

Music, Stress, And Resilience

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Abstract

Music is oftentimes used as a method of dealing with stress, and has been shown in many different studies to be an effective tool for coping with stress^{1,2}. Since one aspect of being resilient is facing stress, challenges, or adverse conditions³, music may be an effective way to help a person be resilient. In order to investigate this relationship, participants in this study were asked to play an unfair computer game to expose them to adverse conditions and cause stress. Participants will be asked to play the game for 5 minutes. During this time, they will listen to music that is either self-selected, pre-selected, the default game music, or ocean waves. The participants' stress levels were measured using the Affect Grid test⁴ and recorded before the start of the game and after 5 minutes of gameplay. After the last affect grid measure was taken, the participants were given a brief survey, order to obtain their feedback about the music, the game, and how it made them feel. Following the survey, participants were asked if they would like to continue playing the game for the remainder of the time slot. If they said yes, this was noted and timed. When they were done, they were handed the debriefing sheet and thanked before leaving. When the results are collected, a one-way ANOVA and an appropriate post-hoc analysis were used to determine the significance of the data. This data can be most directly applied to college students since the participants were selected from North Central College; however, the results may also hold true for adults and younger people. Similar experiments to measure the relationship between resilience, stress, and music could be operationalized in different ways, leading to future studies. These results show music could be used to help individuals increase their resiliency during difficult times.

Keywords: Music, Stress, Resilience

1. Introduction

The feeling of stress, and going through stressful situations is not uncommon to anyone in any stage of life. Students, adults, and children experience many different stressors on a daily basis, which can sometimes interfere with everyday life and affect a person's resilience, or the ability to cope with adverse situations. College students are faced with homework on top of stressors from outside jobs and other activities. To cope with these situations, many people turn to music. "Music helped me get through this" is not an uncommon connection made by college students and many others. Observed connections between concepts such as music and resilience can lead to some testable hypotheses. In this project, relationships between these complex ideas are explored, specifically in terms of their effect on the way a person performs a new, challenging task.

1.1 Music

We humans are a musical species no less than a linguistic one. We integrate all of these and 'construct' music in our minds using many different parts of the brain. And to this largely unconscious structural appreciation of music is added an often intense and profound emotional reaction to music. Darwin, 1871⁵.

As Darwin suggested, music is very important to humans as a species⁵. However, measuring the different ways music affects humans has shown to be challenging, if only because of the countless thoughts, feelings, emotions, and physical responses that occur when music is heard. It is still largely unclear why music affects people so profoundly, but these effects have nonetheless been utilized in many different ways, one of which is to alter emotions and the way people think.

It is not uncommon knowledge that music can make people feel different ways, and it has even been reported that people are most likely to listen to music for its emotional effect in a study investigating the link between music, cognition, and emotion¹. Since music is such an emotional art form, many have measured different physiological effects that were produced by listening to certain types of music, such as heart rate, blood pressure, skin conductance and temperature change¹. Listeners have also been known to associate similar feelings with the same pieces of music, leading researchers to believe that the emotional connection between music and its listeners is not simply based on personal experiences with music¹. This knowledge leads one to believe that something within the music is leading to genuine emotional experiences rather than personal experiences and associations.

Sloboda reported many that music inspires genuine emotion in listeners and believes, along with many others, that music pulls people in by providing this emotional connection⁶. His research suggested that exposure to music lead to an increase of positive emotions, arousal, and present mindedness⁶. Later in the same article, Sloboda discusses how emotions can be mediated in different ways based on a person's exposure to the music and what people have been taught to expect structurally⁶. This is what makes music interesting and it is where much of the emotion from within the music is derived.

With Sloboda's⁶ and Krumhansl's¹ conclusions in mind, different types of musical structure can provoke different ways of thinking. One study that demonstrates these emotional alterations discusses the concept of construal, or "psychological distance" in time⁷. Different levels of construal can be associated with abstract or concrete thought patterns. In this study, different musical structures were used to influence different groups of participants before creating a shopping list and completing other tasks that signaled different ways construal could be evaluated. These findings did show that the different elements of music had an influence on the way their respective groups processed their shopping list. This indicated that the type and structure of music participants listened to did significantly affect their thought patterns and the way they organized their ideas⁷.

Since it has been shown that music can influence the way a person thinks, people seeking certain emotional responses often utilize these effects. Through the years, there has been more and more evidence that music can and should be used for therapeutic emotional purposes. Since developing the idea of music as therapy, there have been myriad recorded benefits including, but not limited to, positive emotional changes, a sense of control over one's life, increased awareness of self and environment, the formation of coping and relaxation skills, and aiding in concentration and focus². Many of these skills can be used to help eliminate and alleviate stressors for which clients would seek therapeutic help.

1.2 Stress

Despite it being such a common occurrence in humans and such a basic part of life today, stress itself is a relatively complex. The term was not scientifically defined until the Hans Selye conducted his lab research in the 1930s. This research resulted in defining stress as a non-specific reaction to external agents⁸. While this definition seems vague, Selye's research was conducted with mice and rats in a physiology lab. This points to the now well-established connection that stress, a mental process, can affect the body. At first, many people contested this definition across many different disciplines before it became more widely accepted in the 1970s⁸. This definition of stress has been able to mostly hold on to its original meaning, in that it is not always a negative force and can be caused by any number of external or internal forces, which is elaborated more below.

Despite Selye's observation of the physical harm that stress can do to organisms⁸, stress is a very necessary part of life. Research conducted by Yerkes and Dodson in 1908 showed an inverted U-curve as the result of an experiment that tested the learning speeds in mice when exposed to a small electric shock⁹. Their results, namely the inverted U-curve, have since been shown to be able to describe any number of phenomena in psychology, including stress¹¹. This curve implies that there is an intermediate level of stress that can be very productive, in which people can reach their peak performance. Extreme higher and low levels of stress usually result in poorer performance and unproductivity, making the optimal conditions include a moderate level of stress⁹. This being said, stress reduction may not always be what is needed, and striking an intermediate balance is what is most productive.

Because of this balance that needs to be achieved, stress can be very difficult to measure. In his 1990 paper, Lazarus discussed many aspects of stress, how researchers can view it, and how it can be measured¹¹. One element of stress that he emphasized is that it is derived from a person's relationship with their environment. Negative stress results

from a relationship that “demands tax or exceeds the person’s resources”¹¹. Because of this relationship, the concept of stress can be viewed in two different ways. The first is the view of stress as an input, meaning that stress is an external for that comes from one’s environment. In contrast, the second way to analyze stress would be from the perspective of stress as an output. Stress is then viewed as a response from within, not an external pressure. However, Lazarus believes that neither way is absolutely correct, but that stress is a combination of both viewpoints. In other words, stress is a combination of what comes from the environment and how a person reacts to it¹¹.

Lazarus also recognizes that having or identifying stress is a result of multiple steps¹¹. The first step being *appraisal*, meaning that a person must assess the situation and realize what may need to be done. The second is *challenge*, which comes from knowing what must be done and the willingness or readiness to overcome obstacles. The third is *coping*. Coping strategies help to “manage the troubled person”¹¹. These three steps lead to the person’s awareness of stress and ability to continue to function with the best of his or her abilities¹¹.

Another distinction that Lazarus made right from the beginning is that stress is multivariate. There are many different aspects of life and different environments that can cause stress, and it is important to distinguish between different types of stress. This is what makes stress so challenging to measure. Many different factors need to be included in order to get an accurate measurement of psychological stress. Despite these conclusions, Lazarus does view psychological stress to be a type of emotion. In the concluding statements of his paper, he suggests that intensity of emotion quality should be measured rather than stress because stress itself is so difficult to pinpoint¹¹.

More research supports Lazarus’ findings by agreeing that stress is indeed a multivariate phenomenon. Three elements (response, stimulus, and stimulus response reactions) are said to comprise “stress” in Sethi’s definition¹². However, Sethi goes slightly further and defines four essential variables as a part of stress are environmental demands, a person’s perceptions, a person’s coping mechanisms, and the effect of those three on the person’s personal and organizational health¹². The addition of the health implications of stress can be a very important factor to consider when assessing the need for stress recovery and possible therapy and treatment.

One other very important element of relieving stress is where it originates. The causes of stress can give insight about the best ways to treat or eliminate it. Lazarus has given three different types of sources of stress: harm or loss, threat, or challenge¹³. With its root pinpointed, stress can be easier to manage and therefore treat. This may also help to narrow down the different variables that aid in causing and increasing stress.

When seeking treatment for a multivariate problem that has an impact on physical and psychological health, it is important and logical to focus treatment on as many variables as possible. Sethi suggests many different options such as organizational coping strategies, personal coping strategies, meditation, biofeedback, and gestalt¹². However, one component that has been used more and more frequently by professionals and individuals is music.

1.3 Music And Stress

Many of music’s benefits have been recorded long before psychologists began studying and applying music to their patients today. In ancient Greece, music was thought to bring three benefits: restoring the body and soul by creating equilibrium of emotions, creating pleasure through movement, and purging the soul of conflict¹³. Of course, these benefits are still seen today as it becomes clearer that music can help people in myriad different ways. Since these ideas have been around for centuries and the benefits can be felt in everyday practice, part of the effectiveness of music comes from that expectation¹³. People have heard that music can help them in so many ways, so they expect to feel better after listening to music.

Many studies have linked certain types of music to the release of chemicals in the brain, many of which are hormones associated with happiness and good moods such as dopamine, serotonin, and endorphin¹³. It has also been shown to lower cortisol levels after cortisol has been elevated. Cortisol is a primary stress hormone, and classical music that induces happy emotions has been shown to have a significant effect in reducing cortisol levels¹³. Thus, certain types of music can have a big impact on reducing those physiological symptoms of psychological stress.

When applying music to each of Lazarus’ previously mentioned three steps of recognizing stress (*appraisal*, *challenge*, and *coping*)¹¹, it becomes apparent how music can truly ease stress. During the *appraisal* step, music can be added to change the person’s perception of the stressful situation, therefore, making it seem like more or less of a challenge. Music may also be inserted at the *challenge* step music can also be inserted with the same outcome in mind: to change a person’s perception of the difficulty of the challenge. It may also motivate a person to get try to overcome this challenge. And finally, music may be applied to the *coping* step to alter a person’s emotions to make coping with the stress easier for them. Whether music evokes certain memories or emotions that may be calming, empowering, or uplifting, music can be seen to have an effect on any of these three steps.

The types of music participants prefer could yield different and more interesting results than only observing the effects of music that is prescribed to them. Music preference can have a significant impact on relaxation and stress

relief. In one study, participants preferred listening to no music over listening to a prescribed music¹³. Another study showed that listening to self-selected music helped to decrease treatment-related distress during curative radiation therapy¹³. This link provides further knowledge into which types music are best suited for aiding patients and those seeking to overcome and relive stress. One reason this link may exist is because listening to self-selected music can help a person feel they have an element of control in his or her life, thus reducing stress¹⁴.

1.4 Resilience

Resilience is a multifaceted concept that has held the attention of many researchers^{15,16,17,18}. It is associated with a person's ability to "bounce back," and has been seen as a quality that affects a person's health and wellbeing throughout his or her lifetime¹⁵. The need to be resilient is not uncommon. Demonstrations of resilience may follow times of change or high pressure, and could be easily found on a college campus near midterm or final exams. The large workloads and oftentimes-difficult tasks that college students are asked to complete help to create an environment for resilient students to succeed. At least in college, being resilient can mean the difference between passing and failing, while for others it may mean much more.

While resilience is a part of everyday life for all types of people, not just college students, psychologists have developed many different definitions and looked at this quality in unique ways. Resilience can be defined as "the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma"¹⁶. While Windle¹⁶ provides what is far from the only definition of this concept, many others also include a classification of what resilience may be, and what happens as a result of being resilient, whether it's a desired reaction, or adaptation, success, stability, growth, etc. Researchers also cover what would cause a person to need to be resilient, such as adversity, risk, challenge, threat, stressor, etc¹⁶. Though there is no accepted or widely agreed upon definition of resilience, most definitions seem to have an element of stress or negativity that needs to be overcome. The response to negativity then yields either static outcomes or better results than expected, thus "bouncing back." However, this negativity is needed in order for positive responses to be seen as the result of a person being resilient.

Though adversity, stress, or negativity is necessary in order for resilience to be truly seen, it has been found that medium levels of adverse events are needed in order for a person to become better at being resilient¹⁷. Too many adverse events can burn a person out or overwhelm them, but too little does not provide one with enough experience to know how to best handle stressful situations, similar to the Yerkes-Dodson law¹⁰. This inverted U-curve idea can apply to larger and more impactful life events and everyday stressors that are much less noteworthy¹⁷. Though stress is needed to show resilience, the amount of stress may vary greatly, making resilience a concept of perspective. The response to the stressor need not be miraculous, but either maintaining normal functioning or edging ahead and becoming better because of it.

Another very important aspect of resilience is that it, like stress, is multivariate. There are many factors that lead someone to become more or less resilient than someone else¹⁶. One of these factors is the amount of adversity a person has previously faced in their lifetime, as discussed above. Another is what causes them to be resilient, and how much it affects them. Some events may cause one person a greater amount of stress than it would if someone else was experiencing the same thing. In this way, mindset is also important. Seery discusses a study conducted by Mineka and Zimbardo in 2006, which outlines how a person's perception of control can affect their feeling of anxiety about different situations¹⁷. In this way, a person's upbringing and personality can become very involved in weighing and managing his or her reaction to a situation.

1.5 Bringing It All Together

When Windle outlined his ideas on the assessment of resilience, he posed three questions: "(a) what is the risk or adversity? (b) which assets/resources might offset the effect of the risk?, and (c) is the outcome better than could be expected...?"¹⁶. When testing and measuring resilience, Questions A and B hold significance. The answer to Question A can tell researchers or clinicians about what the person views to be challenging, or some sort of personal stressor, but the answer to Question B seems to be where some other element could be introduced to help a person overcome, and lead to a more positive answer to Question C. These questions can help reveal where the relationship between music and stress becomes important to being resilient.

It has been stated that some stressor or adversity must be present in order for one to be resilient, but music is something that can change a person's attitude, outlook, or emotions pertaining to stressful situations. If a person changes his or her ideas on the stressful situation or adversity, it may make being resilient easier for them without entirely eliminating the stressful component. As Seery found, resilience can be built by many different life situations

and adverse events¹⁸. One thing that can cause a person's resiliency to increase is previous experiences being resilient. As the saying goes, practice makes perfect. This also leads to the conclusion that resilience, like stress, is multivariate. Despite stress and resilience being influenced by so many different elements, music has the ability to act on these elements in similar ways, thus helping to even out differences between participants. If the stress is reduced, the other factors that influence a person's resilience need not be as strong or utilized as much. This means that people who are less resilient to begin with will still be capable of reaching a positive outcome. There are many different things that can affect the way a person perceives stress, and, as explored above, music has shown to be able to point listeners towards more positive emotions. With the addition of music, the stressful event may seem smaller and more easily manageable. Keeping these many ideas in mind, a testable hypothesis can be formed. Because of the research discussed previously, I hypothesize that resilience is most likely to be displayed when participants in an experiment who are exposed to a stressful situation are exposed to music they have chosen to listen to.

2. Materials and Methods

2.1 Design

This study was an experiment that was designed to help gauge a person's resilience. Several different things were measured including mood of the participants, their responses to a survey, and the amount of time each participant elected to stay past the initial part of the experiment. Studies were held during weekdays as early as 9am and as late as 4:30pm for three weeks toward the end of the winter term. Each time slot for the experiment was 30 minutes long, though not all participants used the full 30 minutes. The four experimental conditions for this study were based on different types of music that may help increase resilience. The selections were self-selected by the participant, pre-selected by the researcher, music that accompanied a game played during the experiment time, and ocean wave sounds. Just before participants came in the room, their condition was chosen using random assignment. This resulted in ten participants in three of the four conditions, and eleven in the self-selected music condition.

2.2 Participants

The participants in this study were recruited from the Psychology 100 class pool. Students in the Psychology 100 class signed up to participate in this study through North Central College's SONA participation system online. They ranged in age from 18 to 29, and there were 23 females and 18 males for a total of 41 participants. No features of the students' background were controlled for, aside from being enrolled in Psychology 100, and in the pool of 41 students, 25 fields of study were represented.

2.3 Materials And Experimental Setting

The room in which the study took place was a psychology laboratory on the North Central College campus. The most important features of this room were two round tables, chairs, and an outlet. The participants used a laptop and a pair of large headphones that covered the entirety of their ears. The laptop was plugged into the wall, and the participants sat in a chair in front of the computer the whole time while the researcher sat at the table next to them and administered instructions from there. Because of the nature of this experiment, the students came in one at a time.

The videogame the participants played was called Unfair Mario, and can be found at www.unfair-mario.com. This game uses a style similar to Nintendo's Super Mario Bros games, but is very unfair to the player. As the participants played the game, several types of obstacles would unexpectedly appear along the character's path as the Mario figure was approaching a seemingly normal part of the game. For example, spikes could shoot up from the ground or other game feature, and the ground could disappear from under them as soon as they landed on it. This would usually result in a very high number of deaths in the game. Some slight modifications had to be made to the game in order for this to cause the participants to feel more negative stress. One was that the game needed to be full-screen in order to prevent the word "unfair" from being seen in the URL, and a small piece of construction paper was placed on the computer screen to hide where "unfair" could be seen on the opening screen of the game.

2.4 Procedure

In order to investigate the relationship between music, stress, and resilience, participants in this study were asked to play an unfair computer game from www.unfair-mario.com to expose them to adverse and challenging conditions. In order to ensure the participants were treated ethically, the Institutional Review Board approved this study. When the participant entered the room, the laptop was partially closed in front of them, and they were asked to read and sign the informed consent sheet. Then they were given the first Affect Grid. The participants' stress levels were measured using the Affect Grid test, which measures pleasant and unpleasant feelings along with high and low arousal⁴. Participants were then asked to play the game for 5 minutes, and during this time, they listened to music that was either self-selected, pre-selected by researchers, the default game music, or the sound of ocean waves as a control. Participants in the self-selected condition chose a song, and the researcher typed it into the music-streaming program Spotify and began playing it through headphones before turning the computer for participants to play the game. The pre-selected music was Katy Perry's song, *Roar*¹⁹, and was chosen because of its upbeat feel and motivational lyrics. The game music did not have words, and was the music associated with Nintendo's Mario character. The wave sounds were from www.soundrown.com. If the song chosen from Spotify was less than 5 minutes long, it was put on repeat in order to fill the entire game playing time (this also includes Katy Perry's song for the pre-selected condition).

After this, another Affect Grid measure was taken, the participants were given a brief survey, which included open-ended and multiple-choice questions in order to obtain their feedback about the process and how it made them feel. Following the survey, participants were asked if they would like to continue playing the game for the remainder of their time slot. If they said yes, this was noted and their new round of game play was timed. When they finished the experiment, whether the participant stayed to continue playing or not, they were handed the debriefing sheet before they left.

3. Results

3.1 Affect Grid

There were multiple calculations used to analyze the data since several different measures were used to gauge resilience. The first set of data that was collected was the Affect Grid measure before and after the participants played the game. A paired sample t test was run for both axes of the Affect Grid (pleasant/unpleasant feelings and arousal) for each participant's pre-play and post-play scores. Most of these calculations indicated there was no significant change in pleasant/unpleasant feelings or arousal. However, there was a significant increase in arousal after playing the game in the self-selected music condition, $t(10)=2.45$, $p=0.034$, $d=0.74$, $r^2=0.37$. In addition to the self-selected music condition, there was also significance found in the wave sounds condition. In this case, there was a significant decrease in arousal after the participants in the waves condition played the game, $t(9)=-3.07$, $p=0.013$, $d=0.972$, $r^2=0.512$.

3.2 Post-Study Time

After analyzing the Affect Grid measures, we then turned to the post-study time. This was the amount of time the participants stayed after they had played the game for the first minutes and after they had completed the survey. A one-way ANOVA was used to obtain these results, and showed that the self-selected music group stayed significantly longer than those in the pre-selected music group, $F(3,37)=3.186$, $p=0.035$, $HSD = 0.063$. The only other group that had any other participants stay was the pre-selected group. These results are illustrated in Figure 1 below.

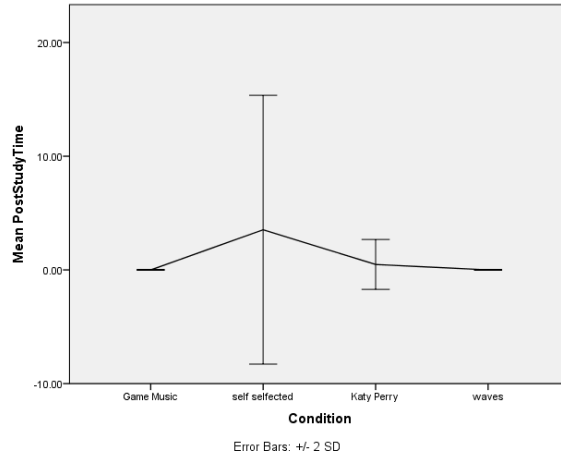


Figure 1: This graph shows the mean post-study time from each condition.

The error bars represent two standard deviations. The error bars on the self-selected are very large in part because only four participants stayed, but also because three participants stayed until the next participant came in and one only stayed until he finished the level, which took less than a minute.

3.3 Survey Questions

Since the first few questions of the survey were used in order to obtain demographic information, such as age, gender, and academic major, only Questions 4-8 were analyzed statistically. For this, a Pearson chi square crosstab test was used for each one (excluding Question 8, which will be discussed below), with significant results found in questions 4 and 6. When asked about the music enhancing their performance in Question 4, participants in the self-selected group were significantly more likely to indicate that it had a positive effect, $\chi^2(6, n=41) = 13.183, p=0.04; z(10)=2.116, p<0.05$. Similarly, in Question 6, the participants were asked about the music's effect on their mood, and participants in the self-selected group were significantly more likely to indicate a positive change, $\chi^2(6, n=41) = 16.142, p=0.013; z(10)=4.091, p<0.05$. Another interesting finding with this question was that none of the participants in the self-selected condition reported that the music they chose affected them negatively, and only one reported that their chosen music did not affect their mood at all. The participants who listened to the game music had the most people report that the game music affected their mood negatively, with the only other participant to report this was in the wave sounds condition.

Question 8 was analyzed using a one-way ANOVA since it measured the number of times a participant felt that he or she would play this game in one day. These results were not significant, but it is interesting to note that the wave sounds condition had the highest average number of times ($M=3.7$, see figure 2).

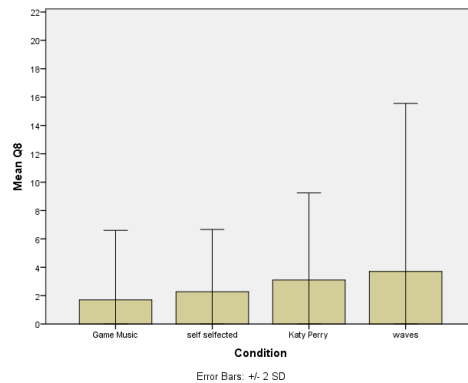


Figure 2: This graph shows the mean number of times each condition reported they would come back to play the game in one day in the survey. The error bars represent two standard deviations.

4. Discussion

4.1 Implications

The original hypothesis stated that people in the self-selected music condition would show more resilience, followed by pre-selected, game music, and waves, in that order. This was partially supported by the different measures used to analyze the data. Based on the post-study times, the self-selected group both stayed the longest and had the highest number of participants who were willing to stay. One thing that was also interesting about these findings was that three out of the four participants who stayed from the self-selected group stayed as long as they could. However, there could be outside factors that contributed to this relationship. One notable difference between this condition and the others is that 8 out of 11 of the participants in the self-selected condition were boys, while only three were girls. Only one participant who stayed was a girl.

Aside from the post-study time, the self-selected group also showed a significant difference in the arousal the participants felt after playing the game and listening to the music they chose. This could also be due to the imbalance of genders in the self-selected group. There could be a relationship between males and their arousal levels when exposed to music or videogames that could skew the results of the whole group.

While there was no tool to measure resilience directly, the survey questions helped to understand what the participants were feeling to a greater detail outside of the Affect Grid measurements. The results to Question 6 could explain the results to Question 4, because Question 6 asked participants if the music affected their mood, to which most of them responded that it positively affected them. These two questions together lead to some interesting conclusions. The music positively affecting their mood could have led them to believe it was impacting their performance more positively, or at least their mindset about their performance. This supports previous findings⁷ that show someone can be brought to have different outlook because of music. It also supports the research showing that music can increase a person's positivity⁶. This, along with the results for post-study times, supports my hypothesis in that the self-selected group displayed more resilience, and it supports the reasoning why they would be able to demonstrate resilience.

The only other condition that showed significant results in any section of the data analysis was the wave sounds condition. This was very interesting because I had originally planned on using this condition as a control. Significance was found in the decrease of the participants' arousal levels. This could have resulted in the participants feeling more relaxed or at ease, which was not necessarily its intended function. This leads to some thought-provoking ideas. Some may come to the conclusion that relaxation could also lead to one displaying more resilience because relaxation may mean the person is not as stressed or does not feel that the situation is pressing and therefore, help them to cope with it by lowering their stress to optimum levels⁹. In this sense, my hypothesis was not supported by these results because I had predicted the wave sounds group to be the least likely to be more resilient.

In addition, the pre-selected condition that listened to Katy Perry's song *Roar*¹⁹ was the only other group to have any participants stay after the initial study was completed. However, most of these participants only stayed until they reached the next level or beat the obstacle they had been stuck on before being asked to stop playing the game. This could be because the lyrics in that song are motivating and talk about getting on one's feet and conquering something or overcoming an obstacle. This could have affected the participant's decision to stay whether they were aware of it or not.

With all the results in, it is clear that two conditions (pre-selected and game music) did not necessarily support my hypothesis. I had predicted these two conditions to fall in the middle of the four groups with the pre-selected music condition to be just behind the self-selected condition. Neither of these two conditions seemed to significantly impact the participants' resilience at all.

4.2 Limitations

One obvious limitation in this study is the sample size and demographic. With only 41 participants, it can be difficult to make accurate conclusions with such a small number of people. With a larger sample size, the age range could be expanded to obtain a set of results that could be more easily generalized to the rest of the population. In addition to gaining more data to better investigate this relationship, the genders could be more evenly distributed across conditions. The demographic is also something that could be expanded upon. Every participant in this study was from the North Central College community and most were between the ages 18 and 21. Even though the study was listed as a half hour time slot, many people cited excuses for not staying to continue playing the game. Many common

reasons people had for not staying were things like practice, homework, or their job, or other commitments that did not seem to have anything to do with their personal capacity for being resilient. There is a possibility this could have been avoided if the population was not comprised of college students.

Another limitation of this study was that it was a short-term study, and resilience can sometimes be conceptualized as a long-term process or a character trait that someone possesses. Since the experiments only lasted a half hour at their maximum, this study may not have picked up on some other traits a person could have that would have also displayed a person's resilience. In these situations, there can be many other factors contributing to a person's ability to be resilient which may surface in some situations, but not others.

4.3 Further Studies

One thing that could be added to this experiment that could add some more depth to the results could be measuring how far the participants got in the game. This game did have levels that could be reached and checkpoints throughout those levels, which could make measuring the distance fairly easy. Some participants catch on much more quickly than others, but their progress could be recorded along with their gameplay time. Another adjustment to this study could be in the timing of the music. The survey questions could be revised to try and be more specific about what they felt. Different resilience measures may be better methods of measuring the magnitude of the reaction of the person.

Based on the results from the post study time in the self-selected condition, resilience, gender, and music could be an interesting and significant direction to take the research. Since that condition was so predominantly made up of men, it would be very beneficial to see just how much that could have affected the results. Even different genders' response to different types of music, different types of tasks, and which may seem to correspond better to different measuring tools could yield noteworthy results.

As discussed above, there are many ways to conceptualize resilience, and because of that, there are many different ways to measure and test for resilience as well. A future study could keep some experimental aspects the same, but change the tools used to measuring resilience to examine personality traits instead of mood, or there could be a few different measures throughout the study that encompass multiple perspectives.

Further alterations could come in the form of the task that participants are required to perform while listening to different types of music. Other puzzles, challenging games, or near impossible tasks could be utilized to test a person's resilience and how long a participant is willing to persist with a task. Even with changes in the task the participants complete, the style of music they listen to could also change. Just adding and exploring different genres of music could bring so much more perspective to the table. And if self-selected music conditions keep showing the most promising and positive results, it would be very interesting to see why that may be and how people can find music that works best for them.

It is clear now that there are many different directions this type of research could lead. Since music, its interpretation, and resilience and its interpretation include so many other factors, there are myriad possibilities for the future of this field of investigation. Each of these different methods, whether it is a study of self-selected music, gender, music genre, or task, each one of these holds an importance in helping others overcome what may be holding them back or keeping them from being resilient. From this study, it definitely seems that self-selected music can be a big supporter of people who need to be lifted back on their feet, which leads one step closer to helping more people learn the best ways to deal with anything that life could throw at them.

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