The Brain on Music: Does music improve academic performance? Do Regina students benefit from their involvement in music?

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For this semester, I chose to study music’s effect on the brain. My driving question is “Does music improve academic performance? Do Regina students benefit from their involvement in music?” I have always been told that my involvement in orchestra and choir will improve my academic abilities and my grades. I never truly believed that this was true. There were plenty of people in my music classes that had poor grades and struggled in school. Therefore, I decided to research this topic myself. By choosing this topic, I hope to learn whether or not involvement in music truly does improve academic performance. I also wanted to find out if my findings hold true in the Regina community. I sent out a survey to determine if fine arts student had higher grades. Overall, I wanted to learn the truth if music truly does make you smarter.

The global theme that my project falls into is Health and Science. My question is asking about the scientific effects of music on the brain rather than the emotional effects of music. In addition, my project covers Individual and Cultural Identity. The phrase “music makes you smarter” has become a part of our society. Many people believe this to be true; others find it to be nonsense. Either way, my project addresses the truth of this colloquialism and how music effects school performance. Academia is a part of our culture. Therefore, my project covers both Health and Science and Individual and Cultural Identity.

To complete my research, I completed a review of literature. I found online sources and obtained a book from Mr. Hiett. I read each article carefully, learned about the myths and facts of music’s effect on the brain, and began to formulate a conclusion. I continued to find more sources and solidify my findings. I contacted two experts, only one of which responded. Dr. Nina Kraus directed me towards her Auditory Neuroscience Lab at Northwestern and their research. Once I had reached a conclusion, I sent a survey out to Regina Dominican students to determine
if they follow what science says. Finally, I compiled everything I had learned into a research paper and reviewed it.

This project would not have been possible without the help of many people. First, I would like to thank Mrs. McLawhorn for all her work in the Leadership Institute. Without her, this program would not even exist, and I would not have this opportunity. In addition, I would like to thank Mr. Hiett for all his help in this project. He was always willing to help me find new sources and has provided great assistance to this project. A special thanks goes to Dr. Nina Kraus from Northwestern University. She directed me towards more sources and helped clarify my research. Thank you to every one of the Regina Dominican community for encouraging me to pursue my interests.
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For years, scientists have believed that music causes significant changes in the brain. The “Mozart effect” has been a common thought among scientists for decades. A term coined in a 1993 article written by Frances H. Rauscher and Gordon L. Shaw, this concept states that listening to classical music at a young age will make children smarter (Krakovsky). Although the Mozart effect has been debunked, millions of Americans still hold it to be true. However, scientists are beginning to find accurate research to prove that music impacts the brain. Learning about the exact chemical processes that occur has taken time, but in recent years, scientists have begun to prove the theory that music affects the brain.

While scientists are still not exactly sure of the effect of music on the brain, they have found certain correlations between music and brain stimulation. First, just recognizing music as “music,” rather than just noise, indicates that there is more going on in the brain than usual. Playing music uses the brain in a different way than typical everyday life. Dr. Charles Limb, an associate professor at Johns Hopkins University, says “I think there's enough evidence to say that musical experience, musical exposure, musical training, all of those things change your brain. It allows you to think in a way that you used to not think, and it also trains a lot of other cognitive facilities that have nothing to do with music” (Landau). Music has always been thought to use the brain differently than other cognitive functions. Now, research is starting to prove it.

Before even considering the chemical responses to music, scientists recognize that music stimulates the brain in ways other activities do not. First, just think of everything you must be aware of while playing or even listening to music. First, hearing music stimulates the auditory
cortices of our brain. It activates the part of our brain required for listening and interpreting sound. In addition, listening to familiar music activates the hippocampus, which is the memory center, and parts of the frontal lobe (Levitin 84). Just from hearing music, three different parts of the brain are stimulated.

As one is more engaged in the music, more brain stimulation occurs. Tapping along or dancing to music requires the use of the cerebellum’s timing circuits as well as many more parts of your brain to create movements and stayed balanced. Actually playing music on an instrument activates the motor cortex and the frontal lobe in order to plan your movements. Reading music on a piece of paper requires the visual cortex to see. Lastly, singing along to music stimulates the language center of your brain (Levitin 84). All of this is just the beginning of brain stimulation in response to music. Just based on what is required to hear, see, play, and move along to music, one can tell that it activates many different parts of the brain.

In addition, playing an instrument has proven to stimulate the brain in ways other than just listening to music. When playing the piano, a “motor action plan” begins to formulate. It helps the brain recognize the order in which the fingers need to be placed. Neural circuits are formed and trained to remember the sequence. Slowly, the brain begins to memorize this pattern, and a musician can memorize a song. The more a musician practices, the stronger their neural circuits become (Landau).

A few studies have even shown the release of neurochemicals in response to music. Robert Zatorre, a professor of neurology and neurosurgery at Montreal Neurological Institute, has shown that listening to music promotes a response. A part of the brain called the striatum releases dopamine when exposed to pleasure-related stimuli. Often dopamine is released in response to food or sex. Zatorre conducted a study to examine this response. The participants
chose whatever music that gave them pleasure, and Zatorre and his colleagues measured the response in the brain. He discovered that when the music reached its peak pleasure point, dopamine was released from the striatum. However, that was not the interesting part. What intrigue Zatorre was that a different part of the brain released dopamine ten to fifteen seconds before the peak pleasure point. Zatorre concluded “‘As you're anticipating a moment of pleasure, you're making predictions about what you're hearing and what you're about to hear. Part of the pleasure we derive from it is being able to make predictions’” (Landau). The amount of dopamine released when listening to music is extremely strong; it could even be compared to methamphetamines. Although it is only one study, Zatorre’s research proved that music does have a beneficial impact on the human brain.

Other studies have correlated increased IQ and music abilities. One study tested the IQ of a group of students taking music lessons against a control group of students without any music lessons. Their IQ was measured before beginning music lessons and after. The results show that the children taking music lessons showed a greater increase in IQ (Schellenberg). This study shows that children can benefit from music lessons.

However, a study at Northwestern University shows that children must be engage in the music class in order to reap the benefits. Nina Kraus, director of Northwestern’s Auditory Neuroscience Laboratory and co-author of the study, says “‘We like to say that ‘making music matters.’ Because it is only through the active generation and manipulation of sound that music can rewire the brain’” (Locker). The children who attended class regularly, paid attention, and stayed on task were the ones to experience brain stimulation. In order to measure the brain’s responses, Kraus and her colleagues hooked up electrode wires in the children’s heads (Locker).
By taking the data directly from the source, Kraus’s results are more likely to be an accurate depiction of the brain’s response to music.

Kraus has also conducted studies with The Harmony Project, a community music program serving low-income children in Los Angeles. The Harmony Project states that 93% of their graduates have gone on to college despite a dropout rate of 50% in their neighborhoods (Locker). The Northwestern team wanted to study this incredible achievement. Their research showed that musical training has an effect on the biological development of children’s nervous systems (Locker). Continuing with this research, Kraus proved the “Mozart effect” wrong. It turns out that listening to music does not have the same effects as playing a music instrument does. In order to see the changes in the central nervous system, a child must be actively participating in music. Kraus’s study proves that music has a positive impact on the brain and a child’s development.

Another study was conducted in Switzerland. Dr. Olive Wetter of the University of Zurich studied the grades of 120 students. Fifty three of these students had musical training through school or at home. The other sixty seven had no experience in playing music. The grades of those playing an instrument were significantly higher than those who did not. Wetter went further and determined which classes benefitted the most from the student’s involvement in music. The students who played an instrument scored significantly higher in history, French, and German lessons than those who do not (Wetter, Koerner, and Schwananiger). Wetter’s studies concluded that continuous, active involvement in music does improve the academic performance of students.

Kraus’s and the Wetter’s studies proved how music is beneficial for children, but what about adults? In 2013, Stanford University published a study done on 17 adults. Eight women
and nine men with no formal musical training were lying in fMRI machines so that researchers
could examine all different parts of their brains. The adults spent nine and a half minutes
listening to classical music. They listened to four different symphonies composed by William
Boyce. While listening to the music, researchers noticed that certain parts of the brain were
stimulated in every test subject. This shows that listening to music does not just stimulate the
auditory processing systems; there is higher cognitive functions occurring when processing
music (Abrams). Between the Stanford study and Kraus’s findings, there are definite benefits to
listening to music.

In order to see if any of this applies to Regina students, I conducted my own study. I sent
out a survey asking students what their involvement is in music and what their grade point
average is. Unfortunately, I did not get many responses. I only received about 50 responses, and
many of those responses did not have any experience in music. Therefore, I had to narrow it
down to those students who were involved with music. That only left about 25 responses so I
worked with what I had and compiled my results into the table below.
While it is not exact, there is a general trend upward as music involvement increases. It goes to show that many musicians do benefit from their involvement in music. Music is not just some arbitrary class that many people choose to take; it can be beneficial and help in other classes as well.

Overall, my results led to a different discovery than I had intended. Professional studies that are trying to determine the brain’s response to music have been all over the place. Many studies concur that music does make the brain release chemicals that react to pleasure. Scientists know that music does engage the brain in many different ways. However, trying to find the exact response to music is nearly impossible. Each person has a different reaction to music. It all depends on what type of music is playing, how the person is feeling that day, what memories are associated with the piece of music, if the subject is musically trained, and many more factors. Because each person can react so differently to the same type of music, science is still trying to figure out what exactly music does to our brain.

However, many studies have concluded that music does improve academic performance. Scientists are not entirely sure why yet. As stated above, the reaction to music is still being researched. Yet, many studies show that students in elementary school do achieve higher grades when they are musically trained. Regina students follow this same pattern. It does seem that Regina students who are involved in music have better grades. However, that is from a very small section of the Regina community. If I wanted more accurate results, I should have made the questions more specific and tried to get more responses.

I ran into many problems while researching this topic. Asking “Does music improve academic performance?” and “Do Regina students benefit from their involvement in music?” was too precise. There are so many studies that do not even consider academics and only focus
on how the brain responds. It was difficult to find research that showed direct correlations between music and academics. In addition, very few Regina girls responded to my survey, so it is not entirely accurate. If I were to do this project again, I would make my driving question a little broader and the questions in the survey a little more precise. There was too much room for error in the survey. After finishing my research, I am completely intrigued by Dr. Nina Kraus’s Auditory Neuroscience Lab. Northwestern has created an entire program just to research how the brain reacts to sounds and auditory processing. There are so many more avenues for study just within that program, and I would love to look into her research regarding music and aging. She has conducted studies that determine if music can protect the brain from aging and from hearing loss. All of it seems incredibly interesting, and I would love to look further into it.
Works Cited


