Active Music Medicine's Impact on Internalized Disorders

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Abstract

The positive consequences of music intervention on depression and anxiety symptoms were investigated in a small sample of college students randomly assigned to the experimental and control groups. Experimental group participants created music daily using an online program called Soundtrap. A 2 (Group: experimental and control) x 3 (Time: baseline, week 1, week 2) mixed factorial design was used. Baseline, midline, and one-week follow-up scores were measured using the Beck Depression Inventory, State-Trait Anxiety Inventory, and General Self-Efficacy Scale. It was expected that there would be a decrease in anxiety and depression symptoms, as well as an increase in self-efficacy for intervention participants. Results showed that state anxiety and depression decreased, while self-efficacy increased from intervention. It can also be noted that more sessions completed by a participant lead to a greater decrease in symptoms and scores on the BDI and STAI. These results exemplify a practically significant correlation between active music medicine, a decrease in anxiety, and an increase in general self-efficacy.

Active Music Medicine's Impact on Internalized Disorders

Music is an integral part of our society. Ever since its assumed creation during the Neolithic era (Killin, 2018), it has influenced the way people communicate, interact, and feel. In 2021, people spent an average of 18.4 hours a week listening to music as a result of the COVID-19 pandemic (International Federation of the Phonographic Industry [IFPI], 2021), showing that in the face of adversity, music can be used as a comforting and safe experience for all ages. Specifically, during the pandemic, 87% of young people (i.e., 16-19 year-olds) found music listening contributed to an increase in their well-being and happiness (IFPI, 2021). Not only is music listening effective in positive outcomes, but so is music creation (e.g., singing, instrumental, writing). With the benefits seen in the general population, psychologists have looked further into how music can help in symptom reduction and recovery in multiple different disorders.

Hargreaves and North (1999) explored how music during the 1990s compared to the 50s, 60s, and 70s with its influence on self-identity, interpersonal relationships, and mood. With easier and more portable access to music-playing devices, lower prices, use of new technology and techniques in music including the Musical Instrument Digital Interface (MIDI), blurring of music genres, and the option to self-select music, there was an increase in the function and influence of music in cognitive, emotional and social processes during the 1990s and early 2000s. Using the ten psychological functions of music (i.e., emotional expression, physical response, aesthetic enjoyment, entertainment, communication, symbolic representation, enforcing conformity to social norms, validating social institutions and religious rituals, continuity and stability of culture and integration of society) researchers found an increase in gender expression, sexuality, views/enforcement of gender prejudices, use in social settings,

discussion on relevant cultural issues, positive influence on thoughts and beliefs, and mood depending on genre.

Researchers Tang et al. (2020) looked at 55 studies on the effectiveness of music therapy and music medicine on symptoms of depression. In this article, they define music therapy as a music intervention program that is administered by a therapist with previous music therapy training (Tang et al., 2020). This can also be broken down into active versus receptive or passive therapies. In active music therapy a participant is creating music using instruments or vocal compositions, while in passive music therapy, a participant is using music as a relaxation method to evoke imagery or interpret musical aspects (Tang et al., 2020). For music medicine, it was defined as a music intervention that focuses on listening to prerecorded music as a replacement for pharmaceutical interventions that do not require a therapist relationship (Tang et al., 2020). To be included in this meta-analysis, studies had to be randomized or quasi-randomized control trials with a non-active control group and a depression evaluation using a credible scale. All studies were evaluated with the Cochrane Collaboration's risk of bias tool as well as a standardized mean difference (*d*) and a 95% confidence interval. Some of the subcategories for this meta-analysis were types of intervention, music therapy methods used in addition to specific active and passive methods, frequency, length of intervention, total sessions, session length, and session setting including group or individual and in- or outpatient (Tang et al., 2020). Over all of the studies, 16 different depression scales were used, creating an inconsistency in depression diagnoses. There also were drastic differences in sample size, where the higher the sample size, the smaller the overall effect reported. Results showed that music therapy decreased depressive symptoms, with the most successful being active music therapy including music recreation (Tang et al., 2020). In addition, music medicine reduced depression symptoms more than music therapy

sessions. Both types of interventions were more effective in higher age groups, such as 50-65, and when done in one to twelve sessions (Tang et al., 2020).

Gustavson et al. (2021) reviewed correlational and experimental studies focusing on the influence of music engagement on internalized, externalized, and thought disorders. Internalized disorders included Post Traumatic Stress Disorder (PTSD), anxiety, and depression, while externalized disorders included substance use, Attention Deficit Hyperactivity Disorder (ADHD), impulsivity, conduct disorder, and thought problems such as schizophrenia and bipolar disorder. In over 40 experimental studies reviewing internalized disorders, music intervention led to significantly reduced depression levels, PTSD symptoms, and anxiety levels in healthy individuals. Most studies were focused on passive interventions (e.g., music listening) and not active interventions (e.g., music creation). Correlational studies found that the use of music listening was successful in more positive social and psychological well-being as well as for use as a regulating strategy (i.e., a calming or tranquil activity to reduce negative symptoms) for anger and anxiety (Gustavson et al., 2021).

In the experimental and correlational studies for externalized disorders music intervention was successful in decreasing withdrawal symptoms and the subsequent stress and increasing attention and positive moods in those with ADHD (Gustavson et al., 2021). Eighteen studies reviewed on thought disorders found a decrease in symptoms and an increase in general mental health and social functioning.

The researchers (Gustavson et al., 2021) created four different frameworks to look into music interventions including finding correlation/causation using the diathesis-stress model, reducing the impact of genetic risk, improving the effects of concurrent treatment or acting as a sufficient solo treatment, and examining how music influences brain structure and function using

neuroimaging. The diathesis-stress model relates the development of a mental disorder to the influence of genetic factors, such as brain structure and gene sequencing, and the onset of a stressful situation, such as abuse or other traumatic events. In addition to this, possible genetic risks were explored to try and decrease the likelihood of a parent passing trait-level symptoms to their offspring.

Other studies reviewed by Gustavson et al. (2021) included three studies conducted in Norway, the US, and Sweden where musicians were found to have a higher risk of major depressive disorder, anxiety disorders, and PTSD and reported more burnout symptoms. In the Norway study, it was found that professional musicians experienced more neuroticism in comparison to the general public.

Chen, Hannibal, and Gold (2015) looked at the effects of group music therapy on Chinese prisoners. Two hundred male participants ages 18 to 57 with an average of eight years of education were randomized into 12 groups. The inclusion criteria were a baseline diagnosis of mild anxiety and/or mild depression with a sentence of six months or greater left from the start of the experiment. At baseline, mid-, and post-experiment, participants were tested with standardized scales (State and Trait Anxiety Inventory [STAI], Beck Depression Inventory [BDI], Texas Social Behavior Inventory [TSBI], and Rosenberg Self-esteem Inventory [RSI]). All groups experienced standard care including 50-minute sessions of mandatory mental health education, as-needed medical care and psychological counseling, four hours of mandatory labor every day, and daily education and exams. The experimental group experienced 20 sessions of music therapy twice weekly for 90 minutes. Musical instruments (e.g., guitars, electronic piano, cymbals, stereo, etc.) were provided in addition to three different possible activities: music and imagery, improvisation, and songwriting. Results showed that anxiety and depression decreased

mid- and post-test for the experimental group. Self-esteem increased mid-test with only the TSBI and post-test with both inventories. Results benefited the younger participants and lower-educated prisoners more than any other group.

Adherence to music therapy for schizophrenic and personality disorders was researched by Hannibal et al. (2012). The experiment included patients with schizophrenia or personality disorder diagnoses that were referred or volunteered. Patients from three different Danish psychiatric centers experienced 18 sessions over a one-year observation, then a one-year follow-up. Out of 27 participants, 24 were able to adhere to the treatment; 90% of the schizophrenic participants and 87% of personality disorder patients. Predictions were made based on regression data from participants but were not shown to be significant due to a Type II error, where researchers failed to reject their hypothesis when it was shown false.

Music therapy effectiveness was also researched with patients suffering from Alzheimer's disease (de la Rubia Orti et al., 2017). Twenty-five patients with mild Alzheimer’s disease were recruited from the Association of Families of People with Alzheimer’s in Valencia, Spain. To be included participants had to be over 65 and have a diagnosis of mild Alzheimer's disease, a score between 18-23 on the Mini Mental State Examination (MMSE). One 60-minute session was conducted with a collection of saliva before and after each session to test for cortisol levels using enzyme-linked immunosorbent assay (ELISA). The Hospital Anxiety and Depression Scale (HADS) questionnaire was administered before the session as well. Results showed that levels of cortisol decreased in saliva, and there was a significant decrease in stress, depression, and anxiety.

A more recent meta-analysis conducted by Schneider et al. (2022) evaluated studies done only on active music therapy’s effect on cognitive disorders and injuries. The main categories

discussed included rhythmical training, the use of musical instruments, singing with or without rhythmical exercise, and any additional methods used in conjunction with these practices like exercise or speaking. The populations studied were patients with dementia, autism spectrum disorder (ASD), traumatic brain injuries, Parkinson's Disease, or those who recently suffered a stroke. With these disorders, active music therapy was used to improve both neurological and motor function and effectively did so. In all populations, significant improvements occurred in gait, rehabilitation, cognitive function, and socio-emotional skills. The emotional function of participants was significantly increased with interventions of creating vocal music and learning musical instruments (Schnieder et al., 2022). One issue found during analysis was the lack of the control group doing anything in place of the music intervention, on which researchers suggested doing an activity of equal cognitive load like chess.

Another issue found was a result of combining the therapy with other physical activities, such as exercise, which made it difficult to "disentangle the underlying mechanisms" (Schnieder et al., 2022) of active music intervention. This confounding variable of physical exercise was most seen in the intervention of *Jymmin*® created by Sala and Gobet (2017). Participants were made to exercise with sensors connected to various muscle groups and as a certain muscle group was used (i.e., calf), it would correspond with a musical note, creating musical feedback for exercise (Schnieder et al., 2022). The participants were tested in a group setting, where each person had sensors on a different part of their body. With the goal of gaining exercise, the participants were also able to create a piece of music based on their collaboration and coordination of exercise routines. In all presented studies, the ability to have musical agency was beneficial to the participants in multiple physical and psychological ways.

Trimmer, Tyo, and Naeem (2016) combined music intervention with traditional cognitive behavioral therapy practices. A sample of 28 participants with mild to moderate symptoms of depression and/or anxiety, according to the HADS scale and World Health Organization Disability Assessment Schedule (WHODAS), were included. During a nine-week program, music was used in addition to their normal cognitive behavioral therapy as a form of self-help. Intervention processes included the use of active musicianship, including critical listening tasks, songwriting and performing, homework, and group discussion. The HADS and WHODAS scale were readministered a week after the program finished. Researchers found there was a significant increase in functioning in participants, but no significant differences in the severity of anxiety or depression symptoms between the control and experimental groups.

Music intervention was also found to benefit views on identity and self-esteem (Lawendowski & Bieleninik, 2017). The analysis included 14 different studies from around the world. Problems for participants ranged from a lack of self-esteem and/or stress to severe mental and physical illnesses such as schizophrenia, multiple sclerosis, and cancer. Results showed an overall increase in mood and self-esteem and a calming effect on negative emotions (depression and anxiety).

A pilot study of a middle school after-school music program was conducted to test for increases in feelings of belonging, empathy, and self-esteem (Liddiard & Rose, 2021). A sample of 32 children from 7-9 years old in a low SES community attended one session per week for a six-week intervention. A focused topic was presented at the beginning of each session including the five core emotions of joy, sadness, anger, fear, and disgust. During the last week, participants created an emotional storyboard of their intervention experience. Each session included listening to songs matching that week's emotion, singing selected songs, instrumental improvisation, and

performing. Before and after the intervention there was a musical aptitude test, Primary Measures of Music Aptitude (PMMA), only for the intervention group, and a self-report questionnaire (non-validated Children's Well-being Questionnaire) on the well-being of the parents and children. Data also were collected using brainstorming activities, observation, audio recordings, and storyboards. It was found that PMMA scores significantly increased over the sessions and there were increases in support for each other (group cohesion) and in self-esteem.

A meta-analysis of five different studies, two randomized control, two quasi-randomized controlled, and one controlled trial, on music intervention effects on anxiety and depressive disorders, was conducted by Geipel and Kaes (2018). Disorder severity was tested with the BDI, Children's Depression Rating Scale-Revised, or using the STAI. All studies conducted baseline and after-intervention tests. Four studies compared music intervention to regular treatment and one was a music education program versus another arts education program. The analysis showed a reduction of internalizing symptoms with positive results for all music intervention programs.

Exploring this further, Witte et al. (2020) conducted an analysis of 47 studies on specifically active and passive music therapy practices on physical and mental stress reduction. The reasoning behind the evaluation was to highlight possible effective non-pharmaceutical interventions for stress relief. Music is identified as being effective in decreasing negative emotions and physical arousal as well as increasing brain activity in the amygdala and reward systems (Witte et al., 2020). All studies included were quasi-experimental since there is no effective way to create a blind or double-blind study. Subcategories coded were the setting including group/individual, the structuring of the sessions, quality of the intervention description, type of music style, presentation and tempo, and finally, the number and frequency of sessions. Considering both active and passive methods, music therapy was effective in reducing both

physical and mental stress symptoms, especially when done in a medical setting, in a group, and/or when using music with a tempo between 60 and 90 bpm (Witte et al., 2020). Results also showed that the effect size was very high when evaluated with Cohen's *d*-value, mainly showing a stronger effect size in studies completed in the 2010s (Witte et al., 2020), which also positively correlated with a smaller sample size.

Considering the studies presented, the current pilot study assessed the effectiveness of music intervention on internalized disorders, such as anxiety and depression, and self-efficacy. As a result of previous definitions, this study identifies separately from active and passive music therapy and music medicine. The intervention type used in this study is called "active music medicine", as the participants are actively creating and listening to music on their own time without the presence of a licensed music therapist or mental healthcare professional. The intent of this study is to find a non-pharmaceutical alternative for those with depression and anxiety symptoms that is more affordable and easier to access. It is expected that interventions would decrease the symptoms of anxiety and depression while increasing feelings of self-efficacy in participants.

Method

Participants

Participants were 22 18-27 year-old college students (M_{age} = 20.05, SD = 1.99) attending Rider University in Lawrenceville, New Jersey. They were volunteers recruited through convenience sampling. Of the 22 participants (16 experimental, 6 control) that started the study, 10 participants completed the study (8 experimental, 2 control). Participants were mainly Caucasian (61%) and female (67%). Two trials were conducted. The first trial was run from February 17th to March 10th, and the second trial was run from March 28th to April 18th, after the institution's Spring Break. A consent form was given at the start of the procedure for the

participants to read through and electronically sign if they voluntarily agreed to the conditions of the study. This study was approved by Rider University's Institutional Review Board.

Apparatus

Each participant in the experimental group used a personal computer with a compatible browser to access the online website Soundtrap, www.soundtrap.com. Music projects were created under a joint account. Soundtrap is a website run by Spotify for musicians to easily make collaborative music projects. It provides free beatmakers, loops, and instrument plugins to create and edit online music projects.

Materials

Self-report measures for anxiety, depression, and self-efficacy were used to assess participants. The State-Trait Anxiety Inventory (STAI), created by Speilberger et al. (1983), is an assessment of participants' agreement with 40 statements using a response scale of one to four. The inventory consists of two forms, Y-1 and Y-2, with Y-1 focusing on how the participant feels when taking the assessment (i.e., state) and Y-2 focusing on how the participant generally feels (i.e., trait). Scores can range from 20 to 80 per form for a total range of 40 to 160 with a higher score indicating significant anxiety. This inventory has been commonly used by clinicians to diagnose anxiety. The validity has been established through multiple retests and it has internal reliability between .65 and .95 (American Psychological Association, 2011b). For this experiment, only form Y-1 (i.e., state anxiety) was used.

The Beck Depression Inventory (BDI), created by Beck et al. (1996), is a revised form of the original BDI created by Beck et al. (1961). The BDI is a 21-question scale with four statements assigned a response score of zero to three. Scores can range from 0 (i.e., no depression) to 63 (i.e., extreme depression). The internal reliability coefficients of the BDI are

between .81 and .86 (American Psychological Association, 2011a) and this assessment's validity has been demonstrated through the different forms developed. To ensure participants' privacy in this study, items 9 and 21 were removed from the form.

The General Self-Efficacy Scale (GSE), created by Schwarzer et al. (1995), is a ten-item scale of statements with a response scoring of one to four, one meaning not at all true and four meaning exactly true. Scores can range from 10 (low self-efficacy) to 40 (high self-efficacy). The inventory has been demonstrated as internally reliable with a Cronbach's alpha between .76 and .90. It also is positively correlated with optimism and negatively correlated with depression and anxiety.

Soundtrap instructions for how to use the website are in Appendix A and the debriefing email sent at the end of the study is depicted in Appendix B. The debriefing email included multiple online resources for mental health hotlines, treatment, descriptions, and at-home activities to help combat symptoms of depression and anxiety.

Procedure

Before the study, participants completed an online questionnaire on their usual music-listening activity (Appendix C). Participants received a baseline test for anxiety using the STAI, depression using the BDI, and self-efficacy using the GSE. Participants in trial one were matched by STAI score and then randomly assigned to either the control or experimental group, but as a result of dropout rates, matching was unsuccessful. During trial two, to ensure the maximum amount of results, all participants were placed into the experimental group.

This study was three weeks long including two weeks of active music creation and one week of cessation. During the first two weeks, participants in the experimental group created music daily for any amount of time using the Soundtrap program. All participants used their

initials to name their projects. At the end of weeks one and two, participants in both groups filled out a form regarding how many sessions were completed, how much time was spent on the program for the week, and reassessments using the STAI, BDI, and GSE. Weekly reminder emails about completing the forms as well as daily reminders for music session completion were used.

During week three, the experimental group stopped music creation and both groups were reassessed at the end of the third week. During the final reassessment, participants received a debriefing questionnaire (Appendix D). Participants also received an email with a list of online resources for those struggling with mental health issues including depression and anxiety at the end of the study.

Design & Analysis

A 2 (Group: experimental and control) x 3 (Time: baseline, week 1, week 2) mixed factorial design was used. The dependent variables were the scores of each assessment.

An analysis of assessment scores was completed with a 2x3 mixed factorial ANOVA for each measure, using SPSS. The Type I error rate (α) was .05, and the minimum effect of interest (MEI) measures were $\eta = .25$ and $d_{MEI} = 0.50$. Data were collected, sorted, and depicted in Figures using Excel.

Results

Descriptive statistics for the STAI are depicted in Figure 1. The main effect of group assignment was not significant, $F(1, 12) = 0.49$, $p = .50$, $\eta = .20$. The main effect of time was not significant, $F(2, 24) = 0.13$, $p = .88$, $\eta = .10$. The interaction of group assignment and time was not significant, but was practically significant, $F(2, 24) = 1.76$, $p = 0.19$, $\eta = .36$.

Descriptive statistics for the BDI are depicted in Figure 2. The main effect of group assignment was not significant, $F(1, 12) = 0.15$, $p = .71$, $\eta = .11$. The main effect of time was not statistically significant but was practically significant, $F(2, 24) = 1.44$, $p = .26$, $\eta = .33$. The interaction of group assignment and time was not significant, $F(2, 24) = 0.40$, $p = .67$, $\eta = .18$.

Descriptive statistics for the GSE are depicted in Figure 3. The main effect of group assignment was not significant, $F(1, 12) = 0.49$, $p = .0.50$, $\eta = .20$. The main effect of time was not statistically significant but was practically significant, $F(2, 24) = 1.72$, $p = .20$, $\eta = .35$. The interaction of group assignment and time was not statistically significant, but was practically significant, $F(2, 24) = 2.79$, $p = .08$, $\eta = .43$. While matching was not successful at the beginning of the study, after dropout, participants were equally matched for pre-form STAI and GSE scores and closely matched for pre-form BDI scores.

Figures 4, 5, and 6 depict the relationship between the number of completed sessions and differences in baseline and follow-up scores for all inventories. The correlation between STAI scores and number of sessions completed was -0.92. The correlation between BDI scores and sessions completed was -0.60. The correlation between GSE scores and completed sessions was 0.11.

Qualitative statistics for independent variables, including the responses to the baseline and debriefing questionnaires, are depicted in Figures 7 and 8.

Discussion

The baseline form questioned music listening habits and interactions of each participant with graphs reflecting all 22 participants' responses. Participants were more likely to listen to music for 1-2 hours a day (36.4%) that always matched the mood they were feeling at the time of listening (45.5%). They particularly listened to music for entertainment (86.4%), to fill a silent

room (86.4%) or to change their mood (81.8%). The most common time for participants to listen to music was when driving (90.9%), walking or exercising (90.9%) and when doing housework (77.3%). Seventeen participants did not play an instrument (77.3%), but of the 5 that did, all were singers and most currently play an instrument (60%).

Follow-up form responses were used to gauge participant satisfaction with the study. Only responses from the experimental group were analyzed and one of the eight participants did not complete the final form. Out of the seven remaining participants, 28.6% agreed there was definite change in their feelings of anxiety, depression and self-efficacy, 28.6% felt there was a moderate change, 28.6% felt there was somewhat of a change and 14.3% felt there was no change or were unsure of a change. Only three participants felt it changed their music listening habits in that there was an increase in overall music listening and an increased inclination to listen to music to change their mood.

When calculating statistical data, drop outs became an issue. The dropout rate was 66.67% for the control group and 50% for the experimental group. This led to a need to stop the randomization and matching of participants to either group so that the study would be able to have a reasonable amount of participants and data. In addition, this forced the incomplete results to be analyzed in a 2x3 ANOVA instead of a 2x4 ANOVA, which would have included an analysis of follow-up responses. Participants in the control group all reached week two of the study, but only two participants completed the follow-up form, which is why that data is not included in the Figures. The participants in the experimental group had one participant whose data were thrown out as a result of skipping the week one form and then successfully completing the week two and follow-up forms. Another participant, as mentioned before, did not complete the follow-up form, but successfully completed all previous forms.

Based on these results, the interactions of group assignment and time were practically significant for the STAI and GSE, but not for the BDI. Time effects and MEI were practically significant for STAI and GSE. With the use of music agency, anxiety scores for the experimental group lowered over the course of the study, while the self-efficacy of the experimental group increased. An analysis of correlation was also conducted between the number of sessions completed and difference in score from baseline to follow-up. The correlation between STAI and session completion was strongly negatively correlated and BDI and session completion were moderately negatively correlated, meaning that as anxiety and depression scores went down, the number of sessions completed increased. The GSE did not show a strong correlation to session completion.

These findings imply a correlation between increased self-efficacy, decreased anxiety symptoms, and active music therapy. With future research, this therapy could be a possible replacement or used in addition to medical interventions that are not only low-cost but also easy access. This study also has the benefit of being done in a non-laboratory setting, where it can replicate “real life” since completion was done whenever and wherever the participants were.

While highlighting a new way to treat anxiety and depression, this study is not without its flaws. As a result of the length of this study, there was also a built-in issue with time controls as a result of when the two trials were conducted. Being that the first trial was before Spring Break and the second was after, there is some variability placed on how high or low anxiety and depression symptoms would be, seeing as midterms were coming up for the first trial participants and for the second trial participants they had just come back from a break. Another possible limitation of this study is evaluating if people are willing to do this on their own. Some people may not have the ambition to handle these symptoms by themselves, so having a licensed

therapist for either music or non-music therapy would create the best outcome for the person. As well, there were issues with an equal amount of cognitive load between groups as there was a lack of activity for control group participants, leaving possibilities for skewed data.

For future iterations of this study, I would encourage creating an active task for the control group participants. This would be an activity close in cognitive load like completing a puzzle, playing a chess game, or even participating in meditation. Future research should also run this study as a full-fledged study instead of as a pilot, meaning there would be a significantly larger sample size. With that in mind, expansions and changes can be made to the procedure, dependent variables, and inclusion criteria. Procedural changes can include creating a set amount of time spent per session, a certain time of day for the session to be completed, and varying the frequency of sessions per week. A final suggestion would also be to find a way to correlate how the instruments, tone, and tempo of the participants' music session corresponds to how they feel in the moment. More specifically if their mood changes from before and after music creation and if that is reflected in their creation.

After conducting research of active music medicine, the findings showed an improvement in depression and anxiety symptoms and self-efficacy. The more engaged a participant was in creating music, the more substantial the decrease in STAI and BDI scores. With future continuation of this study, active music medicine can be used as a replacement or in conjunction to existing interventions as a low cost, easily accessible way to reduce symptoms of anxiety and depression along with an increase in self-efficacy.

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Figure 1

Changes in STAI Scores

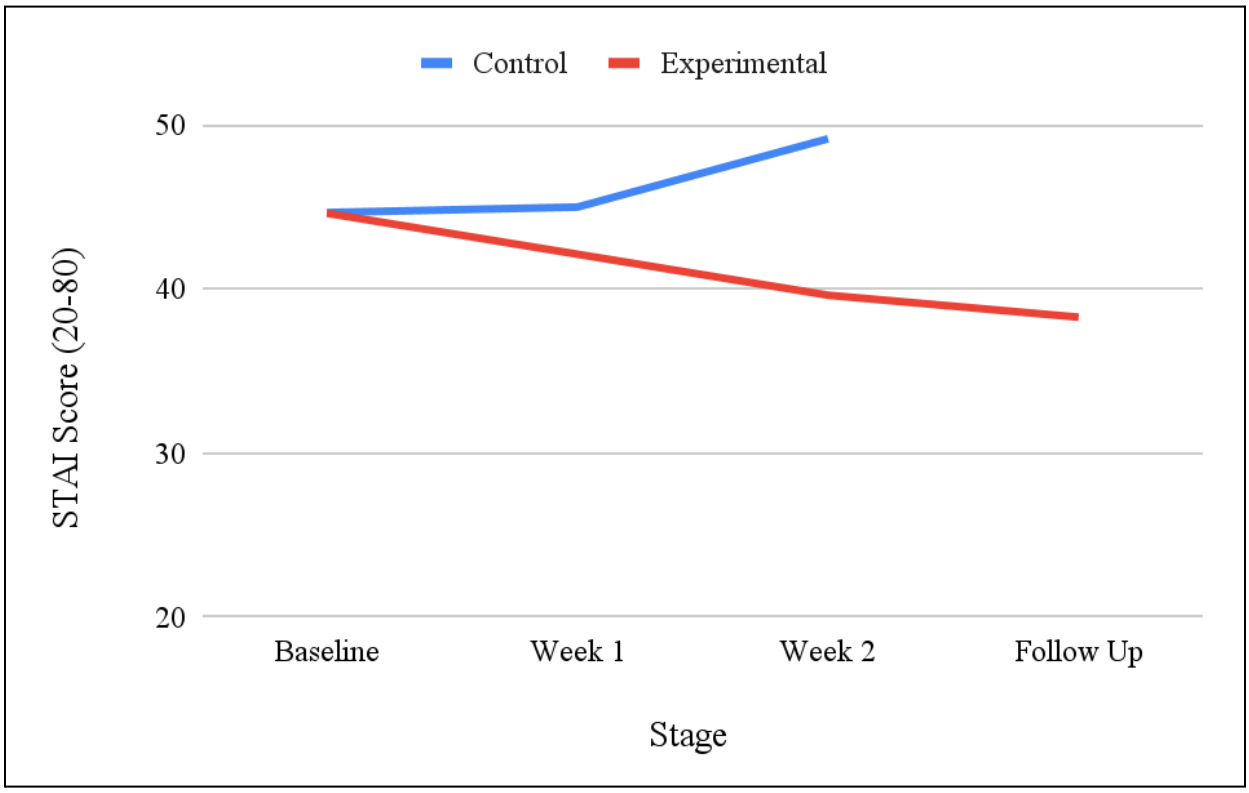


Figure 2

Changes in BDI Scores

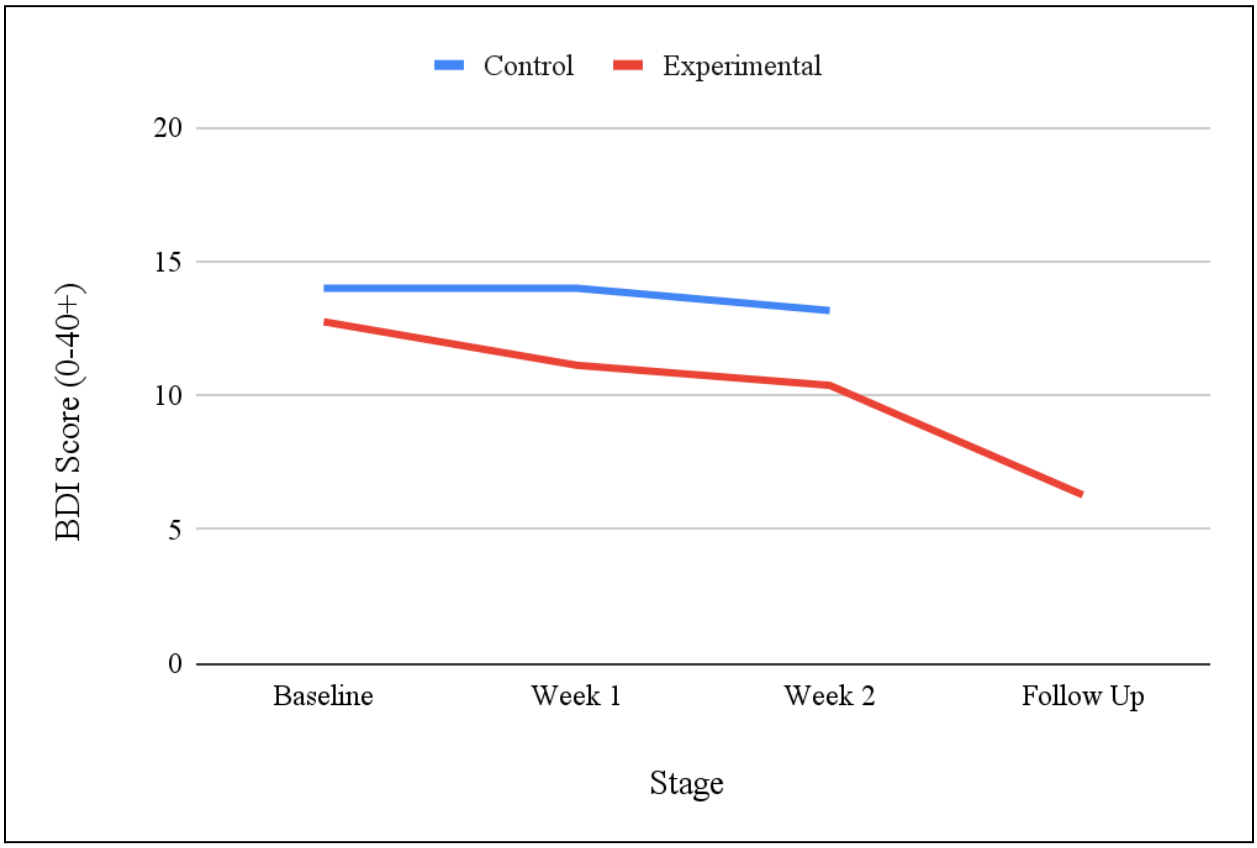


Figure 3

Changes in GSE Scores

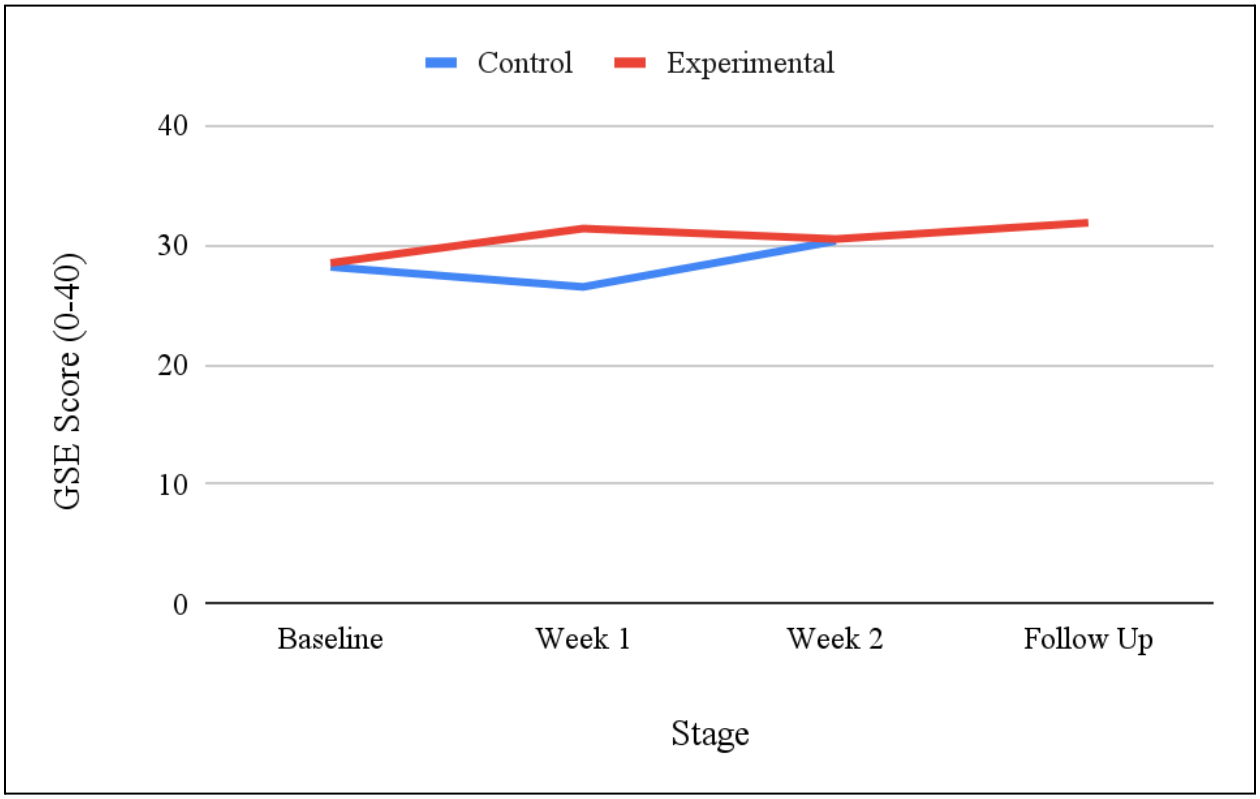


Figure 4

Session Completion and Change in STAI Score

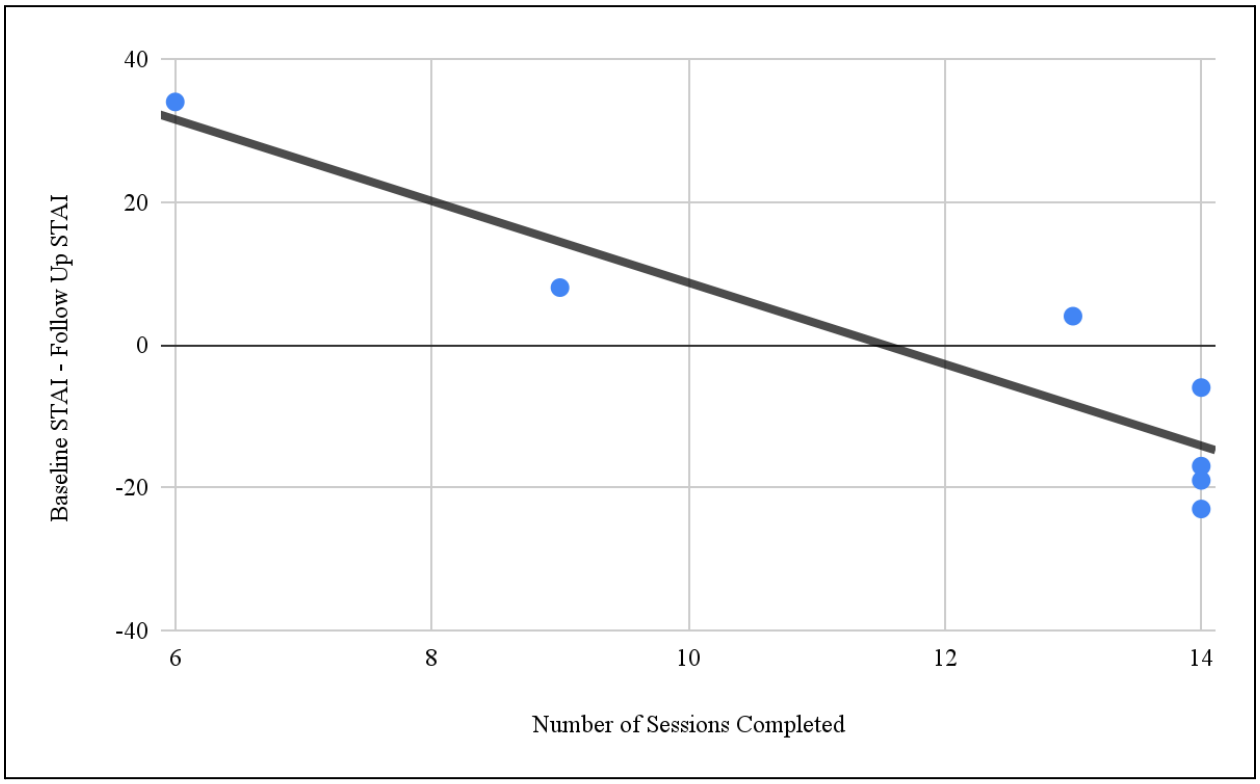


Figure 5

Session Completion and Change in BDI Score

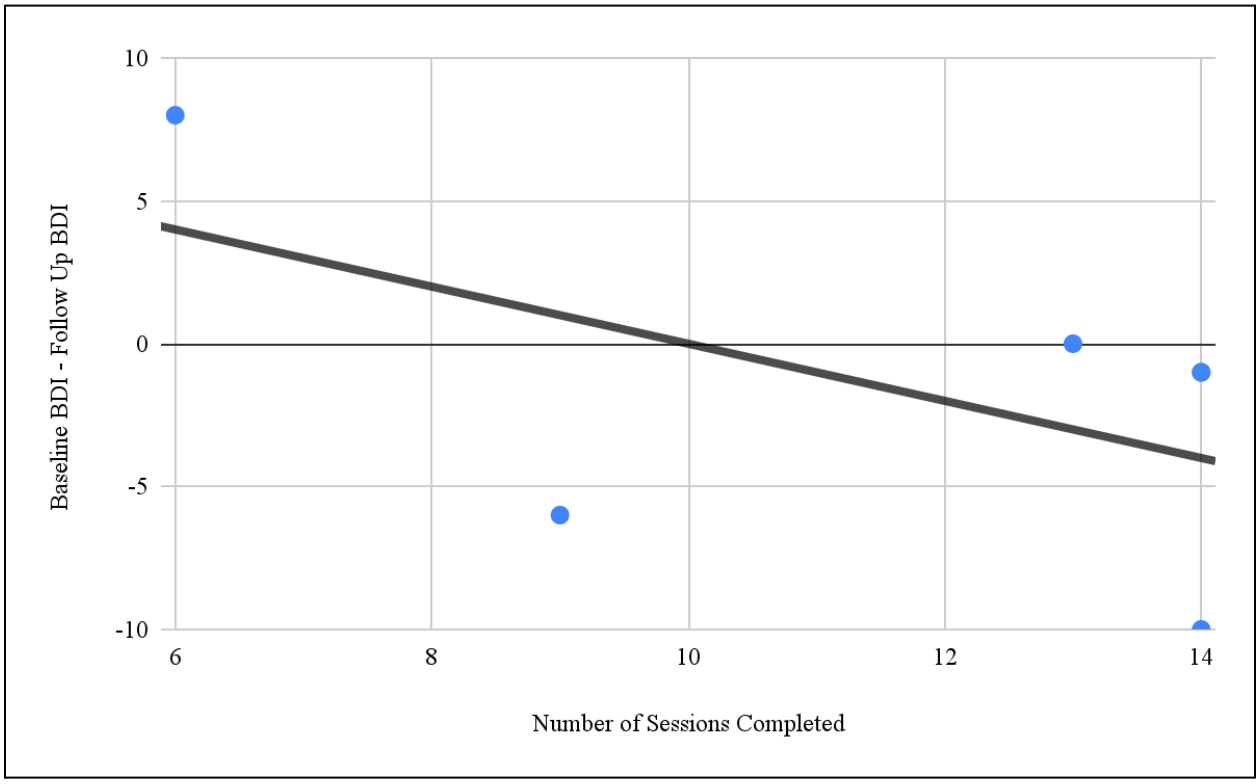


Figure 6

Session Completion and Change in GSE Score

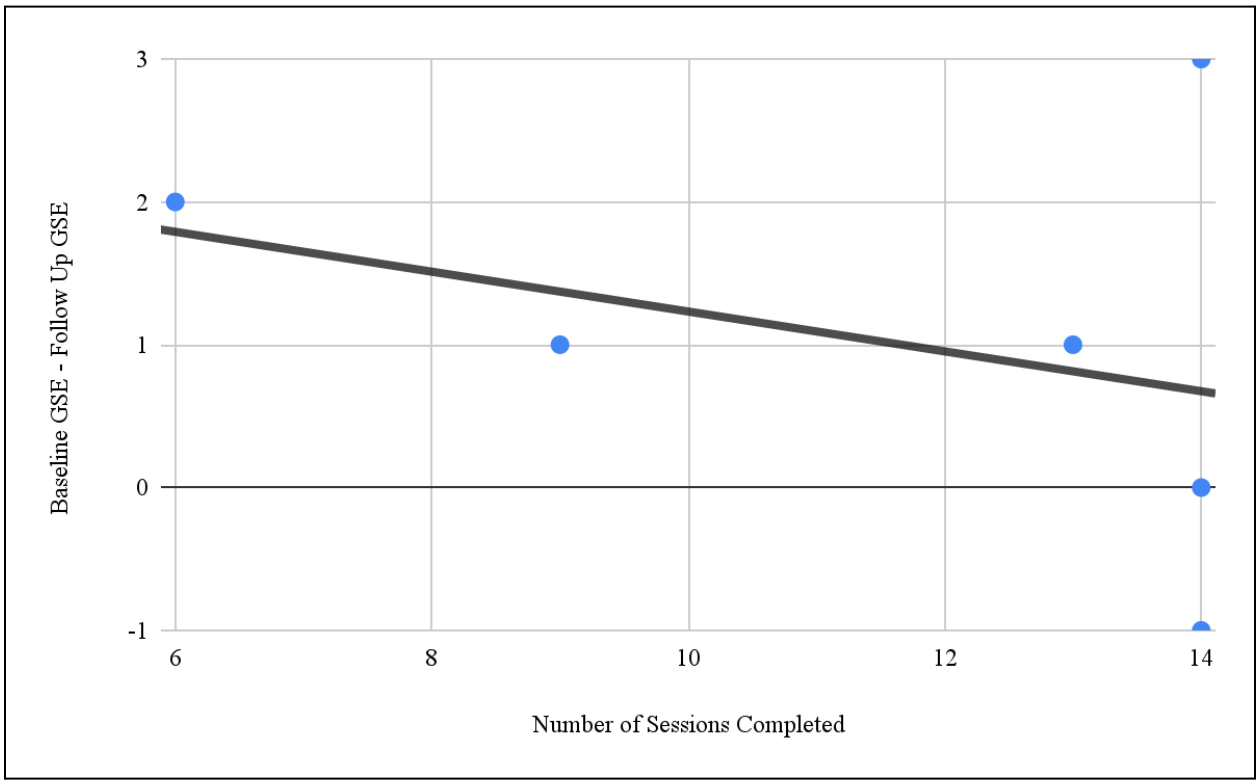
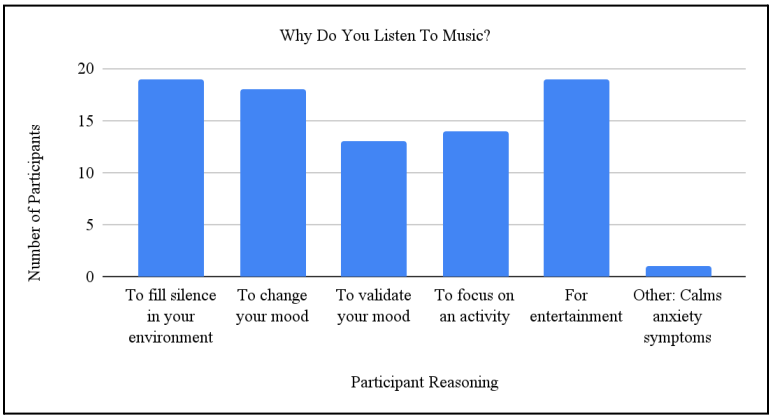
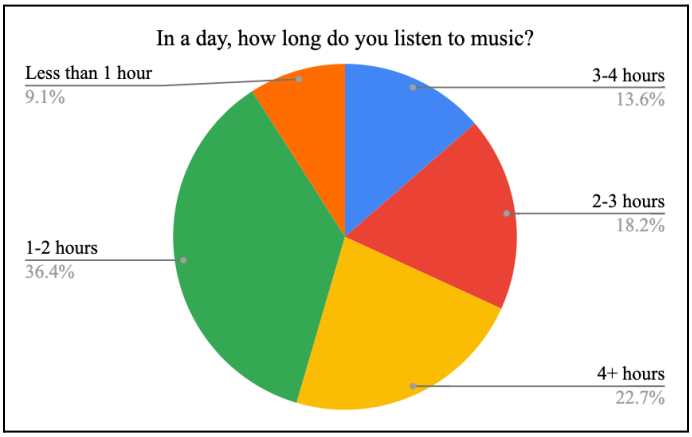
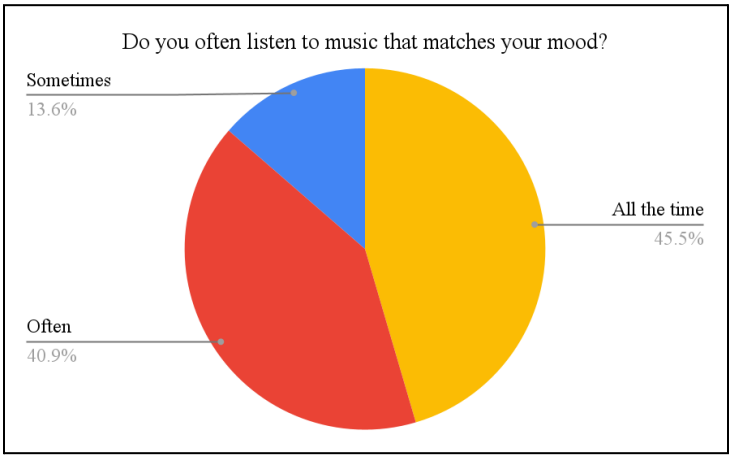


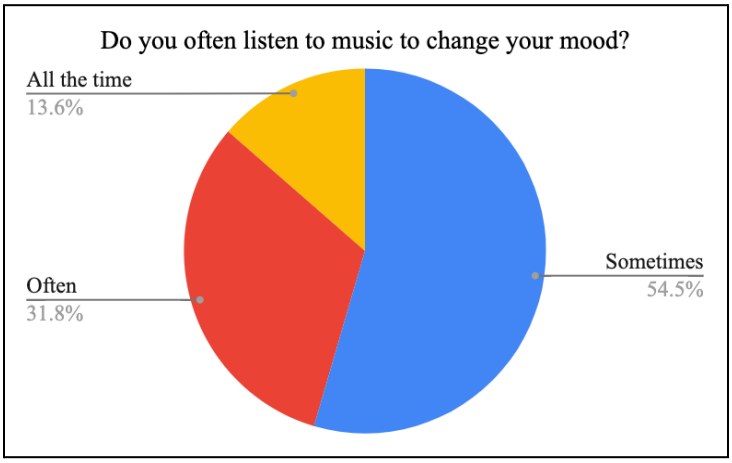
Figure 7

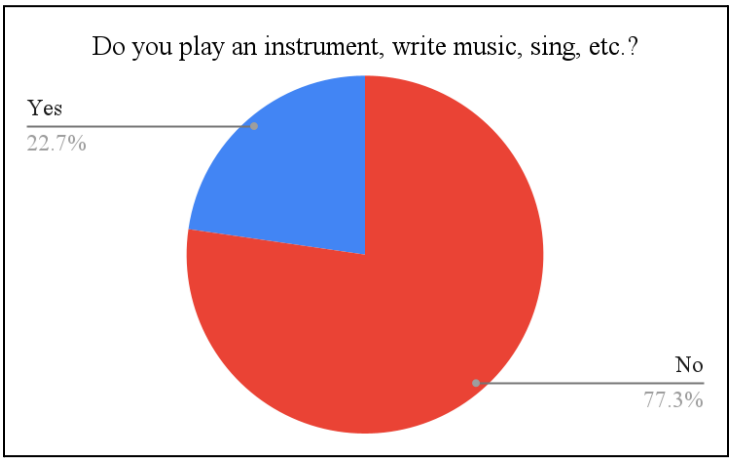
Baseline Form Responses











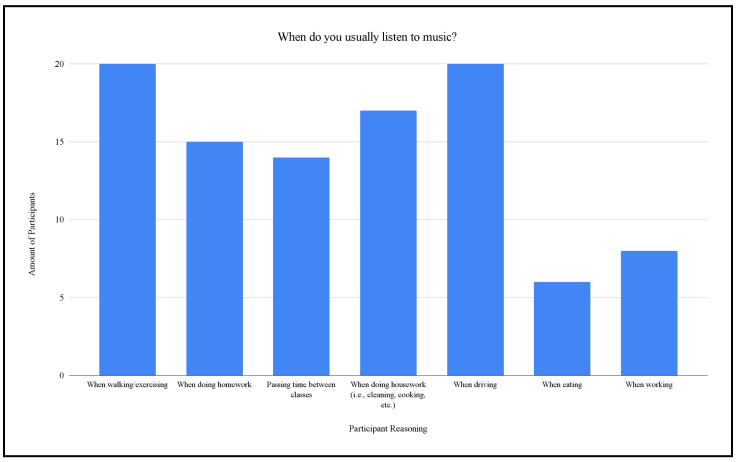
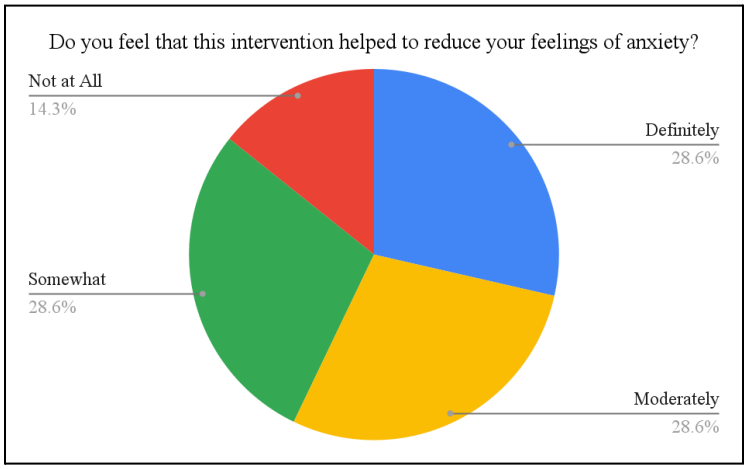
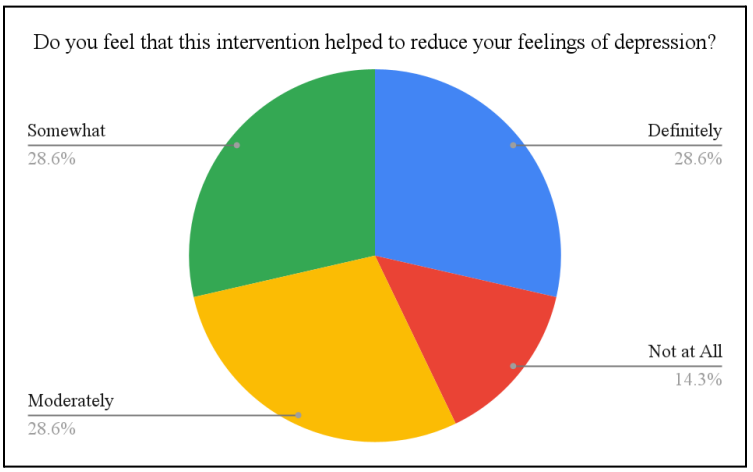
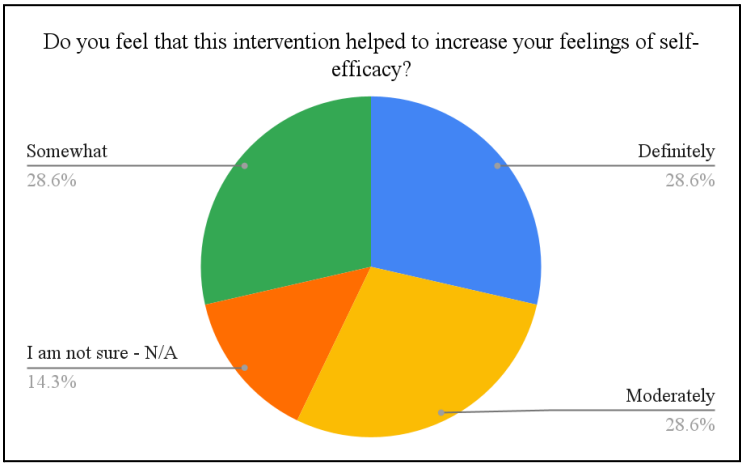


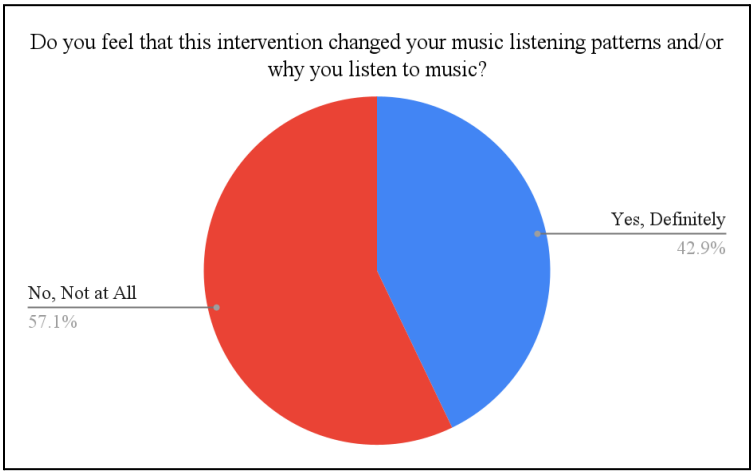
Figure 8

Debriefing Form Responses







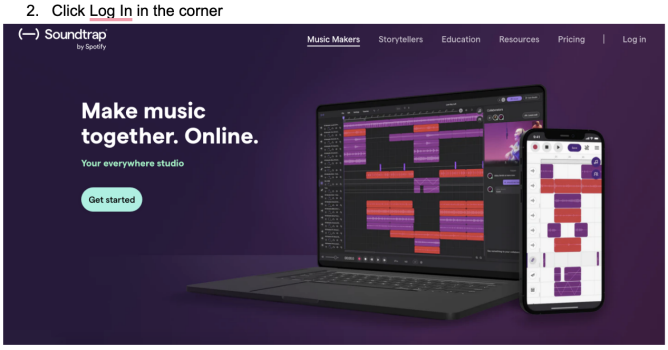


Appendix A

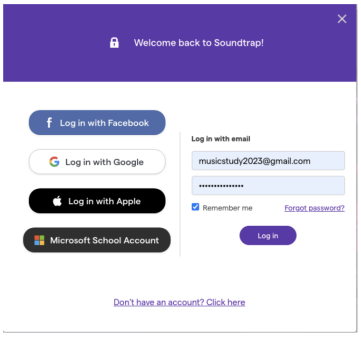
Soundtrap Instructions

Instructions For Using Soundtrap

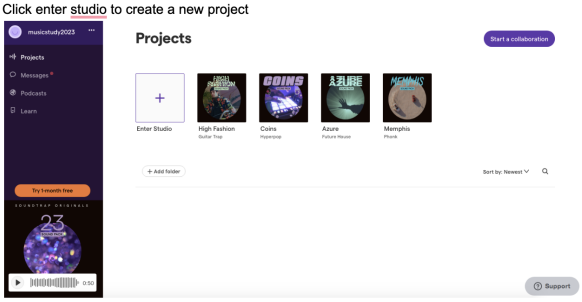
1. Go to www.soundtrap.com
2. Click Log In in the corner



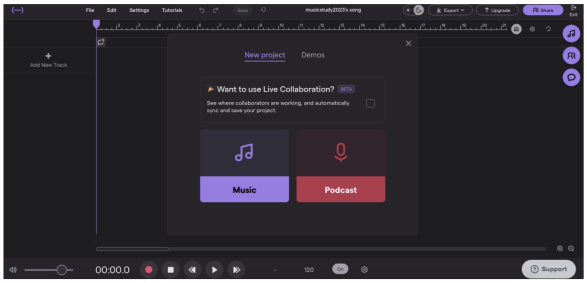
3. Log in with this email
   a. Email: musicstudy2023@gmail.com
   b. Password: musicstudy2023



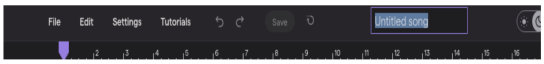
4. Click enter studio to create a new project



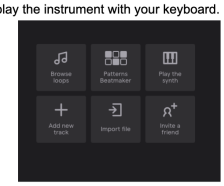
5. Click the music icon to make a music project from scratch



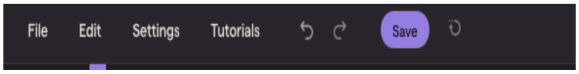
6. Rename the project at the top of the screen to "first initial, middle initial, last initial. today's month/date"
   a. Ex: DAW.2/13



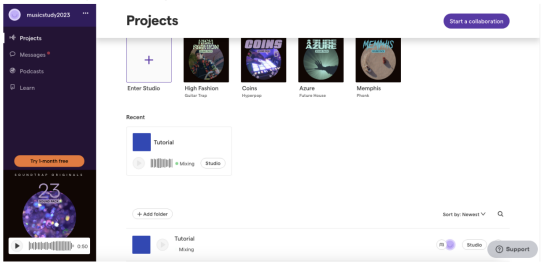
7. Start creating your project
   a. Browse Loops: Click the icon and drag your selected loop from the right menu onto Add New Track on the left menu
   b. Patterns Beatmaker: Click the icon and create repeating 808 beats
   c. Play the Synth: Click the icon and use your keyboard to play the corresponding piano keys
   d. Add new track: Click the icon and choose what instruments to include. Make a choice and play the instrument with your keyboard.



8. When you are done, save your file with the purple button at the top of the screen and exit the tab.



9. Next time you use the program, either create a new project or select your previous project, using the "Studio" button to continue working on it. **Make sure to change the date if you are doing so.**



Appendix B

Debriefing Email

Hello,

If you have not completed the final form please do so ***ASAP***. Here is the link again: https://docs.google.com/forms/d/e/1FAIpQLSd36Qjz4TKBastCQciLTGvSiu7YGN7tlUuU4mtI7SVZa4WhTw/viewform?usp=sf_link.

For those that have finished, thank you so much for participating in my study! This was a study I was very excited to conduct and I appreciate your commitment to it. Realizing the focus of this study, I would like to provide you all with some resources regarding anxiety, depression and general mental health for anyone you feel may need them.

Anxiety Resources

- Everyday Health
- Anxiety and Depression Association of America
- Centre for Clinical Interventions

Depression Resources

- Anxiety and Depression Association of America
- Centre for Clinical Interventions
- National Alliance on Mental Health

General Mental Health Resources

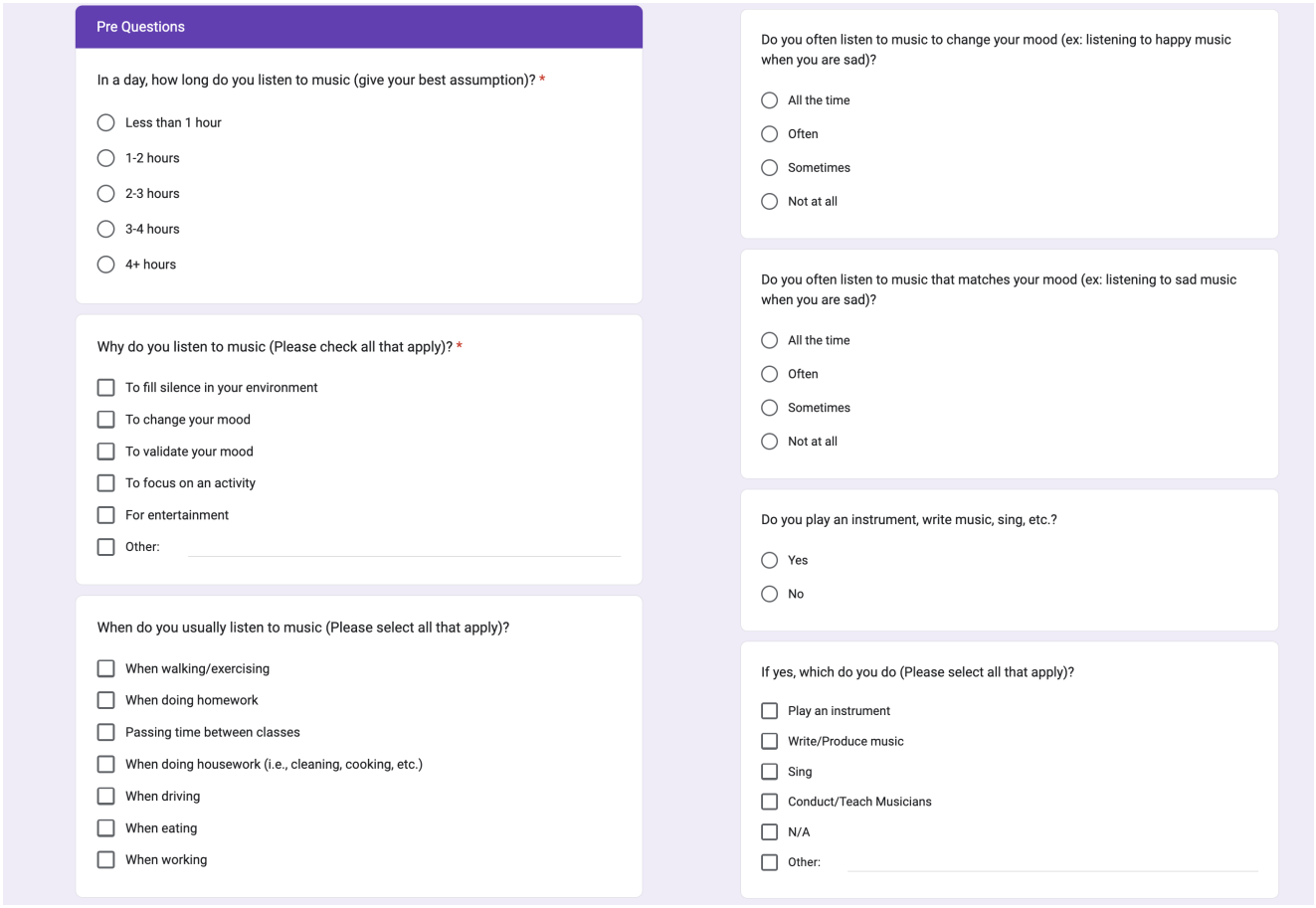
- National Alliance on Mental Health
- Centre for Clinical Interventions
- National Institute of Mental Health
- Mind

Please take care of yourselves and I hope you have a fantastic rest of your semester! Thank you again!

Sincerely,
Dominique

Appendix C

Baseline Questionnaire



Pre Questions

In a day, how long do you listen to music (give your best assumption)? *

- Less than 1 hour
- 1-2 hours
- 2-3 hours
- 3-4 hours
- 4+ hours

Why do you listen to music (Please check all that apply)? *

- To fill silence in your environment
- To change your mood
- To validate your mood
- To focus on an activity
- For entertainment
- Other:

When do you usually listen to music (Please select all that apply)?

- When walking/exercising
- When doing homework
- Passing time between classes
- When doing housework (i.e., cleaning, cooking, etc.)
- When driving
- When eating
- When working

Do you often listen to music to change your mood (ex: listening to happy music when you are sad)?

- All the time
- Often
- Sometimes
- Not at all

Do you often listen to music that matches your mood (ex: listening to sad music when you are sad)?

- All the time
- Often
- Sometimes
- Not at all

Do you play an instrument, write music, sing, etc.?

- Yes
- No

If yes, which do you do (Please select all that apply)?

- Play an instrument
- Write/Produce music
- Sing
- Conduct/Teach Musicians
- N/A
- Other:

Appendix D

Debriefing Questionnaire

Were you in Group A or Group B? *

- Group A
- Group B

Overall, how long did you spend on the music creation program during each session, on average? (Please put N/A, if you were in Group B) *

Your answer

Do you feel that this intervention helped to reduce your feelings of anxiety? *

- Definitely
- Somewhat
- Moderately
- Not at All
- I am not sure - N/A

Do you feel that this intervention helped to reduce your feelings of depression? *

- Definitely
- Somewhat
- Moderately
- Not at All
- I am not sure - N/A

Do you feel that this intervention helped to increase your feelings of self-efficacy? *

- Definitely
- Somewhat
- Moderately
- Not at All
- I am not sure - N/A

Do you feel that this intervention changed your music listening patterns and/or why you listen to music? *

- Yes, Definitely
- Yes, Somewhat
- Yes, Moderately
- No, Not at All
- I am not sure - N/A

If yes, how is it different from the start of the intervention (Please select all applicable)? *

- [ ] An increase in music listening
- [ ] A decrease in music listening
- [ ] Listening to fill silence in your environment
- [ ] Listening to change your mood
- [ ] Listening to validate your mood
- [ ] Listening to focus on an activity
- [ ] Listening for entertainment
- [ ] N/A
- [ ] Other: