



HOW MUSIC AFFECTS THE BRAIN AND COGNITIVE ABILITIES

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ABSTRACT

The purpose of this research paper is to identify what effect music has on the brain and if music can positively influence children or improve symptoms of depression in the elderly. Playing a musical instrument utilizes many cognitive processes, including fine motor skills, memorization, and creativity. Because of this, playing music can act as a workout for the brain. The studies cited in this paper lead to the conclusion that children that can play an instrument score higher on IQ tests than children that cannot. It is still debated whether this is because smarter children are more inclined to play music in the first place, or because music is what increases their cognitive ability. The effect of playing music and exercising the brain in this way is what is being researched.

INTRODUCTION

It is well known that playing a musical instrument is difficult, requiring fine motor skills among other things. For instance, when playing piano, a finger deviating by just a few millimeters from the correct key is enough to cause a discordant sound. Playing music also involves many cognitive processes, including memorization, monitoring, and creativity. As a result of the intensive cognitive ability required to play music, a positive correlation has been found between musical training and IQ in children. It is difficult to know for sure whether this advantage in cognitive abilities is due to the fact that the children practice music, or because of different factors, such as race, fitness, or socio-economic status of the child's family, but the overwhelming amount of studies coming to the same conclusion seems to prefer the former. The "workout" that playing music gives the brain also seems to have a positive effect on the mental health of the elderly. Several studies have shown that seniors with depression were happier and more mentally adjusted after a period of musical therapy.

REVIEW OF LITERATURE

In one study, two groups of children enrolled in a daycare were tested at the beginning and at the end of a two-year period, one group attended a musical enrichment program and the other did not. At the end of the two-year period the group that had musical training outperformed the group that did not in cognitive tests (Costa-Giomi, 2015). Similarly, students that participated in a poor quality 3-year music program showed no improvements in cognitive ability, but students that participated in just a high quality 1-year music program showed significant gains in quantities and temporal tasks. This suggests that the quality of the music training has an important effect (Costa-Giomi, 2015).

Other studies have similar results. One in particular shows how practicing music results in a higher IQ increase in children compared to other arts. 144 children around the age of 6 were selected for formal arts training at the Royal Conservatory of Music in Toronto. They were given an IQ test and then the children were split into four groups, one group was taught piano, another voice, the third drama, and one group took no lessons. At the end of a 36-week period the children were given another IQ test. The groups that took music related lessons (voice and piano) had on average a 7-point increase in IQ. The groups that took music unrelated lessons (drama and the group with no lessons) had on average a 4-point increase in IQ (Schellenberg. 2004).

In another study, a group of one hundred children, with an average age of 8 years old, were surveyed for their musical activities, then completed IQ testing and brain scans. The results show that the children that practiced a musical instrument for more than half an hour per week scored higher on IQ tests and had more white matter in the brain than students that did not play a musical instrument. The results also showed that children that sang in the choir had no significant cognitive advantage to children that had no musical activities. The children also completed fitness tests and their parents were surveyed on their socio-economic status. The results also showed that differences between children in fitness, age, and socio-economic status of the family had no significant effect on the results of the IQ tests. This study seems to suggest that playing a musical instrument may improve the cognitive abilities of children (Psyche Loui, Lauren B. Raine, Laura Chaddock-Heyman, Arthur F. Kramer, & Charles H. Hillman, 2019).

Practicing music also has a positive effect on depression. One study shows the positive effects of music training on 25 seniors between the ages of 60 and 84. The seniors had no prior musical training. They were split into two groups and given two tests, one for fine motor skills using a machine, and the other tested the mood and quality of life of the participants. One group was

given music training for four months while the other participated in other leisure activities. At the end of the 4-month period, both groups were given the same tests again. The results showed that the fine motor skills improved in both groups, but the mood and quality of life was significantly improved in the music group, while the other had no significant improvements in the mood and quality of life test (Sofia eSeinfeld, Heidi eFiguroa, Jordi eOrtiz-Gil, & Maria V Sanchez-Vives, 2013). Other studies come to similar conclusions. This time, the effect of simply listening to music was studied. A group of 47 seniors saw their depression improve on average over the course of 12 music listening sessions (Nur Sayyid Jalaluddin Rummy, Windarti Rumaolat, & Trihartuty Trihartuty, 2020).

DISCUSSION

It seems that almost all studies done on this topic point to the same conclusion: playing music has a positive affect on the human psyche, namely improving cognitive abilities in children, and alleviating symptoms of depression in the elderly. When it comes to children, the answer is obvious: playing music does improve the IQ in children. The third study supports this. It presents a case where a group of children were selected, and the children already doing weekly music lessons performed better on IQ tests than children that did not (Psyche Loui, Lauren B. Raine, Laura Chaddock-Heyman, Arthur F. Kramer, & Charles H. Hillman, 2019).

But there a still a few questions regarding this topic. For one, while it is evident that children that practice music regularly are generally smarter than kids that don't, could it be that these kids are innately smart and are more attracted to music as a consequence?

The data seems to disprove this. In the first study, a group of children were split into two, one was given musical training, the other was left as the control group. At the end of a two-year

period, the music group outperformed the control group, and since the only variable that was changed was the addition of music training, it is safe to assume that that is what influenced the results (Costa-Giomi, 2015).

Now, is music special in some regard? Can other arts, such as drama, have the same effect? The second study seems to indicate that music is indeed set apart from other arts in its ability to positively influence IQ in children. The study gives high quality tutoring to three groups of children. One receives piano tutoring, one voice, and one drama. The last group receives no tutoring and acts as the control group. Both groups that received music related tutoring (voice and piano) showed a significant increase in IQ on average. In contrast, the group that received drama tutoring and the group that received no tutoring did not have as much of an increase in their IQ scores (Schellenberg, 2004). Though the study failed to look into other arts, such as painting, sculpting, or dancing, the study still shows that music has an advantage over other arts in increasing IQ, at least when compared to drama.

It is interesting to note that in the third study, singing in the choir did not have as noticeable increase in IQ as instrument lessons (Psyche Loui, Lauren B. Raine, Laura Chaddock-Heyman, Arthur F. Kramer, & Charles H. Hillman, 2019). This contradicts the findings in the second study, where both voice and instrument tutoring had about the same increase in IQ (Schellenberg, 2004). But this does not refute the fact that musical training seems to be better than other arts in improving cognitive ability.

Lastly, both studies on the subject of music and depression in the elderly came to the same conclusion: music seems to improve feelings of depression and overall mood in the elderly. It is interesting to note that the fifth study does not focus on seniors playing instruments, but rather just the aspect of listening. After twelve sessions of passive and/or active listening (clapping and

singing along) symptoms of depression were greatly improved in the experimental group (Nur Sayyid Jalaluddin Rummy, Windarti Rumaolat, & Trihartuty Trihartuty, 2020). The fourth study focuses on the elderly playing instruments. Seniors that learned to play the piano over the course of a 4-month period saw an improvement in overall life satisfaction and mood compared to the control group that participated in other leisurely activities (Sofia eSeinfeld, Heidi eFiguroa, Jordi eOrtiz-Gil, & Maria V Sanchez-Vives, 2013). Interestingly enough, the control group and the experimental group saw no significant differences in fine motor skills testing. It was hypothesized that the experimental group would see an improvement in their fine motor skills, due to the precise fingering required to play the piano, but that seems to not be the case.

CONCLUSION

Music has a positive effect on the brain. Due to the many cognitive processes required to play an instrument, doing so can increase the IQ in children and positively impact the brain in those formative years. Moreover, music does not only benefit the young. Playing and listening to music improves symptoms of depression in the elderly, and can be used as a sort of therapy. Music is truly a wonderful gift for humans, it can improve our life – and the outlook we have upon it.

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