

## **Can Listening to Music Significantly Improve our Cognition?**

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## LISTENING TO MUSIC

### **Abstract**

In recent years, the link between listening to music and cognition has sparked the interest of many researchers. In this paper, I argue that listening to music can significantly improve certain aspects of our cognition. Specifically, listening to music has positive effects on our emotions, focus, and memory. I also consider alternative views, such as the limitations of music, alternative methods to reduce anxiety, and the relation between music and negative thoughts. I conclude my paper by suggesting that more research is needed to motivate organizations to establish musical therapy centers around the world.

*Keywords:* music therapy, cognitive skills, external stimulation, dementia, brain activity

### **Can Listening to Music Significantly Improve our Cognition?**

In this paper, I argue that listening to music can significantly improve certain aspects of our cognition. According to the American Psychological Association, cognition is defined as “all forms of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem solving” (APA, 2007, p.201). In other words, any task that we perform requires one form or another of the mentioned functions. As a result, improving cognition abilities may facilitate any daily task. While cognition implies multiple functions, this paper focuses on the cognitive improvement of emotion, focus, and memory.

I support my position on music improving our cognition with the following three arguments. First, I argue that music reduces anxiety. According to Yehuda (2011), listening to music activates a pathway that connects the auditory region to the emotional region of the brain. Second, I argue that music improves our focus. For instance, Lima-Silva et al. (2012) demonstrates that for a running trial, individuals that listened to music at the beginning of the race performed 53% better than those who did not. Finally, I argue that music can enhance our memory. For example, McDermott et al. (2012) shows that music can unlock memories for people with dementia. These findings suggest that listening to music that we enjoy is correlated with how we feel, perform, and retain information.

I also consider alternative positions towards music being beneficial to our cognition. First, people may argue how music therapy can only be efficient under certain conditions (Thompson & Schellenberg, 2001). Second, other people argue that there exist more effective ways to relieve anxiety (Harlan & Lannigan, 2017). Finally, some people say that music can depict a negative image of our society (Fairclough et al., 2014). In my paper, I refute such claims by showing the limitations of the alternative methods to relieve anxiety. I also underline that, because music is a kind of media, there should be no reason for it to affect our well-being provided we consume it responsibly.

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This paper is important because although most people listen to music, few are aware of its impact on our brain. To clarify, listening to music activates various parts of the brain such as the cerebellum and the hippocampus, which are linked to physical movement, emotions, and memories. The seriousness of this subject translates into the implementation of musical therapy centers throughout the world to help overcome an array of medical cases linked with the brain. In fact, an international corporation called World Federation of Music Therapy is devoted to spreading the benefits of music on our cognition. Thus, understanding the impact of listening to music on our cognition is important.

### **The Benefits of Listening to Music on Cognition**

Although it may be controversial, listening to music has an array of benefits that cannot be ignored, regardless of some limitations. Some of these benefits include the reduction of anxiety by regulating brain regions responsible for emotion. Another benefit of listening to music is the improvement of performance during physical exercise. Listening to music also ensures a better retention of information by activating certain brain properties.

#### **Reducing Anxiety**

Listening to music relieves anxiety. According to Şoflău and David (2018), music reduces anxiety by acting on the limbic system. This part of the brain is responsible for the regulation of emotions. To quantify anxiety, Şoflău and David measure the change in variables linked to our limbic system. For instance, the authors analyzed the rational-emotive (RE) and cognitive-behavioral (CB) indexes. The RE index is responsible for anxiety that is linked with irrational beliefs while the CB index is responsible for our ability to manage anxiety. The results suggest that the RE index significantly decrease after listening to the favorite genre of each respective subject while CB increases.

Music also stabilizes the amount of electricity in the brain. Our brain encompasses electricity that is carried by ions, which are atoms that embody positive electrical charges. Wang et al. (2018) put subjects in a relaxed state, then, while varying the music genre, studied the different ionic activities that took place. The researchers then examine whether

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the subjects remain in a relaxed state, or a change occurred. The ions displacements were measured using a technique called electroencephalography. This method acquires brain signals with their respective frequencies to analyze them. The frequency of a relaxed brain is between 8 and 12 Hz, which is for an individual that is not anxious. In contrast, for an anxious person, the frequency of electric signals ranges from 13 to 30 Hz. The researchers report that the brain signals while listening to any music genre is approximately 10 Hz. These discoveries suggest that music has a crucial role in decreasing anxiety by stabilizing brain properties.

In addition to the changes that occur in our brain, listening to music affects our body. Yehuda (2011) examines the connection between listening to music and stress management. The author demonstrates that listening to music stabilizes our heart rate and blood pressure, which are two important factors in reducing stress. In fact, the study shows that listening to music ensures regular heartbeats and blood pressures included in the estimated range of a healthy person. The normal resting heart rate of an adult is between 70 and 100 beats per minute, and the average blood pressure is less than 120/80 mm Hg. However, stress causes our body to release adrenaline, which is a hormone that raises our blood pressure and makes our heartbeat faster. Yehuda found the average heart rate of anxious music listeners to be approximately 82 beats per minute, and their blood pressure to be approximately 117/77 mm Hg. This finding indicates that music also relieves anxiety by regulating the blood in our body.

### **Improving Our Focus**

Music can increase our attention during an array of activities. Lima-Silva et al. (2012) argue that a variable called the rating of perceived exertion (RPE) changes when listening to music. This parameter measures our attention while doing an activity. To illustrate this change, the authors measure this variable for runners listening to music. The researchers noticed an increase in the RPE after listening to music before doing a running trial. In addition, Oron et al. (2007) show that listening to music while driving improves alertness.

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The researchers suggest that this effect is possible because listening to music counters the monotony of the route. These results suggest that listening to music makes certain day-to-day activities easier.

In addition to keeping us attentive while doing certain activities, music makes us more motivated to complete physical exercise. Hallett and Lamont (2014) argue that listening to music is the most efficient external stimulation to stay motivated during exercise. The paper demonstrates that people who listened to music while exercising tend to stay more in the gym to exercise than those who do not. This difference is explained by the fact that music activates a region in the brain known as the putamen. This region is responsible for processing rhythms and regulating body movements accordingly. Similarly, Jarraya et al. (2012) demonstrate that the amount of dopamine increases in football players after listening to music before playing a game. This increase in dopamine is translated to a motivated mindset and consequently a better performance. These findings indicate that music influences our performance by acting on the brain regions responsible for movement.

Listening to music can also help in dealing with brain injuries. Chen et al. (2012) argues that listening to music can increase visual attention. The term visual attention refers to our ability to visually distinguish objects and locate them in a specific field of vision. To measure the change of attention, the researchers conduct a test called the Behavioral Inattention Test (BIT). The authors observed from the BIT that while listening to music, participants showed significant improvement on doing a variety of tasks requiring simultaneous eye movements. Therefore, music not only improves our focus while exercising or studying, but it also improves the visual attention of patients who suffered from brain strokes.

### **Enhancing Our Memory**

Individuals with dementia benefit from listening to music. Dementia refers to a group of symptoms linked with a gradual loss of memory. Braid and Samson (2015) suggest that music causes neurogenesis and therefore allows the recovery of forgotten events.

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Neurogenesis is the process during which new neurons are developed in our brain. According to the researchers, the more neurons we have in our brain, the easier it is to remember events that occurred in the past. Likewise, McDermott et al. (2012) demonstrate that music therapy is effective for people exhibiting dementia such as Alzheimer's disease. The authors demonstrate that listening to music enables a connection between listening to a song and attaching it to a memory. For instance, when people with dementia hear certain songs, they gradually remember the context in which they heard it. The researchers demonstrated this improvement by going to nursing homes and showing that on average 72% of the subjects were able to recall certain events with the help of specific songs.

Listening to music also has an influence on language. Moreno (2009) argues that music impacts language even though language and music are processed in different regions of the brain. Music is processed on the right side of our brain while language is processed on the left side of our brain. The researcher shows that the ability to distinguish different pitches in music is the same process used when differentiating between the syllabic sequences of a speech. In fact, music influences language at a very early age to ease the retention of information. In most languages, the alphabet is taught in schools as a song. This method is applied because it allows children to link a letter with a very specific sound. In addition, reading a text while giving it a certain tone facilitates the understanding of a text. These remarks demonstrate the effect of music on memorizing syllabic sequences to form words.

### **Potential Arguments Against the Benefits of Listening to Music**

Some people believe that listening to music has very limited positive effects. They argue that music therapy can only be efficient under certain conditions. Additionally, many argue the existence of better ways to improve our cognitive skills. Some also correlate listening to specific genres of music with violence and suicide.

### **Music Therapy Can Be Inefficient**

Some people argue that music therapy only works under certain conditions. Music therapy is the usage of music to improve cognition skills. For instance, critics believe that

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music therapy is only effective if the subject undergoing the therapy exclusively listens to classical music. This phenomenon is known as the Mozart effect. The Mozart effect is a terminology used by certain researchers to denote that listening to classical artists may potentially lead to better cognitive abilities (e.g., Muftuler, 2001; Rauscher, 1998).

Development in cognitive abilities include an improvement in generating creative ideas and a faster ability to learn information. This improvement allows the effects of disorders such as autism and attention deficit hyperactivity disorder (ADHD) to be reduced. This theory implies that individuals that dislike listening to classical music would benefit from it, which is rare in practice.

Other people argue that music therapy cannot be used alone to have noticeable effects on subjects. Music therapy requires at least one other therapy to be accompanied with it to be effective. For instance, Yadira (2011) suggests that for patients suffering from depression, visiting a behavioral psychologist, and practicing music therapy ensures an approximately 20% faster recovery. In addition, individuals undergoing music therapy and two other types of therapies were able to recover from depression almost 30% faster. Although simultaneously attending two types of therapies may guarantee faster results, it is important to note that music therapy is on average 30% cheaper than other types of therapies. Therefore, an important part of the concerned individuals may prefer to uniquely go to a musical therapist.

Proponents of the inefficiency of music therapy also argue that it can create memories for events that did not occur for people with dementia. False memories usually occur when an individual such as a family member claims that an event has happened even though it did not take place. This type of memories can be created while listening to music with lyrics that contain similar but not identical events that a person with memory loss underwent. However, Patithis and Frenda (2018) argue that there is a probability of approximately 5% that this happens. Thus, listening to a song will generally not generate memories for events that did not take place.

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### **Alternative Methods to Relieve Anxiety**

Some may argue that there are more effective ways than listening to music to reduce anxiety. The easiest way to be less stressed is to eat healthy food (Sinha, 2018). For instance, a substance called flavonoids in chocolate lower stress hormones. In addition, carbohydrates such as oatmeal, quinoa, and brown rice cause the release of a brain chemical called serotonin, which is responsible for boosting our mood. Consuming food rich in vitamin C such as oranges may also help clear a stress hormone called cortisol from the blood. This hormone responds to stress by significantly increasing the heart rate. However, when we are stressed, we tend to overeat, which is the opposite of eating healthy food. Therefore, this proposition seems unrealistic.

In addition to healthy food, sports are considered by many as the best way to disconnect and be less anxious. When we exercise, our body releases a chemical called endorphins, which interacts with opioid receptors in the brain. These receptors are the same acted upon when taking pain killers. Unlike morphine, which is a pain killer, the activation of these receptors by the body does not lead to addiction. The interaction with the opioid receptors enables a feeling of intense happiness, also known as euphoria. Da Silva et al. (2012) suggests that exercising for 30 minutes a day, makes us 71% less likely to suffer from anxiety symptoms. Although sports may be the key to reducing anxiety, it remains a commitment compared to listening to music. This fact implies that it is harder to take the initiative to exercise for anxious people than it is to listen to songs.

Many people also argue that meditation is the most efficient practice to relieve stress. Meditation is a practice that aims to decrease the number of our negative thoughts. This decline allows us to control our emotions in a better way. More specifically, mastering meditation makes it easier to manage stress. According to Eberth and Sedlmeier (2012), the most popular form of meditation is called mindfulness meditation. Mindfulness is about paying attention on purpose during a certain period without reacting to any of our thoughts. The researchers demonstrate that approximately 75% of people that exercised mindfulness

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felt better than before. This improvement can be explained by the fact that meditation activates our prefrontal cortex. Among the many roles of the prefrontal cortex is to enhance our ability to filter thoughts. However, identifying a negative thought does not make it disappear. Therefore, music therapy can be combined with mindfulness meditation to reduce anxiety.

### **Listening to Music and Negative Thoughts**

Critics may argue that listening to certain genre of music leads to aggressive behavior. More specifically, the genre that is often regarded as the epitome of violent media is rap. This perception was born because of the existence of certain subgenres of hip-hop that may contain aggressive lyrics (Lozon & Bensimon, 2014). For instance, drill is a musical subgenre of rap that revolves around the benefits of being a gang member. However, it is important to know that rap is a musical genre that was initiated in early 1970's by street groups in New York as a resort to express their voice with lyrics rather than using violence. Therefore, the existence of certain subgenre that may contain violent lyrics does not reflect the true essence of rap music.

Other people argue that listening to music could potentially lead to suicide. More specifically, over the years multiple researchers tried to identify the involvement of specific music genres in suicide (e.g., Ferguson, 2019; Stack et al., 1992). Although no clear scientific evidence has been found suggesting that music causes suicide, heavy metal has been repeatedly associated with it. Baker and Brown (2016) argue that heavy metal creates a negative mindset by the omnipresence of suicidal topics. The researchers suggest that in 2016, approximately 30% of individuals that have committed suicide and listened to music, expressed an interest in heavy metal.

In addition to heavy metal being often linked with suicide, a Hungarian song called "Gloomy Sunday" is reported to have caused 200 suicide cases globally (Krysinska, 2008). This song was linked to suicide by the presence of its verses in suicide notes, individuals carrying with them the song lyrics while ending their lives or people committing suicide

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while listening to the song. The phenomenon can be explained by a sense of connectivity that the listeners felt when hearing experiences close to their lives. Although the link may indeed be correct, it is important to acknowledge the historical context of this period. “Gloomy Sunday” was a song composed by Rezső Seress in the early 1930’s. During this time many individuals in Eastern European countries were suffering from extreme poverty because the country was annexed by Germany. Consequently, poverty may be the main reason for these suicide cases rather than the song. Therefore, the evidence suggests that a song may be part of a larger group of factors for people to take their own lives.

### **Conclusion**

Certain components of our cognition can be improved by listening to music. Improving cognition is important as better skills make any daily activity easier to complete. Among the many advantages for cognition of listening to music are that it reduces anxiety by acting on the brain areas that are responsible for the regulation of emotions, heart rate, and blood pressure. Listening to music also improves our focus by regulating our body movements adequately during an activity. In addition, music enhances our memory by generating new neurons that facilitate remembering events.

Despite the many advantages that music has on our cognition, it still receives criticism from some researchers and misinformed members of our society. First, people argue that music therapy is often viewed as effective only when listening to classical music. However, we all have different music preferences so being forced to listen to a certain genre cannot have a positive effect on our well-being. Second, many critics argue that there are better methods to relieve anxiety. Again however, evidence shows that music is the most accessible method for reducing anxiety. Third, some people argue that listening to music is correlated with suicide and violence. However, the evidence again shows that music can be a factor leading to negative thoughts, but it is rarely the main reason.

Currently, there is not enough research on the effects of music therapy. Therefore, more research should be conducted to encourage governments and private organizations to

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establish more musical therapy centers around the world. Although it can only be effective under certain conditions, music therapy has a significant impact on a multitude of severe diseases. Thus, the establishment of musical therapy centers all over the globe could be revolutionary.

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