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# Emotional and Psychological Effect of Music on People

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## Summary

**Many of us enjoy music. We listen to it while we study, practice, run, or just while relaxing. However, we may not realize the impact of the music on us, both physically and emotionally. I hypothesize that sedative music will calm and relax, exciting music will bring excitement, and neutral music will bring emotional equilibrium. I also hypothesize that the heart rates of subjects will match the tempo of the song they are listening to. A survey that asked questions about the subject's emotional state and heart rate was conducted before and after the subjects listened to sedative, exciting, and neutral music. The types of music were chosen because of their predicted effects and because of their differences in tempo. Some of the results were surprising concerning heart rate, while the emotional states aligned better with the hypothesis. For heart rate when listening to sedative music, the heart rates were very similar between subjects. When listening to exciting and neutral music, the heart rates were closer to half of the tempo of the music. Understanding the impacts of music on human beings allows us to use music for the greater good. One example of this could be through the use of music therapy to help everyone but specifically those that are emotionally unstable.**

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## Introduction

Sound is a part of our everyday lives and so is music. Music has a way of affecting our lives, emotions, and heart rate without us entirely realizing it. Listening to music can activate many systems of the brain, including the subcortical and cortical systems, similar to other emotional stimuli. This means that music could also be used to communicate emotionally with infants and the rest of the population (1). Our emotions are guided and influenced, both actively and passively, while listening to music, which affects the way humans respond to each other (2). Based on a study conducted by Makoto Iwanaga, Asami Kobayashi, and Chie Kawasaki, the parasympathetic nervous system decreases in activation when excitative music is played (3).

Over the past few years, mental illness cases have continued to grow (4). Music therapy is one option that works for individuals that have mental illnesses by using music to calm some emotional agitation of sufferers in a manic, depressive, or psychotic episode (5). Music therapy can improve motor skills, cognitive function, behavioral and social skills, emotional and affective development, and the general quality of life for patients (6). Knowing the effects of music is vital to our society because music therapy can be used to assist those with developmental disorders, neurological, audiological, oncologic, and psychosomatic diseases (7), victims of abuse, and many more. Music therapy is used to assist those with emotional, physical, and spiritual struggles (6).

We hypothesize that songs will have the effects their names suggest (sedative music will calm and relax, exciting music will bring excitement, and neutral music will bring emotional equilibrium) and that the listener's heartbeat will match the tempo of the song they are listening to.

## Results

After listening to the sedative music, all subjects reported feeling more relaxed and calmer; two out of five subjects reported almost falling asleep. For those that listened to the exciting music, females reported feeling energy and excitement, while the males reported feeling more relaxed and calmer. After listening to the neutral music, most reported feeling calm and at peace; one person even reported that after listening to the neutral music they were "probably the happiest I have been all day." The average change in emotional state based on the survey was calculated for each of the emotional state categories - happiness, sadness, anger, fear, excitement, and disgust - based on the information presented in **Figure 1**. After listening to sedative music, anger, fear, disgust, sadness, and excitement all decreased, with fear showing the largest decrease of 37.5%, while the average happiness increased by 3.7%. After listening to exciting music, average happiness decreased by 3.6%, average sadness decreased by 16.7%, average anger stayed the same, average fear increased by 40%, average excitement increased by 20%, and average disgust increased by 40%. For the neutral music,

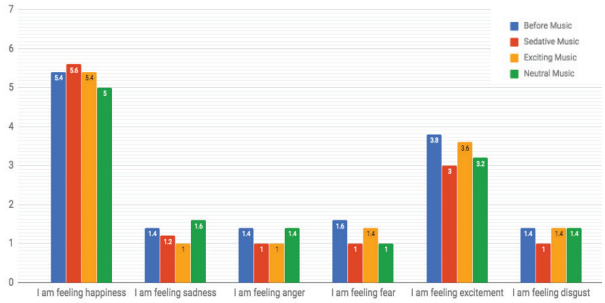


**Figure 1. Change in subjects' emotional state as a result of listening to music.** The average change in emotional state is depicted for the six emotions measure (happiness, sadness, anger, fear, excitement, and disgust) for each of the four surveys: before music (blue), after sedative music (red), after exciting music (yellow), and after neutral music (green).

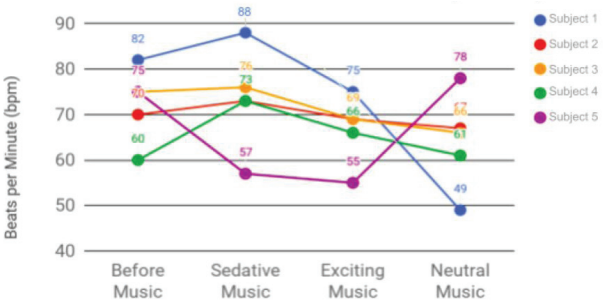


**Figure 2. Heart rate as measured before and after listening to music.** The heart rate is recorded for each subject during each point of testing (premusic, sedative music, exciting music, neutral music).

happiness, fear, and excitement all decreases, with fear showing the largest decrease of 28.6%, while the average sadness increased by 60%, the average anger increased by 40%, and the average disgust stayed the same. These results indicate that music may cause emotional changes.

The majority of the subjects had increased heart rate from the start of the first survey to the start of the next one (**Figure 2**). Only one person's heart rate went down. The average beginning heart rate was 72.4 beats per minute (bpm), while the average heart rate after listening to sedative music was 73 bpm, which is close to the sedative music's tempo of 68 bpm. The average heart rate after the exciting music was 66.8 bpm, which is approximately 40.5% of the tempo of the exciting music. After listening to the neutral music, the average heart rate was 64.2 bpm, which is approximately 65.4% of the tempo of the neutral music. These results show that the tempo of music being listened to cna influence physiological processes, such as and individual's heart rate.

## Discussion

It was originally hypothesized that the songs would have the same effects that their names suggest: sedative calms, exciting brings excitement, and neutral brings about emotional equilibrium. While some data provided evidence for this hypothesis, other data did not. There were no specific trends of emotional states based on gender that applied to all song types. There was a change in emotional state based on the type of the music played. Sedative music tended to put people in a sleepy, relaxed mood. Exciting music relaxed males, while it made females feel more energy. This may have to do with the development of the temporal lobe, the lower frontal lobe, and the hippocampus of the brain because listening to music uses these parts of the brain (8). The effects of exciting music may have to do with the differing development of the brain between males and females (8). Neutral music caused subjects to feel neutral: their emotional state and heart rates were close to the baseline.

Another hypothesis was that the listener's heart beat would match the tempo of the music they were listening to. While the averages were more accurate than that of the individuals, sedative music's tempo tended to match the bpm of the listener's heart rate. This was not true for neutral or exciting music. For those, average heart rate was closer to 50% of the tempo of the music. Therefore, heart rate can be changed by the tempo of the music. When the tempos get to the extremes (really fast or very slow), the heart rate takes either the half note (for fast songs) or the eighth note (for slow songs). It's important to note that since the songs were always presented in the same order, it is difficult to say whether the heartbeat changes were due to the effect of the music or participants just getting used to the testing procedure.

The types of music that subjects enjoyed listening to have an effect on the results of the experiment. Each subject had differing music preferences (**Table 1**). For example, subjects that are more inclined to listen to exciting music would have a greater score of positive emotions when listening to the exciting music. This could be caused by certain types of music being associated with certain emotions. An example of this would be if

| Subject | Music preferences |
|---|---|
| 1 | Indie rock, classic rock, folk |
| 2 | Country |
| 3 | Jazz, country, pop, merengue, gospel |
| 4 | Country |
| 5 | Classic rock |

**Table 1.** The music preferences of each subject which were collected during the course of the study.

| | Subject 1 | | | | Subject 2 | | | | Subject 3 | | | | Subject 4 | | | | Subject 5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Test Number** | **#1** | **#2** | **#3** | **#4** | **#1** | **#2** | **#3** | **#4** | **#1** | **#2** | **#3** | **#4** | **#1** | **#2** | **#3** | **#4** | **#1** | **#2** | **#3** | **#4** |
| Happiness | 6 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 7 | 7 | 6 | 6 | 4 | 5 | 5 | 3 | 7 | 6 | 6 | 6 |
| Sadness | -2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -2 | -2 | -1 | -4 | -1 | -1 | -1 | -1 |
| Anger | -2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -3 | -2 | -1 | -1 | -1 |
| Fear | -2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -2 | -1 | -1 | -1 | -2 | -1 | 3 | -1 | -1 | -1 | -1 | -1 |
| Excitement | 5 | 1 | 5 | 4 | 1 | 1 | 1 | 1 | 5 | 4 | 4 | 5 | 4 | 5 | -5 | 2 | 4 | 4 | 3 | 4 |
| Disgust | -2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -2 | -1 | -3 | -3 | -1 | -1 | -1 | -1 |
| **Total** | **3** | **2** | **6** | **5** | **1** | **1** | **1** | **1** | **7** | **7** | **6** | **7** | **1** | **5** | **-2** | **-6** | **5** | **7** | **5** | **7** |

**Table 2.** A measure of how strongly different emotions were felt by subjects after listening to different music. The scale factor value that was selected by each subject with negative emotions being negative values and positive emotions being positive values.

| | Pretest | Sedative | Exciting | Neutral |
|---|---|---|---|---|
| Happiness | 5.6 | 5.4 | 5.2 | 4.8 |
| Sadness | -1.4 | -1.2 | -1 | -1.6 |
| Anger | -1.4 | -1 | -1 | -1.4 |
| Fear | -1.6 | -1 | -1.4 | -1 |
| Excitement | 3.8 | 3 | 3.6 | 3 |
| Disgust | -1.4 | -1 | -1.4 | -1.4 |
| **Total** | **3.4** | **4.4** | **4.4** | **2.6** |
| *Z-value* | | *0.36* | *0.36* | *0.33* |

**Table 3.** Averages and Z values of subjects' emotional response to different music. The amount of change in emotional state overall for all subjects.

someone heard a specific country song sung at their favorite grandpa's funeral, then they might associathat song (and possibly country music in general) with negative emotions.

Although our experiment does not show much of a change in emotion, other evidence shows that the emotions and heart rate of a human being can be changed by music. The emotional state of a person when listening to different types of music changes with the music. Heart rate is also directly related to the tempo of the music: this includes the extremes in which the heart rate used a beat other than a quarter note in which to take its rate (in 4/4 time in music, the quarter note gets one beat and the tempo is the frequency of that beat). Our experiment was limited by the small number of subjects and time restraints. The way that emotional state data was collected could be more thorough and valid. If we were to do this experiment again, we would watch the respiration of each subject along with heart rate to better understand how those relate. These findings can be directly applied to music therapy. Music therapy can be used to emotionally stabilize and also to regulate heart rate in many settings. Music therapy may be the next step to making our world population more emotionally and physically stable, allowing us to accomplish amazing new things.

## Materials and Methods

ROSS digital stereo headphones over ear DJ style (wiped with sanitized hand wipes each time) were used for each test in a similar location (the library in Shickley Public School) during second Period (8:45 a.m. to 9:48 a.m.). Five sophomores (three females and two males) participated and will remain anonymous. To test heart rate, a Mi Fit band was used. A Macbook Air was used to play the music at a volume of nine blocks on the volume bar. Each subject's music preference was documented for better understanding how music preferences affect the effects of the different types of music on subjects.

The subjects were individually taken into the library (five meters from the classroom), seated at a table, and had their heart rate measured by the Mi Fit band. They were then given a survey to fill out. The survey contained nine questions. The first blank was for them to type their name. Questions two through seven asked how they were feeling (happiness, sadness, anger, fear, excitement, disgust). The eighth question's purpose was to provide more in-depth information and also to assist in the evaluation of the data (both heart rate and emotional state). It was also used to normalize the data. For example, if the person reported in the eighth question that they had a headache, then they are going to have more negative emotions. Question nine was where they recorded their heart rate (we would measure their heart rate then ask them to write it down). **Table 2** shows the survey taken and the point system used; negative emotions (anger, sadness, fear, and disgust) counted for negative points and positive emotions (happiness and

excitement) counted for positive points with the totals after each survey shown at the bottom. After filling out the survey, they were asked to put on the headphones, relax, and close their eyes. Once they had listened to two minutes of the music, they retook the survey and their heart rate was measured with the Mi Fit band. These steps were repeated for all three of the music selections: sedative music (A Natural Sedative: Relaxing Calming Tranquil Music With Isochronic Tones to calm the mind published by Sleep Easy Relax - Sleep Meditation Music on May 3, 2014), exciting music (Exciting Music, Piano: "Jagged" by Thomas Smith published by PolygonMusic on Sep. 3, 2011), and neutral music (Neutral Music published by aishwarya veerabhadran on May 20, 2014). The sedative music was 68 bpm, the exciting music was 160 bpm, and the neutral music was 104 bpm. There was no extra time taken between each selection of music; each song was introduced right after the survey was taken. I used a statistical method outlined by Pocook shown in **Table 3** (9). This statistical method is used to determine the amount of change in data. The Z value is the amount of change that takes place: the larger the Z value, the greater the amount of change and the smaller the Z value, the lesser that amount of change.

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