

The Effect of Lyrical and Instrumental Music on Reading Comprehension tasks

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Summary

Many studies have investigated if music can impact a person's productivity, with varying results reported. Some students argue that music is helpful to their work, but some people think otherwise. Studying this topic is important because teachers might play music while students are working to help students be more focused in class. We tested 37 people in four different conditions: silence, instrumental, Spanish, and English music, using four different reading comprehension articles. We found that English lyrical music is not helpful to most students, compared to silence. Foreign and instrumental music did not help or hurt based on our data because there was not a significant difference between them and the silence condition. Therefore, we recommend that students and teachers use foreign language or instrumental music instead of music with English lyrics when working on reading tasks.

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Introduction

Many studies have investigated if music can impact a person's productivity (1). Some high school students argue that music is helpful to their work (2), and therefore often use music throughout the day to help stay on task (3). In fact, a Kaiser Family Foundation survey in 2009 found that 43% of adolescents often listen to music while doing homework (4). There are many people, however, who disagree with the idea that music can be helpful to students while doing homework, because they feel it is a distraction that can interfere with their concentration (1). Studying this topic is important because if teachers have evidence that music is helpful, they might choose to play music to help students stay focused during class (5, 6). Because many students use music while doing homework, it is important to inform the debate about music by doing more research on that subject. Since reading comprehension is a common component of homework,

this study will attempt to answer whether music affects students' scores on a reading comprehension task.

Distraction and Mood-Arousal Hypotheses

Researchers say that there are two hypotheses, the distraction and mood-arousal hypotheses, which might provide evidence for people's opinions about whether or not music helps or hurts the completion of tasks (1). The mood-arousal hypothesis states that when a person listens to enjoyable music, this affects their mood, and then can affect their arousal. As a result, their performance would be increased (1). The Yerkes-Dodson Law is directly related to the mood-arousal hypothesis. The Yerkes-Dodson Law articulates that music may help a person get to their optimal performance by increasing their arousal. If a student is distracted and not physiologically aroused, music might improve their mood and make them more attentive to the task at hand. Without music, he/she would be too distracted or lacking in focus to work efficiently (1). Other researchers believe that music only takes away from what one is doing or causes a distraction. The distraction hypothesis states that a person has only enough energy for one task at a time, and music would take away from their ability to obtain information (1). In our research on music and performance, the language of lyrics and the presence of lyrics in general had an effect on a person's performance or quality of work.

Effects of Native Language Lyrics

Listening to music with lyrics in a person's native language can be a possible reason that music does or does not help. In one study, researchers wanted to determine if foreign, native, and no lyric conditions were helpful for college school students on a reading section of an SAT. They found listening to music without lyrics was better than listening to English lyrics (3). In a study by Kenol, familiar and unfamiliar music, both with English lyrics, were compared to silence. Kenol found that people did better with familiar music than silence and unfamiliar music (7). In another experiment on Dutch high school students, researchers were trying to determine if foreign music, native soap operas, or silence could help high school students' homework performance. They found out that native language soap operas lowered performance, while foreign music did not harm students' memory or

comprehension (2).

Beentjes, Koolstra, and Van der Voort did a survey of 1,700 high school students from the Netherlands to see how they perceived the effect of doing homework while TV and radio were played (8). They found that students thought it helped when doing pencil and paper assignments but did not help when studying. Sixty-seven percent said they listened to music, but it did not hurt, while the other third felt it distracted them (8). In an experiment by Tze and Chou, they wanted to figure out if classical music, hip hop music, or silence affected English speaking Taiwanese college students. They found that the control group (silence) did significantly better than the group listening to hip hop on a reading comprehension test (9). In summary, there is conflicting evidence that supports and goes against whether native language lyrics are helpful or harmful for students.

Effects of Foreign Language Lyrics

In contrast, some researchers say native language lyrics may tend to distract people because they start focusing more on the lyrics, while if a person does not understand the lyrics, such as with a foreign language, the song might not distract. However, others disagree. For example, Mai and Erdman did a study on college students listening to foreign, native, and no lyric music while doing the reading section of the SAT. There was no difference in the reading comprehension scores between the English and Norwegian lyric conditions (3). Although Mai and Erdman found no difference, another study found that that was not the case. In another study, students who experienced silence and foreign language music did better than when listening to a native language soap opera (2). In summary, there is conflicting data on the effect of foreign lyrics.

Effects of Instrumental Music

Another category of research was listening to instrumental music and comparing performance to silence. In an experiment comparing lyrics and no lyrics for adult workers on a concentration test, researchers found that workers who did not hear lyrics did better on the task (10). Also, an experiment on college students listening to foreign, native, and no lyric music on an SAT reading section found on average people did better with the instrumental music than listening to their native language (3).

Legutko and Trissler conducted an A-B-A design study, where students were exposed to music then silence and then music again, with silence and classical music on learning disabled elementary students. They found students wrote more and higher quality sentences with music (5). In a study on Taiwanese college students taking a reading comprehension test with classical

music, hip hop/pop music, and silence, their findings showed that there were no differences except for hip hop doing worse than silence (9). In conclusion, the consensus is that instrumental music could aid in someone's performance.

Study Hypotheses

Since many studies use multiple songs and different genres, it seems like there is a lot of outside influence that might affect the study of lyrics on reading comprehension. Studies also have too many combinations of comparisons, making it hard to come to a conclusion. This may be why so many studies find conflicting results. Research on native and foreign lyrical music is contradictory, with some studies finding it beneficial and others finding the opposite. However, there may be a consensus that instrumental music has benefits. To address these shortcomings in the literature, we used three songs but in four different ways. In our experiment, we used the same songs with foreign, English, and instrumental tracks, and compared each to a silence condition. The task that we had our participants complete was a reading comprehension assignment. Our study had three hypotheses. First, we hypothesized that students listening to English lyrics would differ in their performance compared to silence. Second, the students listening to foreign lyrics would score differently on their working performance compared to silence. Lastly, we believed that listening to instrumental music would be more helpful than silence for students at a secondary school like at The Neighborhood Academy.

Results

The purpose of this study was to see if different types of music are helpful when completing a reading comprehension task. We had four different packets that were similar in Lexile number and word count, and all were at the 8th grade reading level. The packets were given to the eighth and ninth graders. Each student was a part of all conditions: silence, instrumental music, Spanish lyrical music, and English lyrical music. They also took each packet in a random order throughout the different conditions. All statistical tests were completed using statistical calculators from VassarStats.net.

First, we tested to see if any packets were more interesting than others. A one-way ANOVA test revealed that there were significant difference in interesting scores across tests, ($F(3, 108)=4.2, p=0.0075$). A Tukey HSD post hoc analysis revealed that packets 1 ("The Upside of Dyslexia") and 3 ("The Short-term Impact of the Zebra Mussel Invasion") were different in their level of interest to students. Packet 1 ($M=5.9, SD=2.4$) was more interesting than packet 3 ($M=3.9, SD=3.0$) (Table 1).

	Packet 1	Packet 2	Packet 3	Packet 4	Significant Difference?
Interesting	5.9 (0.97)	5.3 (0.87)	3.9 (0.64)	4.9 (0.81)	1>3
Difficulty	2.7 (0.44)	3.1 (0.51)	3.6 (0.59)	3.2 (0.53)	
Packet Familiarity	4.7 (0.77)	1.9 (0.31)	1.1 (0.18)	0.9 (0.15)	1>2,3,4
	Silence	Instrumental	Spanish	English	Significant Difference?
Music Familiarity		4.7 (0.77)	4.4 (0.72)	4.8 (0.79)	
Score	8 (1.3)	7.4 (1.2)	7.4 (1.2)	7.1 (1.2)	S>E

Table 1. Reading packets and music descriptions. A one-way ANOVA was used to find the differences between each packet. The numbers in the table are the means and the numbers in the parentheses are the standard errors.

We tested the difficulty levels of each packet to see if some were more difficult to comprehend than others. In a one-way ANOVA test, there were no significant differences ($F(3, 108)=1.3, p=0.282$). However, there was a significant difference between the familiarity of the packets ($F(3, 108)=26.13, p<0.0001$). The Tukey HSD post hoc test revealed packet 1 ($M=4.7, SD=3.2$) was more familiar than packet 2, “The Orchid’s secret,” ($M=1.9, SD=2.2$), packet 3 ($M=1.1, SD=2.1$) and packet 4, “High Jumpers,” ($M=0.9, SD=1.6$). There was not a significant difference between the familiarity of music conditions ($F(3, 108)=0.25, p=0.779474$) (**Table 1**). In a one-way ANOVA with correlated samples, there was a difference in reading performance between music conditions ($F(3, 108)=2.8, p=0.043$). There was a significant difference between silence ($M=8, SD=1.4$) and English ($M=7.1, SD=1.9$). There were no other differences between types of music (**Table 1, Figure 1**).

Discussion

As shown in **Table 1**, the score section demonstrated that our first hypothesis was supported; when students listened to English lyrical music, they scored differently compared to silence. The next hypothesis was not supported; foreign lyrical music did not differ compared to the silence condition. Finally, our last hypothesis stated that instrumental music would provide more help than the silence condition. Our third hypothesis was not supported throughout this experiment. The instrumental music and silence condition did not have a significant difference.

Our results relating to English lyrics and silence are inconsistent with prior research by Kenol, which was also conducted on high school students at The Neighborhood Academy. In that study, familiar lyrical music had a greater outcome compared to silence (7), but in our experiment the silence condition was better, although not significantly. The song that we used was not highly familiar (4.8 on a 1-10 scale) to the students but was familiar to some amount. This difference could be due to their use of upperclassmen (10th and 11th) and our use of the lower classmen (8th and 9th). The

upperclassmen are veteran students, so they are more mature and familiar with reading tasks. They might be able to balance their work and are used to high school level reading quizzes. In our study, students were lower classmen, which means it is their first year being at the school, and their arousal could already be very high. Adding music could cause them to have their minds more easily distracted.

Many first-year students enter into The Neighborhood Academy from different schools, which may not be as focused or as strict about completing work. Students that are older might benefit from the use of music as a mood enhancer while doing reading comprehension tasks, which would support the mood and arousal hypothesis. The students that are younger and have less experience with school, may have been more distractible and would support the distraction hypothesis (1). However, since the current study used students attending a private college preparatory school that has a strong emphasis on reading comprehension tasks, it may not be possible to apply the results to a more diverse school setting. Researchers should consider doing this experiment with different populations of students.

Both Tze and Chou and the current study compared silence as the control group to hip hop music with English lyrics (9). Both studies’ findings agree that silence outperformed the other conditions. This evidence supports the distraction hypothesis, that a person may only have enough attention for one task at a time. Trying to use music might take away from people’s ability to gather or collect information (1). In the Tze and Chou study, they used a difficult test (the Graduate Record Examination). It is possible that music was more of a distraction. In our study, people said that the difficulty level of the packets was not that hard; they ranged from 2.7 to 3.6 out of 10 (**Table 1**). However, the average scores were in the 70th percentile, which suggests the tests may have been harder than the students thought. It is possible the distracting music (fast beat/dance) might

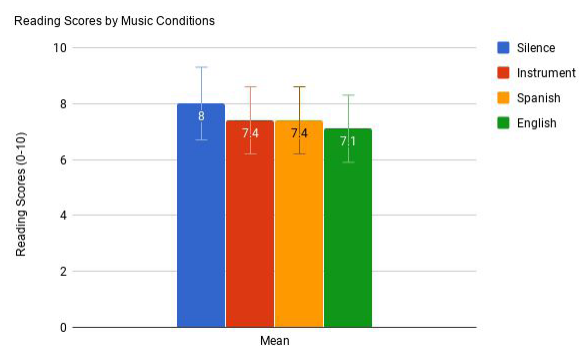


Figure 1. Reading scores by music condition. A one-way ANOVA for correlated samples found that there was a significant difference between Silence and English ($p=0.043$). Error bars represent the standard error of the mean.

encourage rushing, and for students to think that the test was easier than it was.

Mai and Erdman (3) found no differences between foreign language music and silence, while Pool et al. (2) found no difference between listening to foreign language music videos and silence. We also found no difference, but silence had a higher score, although not significantly. Through all of these studies, the findings were that foreign lyrical music did not impact the students' abilities compared to silence. So, foreign language lyrics may be harmless to use, but one should not expect there to be any drastic positive outcome from its use. This might be because the brain treats foreign language as if it is instrumental music, so one is more focused on the beat. Students may be able to focus on the task, instead of the words of the song and therefore not be distracted.

Legutko and Trissler (5) found that classical music helps learning disabled elementary students write more, but we found no difference in performance when students listened to instrumental music. Their study would disagree with our study's findings, however our study population was different. It used higher school students, while Legutko and Trissler studied elementary students. In our study, 8th and 9th graders' optimal performance was in silence. Legutko and Trissler used classical music, which is slower and calmer, versus our upbeat dance music, which might be too arousing and beyond optimal levels. As stated previously, Tze and Chou (9) found no difference between silence and classical, just like in our study, so both studies are in agreement with each other. Basically, instrumental music may have its benefits for some people, to where it can be helpful to get someone to their optimal performance and bring up their arousal, but maturity, mood, and genre may also play a role when listening to instrumental music.

Through each condition, there were a few possible experimental errors that may have affected the data. First, in two of the eight class periods, some of the songs in the English condition were accidentally played in the wrong order. Since "On the Floor" has the most cheerful and upbeat tempo, and was the most familiar, this might have influenced if it was distracting or not. Normally the song was the second of three, but in two instances it was first. Playing the song first might have caused some students to not focus on the initial tasks and playing it second could give have given them time to have tasks already started and possibly help them just continue with the test. Therefore, playing "On the Floor" first might have contributed to why the English condition was lower in the experiment.

There were eight students that withdrew from the study. During the experiment a couple students were not excited about participating. We observed that those

students started to show they did not want to do the tasks; they were circling random answers and talking. The students were split up, but that did not change their actions. After the last section, these students were asked if there was a problem or issue during the experiment. All expressed they wanted to be taken out of the study due to lack of interest. Unfortunately, taking those students out reduced the sample size; their experience with the music could not be accounted for.

Another error was that three copies of the "High Jumper" reading test were copied wrong and those students had to retake the test. However, only a few questions were missing, and the students returned and finished with no problems. A final limitation would be possible test fatigue. Because every participant was in all the conditions, they could have become tired and not tried as hard on the later tests. The last condition was English, so this might explain why English was the lowest scoring. We feel having the same people in all the groups was important though, because it allowed for larger groups and let us measure the individuals' changes over time.

In future studies, researchers can try to use different songs, like songs that are more calming. Some other studies have used jazz and classical instrumental music, and these might prove less distracting (5, 6). Researchers could also try to use different tests instead of a reading comprehension tasks. Students could do other types of homework, like math problems or studying for an exam, and music might affect those differently. The next experiment could be more of a split between female and male students while doing the tests. There could be a difference if there is a classroom filled with the same gender. Researchers previously found that male elementary students were able to be more on task while listening to music, but the females did not see a change (6).

Taken together, this study and numerous others allow us to suggest some recommendations for students and their ability to listen to music while working. We believe that English lyrical music is not a good idea for most students when completing reading comprehension tasks, even though it did help some students. The effect of foreign and instrumental music is not significant, because we found no data to show that it hurts students' performance significantly. Factors like maturity, age, and difficulty of the work might all affect people differently, making the decision to use music a very individual one.

Method

There were 35 female and 10 male participants from the eighth and ninth grades, all of whom had not studied Spanish before. They are all between the ages of 12 to

15 years old. There were 8 female students that dropped from this experiment. There were 3 absent students and the other 5 students chose to quit after learning the amount of work required to participate. There were 5 students that were absent for a portion of the experiment, but they were able to make up the test the next day and are part of the 37 total participants.

We used a website called ReadWorks to find the different tests. The tests were narrowed down by their grade level. The texts had an eighth-grade level and the Lexile numbers were between 1000L and 1200L (average of 1065L). There also was the similar word count, 630 to 900 words (average of 753 words). We used the reading questions that were provided, which included nine or ten questions. For the article called "High Jumpers," we added one multiple choice question to make all tests have ten questions. At the end of each test were added questions with a 1-10 scale to measure interest level, difficulty, prior knowledge, and familiarity with the songs.

The songs that we used were "On the Floor" by Jennifer Lopez featuring Pitbull, "Loca" by Shakira featuring El Cata, and "Bailando" by Enrique Iglesias featuring Sean Paul, Descemer Bueno, and Gente De Zona. All the songs were available for each condition. We chose to use Latin dance music because it was the only genre readily available for the various conditions required.

We did a pilot study using the seventh and twelfth graders to plan how the test should go and to find out how much time the participants needed for each test. The pilot study was also used to figure out how many songs we would need. The average time for "The Upside of Dyslexia" was 9.6 minutes and the average score was 8.6 out of 10. The average time for "The Orchid's Secret" was 9.5 minutes and the average score was 9.3 out of 10. An average time for "The Short-Term Impact of the Zebra Mussel Invasion" was 9.4 minutes and its average score was 7.6. On average, the time for "High Jumpers" was 11.1 minutes and 8.6 was the average score. There was a 99.7% interrater reliability between the primary and contributing authors' scoring of the pilot tests, with disagreements discussed until consensus was reached. During the pilot study, many students took over 10 minutes per packet, so we added the third song because we originally only had two songs.

Students participated during their Religion and English Literature classes. Two tests were given per class period, with a total of two classes, spaced a few days apart. In the study, there were 12 to 14 students in each group, and to avoid order effects the packets were distributed randomly and equally. The first condition students were given was the silence portion as the control. The conditions after silence were instrumental

music, Spanish lyrical music, and English lyrical music. The conditions were in this order because we did not want the students to be able to remember the English lyrics songs and transfer it to the next condition. The songs were played in the same order: "Bailando" by Enrique Iglesias, "Loca" by Shakira, and "On the Floor" by Jennifer Lopez. The songs were played from the classroom speakers at a moderate volume so as to not disrupt the other classes next door. There was a brief five minute break between the two tests administered in the same class period.

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