult. Level of extraversion served as a

participant variable, with introverts representing an EPQ-R score less than or equal to five (out of

12) and extraverts representing scores greater than or equal to seven (out of 12). Reading

comprehension accuracy scores (out of 10) were the dependent variable.

Procedure

Participants entered the lab and took a seat at a computer where they followed along as a researcher read them the study instructions aloud. If they did not have any questions, the researcher began playing one of the four songs on the adjacent computer. Upon this cue, the participant was able to advance to the next computer page on Qualtrics which contained a reading passage. The participant read through the passage to the best of their ability, and then advanced to the next Qualtrics page which contained five reading comprehension questions related to the previous passage. The participant was able to advance once more to read a second passage of similar difficulty and answer the accompanying questions. After completing the pair of passages, participants filled out a brief survey about their familiarity and liking of the song. Immediately after the participant moved on from this survey, the researcher stopped the music. The participant was then asked to step aside, while the researcher set up the next appropriate Qualtrics link on the participant's computer. This procedure was repeated until the participant had experienced two sets of easy passages with questions, and two sets of difficult passages with questions. Each participant heard all four songs once, and counterbalancing was used to ensure each song was coupled with each pair of passages an equal number of times.

A total of four music conditions were used for the purposes of a larger study that manipulated music tempo. Therefore, participants in the current study completed two "fast" music conditions, in which the tempo of the original song was manipulated to be 33% faster than the original, as well as two "normal" music conditions in which tempo was not manipulated. Since the current study is not interested in tempo, data from the "fast" music condition were not

used. Participants proceeded through four conditions total, but the current study will only

comment on the two conditions that used the unmanipulated version of each song.

After completing the reading comprehension portion of the experiment, participants were

asked to step aside while the researcher set up a post-questionnaire Qualtrics link on the

participants computer. This questionnaire included personality questions from the EPQ-R, a few

questions about their musical preferences, and their listening habits when studying. Once the

participants completed the questionnaire, the researcher presented them with a debriefing on the

computer.

Results

Comprehension scores were similar for the extravert and introvert groups when the

passages were easy, and were slightly higher for extraverts when the passages were difficult (see

Figure 1). This pattern is consistent with the hypothesis, but the effect was not significant ($F < 1$)

for the interaction between passage difficulty and extraversion). There was no main effect for

extraversion ($F< 1$), but there was a main effect for passage difficulty, F (1,34)= 12.71, p=

0.001, with difficult passages producing lower scores than easy passages. There was no

significant interaction between studying habit and passage difficulty $F(1,34)= 0.002$, $p= 0.966$

(see Table 1).

Discussion

Although there was no significant interaction between extraversion group and passage

difficulty, a pattern emerged that was consistent with the prediction. Specifically, both groups

had similar scores for the easy passages, while extraverts had slightly higher scores for the

difficult passages. The lack of significant effect, however, does not support the hypothesis and contradicts previous research suggesting that extraverts perform better than introverts when background music is present (Daoussis & McKelvie, 1986; Dobbs et. al, 2011; Furnham & Allass, 1999; Furnham & Strbac, 2002). Previous research raised the question of whether or not habit could have an impact on reading comprehension scores (Daoussis & McKelvie, 1986). The current study asked participants whether or not they listen to music while studying, and results indicated that those who did regularly listen to music while studying performed no different than those who did not listen to music regularly while studying, regardless of passage difficulty. As predicted, this suggests that listening habit does not facilitate performance when there is a lot of competition between mental resources.

The music used in the study contained lyrics and was intended to create competition between mental resources, making the reading comprehension task difficult enough. Interestingly, the additional difficulty of the reading passages themselves had a significant impact on participant's scores, with the hard reading condition being especially challenging. This information could be useful to students or workers who enjoy listening to music while engaging in cognitive tasks. Results suggest that when background music is playing, comprehension suffers less when the task is easy. Using this knowledge, students and workers might consider listening to music only when the task they are working on is easy. Additionally, they should contemplate turning their music off when the task they are working on is difficult.

The results of this study suggest that level of extraversion does not impact reading comprehension scores. This offers little support for Eysenck's theory of personality which

suggests that introverts and extroverts have different baseline levels of cortical arousal, and therefore perform differently when background stimuli are present. The small sample size used in this study could have contributed to a lack of significant results. Only 36 participants in total completed this study, and only about one third of those participants were introverts. Future research should use a larger sample size, and attempt to include an equal number of introverts and extraverts.

Based on Eysenck's theory of personality, extravert's low baseline levels of cortical arousal should have given them an advantage in the highly arousing difficult reading condition. However, because the music used in this study already created a lot of competition between mental resources for both groups, perhaps a floor effect was observed in the hard reading condition. The lyric containing music in combination with a very difficult reading passage could have caused both groups to score so poorly, that differences in scores could not be significantly detected. Considering Eysenck's theory, the difficult reading condition combined with the lyrical music could have heightened arousal so much for both groups, that differences in scores between introverts and extraverts were not significant regardless of baseline levels of cortical arousal. It might be worthwhile to run a similar study using music that will cause less competition, such as non-lyrical music, to better understand how task difficulty interacts with level of extraversion.

References

Anderson, S. A., & Fuller, G. B. (2010). Effect of music on reading comprehension of junior

high school students. *School Psychology Quarterly*, *25*(3), 178-187.

Atherton, R. P., Chrobak, Q. M., Rauscher, F. H., Karst, A. T., Hanson, M. D., Steinert, S. W., &

Bowe, K. L. (2018). Shared processing of language and music: Evidence from a

cross-modal interference paradigm. *Experimental Psychology*, *65*(1), 40-48.

doi:10.1027/1618-3169/a000388

Avila C., Furnham A., McClelland A. (2012). The influence of distracting familiar vocal music

on cognitive performance of introverts and extraverts. Psychol. Music 40, 84-93. Doi:

10.1177/0305735611422672

Daoussis, L., & McKelvie, S. J. (1986). Musical preferences and effects of music on a reading

comprehension test for extraverts and introverts. *Perceptual And Motor Skills*, *62*(1),

283-289. doi:10.2466/pms.1986.62.1.283

Dobbs, S., Furnham, A., & McClelland, A. (2011). The effect of background music and noise on

the cognitive test performance of introverts and extraverts. *Applied cognitive psychology*,

25(2), 307-313. Doi:10.1002/acp.1692

Eysenck, S. B., Eysenck, H. J., & Barrett, P. (1985). A revised version of the Psychoticism scale.

Personality and Individual Differences, *6*, 21–29.doi- 0191-8869

Fiveash, A., & Pammer, K. (2014). Music and Language: Do they draw on similar syntactic

working memory resources? *SAGE Journals, 42*(2), 190-209.

http://journals.sagepub.com/doi/abs/10.1177/0305735612463949

Furnham, A., & Allass, K. (1999). The Influence of musical distraction of varying complexity on

     the cognitive performance of extroverts and introverts. *European Journal of Personality,*

     13(1), 27-38.

Furnham, A., & 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), 203-217.

Kämpfe, J., Sedlmeier, P., & Renkewitz, F. (2011). The impact of background music on adult

     listeners: A meta-analysis. *Psychology of Music*, *39*(4), 424-448.

Küssner, M. B. (2017). Eysenck's theory of personality and the role of background music in

     cognitive task performance: A mini-review of conflicting findings and a new perspective.

     Frontiers in Psychology, *8*.

     https://doi-org.brockport.idm.oclc.org/10.3389/fpsyg.2017.01991

Perham, N., & Currie, H. (2014). Does listening to preferred music improve reading

     comprehension performance? *Applied Cognitive Psychology*, *28*(2), 279–284.

Appendix

Questions used from the Short-Scale Eysenck Personality Questionnaire, Revised Edition

For the purposes of this study, the short-scale EPQ-R was modified to include 24 questions, with

12 questions coming from the extraversion scale, and 12 randomly selected questions serving as

fillers. The original form contains 48 questions to measure psychoticism, extraversion,

neuroticism, and a lie scale. For the purposes of this study, participants saw the following

questions in this order, and were given the option to answer "yes," or "no," to each.

1. Do you take much notice of what people think?
2. Are you a talkative person?
3. Do you ever feel 'just miserable' for no reason?
4. Are you rather lively?
5. Would you take drugs which may have strange or dangerous effects?
6. Do you enjoy meeting new people?
7. Can you usually let yourself go and enjoy yourself at a party?
8. Are *all* your habits good and desirable ones?
9. Do you usually take the initiative in making new friends?
10. Have you ever taken anything (even a pin or button) that belonged to someone else?
11. Do you think marriage is old-fashioned and should be done away with?
12. Can you easily get some life into a rather dull party?
13. Do you tend to keep in the background on social occasions?
14. Have you ever said anything bad or nasty about anyone?
15. Do you think people spend too much time safeguarding their future with savings and insurances?
16. Do you like mixing with people?
17. Do you try not to be rude to people?
18. Do you like plenty of bustle and excitement around you?
19. Have you ever cheated at a game?
20. Are you mostly quiet when you are with other people?
21. Is it better to follow society's rules than go your own way?
22. Do other people think of you as being very lively?
23. Do you sometimes put off until tomorrow what you ought to do today?
24. Can you get a party going?

Table 1: *Studying Habit and Reading Comprehension Scores.*

	Studying Habit	Mean	SD
Easy Passages	Listen to Music	6.71	1.55
	No Music	7.17	1.75
Hard Passages	Listen to Music	5.08	2.06
	No Music	5.58	2.31

Figure 1. Mean reading comprehension scores of introverts and extraverts for easy and difficult passages (*F*<1).

Figure 1

Reading Comprehension

Figure 1. Bar chart showing Comprehension Score (Accuracy) on the y-axis (0 to 8) and Passage Difficulty (Easy, Hard) on the x-axis. Easy: Extravert 6.83, Introvert 6.92. Hard: Extravert 5.43, Introvert 4.92.