The Effects of Classical Music on Memory

In a world of sound, music stimulates brain activity and helps create a closer connection with our emotions and our thinking process. Music is a very powerful tool in terms of human emotion when we hear any sound of any music genre, it can transport us to another place and time throughout history. Music automatically awakens us and engenders specific emotions in ourselves, which in turn modulate and control many of our cognitive functions. Music education develops skills and strategies that are effective for memorization and an individual's working memory capacity, by listening to a specific genre of music can help create feelings of self-awareness and internal thought. From the great works of the Classical Era, was the beginning of the creation and which led to developing Western musical culture, that has helped shaped cognitive processing and development. Certain features in classical music can make you feel a certain way, but it's our experience that makes it important, that by playing or listening to music have proven to be effective ways of activating areas of the brain that positively affect mental health.

Classical music can also play a role in therapeutic role in the human brain, can this genre can help enhance cognitive development. The Brain and Creativity Institute at the University of Southern California (USC) published their study concluding that introducing classical music at a young age can help speed up the maturation rate of the auditory pathway in the brain and that classical music has the ability to form connections in our brain (Christensen and Peirce, 2012). With the help of classical tunes, these connections in our brain can help enable keep our auditory system awake and running. Our auditory system engaged in general sound processing which is very fundamental for our language development, reading skills and development for successful communication skills.

The Mozart Effect was also introduced as a way to the beneficial effect on mental development especially during childhood exposure to classical music. Ky et al. found (1993) that spatial intelligence increase when exposed to Mozart piano concertos to preschool children ages 3-4 years who were given keyboard music lessons for six months. The findings included that all children were able to perform simple melodies by Beethoven and Mozart. Preschoolers were then subjected to spatial-temporal reasoning tests calibrated for age, and their performance accounted for more than 30% better than that of children of similar age given either computer lessons for 6 months or no special training (Ky et al., 1993). Mozart tunes can sublime the effects of classical music on memorization, learning, and creativity. By performing or listening to these tunes, this can boost brain power and can anchor beneficial powers of implementing classical music into our daily lives.

Although classical music is a genre that is not timely relevant compared to the music we listen to the radio nowadays, but famous pieces from well-known musicians like Bach, Beethoven or Mozart carry out the harmonization of humanity and human liberation, which is meant for listeners of classical music to be emotionally, as well as mentally stimulated and increase mental flexibility. As of today, classical music is introduced in music therapy, is currently used to treat patients who have suffered from emotional trauma, dementia, Alzheimer's, depression and other brain disorders because of its ability to lift the mood, enhance concentration and motivation and its ability to re-establish connections in the brain (Cockerton, Moore and

Norman, 1997). Classical tunes in music therapy can improve the wellbeing of the patient and how statistically significant effect in their health. After four sessions of classical music therapy, patients show improvement in their symptoms compared to regular talk therapy and increase dopamine levels within patients throughout the study (Cockerton, Moore and Norman, 1997). Classical music therapy is a growing body of research suggesting that this genre can play an important role in the healthcare industry, including pain management for all patients in a hospital or clinical setting.

Evidence-based music therapy can also improve sensorimotor, language and cognitive functions in the non-musical domain. So far, the Western classical music tradition has been scientifically examined to a far greater extent than music from any other tradition. The findings are generalizable, however, as different forms of music from various cultures have certain common features. Nonetheless, traditional music of various cultures should be systematically studied to determine their unique value, if any, in a therapeutic scenario (Jäncke, 2008). By implementing classical music into sessions of music therapy this can help benefit an individual's wellbeing, by improving the overall livelihood of an individual in many ways including emotionally, mentally and physically.

Further research explains the effects of classical music on the human brain can keep our minds engaged and can prime our brains which can help expand our cognitive and spatial skills. Classical music can develop strong music-related connections in the brain, with some of these music pathways affect the way we think and observe. It was found that numerous brain MRI studies on classical musicians indicate that classical music can activate different areas of the brain that involve music processing that links to our spatial reasoning pathways (Grahn and Nguyen, 2017). For example, listening to music activates basic, more primitive areas of the brain associated with pleasure, survival, and reproduction. It was also found that classical music research, the effects of classical music such as Mozart, Beethoven, and Bach, can activate the corpus callosum which modulates the listener's internal mood and arousal, putting them at optimal levels to enhance memory performance (Aiello and Gonzalez, 2019). Classical tunes can encode information in the brain by the perceptual memory system, which organizes auditory information into melodies and rhythms, rather than by the semantic memory system, which can encode meaning information.

When we listen to different pieces of classical music would prime the activation of areas in the brain that are associated with spatial ability and memory retention, mentioning that brain areas concerned with mental imaging as tested by spatial-temporal tasks (such as building a three-dimensional cube assemblies in sequence) were also mapped by PET scanning, results show that the areas activated included the prefrontal, temporal and precuneus regions which overlap with those involved in music processing (Dowling, Maner, and Tillman, 2016). This can suggest that listening to music would prime the activation of those areas of the brain which are concerned with the spatial ability and memory retention.

Research on music and its effect on brain functions have produced insights into the nature of the brain, prime activation of certain areas in the human brain will reach the phenomenon of neuroplasticity. Highly trained musicians are considered an ideal population with whom to study neural plasticity, to study that instrumental musical performance involving classical music can engage a host of cognitive functions, including information processing, attention, language, memory functions and executive functions (Jenkins, 2001). This information can help confirm as to why instrumental background music can help retain and categorize certain information being

used in a memory task, which can increase concentration level, reduction in any distraction factors and help the human brain organize incoming information.

The classical musical style is easily associated with emotional and semantic information associative memory, either indirectly or directly, relating to semantic information since this specific music genre, does not contain any vocals or lyrics, that with notational precision of instrumentation and notation can assist memory improvement throughout the performance of a specific memory task. Throughout this study of music-induced mood arousal and context on memory from listening to classical music can help create memory context based on recall, recognition and associative memory tasks. Assessing how mood, arousal and context-affected performance from the effects of classical music can help distinguish improved memory cognition and retention compared to non-classical music. Research has demonstrated that classical music has a profound effect on human information processing, affecting emotion, learning and memory, attention, perception, imagery and even motor control (Jenkins, 2001).

Classical music has a strong influence on our emotions and our cognition system as a whole. This raises the question of whether the memory-enhancing effect of classical music based on classical music fluency, style, and rhythmic aspects can be used to enhance cognitive performance in general or in clinical settings compared to non-classical music. Likewise, based on the prior findings of Jenkins (2001), it is hypothesized that participants listening to classical music would have improved memory recall and retention when performing a cognitive memory task. Throughout this study, there will be an evaluation of the participant's recall rate separately for classical versus non-classical background music. This study will reveal that focused attention improved significantly in participants who listened to classical music compared to participants who listened to non-classical music. Participants listening to classical music will perform better on a memory task than non-classical music and there would be a significant difference between performing a memory task while listening to classical music versus non-classical music.

Methods

Participants

For this experiment, I would include 50 college student participants who are enrolled at the University of Nevada, Las Vegas college. which are divided into two groups. The first group will include 25 undergraduate students, age ranges from 17 through 24 years old, including 10 females and 15 males. The second group will include 25 graduate students age ranges from 25 through 30 years old, including 13 females and 12 males. Racial demographics makeup will reflect on UNLV racial demographics of its students include, including 33% White, 27% Hispanic/Latino, 15% Asian, 17% African American or Black, 8% Other. Participants are recruited by receiving extra credit from an upper-level psychology course, participants are also given the choice of consent to participate in this study.

Materials

Each participant will be given a deck of cards while playing a game called, Concentration. In this study is the number of cards being "flipped" and the card matches in this experiment would be measured. In this game, there would be a total of 40 cards presented to each of the two college student groups. Each card has an identical match, and each Concentration card consists of 20

matches. This experiment will also include a radio and a stopwatch, given to record and track how many matches each participant receives and the duration of time for the completion of the Concentration game.

Procedures

Fifty college participants will be divided by undergraduate and graduate level, all participants were given instructions on how to play the Concentration game, and were asked to perform to their highest ability. The classical music group would be the first group to be tested, this group will consist of both a combination of 12 undergraduates and 13 graduate students, and the R&B music group will consist of 13 undergraduates and 12 graduate students. The experimenter would lead the first group a room with classical music playing in the background. The observer will only allow five participants at a time to be in the room because having many individuals in a room can cause distraction. Once participants enter the room, both rooms will include a table with three chairs placed in the middle of the room. The R&B music group was led to another room with R&B music playing in the background and as well, approximately five participants at a time can be in the room.

On each table, there was a deck of Concentration cards faced upside down in the same starting formation and a short demographic questionnaire inquiring about participant age and gender. Participants completed the experiment while listening to either classical and R&B music, by completing as many matches as they can complete in under twenty minutes. Once the Concentration game had been completed participants responded to the demographics questionnaire. The experimenter will observe and measure the number of flips needed to finish the memory game and the number of matches for each group will be measured. The music for both classical and R&B music conditions were played at the same volume and both genres of music were instrumental to reduce distraction. After the participants finished the memory task, the experimenter entered the room, collected the demographics questionnaire and thanked the students for participating in the study.

Results

The first hypothesis predicted that there would be a difference between the two groups, classical music and R&B music on a memory task score. Classical music participants are expected to report significantly higher card matches compared to R&B music participants. The data was analyzed using an Independent-sample T-test. Based on Figure 1, the bar graph summarizes the expected results that college students listening to classical music: M=33 matches, college students listening to R&B music: M=25 matches. The second hypothesis predicted that classical music would produce the best performance while performing a memory task. This hypothesis was also supported by the undergraduate group exposed to instrumental classical music while completing the Concentration card game in fewer flips and more matches compared to the graduate group exposed to instrumental R&B music. The classical music group is reported to have a shorter time of completion, compared to the R&B music group. The results supported the hypothesis with the classical music group scoring the best on the memory task with a significantly better memory task score than the R&B group. The represented expected p-value is p

Discussion

It was hypothesized that there would be a difference between the two conditions while listening to both classical and R&B music on memory scores that resulted from playing the Concentration card matching game. The results indicated that there was a difference between the two groups on the scores of a memory task. Participants in the Classical group significantly did better than those in the R&B group. These findings are consistent with the work of Jenkins (2011) that found that participants performed better on memory retention and cognitive tasks when exposed to classical music tunes while performing a cognitive memory task. For example, classical music has a profound effect on human information processing, along with memory boost during a performance on tasks using cognition. College students who belonged to the Classical group vs the R&B group were reported to have more matches and fewer flips while playing Concentration game. This can determine improved memory retention when each card is being flipped and identifying which card from the stack of 40 cards corresponds with the first card that is being flipped. Throughout the game, it was also noted that there was a shorter time of completing the game, this can account for improved focused attention and higher concentration level compared to listening to non-classical tunes.

Another finding that that is consistent with the work of Cockerton, Moore, and Norman, (1997) also found that classical tunes in music therapy can keep us mentally stimulated and increase mental flexibility which can enhance attentiveness and motivation in order to the ability to re-establish the connection in our brain while performing a cognitive task. This can reflect on the accuracy of card matches that are performed by the Classical group compared to the non-classical group, R&B.

From the supported results, participants that were randomly assigned to the instrumental Classical group, while performing a memory task, processing speed performance was faster and produced more accurate card matches than the instrumental R&B group while playing Concentration. One limitation of this study is that while the current study demonstrated that participants exposed to Classical music outperformed those exposed to R&B music. Throughout finding different studies dedicated to classical music, this can contribute to real-life situations when trying to solve a cognitive task, like solving a math equation or figuring out a jigsaw puzzle. Certain groups of individuals who might benefit from the expected results of this study are college students, classical music is a useful tool for enhancing pattern development and improve other related cognitive functions which can be beneficial for studying for a final exam.

Although both Classical and R&B music deal with emotions that range from symbols of happiness and sadness, one weakness is that it is difficult to understand why the superiority of Classical music related is considered to be related as, “relaxing” and how it is associated with soothing music. This theory may be related to Christensen & Pearce (2012), that found that poorer performance seemed to be related to heightened emotionality in music. Classical music is meant to sound complicated and academic, because of its bewildering complexity of musical notations and counter melodies, classical tunes can include 10-20 instruments within a single piece. When more instruments are involved in a symphony or sonata, it is more convoluted and leads to difficulty in completing the cognitive task and unable to retain information.

In the final analysis, three recommendations for future research to conclude is, more research should be done exploring these issues to determine whether Classical and R&B pieces have beneficial or distracting effects. Second, the effect of other genres of music on memory should also be evaluated including music genres of Rap, Pop, Heavy-Metal, Rock and so forth. Other

types of music, considered, “soothing and aggressive”, should be tested on a memory task. This might shed light on the issue as to whether something unique is occurring with Classical or R.B., whether it is a more general effect of soothing and aggressive music. Thirdly, the effect of music on other cognitive tasks should be evaluated, and how there is a scientific explanation, evaluating the difference between both genres on non-memory cognitive tasks, such as cognitive skills, math and application skills of memory retention. These three future researches can help provide a better understanding of the effects of classical music and how the harmonization of classical music has shaped our emotions, our minds, and the outlook of the music world.