2021

The Effect of Therapeutic Music Playlists on Symptoms of Anxiety: A Clinical Trial

Katie A. Bautch
University of the Pacific

THE EFFECT OF THERAPEUTIC MUSIC PLAYLISTS ON SYMPTOMS OF ANXIETY: A CLINICAL TRIAL

By

Kate Bautch

A Dissertation Submitted to the

Graduate School

In Partial Fulfillment of the

Requirements for the Degree of

DOCTOR OF EDUCATION

Benerd College
Counseling Psychology

University of the Pacific
Stockton, California

2021

THE EFFECT OF THERAPEUTIC MUSIC PLAYLISTS ON SYMPTOMS OF ANXIETY: A CLINICAL TRIAL

By

Kate Bautch

APPROVED BY:

Dissertation Advisor: Linda Webster, Ph.D.

Committee Member: Eric G. Waldon, Ph.D., MT-BC

Committee Member: Justin Low, Ph.D.

Senior Associate Dean of Benerd College: Linda Webster, Ph.D.

THE EFFECT OF THERAPEUTIC MUSIC PLAYLISTS ON SYMPTOMS OF ANXIETY: A CLINICAL TRIAL

By

Kate Bautch

DEDICATION

This dissertation is dedicated to Sam, Owen, and Lila: the people who have taught me the most in this life. You are my heart and my joy, and the greatest adventure I could ever imagine. I will always strive to be worthy of the trust, admiration, and love that you show me daily.

ACKNOWLEDGMENTS

I would like to thank my husband, Kevin, for his support, his humor, and his willingness to jump in and keep life functioning when I needed to dive headfirst into coursework.

I would like to thank Nan for her gallows humor that kept me sane, her unfailing belief in me, and for air dropping supplies during finals week.

I would like to also thank Dr. Webster for supporting me in undertaking both programs simultaneously. It was definitely unconventional, but I am forever grateful that you believed in my ability to take on the challenge.

I would like to thank Jenni Fiederer for keeping me sane through both of these degrees, and for all of those long conversations standing around after class.

Finally, I would like to think Brian Luedloff. He was the teacher who insisted that I was capable of more than I thought I was and encouraged me to strive for excellence. He was a guide during a particularly difficult stretch of my path through life, and for that I will be eternally grateful.

THE EFFECT OF THERAPEUTIC MUSIC PLAYLISTS ON SYMPTOMS OF ANXIETY: A CLINICAL TRIAL

Abstract

By Kate Bautch

University of the Pacific
2021

This is a pilot study examining the comparative effectiveness of self-administered therapeutic playlists in the treatment of anxiety symptoms. Interventions examined during this study include the musical contour regulation playlist (MCR-P) and a one-directional mood vectoring playlist (MV-P). Measures included the Spielberger State Trait Anxiety Inventory (STAI), and a Likert-type scale for participants to rate their pre- to post-listening levels of anxiety. At the conclusion of the study, participants took part in an interview which were analyzed for data that could help inform for whom the MCR-P intervention would be best suited.

Both interventions discussed in this study are grounded in existing research in the fields of music therapy, psychotherapy, and neuroscience, and all playlists are personalized to take into account the musical preferences of each participant. Findings indicated that there was a significant relationship between use of the MCR-P and a reduction in symptoms of state and trait anxiety scores in participants with pretest trait anxiety scores at or above the 85th percentile (state $p = 0.023$; trait $p = 0.037$), and state anxiety scores in all participants (state $p = 0.026$). Analysis of all participant scores also indicated that there was a significant relationship between use of the MCR-P and a reduction in pre- to post-listening anxiety ($p = 0.029$) with greater effectiveness in participants with pretest trait anxiety scores at or above the 85th percentile ($p = 0.01$). Findings

must be interpreted with caution due to the small sample size, but they indicate that this may be an effective tool to assist patients in the management of anxiety symptoms.

TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Figure

CHAPTER 1: INTRODUCTION

Anxiety is a condition that many people face at some point in their lives. While most will experience some form of anxiety, not all will experience clinical levels. Current data suggests that 31.1% of Americans will be diagnosed with an anxiety disorder during their adulthood. Women show a higher rate of anxiety disorders with 38% of adolescent females and 23.4% of adult women experiencing an anxiety disorder in the past year. Of those persons diagnosed, 56.5% will experience symptoms ranging from moderate to serious, and causing significant impairment in their lives (National Institute of Mental Health, 2017). Current recommended treatments for symptoms of anxiety are skills-based therapies, the most common of which are cognitive behavioral therapy and Dialectical Behavior Therapy (O'Toole et al., 2015; Moscovitch. et al., 2012; Sehatti et al., 2019; Neacsiu et al., 2014; Lothes II & Mochrie, 2017).

Music listening and music therapy have been repeatedly studied as a means of managing anxiety as well as other symptoms of emotional dysregulation (Baker et al., 2017; Jasemi et al., 2016; Plener et al., 2010; Strehlow & Linder, 2016). Studies have also demonstrated that receptive music therapy, which relies primarily on listening and experiencing music in a more passive way, stimulates neurological structures implicated in emotion regulation (Sena Moore, 2013) and has been shown to be effective in the management of disorders featuring emotional dysregulation (de la Torre-Luque et al., 2017; Bidabadi & Mehryar, 2015; Landis-Shack et al., 2017; Carr et al.,2012; Beck et al., 2018). While there have been studies noting the effects of music listening on emotions, there are no current studies that examine the effectiveness of the specific playlist interventions addressed in this study (Flores-Gutiérrez & Terán Camarena, 2015; Garrido et al., 2016; Krahé & Bieneck, 2012; McFerran et al., 2010; Nguyen & Graham, 2017;

Shatin, 1970). This study proposes to examine the effectiveness of musical contour regulation playlists in comparison to one-directional mood vectoring playlists in the treatment of anxiety symptoms. This study will further attempt to identify the feasibility and potential barriers of adherence to the protocol of these self-administered interventions.

Background

Mental health diagnoses affect a significant portion of the population, with 50% of all Americans receiving at least one mental illness diagnosis in their lifetime (American Psychological Association, 2018). According to the American Psychological Association (2018) 45% percent of adults with a mental health diagnosis also meet the criteria for at least one other disorder. The prevalence of Americans diagnosed with specific conditions that the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5)* lists emotion dysregulation as a key component of are as follows: anxiety disorders at 31.1%, other mood disorders at 21.4%, attention deficit hyperactivity disorder (ADHD) at 8.7%, posttraumatic stress disorder (PTSD) at 6.8%, bipolar disorder at 4.4%, eating disorders at 2.7%, obsessive compulsive disorder (OCD) at 2.3%, and borderline personality disorder (BPD) at 1.4%. (American Psychiatric Association, 2013; National Institute of Mental Health, 2017).

In a survey by Bautch (2019), 84% of participants reported using music for the purposes of regulating emotions. As is noted in a study performed by McFerran et al. (2010), people do not always select music for themselves that will improve their emotional state. In their research they found that it is not uncommon for people who are struggling with mood to select music which can actually intensify rumination and which can have a detrimental effect on their emotions. However, music has the ability to assist in mood elevation. Bidabadi and Mehryar demonstrated the efficacy of music therapy in the treatment of OCD with comorbid depression

and anxiety symptoms in their 2015 study. The music therapy group showed 47% greater relief from anxiety and depression symptoms when compared to the control group. It is also indicated as an effective treatment of anxiety disorders without co-morbid conditions (Landis-Shack et al., 2017), and as and effective treatment for PTSD (Carr et al.,2012; Beck et al., 2018).

In her 2013 systematic review, Sena Moore explained these results by examining the neural correlates between the structures involved in emotion regulation and the impact of music experiences on those neural structures. Neural structures and activity that are related to emotion regulation include activation of the anterior cingulate cortex (ACC), the orbitofrontal cortex (OFC), and the prefrontal cortex (PFC), the last of which has a mediating effect on the amygdala. Multiple studies have used imaging technology as well as other measures to demonstrate the effect of music listening experiences on patterns of neurological activation (Blood & Zatorre, 2001; Brown et al., 2004, Mitterschiffthaler et al., 2007; Berns & Moore, 2012; Berns et al., 2010, Flores-Gutierrez et al., 2007; Koelsch et al., 2006; Levitin, 2013; Alluri et al, 2015; Hou et al., 2017). Activity in the limbic system is also altered by music listening, engaging the limbic and the paralimbic systems and improving functional connectivity of the limbic regions (Brown et al., 2004; Alluri et al., 2015). This suggests that music listening activities are capable of facilitating optimal activation of neurological structures implicated in emotion regulation.

Both music listening as well as music therapy has long been used as a means of effectively addressing goals of emotion regulation. Beginning in the 1940s, music therapy was used as a means of addressing symptoms of what eventually became known as post-traumatic stress disorder, though it was then called shell shock. Interventions currently used in addressing symptoms of anxiety include music assisted relaxation, guided imagery and music, improvisation, and therapeutic playlists (Wurjatmiko, 2019; Karadag et al., 2019; Ribeiro et al.,

2018; Millet & Gooding, 2017; Pavlov et al., 2017; Hwang et al., 2013; Alam et al., 2016; Hammer, 1996; Bradt & Teague, 2018; Zarate, 2016; Hense et al., 2018). Many of these interventions are done in the presence of a music therapist and are not self-administered. Notable exceptions are therapeutic playlists, and music assisted relaxation, which are interventions that can be taught and used in the home environment. A therapeutic playlist is a sequence of songs that are targeted to reach a goal. They are frequently used as a means of addressing dysregulation of emotions, most commonly symptoms of anxiety and/or depression. The present study will investigate the use of one-directional mood vectoring playlists and musical contour regulation playlists in the treatment of symptoms of anxiety. For the purposes of this study, Shatin's (1970) definition of mood vectoring will be used, which is "The directed alteration of mood through music- an alteration from one affective pole to it's [sic] opposite or it's [sic] contrast" (pg. 81). Musical contour regulation, on the other hand, alternates between high- and low-arousal music experiences in order to support healthy management of high- and low-arousal situations which may induce symptoms of anxiety (Sena Moore, 2018).

Description of the Problem

Basic research demonstrates that music shows promise of being an effective treatment for emotion dysregulation, and that music has a direct effect on neural structures involved in emotion regulation, including the ACC, OFC, and the lateral PFC, which has a mediating effect on the amygdala (Blood & Zatorre, 2001; Brown et al., 2004, Mitterschiffthaler et al., 2007; Berns & Moore, 2013; Berns et al., 2010, Flores-Gutierrez et al., 2007; Koelsch et al., 2006; Levitin, 2013; Alluri et al, 2015; Hou et al., 2017). Music listening can also be used to decrease activation in the limbic and the paralimbic systems which are heavily involved in autonomic nervous responses (ANS) and improve functional connectivity of the limbic regions (Brown et

al., 2004; Alluri et al., 2015). In addition, research demonstrates that receptive music therapy interventions can be used in the treatment of conditions featuring emotional dysregulation (Baker et al., 2017; Plener et al., 2010; Strehlow & Linder, 2016).

Though the effectiveness of receptive music therapy interventions has been determined in the treatment of emotion regulation, and functional magnetic resonance imaging (fMRI) studies have confirmed neural correlates between structures activated by receptive music therapy interventions and the structures involved in emotion regulation (Sena Moore, 2013), there are no studies examining the difference in effectiveness of mood vectoring playlists and musical contour regulation playlists in their management of anxiety. This is important to examine as each intervention approaches the management of emotion regulation differently, with the one-directional mood vectoring playlist gradually shifting from dysregulated emotion to regulated emotion, while the musical contour regulation playlist uses a neuropsychological approach in training the pathways of emotion regulation to build the skill of implicit emotion regulation. However, it must be noted that comparisons are somewhat limited in that the MCR-P functions from an emotion regulation framework, whereas the MV-P serves as a distress tolerance skill.

Research has been done into the effects of playlists on anxiety and depression, but the playlists were very different in nature from those being examined here. In their 2016 study, Garrido et al. did not note any lasting effects on mood when a therapeutic playlist was used, but the playlists used in their study either contained entirely sad music or entirely happy music, instead of shifting the components of the music throughout the playlist in order to attempt to facilitate a change of mood as this study proposes. While no long-term effects were noted, participants reported an increase of awareness in how music affects their mood. In the listening diaries that participants kept, multiple participants stated that they would be using music in a

more deliberate manner in the future. They also noted that patient preferred music was more effective than researcher-selected music.

Proposed Intervention

This study will explore two different kinds of playlists that were designed to address a range of emotions and assist listeners in shifting from dysregulated to regulated mood states. Music will be participant-selected from their own collection of recorded music and organized in collaboration with a board-certified music therapist. Playlists will be designed to facilitate a reduction of anxiety symptoms.

In addition, it is important to also examine the feasibility of both interventions, as well as barriers to faithful adherence to the protocol that participants experienced. This will assist practitioners in the identification of persons who would benefit, as well as those for whom the interventions may not provide optimal results. The results of this study may also provide information as to whether there are changes that could be made to improve accessibility and increase fidelity in the protocol in order to facilitate improved outcomes for patients.

Theoretical Framework

This mixed-methods study examined the effectiveness of mood vectoring playlists and musical contour regulation playlists to determine which is a more effective in the treatment of anxiety symptoms. A quantitative method was used to collect evidence of comparative effectiveness. A qualitative method was used to discern feasibility as well as identify potential barriers to effective fulfillment of the protocol. This is an exploratory sequential design. Synthesized data will also be used to identify what effects control variables as well as data gathered during the final interviews have over the participant's response to the intervention. Control variables will include trait anxiety, mental health diagnosis, and previous musical

experience. I also collected data in order to evaluate differences in effectiveness between two different theoretically distinct interventions of how to facilitate optimal emotion regulation. These two theories have never been examined in a side-by-side manner before, as they will be in this study.

The research supporting the development of the musical contour regulation playlist comes from a study conducted by Sena Moore and Hansen-Abromeit (2018). The intervention which they tested was a musical contour regulation facilitation, in which they sought to train the neural pathways associated with emotion regulation through alternating music between high, mid, and low arousal throughout a music therapy session. The current study examines if the same principle could be effective when presented in the format of a playlist. This approach is consistent with the Neurologic Music Therapy (NMT) approach of Music Psychotherapy and Counseling (MPC). The basis for the one-directional mood vectoring playlist is based on the work of Hense et al. (2018), in which they identified healthy and unhealthy use of music listening and proposed a model for healthy use of music to assist with emotion regulation. It also builds off of the iso principle, the origins and use of which is detailed in Heidersheit and Madison's study (2015). Iso principle states that one must first match the music to the state in which the person is already in before gradually shifting to facilitate the desired change. The one-directional mood vectoring playlist is also consistent with the NMT approach of MPC, as the information detailing said approach is vague enough to apply to both playlist interventions.

This topic was determined to be especially relevant after a study conducted earlier by Bautch (2019) in which 73.45% of participants reported using music listening to match their emotions. As Hense et al. (2018) outlined in their study, this can be damaging if one is using

music in a manner to reinforce negative emotions and increase rumination. This finding is pertinent for persons who are managing mood disorders.

I theorize that the musical contour regulation playlist will have a greater effect in facilitating relief from symptoms of anxiety over the full course of the study, but that the one-directional mood vectoring playlist will provide greater immediate relief. This is due to the data supporting use of the iso principle in the management of symptoms of anxiety, as well as the study supporting the use of musical contour regulation facilitation in long term improvement.

Quantitative measures was the self-report treatment log as well as the Spielberger State Trait Anxiety Inventory (1984). Qualitative data was collected via interview and examined the barriers to faithful adherence to the protocol which was experienced by the participants in the study, as well as the feasibility of these self-administered interventions. Qualitative data collected in the exit interviews will be recorded, coded, and analyzed using a semantic approach and according to the protocol of Braun and Clarke (2006).

Purpose of the Proposed Study

This study will explore whether musical contour regulation playlists are more or less effective than one-directional mood vectoring playlist in the management of anxiety symptoms. It will also examine the feasibility of self-administered therapeutic playlist interventions as well as identify potential barriers.

Research Questions

The following research questions are proposed:

1. To what extent does a course of treatment involving an MCR-P impact state anxiety?
2. To what extent does a course of treatment involving an MCR-P impact trait anxiety?

3. To what extent does the MCR-P intervention impact momentary anxiety, pre to post per administration?

4. To what extent does a course of treatment involving an MCR-P impact state anxiety in participants with pretest trait anxiety at or above the 85th percentile?

5. To what extent does a course of treatment involving an MCR-P impact trait anxiety with pretest trait anxiety at or above the 85th percentile?

6. To what extent does the MCR-P intervention impact momentary anxiety, pre to post per administration with pretest trait anxiety at or above the 85th percentile?

7. Is the use of a musical contour regulation playlist more or less effective than the use of a one-directional mood vectoring playlist in the management of symptoms of anxiety?

8. What is the feasibility of using a self-administered therapeutic playlist?

9. Which themes are present with participants who take part in a course of treatment involving the MCR-P intervention?

10. Which codes are present with participants who were high responders to the MCR-P intervention in participants with pretest trait anxiety at or above the 85th percentile?

11. What are the barriers to using self-administered therapeutic playlists for participants who were high responders to the MCR-P intervention with pretest trait anxiety at or above the 85th percentile?

Description of the Study

This study will examine the effectiveness of two different types of therapeutic playlists on symptoms of anxiety: a one-directional mood vectoring playlist and a musical contour regulation playlist. Data on the one-directional mood vectoring playlist will be pulled from a previous study conducted for the researcher's thesis. Measures of the dependent variable will be participant self-report in the form of a daily log and exit interview, as well as the Spielberger State Trait Anxiety Index (Spielberger, 1972; Spielberger et al., 1983).

Significance of the Study

While many studies note the neural correlates between emotion regulation and music listening, there are no studies investigating the use of self-administered music therapy

interventions for the purpose of treating symptoms of anxiety. There are a number of studies, both quantitative and qualitative, which link music to emotion and identify music as an effective tool of emotion regulation (Alluri et al., 2015; Baker et al., 2017; Bautch, 2019; Beck et al., 2018; Bidabadi & Mehryar, 2015; Blood & Zatorre, 2001; Brown et al., 2004; Carr et al., 2012; Flores-Gutiérrez & Terán Camarena, 2015; Garrido et al., 2016; Hou et al., 2017; Jasemi et al., 2016; Koelsch et al., 2016; Krahé & Bieneck, 2012; Landis-Shack et al., 2017; Levitin, 2013; McFerran et al., 2010; Mitterschiffthaler et al., 2017; Nguyen & Graham, 2017; Sena Moore, 2013; Shatin, 1970). This study will build upon previous studies on music listening and emotions, as well as the basic research into neural correlates between the structures involved in emotion regulation and the structures activated during receptive music therapy interventions, in order to fully utilize the neurological effects of music in support of effective emotion regulation. This has the potential to identify effective self-administered music therapy interventions, which would give patients a tool that they could use to assist with symptoms of anxiety at any time when they need support.

Collaboration with a board-certified music therapist will assist the participant in building a playlist which may assist in management of their symptoms of anxiety. As music can affect our emotions in many different ways, it is important to have a qualified professional guiding the selection of music so that expressionistic qualities, such as the structural characteristics of the music itself, are considered as well as referential characteristics, such as personal associations and memories. The role of the music therapist is to help the participant blend these components in order to create a playlist that will facilitate a reduction in symptoms of anxiety.

CHAPTER 2: REVIEW OF LITERATURE

Psychologists currently recognize skills-based therapeutic methods including cognitive behavioral therapy (CBT) and Dialectical Behavior Therapy (DBT) as the most effective treatments for mood disorders, such as anxiety. Research identifies that the most accurate measure of effectiveness of CBT treatment of anxiety disorders is the improvement of emotion regulation (ER) skills (Otte, 2011). As such, this study hypothesizes that a skills-based music therapy intervention could also be effective in the reduction of anxiety symptoms, and that a tool to assist with ER would be of the greatest help.

Music Therapy and Emotion Regulation

ER is a topic with a wide variety of operational definitions. For the purposes of this study, the researcher will use Sena Moore's definition of ER (2013). It is an internal process by which a person regulates a component of emotion in order to bring about a state of neutral arousal (Blaustein & Kinniburgh, 2010; Diamond & Aspinwall, 2003; McRae et al., 2010), and involves activation of the amygdala (Gyurak et al., 2011; Masao, 2004; McRae et al., 2010; Ochsner & Gross, 2005), the anterior cingulate cortex (Gyurak et al., 2011; McRae et al., 2010; Ochsner & Gross, 2005), the orbitofrontal cortex (Masao, 2004; Ochsner & Gross, 2005; Rempel-Clower, 2007; Schore, 2001), and the lateral PFC (Gyurak et al., 2011; McRae et al., 2010; Ochsner & Gross, 2005).

Receptive music therapy interventions are used to reduce symptoms of anxiety. The effectiveness of this has been demonstrated in a wide variety of populations (Madson & Silverman, 2010; Choi, 2010; Mohammadi et al., 2011; Jasemi et al., 2016; Cepeda et al., 2006; Nilsson, 2008; Pittman & Kridli, 2011; Tam et al., 2008; Klassen et al., 2008; de l'Etoile, 2002;

de l'Etoile, 2005; Gold et al., 2004; Unkefer, 2005; Dile & Bradt, 2007; Knight & Rickard, 2001). Music therapy incorporates other techniques to improve ER including creating new emotional responses to substitute for current responses (Gyurak et al., 2011; McRae et al., 2010; Ochsner & Gross, 2005), or to ask a patient to attend to particular, specific details of the music. These techniques can reduce the emotional potency of an event, and also encourages effortful, explicit ER strategies that can be valuable tools (de Manzano & Ullen, 2012; Fratianne et al., 2001; Gyurak et al., 2011; Jerde et al., 2011; Knösche et al., 2005; Satoh et al., 2001; Tam et al., 2010).

Therapeutic Function of Music (TFM)

Another crucial component to consider is the therapeutic function of music (TFM), as outlined by Hanson-Abromeit (2013). She emphasized the importance of aligning the characteristics of the music with the overall goals of the intervention. In the context of managing symptoms of anxiety, musical choices will be made in order to facilitate an increase in activation of the PFC, OFC, ACC, VCT, and NAc, and a reduction of activation in the amygdala. As was outlined in the previous section, all music does not have an equivalent effect on emotions. Important considerations to attend to while selection music for optimal ER are the mode, level of consonance, perception of pleasantness, familiarity, and likability. This will facilitate effective use of the intervention and will improve the TFM.

Structural and Referential Characteristics of Musical Stimuli

Structural components of the music refer to characteristics that are inherent to the music itself. These include things such as the tempo, instrumentation, and pitch. Referential characteristics refer to personal associations that they may have with the music. Musical stimuli classified as neutral-arousal should be as follows: easy-to-follow contours and recognition in the

melody; small intervals, or intervals including the octave, perfect fourth, or perfect fifth; rhythmic repetition; simple harmonic structure; consonance; concordance between mode and lyrics; simple structure; style that can be flexible; and lyrics that align with valence and purpose of intervention. Musical stimuli classified as high-arousal should be as follows: unexpected melodic elements to direct focus and attention, such as ascending intervals, wide skips, or pauses before cadential moments; rising pitches or sharp changes in pitch tunings; steady rhythms without ritardando or unstressed notes; dynamics mirroring lyrics; intermittent dissonance; pauses in phrasing to pique expectation; fast tempos, bright or sharp timbres; sudden or unexpected shifts in style, such as staccato or abrupt attacks; lyrics aligned with high-arousal themes; and use of novel or unexpected textures. Musical stimuli identified as low-arousal should be as follows: melodic repetition; low pitches and no changes in tuning; ritardando moments are acceptable, as are accents on rhythmically stable notes, but with very little rhythmic change; minimal variability and avoidance of excessively loud dynamics; familiar harmonies; simple structures, including melodic and rhythmic repetition; slow tempos; familiar timbres, especially those that are soft or dull; legato articulations; minimal variability in articulations; low-arousal concordant lyrics; and simple textures.

A study conducted by Hooper (2012) listed similar components of music that are necessary to identify music that is considered relaxing. Their study identified the components of form, tempo, volume, texture, melody line, melodic timbre, melodic pitch, melodic accents, and harmony. These factors were used to create a measure of how relaxing a piece of music could be. The music should follow a predictable and familiar form, and the tempo and volume should remain stable with only gradual shifts. The texture should remain stable and the harmonies should be predictable and avoid dissonance. The melodic timbre should remain gentle, and the

melodic pitch should include only gradual changes between registers. Melodic accents should be minimal, and the melodic line should include repetition of material. Personal music tastes and perceived aesthetics are also shown to have a significant effect on the use of music toward goals of self-regulatory ER (Van den Tol & Edwards, 2014).

The impact of both structural as well as referential components of the music emphasizes the importance of the creation of the playlist being a collaborative effort. In order to fully access the benefits of this playlist intervention, there needs to be input from both the music therapist as well as the participant. The music therapist will contribute their knowledge of the structural components of music, while the participant will indicate their musical preferences, as well as discuss associations that they may have with specific songs.

Patients with Mental Health Disorders

It is especially important to take perceived valence into consideration when it comes to persons who are struggling with mental illness (Bautch, 2019; Dillman et al., 2008; Hense et al., 2018). Adolescents are particularly vulnerable to using music in a maladaptive manner, as they spend more time listening to music and report an increase during emotionally difficult times (Thomson et al., 2014). When distressed, people tend to select music that mirrors their current emotional state, which is the core tenant of iso principle, which states that one must begin with music that matches the client's mood (Altschuler, 1945; Metzner, 2016). It has also been noted that participants stated that listening to sad music was comforting as it made them feel connected to others by sharing a common affective state, and that it reduced the sense of isolation (Friedman et al., 2012; Huron, 2011; Knobloch et al., 2004; Sena Moore, 2013; Zillmann, 2000). This relationship between affective state and independent music selection has been shown to be stronger in the presence of mental illness. For example, McFerran and Saarikallio's (2014) work

found that adolescents used music to intensify strong emotions, even if they are negative, versus creating change. Music listening has even gone so far as to be linked with symptomatic behavior of mental illness, including self-harm behaviors (Cheong-Clinch & McFerran, 2016). Bibb (2016) also noted that patients with mental health diagnoses found certain music either triggering or associated it with previous experiences. Due to these studies, it is clear that personalization of playlists is particularly crucial with this population.

Mood Vectoring and Affect Induction

One of the earliest mood induction procedures was the Velten mood induction procedure (Kenealy, 1986). In the procedure, participants would read aloud statements about themselves, ranging from fairly neutral to statements that had positive or negative associations. Velten's procedure demonstrated effectiveness, though the response was fairly mild (Lewis & Harder, 1988). Pignatiello et al. (1989) took the next step with the Velten procedure and compared it with musical mood induction techniques. Findings demonstrated that they were equally effective. Participants in the musical condition, however, showed greater reactivity in their heart rate and systolic blood pressure as compared to the Velten condition, indicating that music had a greater impact on physiological measures, though they are known to be idiosyncratic.

Music is a powerful tool for assisting in vectoring from one mood to another (Altschuler, 1945; Bautch, 2019; Bibb, 2016; Flores-Gutiérrez & Terán Camarena, 2015; Garrido et al., 2016; Koelsch et al., 2006; Shatin, 1970). While there is research to support mood vectoring, a majority of studies regarding music and mood focus on a single emotion. Garrido et al. conducted a study that examined how music listening affects mood by assigning participants to listen to either happy or sad music for four weeks (2016). No long-term effects were noted, and participants with high tendencies toward rumination experienced fewer positive effects. They

did note, however, that keeping a diary detailing use of music increased awareness and deliberateness in use of music. Garrido et al. (2016) also found that researcher-selected music was only effective for a single listening session, but consciousness-raising programs could change long-term listening strategies for those who currently use music in a maladaptive manner.

Shatin (1970) conducted seminal research in mood vectoring utilizing music listening. Mood vectoring is a technique which involves beginning an intervention by matching the patient's current mood, and gradually shifting toward the desired change using incremental steps. Shatin used step-wise gradients to achieve the desired mood, creating the mood vectoring desired. The effects were intensified by the level of familiarity a participant had with the music stimuli. He noted in the analysis that it was crucial to attend to the preferences of the participant in order to maximize benefits.

The Healthy-Unhealthy Uses of Music Scale (HUMS)

One of the primary studies on which this dissertation is based is a validation study on the Healthy-Unhealthy Uses of Music Scale (HUMS), which tested the measure by using it to create a therapeutic playlist (Hense et al., 2018). This study defined the healthy use of music as using music to promote social connection, mood enhancement, and distraction, whereas unhealthy use of music facilitates the use of avoidant coping strategies, rumination, mood worsening, and to increase symptoms of psychopathology (Garrido & Schubert, 2013; McFerran et al, 2014; McFerran & Saarikallio, 2014; Miranda & Claes, 2009; Saarikallio & Erkkilä, 2007; Thompson et al., 2014; Van den Tol & Edwards, 2014). They noted that their participants reported using playlists, but they did not use the music as a way to achieve an emotional goal. The one-directional mood vectoring playlist used by Hense et al. (2018) is based on the protocol outlined for use in testing the HUMS, but does not use the HUMS tool. Of the 13 participants in the

study, 12 reported immediate benefit from the music therapy session in which they developed their playlist. McFerran et al. (2018) additionally examined this intervention in an outpatient setting. During this study, the music therapist and patient collaboratively created the playlist if time allowed, but if it did not, there was instruction provided to the participant on how to create their therapeutic playlist based on the HUMS data gathered and discussion that occurred during the session. A key theme to emerge from that study was that the participants gained a sense of agency regarding their use of music and felt more empowered to make informed choices to facilitate desired mood change. This aligns with the results from other studies in which researchers noted an increase of effect size when participants reported experiencing the perception of autonomy in selecting music for interventions (Knappe & Pinquart, 2009; Leftcourt, 1976; Saarikallio, 2012).

Musical Contour Regulation Facilitation

The other study which served as the basis for this dissertation was conducted by Sena Moore and Hansen-Abromeit (2018). They explored the feasibility and effectiveness of the Musical Contour Regulation Facilitation (MCRF) intervention with preschool children. MCRF is an intervention that requires multiple sessions facilitated by a music therapist. Within each session, music used vacillates between high- and low-arousal musical stimuli. This is designed to further develop the neural pathways of which facilitate optimal ER and increase adaptive ER skills and reduce emotional reactivity. In their 2015 study, Sena Moore and Hanson-Abromeit identified key musical components to be considered in the creation of neutral-, high- and low-arousal musical stimuli, including melody, pitch, rhythm, dynamics, harmony, form, tempo, timbre, style, lyrics, and texture. MCRF is an intervention which is directed towards

preschoolers. As such, there are developmental considerations in adaptation of the concept for use with an older population.

Emotion Regulation in Psychotherapy

Documented Effectiveness of Behavioral Treatment Models

This study is taking a skills-based behavioral approach to the management of anxiety symptoms, aligning with well supported treatment models in psychotherapy. Behavioral models of treatment, such as CBT and DBT, have gained extensive support as effective interventions for management of specific mental illnesses. Watts et al. (2015) conducted a meta-analysis including 1,318 participants with a diagnosed anxiety disorder. They compared CBT with treatment as usual (TAU) and discovered medium effects (p<0.001). Hunot et al. (2007) conducted a meta-analysis examining effectiveness of treatments for generalized anxiety disorder (GAD) and identified CBT as the treatment for GAD with the strongest body of research to support its use. This information is consistent with a more recent meta-analysis also for the Cochrane review, conducted by James et al. (2015), examining the effectiveness of CBT in the treatment of anxiety disorders in children and adolescents. DBT has been incorporated into a meta-analysis identifying it as an effective treatment for depression which has otherwise been treatment-resistant (2018), as well as a review identifying it as an effective way of reducing the frequency of self-harm behaviors in adults (2016).

As ER skills are crucial in the management of symptoms of anxiety, it is important to identify strategies that have been useful in the facilitation of that goal. In a study conducted by Sheppes et al. (2011), they examined which strategies that people use for emotion regulation in different circumstances, given the choices of engagement reappraisal and disengagement distraction. Engagement reappraisal allows for emotional processing, whereas disengagement

distraction blocks emotional processing at an early point. Participants in the study selected engagement reappraisal for low-intensity negative situations, and disengagement distraction for high-intensity negative situations. Both are examples of ways in which people can manage situations that induce strong emotional responses, such as anxiety.

How ER Is Linked to Mental Health Diagnoses

Another important consideration is the way in which ER skills are linked to mental health diagnoses, such as anxiety, as well as physiological outcomes that are related to a stress response. In their 2014 study, Compare et al. discovered that adaptive ER skills contributed to lower rates of mental health diagnoses and physiological illness, whereas dysfunctional ER strategies, specifically rumination and emotion suppression, elevated rates of psychological disorders and physiological disease. Both depression and rumination were shown to affect cognitive and neurobiological systems, increasing hypothalamic pituitary adrenal axis (HPA axis) hyperactivity, as well as elevated rates of salivary cortisol. This suggests that skills-based therapies give the patients strategies to effectively regulate their emotions and can improve both psychological outcomes for patients with mood disorder, as well as physiological health and outcomes.

Late Positive Potential (LPP) and Event-Related Potential (ERP) as a Measure of ER

Another way to examine ER on a neurobiological level is to investigate the electrical activity within the brain. In the following studies, investigators use event-related potential (ERP) and late positive potential (LPP) as a way of identifying the intensity of emotion, the attention directed to emotional stimuli, and processing of emotions. An ERP is a response in the electrical activity of the brain and is measured by an electroencephalogram (EEG). An ERP occurs in response to a stimulus which can be sensory, cognitive, or motor. Flemingham et al. (2016)

noted elevated amplitude of ERPs in research participants with high trait social anxiety. They exposed two groups of women, one with high trait social anxiety and one with low trait social anxiety, to photos of emotional expressions. The high social anxiety group scored higher in hypervigilance, sustained attention, and elaborative processing of facial expressions, as measured by ERPs. The increased attention and elaborative processing were present throughout all facial expressions presented: positive, negative, and neutral. This supports cognitive models for treating social anxiety, which are largely skills-based.

LPP is a component of an ERP that is related to the attention paid to emotional stimuli (Dennis & Hajcak, 2011). LPP is used to measure effective emotion perception as well as intensity. When presented with emotional stimuli that are either pleasant or unpleasant, there is an increase in amplitude of the LPP. When presented with emotionally neutral stimuli, however, there is no significant shift in the amplitude (Liu et al., 2012). This indicates that the LPP is a measure of perception of the intensity of emotions. In a study conducted by Shafir et al. (2016), researchers examined the intensity of LPP to determine emotional-intensity and how that relates to choices made to use either disengagement distraction or engagement reappraisal as a way of managing challenging situations. The greater the LPP amplitudes were, the greater the processing of intensity of emotions. Participants who had an elevated amplitude of LPP consistently chose distraction over reappraisal. The strategy of distraction showed high rates of effectiveness in decreasing the amplitude of the LPPs, and participants reported fewer arousal symptoms.

Neural Basis/Correlates of Anxiety and Music

Role of the Prefrontal Cortex (PFC)

The PFC is the portion of the cerebral cortex covering the frontal lobe, and it manages executive function. This is especially relevant in the management of anxiety, as the PFC is paramount in modulating the reactivity of the amygdala. Activation in the dorsomedial PFC has also been found to be predictive of successful management of symptoms of anxiety regardless of anxiety type (Burkhouse et al., 2017), supporting the use of treatment methods which access and use the function of the PFC regardless of specific anxiety diagnosis. The relationship between increased activity in the medial PFC and a reduction of anxiety symptoms was discussed by Compare (2013). As responses to music are not uniform as a function of music preference, it is important to incorporate research specific to PFC activity and music listening. Berns et al. (2010) found that activation of the lateral PFC had a strong correlation with song likability, familiarity, and if it aligned with song preference, emphasizing the importance of creating playlists in collaboration with a specific patient.

Role of the Orbitofrontal Cortex (OFC)

The OFC is another structure crucial to understanding the neural circuitry of the stress response. The OFC coordinates interactions of the PFC, which facilitates the regulation of the amygdala (Compare, 2013). This creates a link between the cognitive and affective neural systems that show activation when engaging in music listening (Menon & Levitin, 2005). It also processes social emotions, managing behaviors relating to rewards or punishments and controlling impulses. It is activated during preferred music listening activities (Menon & Levitin, 2005), and had a stronger response than listening to speech alone (Callan et al., 2006), indicating why music-based interventions have the potential to be effective. Activation is related

to participant-rated song likability as well the emotional intensity (Sena Moore, 2013; Berns et al., 2010; Berns & Moore, 2012; Blood & Zatorre, 2001; Florez-Gutiérrez et al., 2007). Music that was associated with sadness and fear, however, was associated with OFC down-regulation (Bogert et al., 2016). These findings reinforce the need to develop the playlist in collaboration with the participant so that factors such as likability and emotional associations can be taken into account.

Role of the Anterior Cingulate Cortex (ACC)

The anterior cingulate cortex (ACC) is located between the PFC and the amygdala, and has several roles, some of which are highly relevant to the moderation of the anxiety response. It is implicated in processing conflict (Brown & Martinez, 2007; Mizuno & Sugishita, 2007; Pallersen et al., 2010; Sena Moore, 2013), error monitoring (Ruiz et al., 2009), response inhibition and selection (de Manzano & Ullén, 2012), and mediation of the cognitive influence on emotion. Hypoactivity or hyperactivity in the ACC is associated with psychopathology featuring dysregulated emotions (Stevens et al., 2011).

Music listening has been shown to have significant effects on patterns of activation in the ACC. An increase in activation in the ACC has been noted while people listen to familiar music (Janata, 2009), favorable or energetic music (Brown et al., 2004), and happy or pleasant music (Blood & Zatorre, 2001; Flores-Gutiérrez et al., 2007). The extent of activation is dependent on song likability just as it was in the OFC (Berns & Moore, 2012). A significant increase in activation also occurs when a patient listens to music that gives them chills (Blood & Zatorre, 2001; Mitterschiffthaler et al., 2007, Sena Moore, 2013). Music-evoked chills are a psychophysiological arousal that occurs in response to highly pleasurable emotions which are attributed to musical stimuli (Mori, & Iwanaga, 2015). The ventral ACC shows greater

activation during music listening than the dorsal ACC, which has implications for this research as the ventral ACC is closer to the affective neural structures as opposed to cognitive (Green et al., 2008). The ACC is strongly implicated in ER and music to facilitate activation of optimal patterns of ER including familiar, favorable, or energetic, and likable music.

Role of the Amygdala

The amygdala is a structure which is at the center of processing intense emotions such as fear and pleasure (Rasia-Filho et al., 2000). The amygdala experiences increased activation during periods of elevated emotional response, including anxiety. During episodes of panic or anxiety, the amygdala shows particularly high levels of activation. Strong amygdala-prefrontal connectivity is crucial, as it is predictive of both effective ER, and lower levels of anxiety (Kim et al., 2011). That is due to the role that the PFC plays in moderating activity in the amygdala.

The amygdala shows increased activation among listeners exposed to music which is identified as minor, dissonant, negative, or unpleasant (Koelsch et al., 2006; Lerner et al., 2009; Mitterschiffthaler et al., 2007: Pallsen et al., 2005; Sena Moore, 2013). A decrease in activity of the amygdala was noted, however, when participants were listening to music that they identified as pleasant or happy, or which resulted in chills (Blood & Zatorre, 2001; Koelsch et al., 2006; Sena Moore, 2013). This also reinforces the importance of taking the patient's personal music preferences into consideration during the creation of their music listening playlist. Amygdala activation has also been shown to be modulated dependent on the type and characteristics of music to which a person is listening. Additionally, it has shown heightened levels of activity during unexpected musical events, and was sensitive to a musical unit as small as a single chord change (Koelsch et al., 2008). Due to the potent relationship between music stimuli and activation of the amygdala, it is important that the creation of the playlists for this intervention

occurs under the supervision of a music therapist and/or mental health professional in order to avoid potential adverse reactions.

Role of the Ventral Tegmental Area (VTA) Nucleus Accumbens (NAc), and Neurotransmitters

The ventral tegmental area (VTA) and nucleus accumbens (NAc) are the primary structures implicated in the brain's pleasure response and are key in the moderation of the anxiety response. They are additionally implicated in addiction behaviors, and pleasure responses such as orgasm, and facilitate the release of the neurotransmitter dopamine. Both areas show activation during music listening (Menon & Levitin, 2005). The experience of musical emotions is strongly tied to the pleasure centers of the brain, which includes the VTA, NAc, and the resulting release of dopamine (Levitin, 2013). Elevated dopamine levels have also been noted as a result of listening to pleasurable music (Menon & Levitin, 2005; Salimpoor et al., 2011).

In addition to releasing dopamine, the VTA was shown to mediate activity in the hypothalamus, insula, and OFC, which is concordant with participant reports of finding music to be pleasurable (Menon & Levitin, 2005). Neurotransmitters other than dopamine have also been shown to be linked to pleasure experienced from music listening, including serotonin and the brain's endogenous opioids (Chanda & Levitin, 2013). Links between endogenous opioids and music induced pleasure was also found in a study conducted by Goldstein (1980). Participants were given a dose of naloxone, which is an opioid antagonist, and they reported a lack of pleasure experienced from music listening that had previously been pleasurable. This provided conformational evidence that the brain's endogenous opioids play a role in the perception of pleasure derived from music listening.

It is not only the increase of neurotransmitters related to pleasure that is important to note, but also the reduction of those related to stress. There is a reduction of cortisol and other stress hormones that was noted in healthy subjects after they listened to music that the participants identified as relaxing that was maintained even after performing tasks identified to be stressful (Grape et al., 2003; Khalfa, 2003; Knight & Rickard, 2011; Kreutz et al., 2012). The hormone, prolactin, is also related to positive feelings. Its role is to console and tranquilize, and it is created and released by the anterior pituitary gland in situations in which a person is feeling sad, as well as immediately after birth, during lactation, and during orgasm. Tears contain prolactin, but only tears of sadness. There is no prolactin present in tears of joy, or tears which lubricate the eye or clear irritation (Huron, 2006; Panskepp, 2006). In their 2006 study, Huron theorized that listening to sad music could be used to facilitate the release of prolactin in order to improve mood.

Role of Reflexive Brain Stem Responses

In addition to the hormonal responses and activation patterns in the cortical and limbic regions of the brain, the reflexive brain stem has also been implicated in physiological regulation. This includes heart rate, pulse, blood pressure, body temperature, skin conductance, and muscle tension (Juslin & Västjäll, 2008; Lundqvist et al., 2009). Levitin (2013) found elevated responses of heart rate, blood pressure, respiratory rate, skin conductance, and hypothalamic-pituitary adrenal (HPA) axis activity that took place during music listening activities. These markers were decreased by relaxing music and increased by music determined to be stimulating (Chanda & Levitin, 2013; Kreutz et al., 2012). With the exception of the HPA axis activation, these measures are less pertinent than the neural activation patterns and hormone

responses reported above, because physiological measures related to heart rate, blood pressure, and body temperature are idiosyncratic and are not always indicative of emotional responses.

Conclusion

This study will draw upon the research that has been conducted and is outlined above, combine data from the results, and attempt to identify effective therapeutic playlist interventions that can be utilized as a tool in the management of symptoms of anxiety.

CHAPTER 3: METHODOLOGY

Research Design

This study was a sequential explanatory mixed-methods study which included a clinical trial and secondary data analysis. It compared the effectiveness of one directional mood vectoring playlists (MV-P) with the effectiveness of musical contour regulation playlists (MCR-P) on improving symptoms of anxiety. This study is also explored the feasibility of self-administered interventions utilized after a psychoeducational session, as well as potential barriers to faithful adherence to treatment protocol. The data from this portion of the study was used to explore how these interventions worked for the participants and alert to any possible counterindications.

Participants

The sample was drawn from the United States. All participants were recruited online through social media. Inclusionary criteria included that all participants must be between the ages of 18 and 70 and report experiencing symptoms of anxiety on a regular basis. This was operationally defined as feeling anxiety and worry more often than not for at least 6 months and finding it difficult to control. These criteria are taken from the *DSM-5* (American Psychiatric Association, 2015) diagnostic criteria for Generalized Anxiety Disorder. No diagnoses were conferred over the course of this study. Exclusionary criteria included being unable to speak and write in English, as well as having a medical condition which caused hearing impairment. Participants needed to have access to a computer and a device on which they could listen to recorded music. The participants could have made contact with the researcher via phone or e-

mail, whichever was more convenient for them. All meetings took place over Zoom (https://zoom.us/.) This study contained a sample of 10 participants.

Intervention

The interventions examined in this study are therapeutic playlists which are designed to reduce symptoms of anxiety. For the creation of both playlists, the researcher and participant collaborated using recorded music the participant selected from their own collection. Playlists lasted no more than 20 minutes as a way of regulating the dose. All playlists were created in collaboration with the researcher who is a board-certified music therapist. Information regarding the intervention was outlined in alignment with the NIH reporting guidelines for music-based interventions (Robb, 2011).

MCR-P Treatment

Participants who used the musical contour regulation playlist (MCR-P) collaborated with the researcher to create a playlist which alternates between various states of arousal, organized as outlined in Sena Moore and Hanson-Abromeit (2018). Playlists alternated between music supporting high, mid, and low arousal states in order to stimulate the neural pathways associated with emotion regulation. Musical contour regulation playlists ended on a mid-level arousal song, which supports a calm state at the end of their session. The researcher instructed participants in how to use said playlists, as well as the options for activities to take part in during music listening.

Activities for both groups included movement, drawing, breathing exercises, or imagery. Music was selected from the participant's collection in collaboration and followed guidelines for appropriate music for relaxation in the final pieces of the playlist. Guidelines for relaxing properties of music will follow the findings of Hooper's study (2012) in conjunction with the

low-arousal properties of Hanson-Abromeit and Sena Moore's study (2015). This combination of patient preferred music and incorporation of the relaxing properties of specific musical qualities are expected to reduce a participant's level of anxiety given neural correlates as well as results from previous studies on the effects of music on emotion (Shatin, 1970; Stratton & Zalanowski, 1991; Sena Moore, 2013; Mitterschiffthaler et al., 2007; Levitin, 2013; Koelsch et al., 2006; Hou et al., 2017; Flores-Gutiérrez & Terán Camarena, 2015; Flores-Gutiérez et al., 2007; de la Torre-Luque, 2017; Brown et al., 2004; Blood & Zatorre, 2001; and Alluri et al. 2015).

MV-P Treatment

Data regarding the mood vectoring playlist (MV-P) was abstracted from the researcher's thesis study on the effectiveness of one-directional mood vectoring playlists in the treatment of symptoms of anxiety. The researcher's thesis study used the same period and the same measures. The MV-Ps were also created collaboratively using participant-selected recorded music from their personal collection. The playlist is comprised of music which incrementally vectors from dysregulated anxiety to a regulated emotional state. Music that was selected also followed guidelines for appropriate music for relaxation in the final pieces of the playlist. Guidelines for relaxing properties of music matched those used for the MCR-P.

Procedure

After the participants read and signed the informed consent document online, the researcher contacted the participant to set up the initial meeting time. All meetings took place on Zoom. In the initial meeting, the researcher implemented the psychoeducational component by explaining the procedure for the treatment. The researcher also instructed the participant on the website for recording data and using the apparatus. The researcher reviewed the procedure and

allowed time for any questions they had, as well as scheduling the final meeting time. They were also provided with the link for the STAI during this meeting.

The participants were instructed to engage in the listening intervention daily for 2 weeks. The participants took the STAI before starting their 2 weeks of a music listening intervention, as well as after they have finished the study. They also filled out a treatment log as a fidelity check (see attached treatment log form). All participants were contacted via email weekly for a fidelity check and to answer any questions the participant had.

Date	Pre-listening anxiety (1-5)	Post-listening anxiety (1-5)	Activity

Figure 1. Sample diary card.

At the final session, participants were given the link for the posttest STAI and took part in an exit interview. They were asked what challenges/barriers there were to completion of the protocol, and what their experience was like using the intervention. They then were asked if they had any other questions or observations on the process that they would like to share.

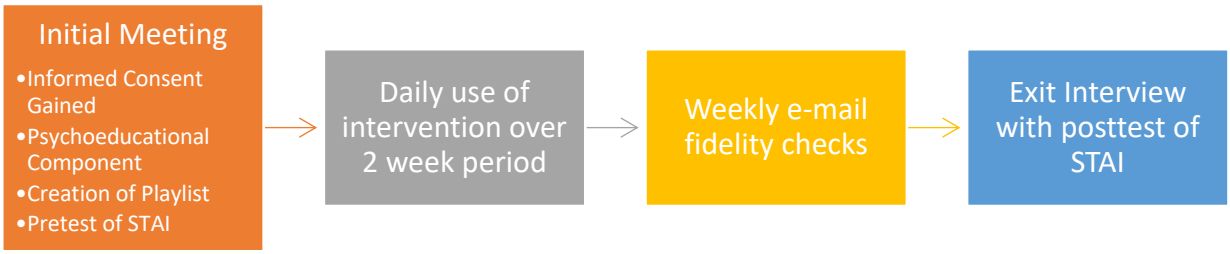

Figure 2. Progression of study.

Instrumentation

Study variables. The dependent variables in this study is anxiety, which were divided into state, trait, and momentary anxiety. State anxiety is anxiety which fluctuates dependent on circumstances. Trait anxiety is the level of anxiety which a person generally experiences regardless of circumstances. Momentary anxiety, for the purposes of this study, is the anxiety that is experienced by a person which can change quickly and is measured by the pre- to post-listening anxiety scores rated by the Likert-type scale. State and trait anxiety was measured by the Spielberger State Trait Anxiety Inventory (STAI).

The independent variable in this study is the type of playlist. The MV-P consisted of a playlist of songs which began with a piece representing a dysregulated level of anxiety and incrementally shifting toward a piece representing a regulated, calm emotion. The MCR-P consisted of a playlist of songs which shuttled back and forth between songs that cued high, mid, and low arousal states. The data on the MV-P intervention will be collected from the researcher's thesis study on feasibility and effectiveness of one-directional mood vectoring playlists in the management of symptoms of anxiety.

Measures. The dependent variable is state anxiety. Trait anxiety was analyzed as a covariate. The dependent measure will be the Spielberger State Trait Anxiety Inventory (STAI). The STAI is an interval level self-report questionnaire which consists of 40 questions split evenly between the state and trait subsections. The state portion measures anxiety that a participant experiences in response to a stressful stimulus, whereas the trait portion measures the way a participant generally feels. In this study, the trait subsection will be analyzed as a covariate. The STAI (Spielberger, 1972; Spielberger et al, 1983) is strongly recommended as a measure for anxiety levels (Vitasari et al., 2011), as it shows strong reliability, construct validity,

and strong coefficient correlation of the State and Trait portions. Coefficient alpha ranged from .86-.95 for the State portion, and .89-.91 for the Trait portion. This is well above the recommended threshold of .70, giving a strong Cronbach's alpha in favor of reliability. Test-Retest reliability for the State subtest was high with .73 for males and .77 for females over a period of six months according to Mental Measurements Yearbook (1978). Correlation between State and Trait sections range between .59-.75. There is high correlation between the STAI and other anxiety measures, such as the IPAT and TMAS (r = .73-.85) indicating sufficient validity in measuring the dependent variable.

The self-report dependent measure was the STAI and the treatment log. Data taken on the trait portion of the STAI was examined as a covariate. Interviews were recorded using iTalk on a password protected device. iTalk is a recording app designed by Apple and available on iPhones. It was used to record the interviews, which were then transcribed onto a computer that is password protected. Participants logged all fidelity check data onto Google Docs which was only be accessed by me and that participant. Google Docs is an online application which allows for multiple people to collaborate on a document, and is password protected so only invited participants can alter the text. The diary card was included in the Google Docs. It is a Likert-type scale used to measure pre- and post-listening anxiety is an ordinal measure and ranges from low anxiety represented by a 1 to high anxiety represented by a 5.

Apparatus and Materials

This study required an online copy of the STAI. A treatment log was kept using a Google document, a copy of which is included in the procedure section. They were also given access to a Google document with instructions for the intervention, which was explained during the initial meeting. They also received a document which detailed activities that they could take

part in while listening to the music. These activities could include drawing, imagery, movement, or breathing exercises. This study also involved participants using their personal music listening device to listen to the playlists themselves. All meetings with participants took place on Zoom in order to comply with COVID-19 safety measures.

Analysis

Quantitative Analysis

Descriptive analysis was conducted examining the gender and age range of participants, as well as STAI pre and posttest scores, and pre to post listening scores in order to determine potential interactions. All STAI scores have been converted to percentiles. Inferential statistical examined STAI pre and posttest scores and pre to post listening scores. The values from the MCR-P were then compared to the values from the aforementioned thesis on the MV-P to compare levels of effectiveness.

The STAI is an interval level measure, which allows for the use of a parametric statistical test. When comparing a pretest to a posttest, a two-tailed dependent samples *t*-test is appropriate with $p = 0.05$ which is the standard for research in the social sciences. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS). The Likert-style scale is an ordinal level measure, and because of that I chose to take the conservative approach of using a non-parametric test. I chose to use the Wilcoxon signed-rank test, which is the nonparametric equivalent of a two-tailed dependent samples *t*-test (Aron et al., 2013).

Once both *t*-tests and the Wilcoxon signed-rank test have been performed, they were run only using participants with pretest trait anxiety at or above the 85th percentile. This helped to identify how the interventions impact participants with high trait anxiety and may inform patients for whom the interventions are well suited. Shapiro-Wilk normality tests were run to

examine the distributions of differences (Aron et al., 2013). All effect sizes were interpreted according to Rosenthal (1994). This analysis was conducted for research questions 1-6.

Qualitative Analysis

Qualitative analysis involved verbatim transcription of the exit interviews, and analysis for themes. The theoretical framework for thematic analysis followed the six-step process outlined by Braun and Clarke (2006). A semantic approach was taken, focusing solely on direct information from interviews as opposed to extrapolating potential meaning from the participant's statements. The coding focused on any barriers to completion of the protocol that was noted by the participants, as well as the immediate and long-term perceived effectiveness of the intervention.

Mixed Analysis

A complementary approach was taken with regards to mixing the quantitative and qualitative data gathered. Data was synthesized using a table, focusing on interview themes that arose with those identified as high responders, as well as themes that arose with those identified as low responders. Examining themes noted by participants according to their responsiveness could give information as to for whom this intervention is especially well-suited, as well as any barriers that might be addressed in further development and studies. This gives a picture as to how, why, and for whom the intervention works, and can assist in creating best practice in use of these therapeutic playlists.

CHAPTER 4: RESULTS

Sample Characteristics

This sample consisted of 13 participants, 10 of whom completed the study, all located in the United States and recruited through social media. Of the 13 people who agreed to participate, 10 completed the study. The people who did not follow through with the study cited being too busy to participate. None of the people who decided not to participate had begun the listening protocol. All participants were between the ages of 18 and 70 and all were fluent in English. No participants had a diagnosis of a medical condition which interfered with their hearing. Data by participant is included in table 1 below:

Table 1
Descriptive Data

				mean		State		Trait	
Participant	Gender	Age Range	mean pre-listening	post-listening	mean difference	pre	post	pre	post
1	Non-binary	18-29	3.86	2.14	1.71	77	48	94	80
2	Male	30-49							
3	Female	18-29							
4	Male	30-49	3.43	2.64	0.79	92	87	98	92
5	Female	18-29	2.96	2.65	0.31	87	73	95	93
6	Female	18-29	2.25	1.58	0.67	30	40	42	54
7	Female	30-49	2.93	1.36	1.57	98	72	99	89
9	Female	50-70	3.54	1.62	1.92	99	32	100	100
10	Male	30-49	1.86	1.68	0.18	70	4	4	24
11	Female	18-29	1.54	1.00	0.54	59	76	80	80
12	Female	18-29	4.08	3.17	0.92	73	56	89	69
15	Male	30-49	2.57	2.07	0.50	87	78	98	97

Quantitative Descriptive Analysis

Participants' pretest percentiles on the state portion of the STAI ranged from 30 to 99, with a composite mean of 77.2 and an interquartile range of 22. Their posttest percentiles on the state portion of the STAI ranged from 4 to 87, with a composite mean of 56.6 and an interquartile range of 36. This indicates a significantly larger spread between responses on the posttest than on the pretest. While interquartile range would not generally be included, it is important to include here as both pretests had at least one significant outlier, so range would not be appropriate.

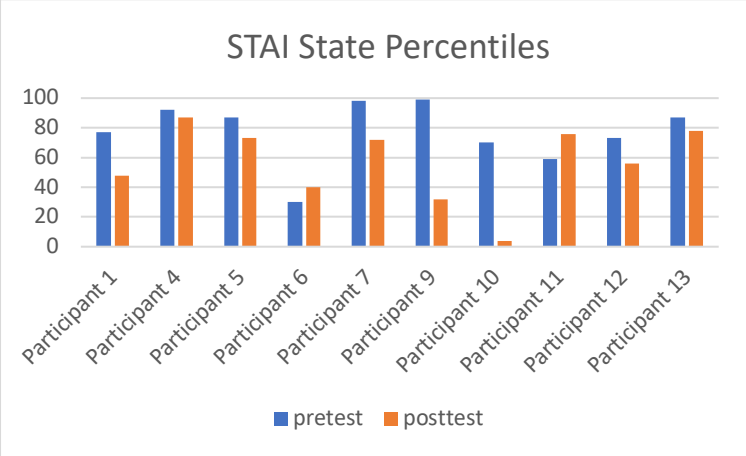

Figure 3. Graphic representation of STAI state scores.

Participants' pretest percentiles on the trait portion of the STAI ranged from 4 to 100, with a composite mean of 79.9 and an interquartile range of 18. Their posttest percentiles on the trait portion of the STAI ranged from 24 to 100, with a composite mean of 77.8 and an interquartile range of 24. This indicates that there was slightly more variation in posttest scores than in pretest scores. We must again consider the interquartile range of these scores, as there

were also significant outliers within the trait pretest and posttest scores, which renders range inappropriate.

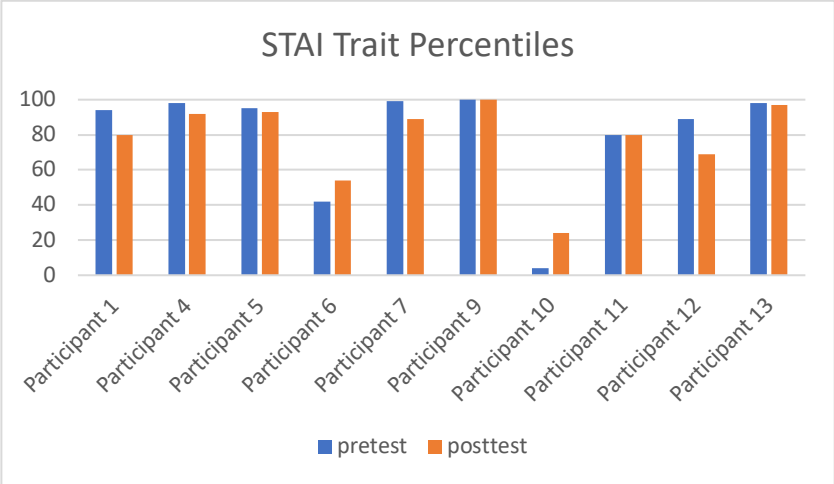

Figure 4. Graphic representation of STAI trait scores.

Differences between pre and post listening means by participant are outlined below, in figures 6 and 7. The mean differences between pre-listening to post-listening scores ranged from 0.18 to 1.92, with a median of 0.73. Pre and post listening means broken down by participant can be found in Appendix D.

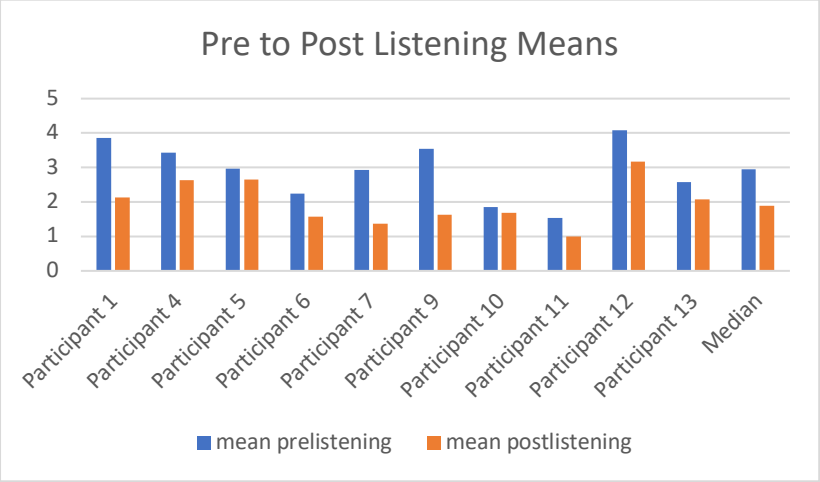

Figure 5. Graphic representation of pre to post listening means.

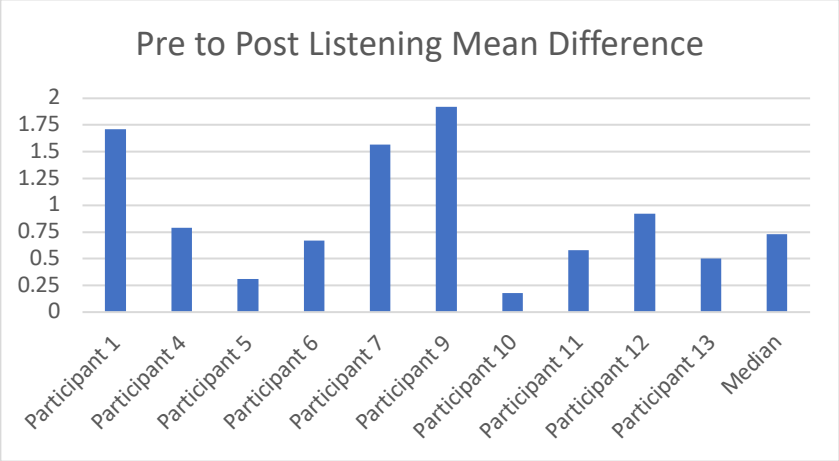

Figure 6. Graphic representation of difference.

Quantitative Inferential Analyses

Research Question 1

The first research question asked: To what extent does a course of treatment involving an MCR-P impact state anxiety? This research question examined the effects (pre- to post-

program) of the entire music listening program on state anxiety. The null and alternative hypotheses were as follows:

> H_0: There is no difference between pre and posttest STAI state anxiety scores following a course of treatment using an MCR-P intervention.
>
> H_a: There is a difference between pre and posttest in STAI state anxiety scores following a course of treatment using an MCR-P intervention.

The results of a two-tailed, dependent samples t-test were significant, $t(10) = 2.43$, $p = .026$, $d = 0.73$, wherein there was a significant decrease in state anxiety scores from pre-program ($M = 77.2$, $SD = 19.87$) to post-program ($M = 57.5$, $SD = 24.47$). An examination of Cohen's d suggests a large clinical effect.

Research Question 2

The second research question asked: To what extent does a course of treatment involving an MCR-P impact trait anxiety? This question examined whether there was a change (pre- to post-program) in trait anxiety. The null and alternative hypotheses were as follows:

> H_0: There will be no significant change in STAI trait anxiety scores following a course of treatment using an MCR-P intervention.
>
> H_a: There will be a significant change in STAI trait anxiety scores following a course of treatment using an MCR-P intervention.

The second research question examined whether there was a change in trait anxiety following a course of treatment using an MCR-P intervention. The results of a two-tailed, dependent samples t-test were significant, $t(10) = 0.51$, $p = .62$, wherein there was a non-significant decrease in trait anxiety scores from pre-program ($M = 79.9$, $SD = 27.88$) to post-program ($M = 77.8$, $SD = 20.43$).

Research Question 3

The third research question asked: To what extent does the MCR-P intervention impact momentary anxiety, pre to post per administration? This research question examined the impact of the music listening intervention for each daily administration of the MCR-P. The null and alternative hypotheses were as follows:

> H_0: There is no difference between pre and posttest daily anxiety scores following a single administration of the MCR-P.
>
> H_a: There is a difference between pre and posttest daily anxiety scores following a single administration of the MCR-P.

A dependent Wilcoxon signed-ranks test indicated that the median posttest daily anxiety scores (*Mdn* = 1.88), were significantly lower than the pretest daily anxiety scores (*Mdn* = 2.95), change = -2.80, $p = 0.029$, $r = -.63$. Examination of the effect size using *r* followed parameters as laid out by Cohen (1988) and were found to be large.

Research Question 4

The fourth research question asked: To what extent does a course of treatment involving an MCR-P intervention impact state anxiety in participants with pretest trait anxiety at or above the 85th percentile? This research question examined the effects (pre- to post-program) of the entire music listening program on state anxiety. The null and alternative hypotheses were as follows:

> H_0: There is no difference between pre and posttest STAI state anxiety scores following a course of treatment using an MCR-P when used by participants with pretest trait anxiety at or above the 85th percentile.
>
> H_a: There is a difference between pre and posttest in STAI state anxiety scores following a course of treatment using an MCR-P when used by participants with pretest trait anxiety at or above the 85th percentile.

This research question examined whether there was a change in state anxiety in participants with pretest trait anxiety at or above the 85th percentile following a course of treatment using an MCR-P intervention. The results of a two-tailed, dependent samples t-test were significant, $t(7) = 3.24$, $p = .023$, $d = 1.14$, wherein there was a significant decrease in state anxiety scores from pre-program ($M = 87.57$, $SD = 9.13$) to post-program ($M = 63.71$, $SD = 17.78$). An examination of Cohen's d suggests a large clinical effect.

Research Question 5

The fifth research question asked: To what extent does a course of treatment involving an MCR-P intervention impact trait anxiety in participants with pretest trait anxiety at or above the 85th percentile? This question examined whether there was a change (pre- to post-program) in trait anxiety. The null and alternative hypotheses were as follows:

> H_0: There will be no significant change in STAI trait anxiety scores following a course of treatment using an MCR-P intervention when used by participants with pretest trait anxiety at or above the 85th percentile.
>
> H_a: There will be a significant change in STAI trait anxiety scores following a course of treatment using an MCR-P intervention when used by participants with pretest trait anxiety scores at or above the 85th percentile.

This research question examined whether there was a change in trait anxiety in participants with pretest trait anxiety at or above the 85th percentile following a course of treatment using an MCR-P intervention. The results of a two-tailed, dependent samples t-test were significant, $t(7) = 2.67$, $p = .037$, $d = 1.01$ wherein there was a significant decrease in trait anxiety scores from pre-program ($M = 96.14$, $SD = 3.52$) to post-program ($M = 88.57$, $SD = 9.93$). An examination of Cohen's d suggests a large clinical effect. This could be partially due to the large SD in the pre-test and should be interpreted with caution.

Research Question 6

The sixth research question asked: To what extent does the MCR-P intervention impact momentary anxiety, pre to post per administration in participants with pretest trait anxiety scores at or above the 85th percentile? This research question examined the impact of the music listening intervention for each daily administration of the MCR-P. The null and alternative hypotheses were as follows:

> H_0: There is no difference between pre and posttest daily anxiety scores following a single administration of the MCR-P in participants with pretest trait anxiety at or above the 85th percentile.
>
> H_a: There is a difference between pre and posttest daily anxiety scores following a single administration of the MCR-P in participants with pretest trait anxiety at or above the 85th percentile.

A dependent Wilcoxon signed-ranks test indicated that the median posttest daily anxiety scores (*Mdn* = 2.14), were significantly lower than the pretest daily anxiety scores (*Mdn* = 3.43), change = -2.37, $p = .01$, $r = -0.63$. Examination of the effect size using *r* followed parameters as laid out by Cohen (1988) and were found to be large.

Research Question 7

The seventh research question asked: Is the use of a musical contour regulation playlist more or less effective than the use of a one-directional mood vectoring playlist (MV-P) in the management of symptoms of anxiety? This research question examined the comparative effectiveness of the playlist interventions. The null and alternative hypotheses were as follows:

> H_0: Effectiveness will be similar between MCR-P and MV-P effectiveness in momentary, state, or trait anxiety scores.
>
> H_a: Effectiveness will not be similar between MCR-P and MV-P effectiveness in momentary, state, or trait anxiety scores.

Effectiveness of the playlists were comparable with no notable differences upon a visual assessment. All data included in Table 2 for the MV-P is from the aforementioned thesis and is used to identify relative effectiveness of the MCR-P intervention.

Table 2
Inferential Statistics Data

		State		Trait		Pre-post		
Group	*df*	*p*	*d*	*p*	*d*	change	*p*	*r*
MCR-P	9	*0.026	0.73	0.62	N/A	-2.80	*0.029	-0.63
MCR-P high trait	6	*0.023	1.14	*0.037	1.01	-2.37	**0.01	-0.63
MV-P	8	*0.026	0.90	**0.001	0.84	-2.93	**0.003	-0.88
MV-P high trait	6	*0.028	1.31	**0.001	1.103	-2.67	**0.007	-0.63

*$p<0.05$. **$p<0.01$.

Activities

Participants took part in activities while listening to their playlist in order to improve attentiveness and mindfulness in the listening task. Upon visual examination, data collected on which activities participants chose did not show any relationship to how a participant responded to the intervention. A graphic representation of which activities participants took part in is displayed below in figure 7.

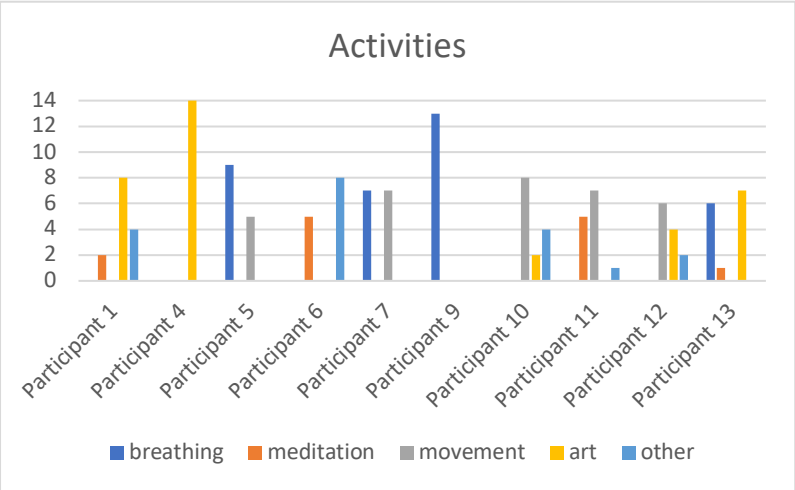

Figure 7. Participant activities.

Qualitative Analysis

The qualitative analysis for this study included recording, transcription, and analysis of the data for themes using a semantic approach following the six-step protocol of Braun and Clarke (2006). Analysis centered around those participants who were at or above the 85th percentile in pretest trait anxiety in order to target the population who would be most likely to benefit. All recordings were reviewed several times before transcription which was double checked for accuracy, familiarizing me thoroughly with the data. Once this was complete, I created the initial codes for the data and then grouped them together in overarching themes. Those themes included 'challenges,' 'awareness,' 'active management,' and 'alteration of mood/arousal.'

The theme of 'challenges' came from the codes of 'busy schedule/time,' 'no significant barriers,' 'setting other tasks aside,' and 'grew tired of songs.' Among these codes, participants overwhelmingly noted having a busy schedule and that it was challenging to find time. Just over half of the participants stated that there were no significant barriers to fulfilment of the protocol,

with two participants giving both answers, indicating that they thought it was difficult to find time, but not enough to pose a significant barrier. Other codes within this theme were 'grew tired of songs' which 2 participants reported, and 'setting other tasks aside' which was only reported by 1 participant.

In the theme of 'awareness,' three codes were identified; 'awareness of use of music,' 'awareness of emotions/mindful,' 'awareness of positive associations.' Over half of the participants stated that they were more aware of how they were using music. There were also 2 participants who reported an increase in their awareness of emotions, or greater mindfulness, and 1 reported being more aware of positive associations that they have with music and how that impacts their experience.

The theme of 'active management' included two codes which are 'better able to self-regulate' and 'greater sense of control.' These each were only mentioned by 2 participants during interviews, and as such are likely not as strong of a theme as the others reported. The final theme which was examined was 'alteration of mood/arousal,' which included the codes of 'more relaxed,' 'happier/refreshed,' and 'decrease in anxiety/improved mood.' Out of these codes, all but 2 participants reported feeling more relaxed, indicating a shift in arousal state from high to low. There were 2 participants who stated that they felt happier or refreshed, and 3 indicated that they were experiencing less anxiety and/or had an improved mood.

Over the course of the analysis, several codes were condensed as is outlined here. Under the theme of 'challenges,' I condensed 'time' and 'busy schedule,' though I included the wording of both in the updated theme. Additionally condensed codes included feeling happier and feeling refreshed, as well as being increasingly aware of emotions and being more mindful. Similar to the previous codes, all wording was preserved. I also combined 'better able to manage

emotions' with 'better able to manage anxiety' into a single code, as this was a study on stress and anxiety reduction. The codes of 'more aware of use of music' and 'use music more intentionally', were combined as they are arguably the same skill. The final codes which were condensed were 'decrease in anxiety' and 'improved mood', though I preserved the wording of both.

For definitions and example quotes of all thematic analysis, see table 3 below.

Table 3
Themes from Qualitative Data

Codes	Themes	Supporting Quotations
Challenges: Any barriers or challenges that participants encountered to faithful adherence to the protocol	Busy schedule/time: Having a busy schedule or lack of time being a barrier to listening to the playlist on a daily basis	"Just life, you know? It gets busy, but I just got in the habit of doing it." "Time. Definitely time." "I had a lot going on at work. This is one of our really busy times, and sometimes I had to work late which made it harder. Yeah. Just being busy."
	No significant barriers: No barriers that caused a significant problem with listening to the playlist on a daily basis	"None, really, once I got going. I just made it a part of my day, and I started looking forward to it, so that made it easy to work in." "Um, not really any. It seemed like it was pretty easy to do."
	Setting other tasks aside: Having a difficult time setting other tasks aside in order to listen to the playlist on a daily basis	"Sometimes it was just hard to set things aside that I needed to get done to do the listening. I get why we need to really listen to the music, but it was hard to put things down when I needed to get stuff done."

(Table 3 Continued)

Codes	Themes	Supporting Quotations
	Grew tired of songs: Feeling reluctant to listen to the same songs repeatedly	"Well, towards the end I got kind of tired of listening to the same songs every day. And I mean, I knew that I could have changed it up, but I just didn't because I was so close to being done."
Active Management: Greater ability to actively manage symptoms as needed	Better able to self-regulate: Increased ability to self regulate symptoms of anxiety	"I felt like I could regulate things better. And like I would still get the spikes of anxiety like I got before, but could bring them down faster. So yeah, I guess I could just regulate that better."
		"I could manage my anxiety better. I could handle it after I had listened and was in that calmer space."
	Greater sense of control: Feeling a greater sense of control over symptoms of anxiety.	"Just now I have a tool that I feel like I can use when I need it. It kind of reminds me of some of the things my therapist has me do when I have trouble."
		"It made me feel like I had better control over how I felt. I hadn't really noticed the way music does that before. Or I guess I noticed, I just never thought to use it like this."
Awareness: An increase in awareness and/or mindfulness	Awareness of use of music: Increased awareness of how they use music in their lives	"It just made me think more about how I use music to make me feel better. Music is really important to me, but I've never used it like this before. I guess it made me think about the music I listen to in a different way."

(Table 3 Continued)

Codes	Themes	Supporting Quotations
	Awareness of positive associations: A greater awareness of positive associations to autobiographical events	"It brought me up, but I think a lot of that was because I picked songs that made me think of certain times, like when I was really happy, and that made me feel good."
	Awareness of emotions/ Mindful: An increase in awareness of emotions and general mindfulness	"I felt more mindful, you know? Like, just more present."
		"I was more aware of how I felt. Like, sometimes I don't know if I'm really aware of how stressed I am until I don't feel so stressed. After listening, though, I would realize how stressed I had been before."
Alteration of Mood/Arousal: A shift in mood or arousal state	More relaxed: A greater feeling of relaxation than was experienced previous to listening to the intervention	"I felt more relaxed. Like, so relaxed I almost fell asleep, and that's not common for me. It was kind of amazing to feel like that."
		"Relaxed. Definitely more relaxed."
		"I'm not sure. I mean, more relaxed. Yeah, I felt more relaxed at the end."
	Happier/Refreshed: Increased feelings of happiness or being refreshed	"Happier! I don't know if that was how I was supposed to feel, like, I think it probably should have been more calm or something, but I just felt happier, which was nice."
		"Kind of refreshed. Like I had taken a break and could get back to life all refreshed and everything."

(Table 3 Continued)

Codes	Themes	Supporting Quotations
	Decrease in anxiety/ improved mood: A reduced experience of anxiety symptoms and or a more positive mood	"My anxiety wasn't as bad, which is saying something because I had some big things hit during this, including the death of a close friend and what happened at the capitol. But my anxiety just didn't hit at the same level it usually does."
		"I guess, better. Yeah, definitely better. I don't know how to really say it, but my mood was just better overall."

Research Question 8

The eighth research question asked: What is the feasibility of using a self-administered therapeutic playlist? This research question examined whether or not self-administered therapeutic playlists are feasible for use by patients.

While participants reported challenges with adherence to the protocol, most of the responses fell within the code of 'busy schedule/time.' This challenge could be easily managed by instructing patients to schedule a specific time each day to use the intervention and set a reminder alarm.

Research Question 9

The ninth research question asked: Which themes are present with participants who take part in a course of treatment involving the MCR-P intervention? This research question examined which themes arose in the final interviews with participants who took part in the MCR-P intervention.

Themes that arose within the final interviews included ‘challenges,’ ‘active management,’ ‘awareness,’ and ‘alteration of mood/arousal.’ Definitions and codes are included in Table 3 above.

Mixed Analysis

The mixed analysis of data is intended to inform who may respond particularly well to this intervention, as well as who may be better served by a different intervention. This could include participants who do not have music with which they strongly identify. Information given on the barriers to this treatment may be used to adapt the protocol so that it is as accessible and feasible as possible. For the purposes of the mixed analysis, I again focused on the participants who had pretest anxiety scores in the 85th percentile or above, as this intervention seeks to target those with high levels of trait anxiety. Incidentally, the participants who had pretest anxiety scores in the 85th percentile or above were also the participants who had a mean initial reported anxiety level of 2.5 or higher, which indicates that they had levels of anxiety high enough that it could cause distress in their lives, and could also be significantly reduced. Among those participants, high responders are identified as those who had a mean pre to post listening difference above the median score of 0.73. Low responders are identified as those participants whose mean pre to post listening difference scores fell below that threshold.

Research Question 8

The eighth research question asked: Which themes are present with participants who were high responders to the MCR-P intervention in participants with pretest trait anxiety at or above the 85th percentile? This research question examined which codes were most common among participants who are identified as high responders to the MCR-P and had high pretest trait anxiety as are outlined in previous research questions.

The most common code reported by high responders under the theme of awareness was 'awareness of use of music.' Under the theme of active management, both codes of 'better able to self-regulate' and 'greater sense of control' were reported by high responders. In the theme of alteration of mood/arousal, the most common codes reported by high responders were 'decrease in anxiety/improved mood' and 'more relaxed.' The most common code reported by high responders in the challenges theme was 'busy schedule/time.'

Research Question 9

The ninth research question asked: What are the barriers to using self-administered therapeutic playlists for participants who were high responders to the MCR-P intervention with pretest trait anxiety at or above the 85th percentile? This research question examined which barriers were noted most in participants who were identified as high responders who had high pretest trait anxiety.

The first theme that was examined was 'challenges.' The sample were then bifurcated into groups of high and low responders so that patterns of responses could be identified. Both high and low responders stated that having a busy schedule and a lack of time were the primary challenge. Participants 5 and 9 both cited schedule but also included that it was not a significant barrier. Only participants who were identified as high responders reported having difficulty setting other tasks aside or growing tired of the songs. As they both still had a high response, however, it does not appear that it caused a serious negative interaction.

Table 4
Mixed Analysis on Challenges in High Responders

Participant	Busy schedule/ time	No significant barriers	Setting other tasks aside	Grew tired of songs
1		X		
4	X		X	
7	X			X
9	X	X		
12	X			X

Table 5
Mixed Analysis on Challenges in Low Responders

Participant	Busy schedule/ time	No significant barriers	Setting other tasks aside	Grew tired of songs
5	X	X		
13		X	X	

The next theme examined was that of 'active management' which had the codes of 'better able to self-regulate' and 'greater sense of control.' There were only 2 participants who reported each of these, and those were participants 1 and 9. Both of them are considered to be high responders to this intervention. No participants who were considered low responders reported either of these codes. Given the few responses within this theme, it does not appear that this intervention facilitates a sense of active management of symptoms. However, if a participant does report feeling a greater sense of being able to actively manage symptoms, they are likely to be someone who has a strong response to the intervention.

Table 6
Active Management in High Responders

Participant	Better Able to Self-Regulate	Greater Sense of Control
1	X	X
4		
7		
9	X	X
12		

Table 7
Active Management in Low Responders

Participant	Better Able to Self-Regulate	Greater Sense of Control
5		
13		

The next theme examined is ‘awareness in high responders’ which contained the 3 codes of ‘awareness of use of music,’ ‘awareness of emotions/mindful,’ and ‘awareness of positive associations.’ Over half of the participants identified as high responders reported an increase in their awareness of how they use music, as did 1 participant who was not a high responder. Only 1 participant reported an increased awareness of positive associations that they have with music, and 2 reported increased awareness of their emotions or mindfulness. All 3 of those participants were identified as high responders.

Table 8
Awareness in High Responders

Participant	Awareness of Use of Music	Awareness of Emotions/Mindful	Awareness of Positive Associations
1	X		
4			X
7	X		
9	X	X	
12		X	

Table 9
Awareness in Low Responders

Participant	Awareness of Use of Music	Awareness of Emotions/Mindful	Awareness of Positive Associations
5	X		
13			

The final theme was ‘alteration of mood/arousal,’ and that contained the themes of ‘more relaxed,’ ‘happier/refreshed,’ and ‘decrease in anxiety/improved mood.’ This was interesting as it showed greater patterns of response than some of the other themes. Both of the high pretest trait anxiety participants who were identified as low responders reported feeling more relaxed. Out of the participants who were high responders, over half reported feeling more relaxed as well. The same number of high response participants reported a decrease in anxiety and/or improved mood. There were 2 participants who reported feeling happier or refreshed which indicates a shift in mood/arousal from low to high, but with a positive valence. The codes of ‘more relaxed’ and ‘decrease in anxiety/improved mood’ indicate a shift in mood/arousal from high to low, which aligns with the goal of anxiety reduction. Out of the high responding

participants, only 1 did not report either of these codes. Both of the participants who reported feeling happier or refreshed were identified as high responders.

Table 10
Alteration of Mood/Arousal in High Responders

Participant	More Relaxed	Happier/Refreshed	Decrease in Anxiety/ Improved Mood
1		X	X
4	X		X
7		X	
9	X		
12	X		X

Table 11
Alteration of Mood/Arousal in Low Responders

Participant	More Relaxed	Happier/Refreshed	Decrease in Anxiety/ Improved Mood
5	X		
13	X		

CHAPTER 5: DISCUSSION

Overall Findings

The purpose of this comparative sequential study was to determine the impact of an MCR-P intervention on symptoms of anxiety, as well as comparing that data to the impact of an MV-P intervention on symptoms of anxiety in order to see which may be more effective. It also sought to examine the feasibility of self-administered therapeutic playlist interventions, as well as to identify potential barriers to faithful adherence to the protocol. This study used a pre-experimental single group design, where participants were their own control. A secondary data analysis was also incorporated, using the data from my thesis on effectiveness of the MV-P. Participants in this study received a psychoeducational session in which they were instructed in the use of the MCR-P intervention. They then used the intervention for two weeks, with approximately 14 administrations.

Quantitative analysis of all participants showed statistically significant findings in state anxiety, and pre- to post-listening anxiety. There was not a statistically significant reduction in trait anxiety when all participants' scores were examined. This will be discussed in more detail in upcoming sections. Analysis of all participants with pretest trait anxiety at or above the 85th percentile was also conducted, and showed statistically significant reductions in state, trait, and pre- to post-listening anxiety. State and trait anxiety were measured using the STAI and were analyzed using a two-tailed dependent *t*-test with Cohen's *d* analysis of effect size. Pre- to post-listening anxiety was measured by a Likert-style scale and was analyzed using a Wilcoxon signed rank test with *r* examined for effect size.

Qualitative data was coded and analyzed according to Braun and Clarke's 6 step procedure. Three codes were identified, with themes defined and supportive quotes provided above in table 3. The codes were 'challenges,' 'awareness,' 'active management,' and 'alteration of mood/arousal.' Qualitative and quantitative data was then combined to look at which themes were most prevalent among high versus low responders. While there were 4 codes of challenges, no negative effects were noted in the codes addressing perceived alterations of mood for either high or low responders. The following further addresses and elaborates on these findings and discusses limitations to this study and assumptions that were made which could impact the interpretation of the gathered data. Once this data analysis was completed, the participants were bifurcated into high and low responders according to their response to momentary anxiety. Qualitative data was then examined to identify which codes were most common among high responders. There are limitations to both the MCR-P and MV-P studies, of course, and all findings should be interpreted with caution.

Findings by Research Question

Quantitative Analysis

Initial analysis on this study was conducted with the quantitative data, including results from the STAI administrations, as well as pre- to post-listening levels of anxiety. A full analysis was run on all participant data, and then follow up analyses were run on the data from participants with pretest trait anxiety at or above the 85th percentile in order to examine the impact of the intervention in persons with high levels of trait anxiety.

That analysis was then divided into participants who were identified as high responders, and those who were identified as low responders. High responders were identified as participants whose mean difference of pre- to post-listening anxiety scored over the median from

all participants, and low responders were identified as participants whose scores fell below it. This data was then used in the mixed analysis later on in the process.

State Anxiety

State anxiety is the type of anxiety which fluctuates in response to stressful stimuli present in the life or environment of the participant. Levels of state anxiety fluctuate, which makes it more open to influence by intervention. The impact of the intervention on levels of state anxiety in all participants who used the MCR-P was addressed in research question 1, and the impact of the intervention on levels of state anxiety in participants who used the MCR-P and had pretest trait anxiety at or above the 85th percentile was addressed in research question 4. Findings on state anxiety in all participants found statistical significance ($p = 0.026$) with a strong effect size ($d = 0.73$) indicating that this intervention shows some effectiveness on reducing symptoms of state anxiety. Findings on state anxiety in participants with high pretest trait anxiety found statistical significance ($p = 0.023$) with a strong effect size ($d = 1.14$). This demonstrates that participants with high pretest trait anxiety also experienced a reduction of symptoms. Participants from a previous study on the MV-P intervention also showed statistically significant results in all participants of that study ($p = 0.026$, $d = 0.9$) and participants with high pretest trait anxiety scores ($p = 0.028$, $d = 1.311$). Results closely aligned with results from the MCR-P experiment.

Trait Anxiety

Trait anxiety is the type of anxiety that is relatively stable and representative of a person's personality regarding their attention to, or experience of, anxious stimuli. It does not generally shift in response to stimuli, and as such was expected to be stable throughout the study as it is less responsive to interventions. The impact of the intervention on levels of trait anxiety

in all participants who used the MCR-P was addressed in research question 2, and the impact of the intervention on levels of trait anxiety in participants who used the MCR-P who reported pretest trait anxiety at or above the 85th percentile was addressed in research question 5. Impact on trait anxiety in all participants who used the MCR-P found no statistically significant change ($p = 0.62$). However, changes in trait anxiety in participants who used the MCR-P and had high pretest trait anxiety found statistical significance ($p = 0.037$) with a strong effect size ($d = 1.01$). Surprising results were also found in the MV-P study with significant effects found on trait anxiety in all participants of that study ($p = 0.001$, $d = 0.84$) and participants with high pretest trait anxiety scores ($p = 0.001$, $d = 1.103$). These results indicate that the MV-P intervention has a stronger statistical relationship with a reduction in levels of trait anxiety than the MCR-P, though participants in the MCR-P intervention with high levels of trait anxiety did have a significant finding.

These findings are counter to the concept of trait anxiety as a score which remains stable and relatively unchanging. There are several reasons that this may have occurred. It is possible that the intervention worked with the activation patterns in neural structures associated with emotion regulation in order to support more effective management of anxiety. However, other factors must be considered. It is possible that the participants who volunteered for the studies were not fully representative of the target population. There is also a significant possibility that this finding was a result of subject demand effects, as the informed consent form clearly stated the purpose of the study. It is also not unlikely that people who would choose to take part in these studies are high-functioning adults with reasonable resources and an internal locus of control. This could impact the data gathered and may account for these unexpected findings.

Pre- to Post-listening Anxiety Levels

Pre- to post-listening anxiety was measured by a Likert-type scale which participants used to rate their anxiety levels before and after listening to the MCR-P, and in the previous study, the MV-P. This is conceptualized as momentary anxiety, which is highly responsive to environment and stimuli, and is receptive to interventions. The impact of the intervention on levels of pre- to post-listening anxiety in all participants who used the MCR-P was addressed in research question 3, and the impact of the intervention on levels of pre- to post-listening anxiety in participants who used the MCR-P and had pretest trait anxiety at or above the 85th percentile was addressed in research question 6. Findings on pre- to post-listening anxiety in all participants found statistical significance ($p = 0.029$) with a strong effect size ($r = -0.63$). Findings on pre- to post-listening anxiety in participants with high pretest trait anxiety found statistical significance ($p = 0.01$) with a strong effect size ($r = -0.63$). These findings indicate that all participants, as well as those with high pretest trait anxiety, experienced a statistically significant reduction in symptoms of momentary anxiety. In the MV-P intervention study, findings also showed statistically significant results in all participants of that study ($p = 0.003$, $r = -0.88$) and participants with high pretest trait anxiety scores ($p = 0.007$, $r = -0.63$). These results aligned closely with those from the MCR-P study.

Qualitative Analysis

Analysis was conducted by using the 6-step framework laid out by Braun and Clarke (2006) to identify codes and themes to organize data from final interviews. The 4 themes were identified, including; 'challenges,' 'awareness,' 'active management,' and 'alteration of mood/arousal.' Each of the themes arose from an analysis of the codes and were checked against the transcripts. An examination of the data shows that the theme of 'active management' was

not as strong as certain codes within ‘alteration of mood/arousal,’ ‘awareness,’ and ‘challenges.’ The specific codes which generated the strongest response were ‘busy schedule/time’ in the theme of ‘challenges,’ ‘more relaxed’ in the theme of ‘alteration of mood/arousal,’ and ‘awareness of use of music’ in the theme of ‘awareness.’ A general overview of this data is that participants are likely to find time challenging, to become more aware of the way that they use music, and that they will likely feel more relaxed. Given the themes that arose in the interviews, it is also suggested that this intervention is highly feasible. It may be helpful for participants to schedule time in which to use the intervention. That could help to alleviate the challenge of finding time, as it would already be set aside for this purpose.

Three participants showed an increase in anxiety from STAI pretest to posttest: participants 6, 10, and 11. Participant 6 reported a pretest state score in the 30th percentile and a posttest state score in the 40th percentile, while participant 11 reported a pretest state score in the 59th percentile and a posttest state score in the 76th percentile. Participant 6 also had an increase in their pretest to posttest trait score, beginning in the 42nd percentile and rising to the 54th. Participant 10 reported stark differences in both of their pre to posttests. Their pretest trait was in the 4th percentile with their posttest in the 24th, and their pretest state was in the 70th percentile with the posttest in the 4th. Participant 10 reported significant challenges in their lives that had created a mercurial emotional environment.

Data for this study was collected over November and December of 2020, and there were environmental stressors which could account for the increases, such as the turmoil following the presidential election, the increase in COVID-19 cases around that time, and the holiday season which can be stressful for many people. Another consideration is the floor effect, as these participants all had pretest state scores below the group mean. Participants 10 and 6 also had

pretest trait scores below the group mean. When scores are either particularly high or particularly low, they have a tendency to move closer to the mean, and this dynamic could account for the shifts.

Mixed Analysis

I conducted a mixed analysis on data from all participants who had pretest trait anxiety at or above the 85th percentile in order to focus in on the experience of participants who struggle with high levels of trait anxiety. Participants were then identified either as high responders or low responders depending on whether their mean difference in their pre- to post-listening scores fell above or below the median score for all participants. Out of the 7 participants who had high pretest trait anxiety scores, 2 were identified as low responders and 5 were identified as high responders.

Challenges

The theme of 'challenges' is defined as any barriers or challenges what participants encountered to faithful adherence to the protocol. Within this theme, four codes were identified including 'busy schedule/time', 'no significant barriers', 'setting other tasks aside', and 'grew tired of songs.' Of those themes, the most frequently mentioned was 'busy schedule/time.' Every participant other than participant 1 stated that this was a barrier. Out of all 9 participants who identified this as a barrier, though, 4 said that it was not a significant barrier. Even taking that information into consideration, though, this theme was prevalent and must be considered. Only 1 participant said that there were no significant barriers and did not list anything else. There were 2 participants who stated that they grew tired of the songs but did not alter the playlist, though they had been instructed that they could contact me and that I would help them substitute in new music. One of those participants was a high responder, indicating that for that

participant it did not have a major impact on the potential benefits of the intervention. One participant stated that they had difficulty setting other tasks aside in order to take part in their daily listening. This theme is similar to having a busy schedule and a perceived lack of time and could be considered a part of that category. The participant who identified this barrier additionally identified schedule as a challenge, so that would not have a significant impact on findings.

Active Management

The data for this theme evidenced the fewest examples. It included the two codes of 'better able to self-regulate' and 'greater sense of control.' Each received 2 responses, both of which were from participants 1 and 9 who were identified as high responders. Neither of the participants identified as low responders reported these codes. If a participant does experience a greater ability to actively manage their symptoms, they are likely someone who had a strong response to the intervention, but findings indicate that one cannot expect to have an increase in their management skills as a result of this intervention.

Awareness

Under the theme of 'awareness,' there was a strong pattern of response in participants who were identified as high responders reporting an increase in their awareness of how they use music. This was also noted by 1 participant who was identified as a low responder. High responders also reported an increase in awareness of their emotions or mindfulness, and an increase in awareness regarding the positive associations that they have with music. Neither of these had as strong of a response pattern as an increase in the awareness of how they use music, though.

Alterations of Mood/Arousal

The final theme of 'alterations of mood/arousal' showed a very interesting response pattern. All but 1 of the participants who were identified as high responders stated that they felt either more relaxed or had a decrease in their anxiety. Both of the participants identified as low responders also reported feeling more relaxed. This is important because it indicates that across the board, participants experienced a shift in arousal state from high to low whether or not they had a strong response in the quantitative data.

Feasibility

When examining the feasibility of using therapeutic playlists, one must consider both the quantitative and qualitative data available. On the quantitative side, both the MV-P and MCR-P findings showed statistically significant results in reducing state and trait anxiety. This indicates that the self-administration of the therapeutic playlists demonstrated some effectiveness in reducing symptoms of anxiety.

In the qualitative analysis there were several barriers noted, including 'busy schedule/time,' 'grew tired of songs,' and 'setting aside other tasks.' Out of the 10 participants, 4 reported that there were no significant barriers. They also cited 'busy schedule/time' as a barrier, but did not perceive that as significant enough to pose a serious challenge. The participant who stated that they had difficulty setting aside other tasks in order to complete the MCR-P protocol still responded well enough that they were identified as a high responder, suggesting that it likely didn't have a major impact on their treatment. There were 2 participants who reported that they grew tired of listening to the same songs but did not reach out to me about helping them substitute in other pieces, even though they knew that was an option. This could be easily managed in the future by the therapist or researcher checking in more frequently with the

participant and reminding them that they can change out a song at any point in time. Other participants did this, but these two may have needed that extra reminder that it's perfectly fine to substitute in new pieces.

A busy schedule and lack of time are common barriers to a wide variety of treatments, and while it was the most common theme in the 'perceived barriers' code, all but one of the high responders mentioned it in the interview, and yet went on to have a strong response to the treatment. As such, it would appear that it is not a barrier significant enough to render the treatment ineffective. Given the gathered data, it would appear that using a self-administered therapeutic playlist to assist with management of anxiety symptoms is highly feasible.

Assumptions and Limitations

One other significant consideration when interpreting findings must be the events that occurred over the course of the study. Work on this study began before the COVID-19 pandemic and meetings were intended to occur in person. Also, it was intended to measure anxiety levels that were typical to each participant's life. The actual experimental portion of this study as well as the data incorporated regarding the MV-P occurred during stay at home orders during the COVID-19 pandemic. This altered many people's everyday lives and caused a significant amount of anxiety in many. As a result, the intended context of the study changed, as the environment we are all currently living in has greater levels of ambient anxiety than we typically experience. However, the effects of COVID-19 did not impact all people equally, as some people experienced greater levels of financial, emotional, and medical distress than others. As such, this study measured their anxiety during an unusual time of history, which may have an effect on the findings. There should also be considerations for people who have not had access to mental health care due to socio-economic status. Previous experience with mental health care

may make people more apt to respond strongly to a playlist intervention, as opposed to those who have not had that opportunity due to issues of accessibility.

This study assumes that participants have music with which they emotionally identify. It also presumes that the participants have enough self-awareness to complete the self-report measures with accuracy and the sample is representative of the target population which is people who experience symptoms of anxiety on a regular basis. Future research should examine the moderating effects of mental health diagnosis and previous music experience. It could also further restrict the activities allowed while taking part in the music treatment conditions, minimizing the effects that these may have on the final results.

Internal Validity

Internal validity refers to how well controlled and contained an experiment is (McMillan & Schumacher, 2010). An experiment which has high internal validity gives more accurate measurements of the effect the independent variable has on the dependent variable. The results of this study must be interpreted with caution, given the somewhat low internal validity. One threat is that there may well have been error which occurred in the administration of the self-administered therapeutic playlists. As the intervention is being actually administered by participants, it leaves the possibility for more error. While fidelity checks were put in place to prevent inconsistencies, it is reasonable to assume that not all participants implemented the intervention as instructed. There is also the opportunity for a placebo effect, as their symptoms may improve simply because they are paying more attention to them.

Confounding variable. There are potential confounding variables in this study, including life events that were noted by participants which may have impacted levels of anxiety.

This is a study with high ecological validity, the downside of which is that there are opportunities for confounding variables to act upon the dependent variable and shift results.

External Validity

External validity refers to how well the results of a study can be generalized to other people and settings outside of the study (McMillan & Schumacher, 2010). As has been previously mentioned, these findings must be interpreted with caution. This is a pre-experimental study with a small sample size. The ecological validity is high, as implementation of the intervention took place in the same way it would when used clinically. No part of the experiment occurred within any sort of a controlled setting, which gives a better idea of how it would behave clinically. Due to the high ecological validity, though, the internal validity is not as high as it otherwise would be. Threats to external validity include challenges with replicating the experiment with fidelity. This is due to the fact that each individual's musical preference will vary, which could impact the response. When the intervention is used outside of the study, there would be a different music therapist creating the playlist, and they may consider musical factors not specified in the protocol. There is also the possibility of aptitude-treatment interaction, indicating that future research may wish to include a moderator analysis for musical experience/aptitude.

Hawthorne effect. There is a potential threat to external validity in the form of the Hawthorne effect. Participants may wish to assist the researcher, which is pro-social behavior, but could interfere with collecting accurate data. As a researcher, I openly stated the purpose of the study in the informed consent form, and the participants may perceive more of a difference than they truly experienced out of an unconscious desire to help.

Selection bias. One threat to external validity of this study is selection bias. Based on the small sample size and the age and gender demographics that were gathered, this sample is not fully representative of the target population. Additionally, the sample was gathered by a call from volunteers, and it is entirely possible that the participants share characteristics which may impact the data. For example, all participants were adults, and were likely to have enough resources and internal locus of control to believe that they may be able to alter their experience of anxiety through intervention. It is also quite possible that participants who would volunteer for this study are naturally more inclined to be emotionally responsive to music.

Implications for Intervention

While they are to be interpreted with caution, the findings of this study imply that both the MCR-P and the MV-P can be used as effective tools for managing symptoms of anxiety. An examination of the *p* values for pretest to posttest state anxiety indicate that there is no difference in effectiveness between the MCR-P and the MV-P. Both showed statistically significant improvement with a large effect size, suggesting that they can be used to decrease symptoms of state anxiety in patients. While trait anxiety also showed statistically significant differences, there is reason to be skeptical of these results, as they are contrary to the concept of trait anxiety as a stable entity. Both the MV-P and the MCR-P showed statistical significant differences from pre-administration to post-administration, again suggesting that this can be an effective means of reducing symptoms of anxiety in a short period of time. This also shows that self-administered therapeutic playlist interventions are feasible, which opens the door to future research possibilities.

Another point for consideration is how these findings fit within the broader context of psychotherapeutic treatment. As was stated in the literature review, the gold standard for

treatment of anxiety includes some form of exposure to the stressful stimulus. These interventions stand apart from exposure treatments as it exposes the participants to the physical sensation of SNS arousal without exposing them to the actual stimulus. While it is certainly not suggested that this should be used in the place of treatments such as prolonged exposure, it could be used for patients who were at high risk of attrition from prolonged exposure. They could use these interventions to help them to acclimate to the physical sensation of SNS arousal and build tolerance so that they could withstand the challenges of exposure. The MCR-P intervention particularly functions by rehabilitating underlying neural activation patterns, and could assist in optimizing response patterns before beginning treatment which contained an exposure components.

These interventions additionally could be used in alignment with DBT training. The MCR-P intervention would be located within the emotion regulation skill, as it would assist the patient in managing shifting arousal levels. This would allow the patient to practice the skill of regulating their emotions without being in a state of distress at the moment. The MV-P intervention would be located within the distress tolerance skill, as it would assist the patient in reducing their level of anxiety. It can be particularly helpful when a patient is trying to improve the moment. Further comparative studies would be needed to determine how effectively these interventions function within the specific DBT framework.

Conclusions

The MCR-P is a management tool to reduce anxiety symptoms which was developed using existing research in music therapy, neurology, and psychotherapy. After a psychoeducational session, the participants self-administered the playlist with a total of approximately 14 administrations over a period of two weeks. There are limitations with this

study, but findings suggest that this could be an effective treatment option for managing symptoms of anxiety. There were no negative impacts which were mentioned by participants, and all participants, including low responders, reported some positive effects.

Future research would benefit from a larger sample size which better represented the target population. Ideally, a randomized controlled trial would allow for greater confidence in the findings and their clinical relevance. It would also be beneficial to have the researcher who manages analysis be a separate person from the music therapist who interacts with participants, in order to minimize any potential researcher bias. Future research with a larger sample size could additionally analyze results according to the genres and/or precise tempi of the music selected in order to control for those interactions. An examination of feasibility suggests that self-administered therapeutic playlists have the potential to be both effective and feasible, which opens the door for future research opportunities into other interventions.

REFERENCES

Alam, M., Roongpisuthipong, W., Kim, N. A., Goyal, A., Swary, J. H., Brindise, R. T., Iyengar, S., Pace, N., West, D. P., Polavarapu, M., & Yoo, S. (2016). Utility of recorded guided imagery and relaxing music in reducing patient pain and anxiety, and surgeon anxiety, during cutaneous surgical procedures: A single-blinded randomized controlled trial. *Journal of the American Academy of Dermatology, 75*(3)*,* 585-589. https://10.1016/j.jaad.2016.02.1143

Alluri, V., Toiviainen, P., Burunat, I., Numminen, J., Brattico, E., Bogert, B., & Kliuchko, M. (2015). Musical expertise modulates functional connectivity of limbic regions during continuous music listening. *Psychomusicology: Music, Mind and Brain, 25*(4)*,* 443-454. https://doi.org/10.1037/pmu0000124

American Cancer Society. (2020, January). *Lifetime risk of developing or dying from cancer*. https://www.cancer.org/cancer/cancer-basics/lifetime-probability-of-developing-or-dying-from-cancer.html

American Heart Association. (2017, December). *Heart disease and stroke statistics 2017 at-a-glance.* http://healthmetrics.heart.org/wp-content/uploads/2017/06/Heart-Disease-and-Stroke-Statistics-2017-ucm_491265.pdf

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

American Psychological Association. (2018). *Data on behavioral health in the United States.* https://www.apa.org/helpcenter/data-behavioral-health.aspx

Aron, A. A., Coups, E. J., & Aron, E. N. (2013). *Statistics for Psychology* (6th ed.). Pearson Publishing.

Baker, F. A., Metcalf, O., Varker, T., & O'Donnell, M. (2017). A systematic review of the efficacy of creative arts therapies in the treatment of adults with PTSD. *Psychological Trauma: Theory, Research, Practice, and Policy*. https://doi.org/10.1037/tra0000353

Bautch, K. A. (2019). Personal music listening for regulating emotions: A survey study. *Pacific Journal of Health, 2*(3). https://scholarlycommons.pacific.edu/pjh/vol2/iss1/3

Beck, B. D., Lund, S. T., Søgaard, U., Simonsen, E., Tellier, T. C., Cordtz, T. O., Laier, G. H., & Moe, T. (2018). Music therapy versus treatment as usual for refugees diagnosed with posttraumatic stress disorder (PTSD): Study protocol for a randomized controlled trial. *Trials*, *19* (1). https://doi.org/10.1186/s13063-018-2662-z

Berns, G. S., Capra, C. M., Moore, S., & Noussair, C. (2010). Neural mechanisms of the influence of popularity on adolescent ratings of music. *NeuroImage, 49*(3), 2687-2696. https://doi.org/10.1016/j.neuroimage.2009.10.070

Berns, G. S., & Moore, S. E. (2012). A neural predictor of cultural popularity. *Journal of Consumer Psychology, 22*(1), 154-160. https://doi.org/10.1016/j.jcps.2011.05.001

Bibb, J., Castle, D., McFerran, K. (2019). Reducing anxiety through music therapy at an outpatient eating disorder recovery service. *Journal of Creativity in Mental Health, 14*(3), 306-314. https://doi.org/10.1080/15401383.2019.1595804

Bibb, J., & McFerran, K. (2018). Musical recovery: The role of group singing in regaining healthy relationships with music to promote mental health recovery. *Nordic Journal of Music Therapy, 27*(3), 235-251. https://doi.org/10.1080/08098131.2018.1432676

Bidabadi, S. S., & Mehryar, A. (2015). Music therapy as an adjunct to standard treatment for obsessive compulsive disorder and co-morbid anxiety and depression: A randomized clinical trial. *Journal of Affective Disorders, 184,* 13-17. https://doi.org/10.1016/j.jad.2015.04.011

Blaustein, M. E., & Kinniburgh, K. M. (2010). *Treating traumatic stress in children and adolescents: How to foster resilience through attachment, self-regulation, and competency.* The Guilford Press.

Blood, A. J., Zatorre, R. J., Bermudez, P., et al. (1999). Emotional responses to pleasant and unpleasant music correlate with activity in paralimbic brain regions. *Nature Neuroscience, 2*(4)*,* 382-387. https://doi.org/10.1038/7299

Blood, A. J., & Zatorre, R. J. (2001). Intensely pleasurable responses to music correlate with activity in brain regions implicated in reward and emotion. *Proceedings of the National Academy of Sciences, 98*(20)*,* 11818-11823. https://doi.org/10.1073/pnas.191355898

Bogert, B., Numminen-Kontti, T., Gold, B., Sams, M., Numminen, J., Burunat, I., Lampinen, J., & Brattico, E. (2016). Hidden sources of joy, fear, and sadness: Explicit versus implicit neural processing of musical emotions. *Neuropsychologia, 89,* 393-402. https://doi.org/10.1016/j.neuropsychologia.2016.07.005

Bradt, J., & Teague, A. (2018). Music interventions for dental anxiety. *Oral Diseases, 24*(3)*,* 300-306. https://doi.org/10.1111/odi.12615

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2)*,* 77-101. https://doi.org/10.1191/1478088706qp063oa

Brown, S., Martinez, M.J., & Parsons, L. M. (2004). Passive music listening spontaneously engages limbic and paralimbic systems. *NeuroReport, 15*(13)*,* 2033-2037. http://neuroarts.org/pdf/neuroreport.pdf

Burkhouse, K. L., Kujawa, A., Klumpp, H., Fitzgerald, K. D., Monk, C. S., & Phan, K. L. (2017). Neural correlates of explicit and implicit emotion processing in relation to treatment response in pediatric anxiety. *The Journal of Child Psychology and Psychiatry, 58*(5)*,* 546-554. https://doi.org/10.1111/jcpp.12658

Callan, D. E., Tsytsarev, V., Hanakawa, T., Callan, A. M., Katsuhara, M., Fukuyama, H., & Turner, R. (2006). Song and speech: Brain regions involved with perception and covert production. *NeuroImage, 31*(3)*,* 1327-1342. https://doi.org/10.1016/j.neuroimage.2006.01.036

Camacho, M. C., Karim, H. T., & Perlman, S. B. (2018). Neural architecture supporting active emotion processing in children: A multivariate approach. *NeuroImage, 188,* 171-180. https://doi.org/10.1016/j.neuroimage.2018.12.013

Carr, C., d'Ardenne, P., Sloboda, A., Scott, C., Wang, D., & Priebe, S. (2012). Group music therapy for patients with persistent Post-Traumatic Stress Disorder- An exploratory randomized controlled trial with mixed methods evaluation. *British Psychological Society, 85*(2)*,* 179-202. https://doi.org/10.1111/j.2044-8341.2011.02026.x

Cepeda, M. S., Carr, D. B., Lau, J., et al. (2006). Music for pain relief. *Cochrane Database of Systematic Reviews,* 19(2), https://doi.org/10.1002/14651858.CD004843.pub.2

Chanda, M. L., & Levitin, D. J. (2013). The neurochemistry of music. *Trends in Cognitive Sciences, 17*(4)*,* 179-193. https://doi.org/10.1016/j.tics.2013.02/007

Cheong-Clinch, C. & McFerran, K. S. (2016). Musical diaries: Examining the daily preferred music listening of Australian young people with mental illness. *Journal of Applied Youth Studies, 1,* 77-94. Retrieved from: https://minerva-access.unimelb.edu.au/handle/11343/38519

Choi, Y. K. (2010). The effect of music and Progressive Muscle Relaxation on anxiety, fatigue, and quality of life in family caregivers of hospice patients. *Journal of Music Therapy, 47*(1)*,* 53-69. https://doi.org/10.1093/jmt/47.1.53

Compare, A., Zarbo, C., Shonin, E., VanGordon, W., & Marconi, C. (2014). Emotional regulation and depression: A potential mediator between heart and mind. *Cardiovascular Psychiatry and Neurology,* http://doi.org/10.1155/2014/324374

de la Torre-Luque, A., Caparros-Gonzalez, R. A., Bastard, T., Vico, F. J., & Buela-Casal, G. (2017). Acute stress recovery through listening to Melomics relaxing music: A randomized controlled trial. *Nordic Journal of Music Therapy*, *26*(2), 124–141. https://0-doi.org.pacificatclassic.pacific.edu/10.1080/08098131.2015.1131186

de l'Etoile, S. K. (2002). The effectiveness of music therapy in group psychotherapy for adults with mental illness. *The Arts in Psychotherapy, 29*(2)*,* 69-78. https://doi.org/10.1016/S0197-4556(02)00139-9

de l'Etoile, S. K. (2005). Teaching music to special learners: Children with disruptive behavior disorders. *Music Educators Journal, 91*(5)*,* 37. https://doi.org/10.2307/3400141

de Manzano, O., & Ullén, F. (2012). Goal-independent mechanisms for free response generation: Creative and pseudo-random performance share neural substrates. *NeuroImage, 59*(1)*,* 772-780. http://doi.org/10.1016/j.neuroimage.2011.07.016

Dennis, T. A., & Hajcak, G. (2011). The late positive potential: A neurophysiological marker for emotion regulation in children. *Journal of Child Psychiatry, 50*(11)*,* 1373-1383. http://doi.org/10.1111/j.1469-7610.2009.02168.x

Diamond, L. M., & Aspinwall, L. G. (2003). Emotion regulation across the life span: An integrative perspective emphasizing self-regulation, positive affect, and dyadic processes. *Motivation and Emotion, 27*(2)*,* 125-156. http://doi.org/10.1023/A:1024521920068

Dillman Carpentier, F. R., Brown, J. D., Bertocci, M., Silk, J. S., Forbes, E E., & Dahl, R. E. (2008). Sad kids, sad media? Applying mood management theory to depressed adolescents' use of media. *Media Psychology, 11*(1)*,* 143-166. http://doi.org/10.1080/15213260701834484

Flemingham, K. L., Stewart, L. F., Kemp, A. H., & Carr, A. R. (2016). The impact of high trait social anxiety on neural processing of facial emotion expressions in females. *Biological Psychology, 117,* 179-186. http://doi.org/10.1016/j.biopsycho.2016.04.001

Flores-Gutiérrez, E. O., Díaz, J., Barrious, F. A., Favila-Humara, R., Guevara, M. A., del Río-Portilla, Y., & Corsi-Cabrera, M. (2007). Metabolic and electric brain patterns during pleasant and unpleasant emotions induced by music masterpieces. *International Journal of Psychophysiology, 65*(1), 69-84. https://doi.org/10.1016/j.ijpsycho.2007.03.004

Flores-Gutiérrez, E. O., & Terán Camarena, V. A. (2015). Music therapy in generalized anxiety disorder. *The Arts in Psychotherapy, 44,* 19-24. https://doi.org/10.1016/j.aip.2015.02.003

Ford, J. H., Addis, D. R., & Giovanello, K. S. (2011). Differential neural activity during search of specific and general autobiographical memories elicited by musical cues. *Neuropsychologia, 49*(9)*,* 2514-2526. http://doi.org/10.1016/j.neuropsychologia.2011.04.032

Fratianne, R. B., Presner, J. D., Houston, M. J., Super, D. M., Yowler, C. J., & Standley,J. M. (2001). The effect of music-based imagery and musical alternate engagement on the burn debridement process. *Journal of Burn Care & Rehabilitation, 22*(1)*,* 47-53. https://doi.org/10.1097/00004630-200101000-00010

Friedman, R. S., Gordis, E., & Förster, J. (2012). Re-exploring the influence of sad mood in music preference. *Media Psychology, 15*(3)*,* 249-266. https://doi.org/10.1080/15213269.2012.693812

Frühholz, S., Trost, W., & Kotz, S. (2016). The sound of emotions- Towards a unifying neural network perspective of affective sound processing. *Neuroscience & Biobehavioral Reviews, 68,* 96-110. https://doi.org/10.1016/j.neubiorev.2016.05.002

Garrido, S., Schubert, E., & Bangert, D. (2016). Musical prescriptions for mood improvement: An experimental study. *The Arts in Psychotherapy, 51,* 46-53. https://doi.org/10.1016/j.aip.2016.09.002

Garrido, S., & Schubert, E. (2013). Adaptive and maladaptive attraction to negative emotions in music. *Music Scientiae, 17*(2)*,* 147-166. https://doi.org/10.1177/1029864913478305

Gold, C., Solli, H. P., Krueger, V., & Lie, S. A. (2009). Dose-response relationship in music therapy for people with serious mental disorders: Systematic review and meta-analysis. *Clinical Psychology Review, 29*(2)*,* 193-207. https://doi.org/10.1016/j.cpr.2009.01.001

Gold, C., Voracek, M., & Wigram, T. (2004). Effects of music therapy for children and adolescents with psychopathology: A meta-analysis. *Journal of Child Psychology, 45*(6)*,* 1054-1063. https://doi.org/10.1111/j.1469-7610.2004.t01-1-00298.x

Goldstein, A. (1980). Thrills in response to music and other stimuli. *Physiological Psychology, 8*(1)*,* 126-129. Retrieved from: https://link.springer.com/article/10.3758/BF03326460

Grape, C., Sandgren, M., Hansson, L. O., Ericson, M., & Tores, T. (2003). Does singing promote well-being? An empirical study of professional and amateur singers during a singing lesson. *Integrative Physiological & Behavioral Science, 38*(1)*,* 65-74. https://doi.org/10.1007/BF02734261

Green, A. C., Baerentsen, K. B., Stokilde-Jorgensen, H., Wallentin, M., Roepstorff, A., & Vuust, P. (2008). Music in minor activates limbic structures: A relationship with dissonance? *NeuroReport, 19*(7)*,* 711-715. https://doi.org/10.1097/WNR.0b013e3282fd0dd8

Gyurak, A., Gross, J. J., & Etkin, A. (2011). Explicit and implicit emotion regulation: A dual-process framework. *Cognition & Emotion, 25*(3)*,* 400-412. https:10.1080/02699931.2010.544160

Hammer, S. E. (1996). The effects of Guided Imagery through Music on state and trait anxiety. *Journal of Music Therapy, 33*(1)*,* 47-70. https://doi.org/10.1093/jmt/33.1.47

Hanson-Abromeit, D. (2013). Therapeutic Function of Music. In Kevin Kirkland (Ed.), *International dictionary of music therapy* (p. 130). Routledge.

Hawton, K., Witt, K. G., Taylor Salisbury, T. T., Arensman, E., Gunnell, D., Hazell, P., Townsend, E., van Heeringen, K. (2016). Psychosocial interventions for self-harm in adults. *Cochrane Systematic Review, 12*(5), CD012189 https://doi.org/10.1002/14651858.CD12189

Heidersheit, A., & Madison, A. (2015). Use of the iso principle as a central method in mood management: A music psychotherapy clinical case study. *Music Therapy Perspectives, 33*(1)*,* 45-52. https://doi.org/10.1093/mtp/miu042

Hense, C., Silverman, M. J., & Skewes McFerran, K. (2018). Using the healthy-unhealthy uses of music scale as a single-session music therapy intervention on an acute youth mental

health inpatient unit. *Music Therapy Perspectives, 36*(2)*,* 267-276. https://doi.org/10.1093/mtp/miy013

Hense, C., & McFerran, K.S. (2017). Promoting young people's musical identities to facilitate recovery from mental illness. *Journal of Youth Studies, 20,* 997-1012. https://doi.org/10.1080/13676261.2017.1287888

Hildebrandt, L. K., McCall, C., & Singer, T. (2019). Socioaffective versus sociocognitive mental trainings differentially affect emotion regulation strategies. *Emotion, 19*(8)*,* 1329-1342. https://doi.org/10.1037/emo0000518

Hou, J., Song, B., Chen, A. C. N., Sun, C., Zhou, J., Zhu, H., & Beauchaine, T. P. (2017). Review on Neural Correlates of Emotion Regulation and Music: Implications for Emotion Dysregulation. *Frontiers in Psychology*, *8*(501). https://doi.org/10.3389/fpsyg.2017.00501

Hunot, V., Churchill, R., Teixeira, V., & de Lima, M. S. (2007). Psychological therapies for generalized anxiety disorder. *Cochrane Systematic Review.* https://doi.org/10.1002/14651858.CD001848.pub4.

Huron, D. (2011). Why is sad music pleasurable? A possible role for prolactin. *Musicae Scientiae, 15*(2)*,* 146-158. https://doi.org/10.1177/1029864911401171

Hwang, E., & Oh, S. (2013). A comparison of the effects of music therapy interventions on depression, anxiety, anger, and stress on alcohol-dependent clients: A pilot study. *Music and Medicine: An Interdisciplinary Journal, 5*(3), 136-144. https://doi.org/10.47513/mmd.v5i3.322

Ijaz, S., Davies, P., Williams, C. J., Kessler, D., Lewis, G., & Wiles, N. (2018). Psychological therapies for treatment-resistant depression. *Cochrane Systematic Review, 14*(5). https://doi.org/10.1002/14651858.CD010558.pub2

James, A. C., James, G., Cowdrey, F. A., Soler, A., & Choke, A. (2015) Cognitive behavioural therapy for anxiety disorders in children and adolescents. *Cochrane Systematic Review,* (6*).* https://doi.org/10.1002/14651858.CD004690.pub4

Janata, P. (2009). The neural architecture of music-evoked autobiographical memories. *Cerebral Cortex, 19*(11)*,* 2579-2594. https://doi.org/10.1093/cercor/bhp008

Jasemi, M., Aazami, S., & Zabihi, R. E. (2016). The effects of music therapy on anxiety and depression of cancer patients. *Indian Journal of Palliative Care, 22*(4)*,* 455-458. https://doi.org/10.4103/0973-1075.191823

Jerde, T. A., Childs, S. K. Handy, S. T. Nagode, J. C., & Pardo, J. V.(2011). Dissociable systems of working memory for rhythm and melody. *NeuroImage, 57*(4)*,* 1572-1579. https://doi.org/10.1016/j.neuroimage.2011.05.061

Joseph, D. L., Chan, M. Y., Heintzelman, S. J., Louis, T., Diener, E., & Scotney, V. S. (2020). The manipulation of affect: A meta-analysis of affect induction procedures. *Psychological Bulletin, 146*(4)*,* 355-375. https://doi.org/10.1037/bul0000224

Juslin, P. N., & Västfjäll, D. (2008). Emotional responses to music: The need to consider underlying mechanisms. *Behavioral and Brain Sciences, 31*(5)*,* 559-575. https://doi.org/10.1017/S0140525X08005293

Karadag, E., Ugur, Ö., & Cetinayak, O., (2019). The effect of music listening intervention applied during radiation therapy on the anxiety and comfort level in women with early-

stage breast cancer: A randomized controlled trial. *European Journal of Integrative Medicine, 27,* 39-44. https://doi.org/10.1016/j.eujim.2019.02.003

Kenealy, P. M., (1986). The Velten mood induction procedure: A methodological review. *Motivation and Emotion, 10*(3)*,* 315-335. Retrieved from: https://link.springer.com/article/10.1007/BF00992107

Khalfa, S., Dalla Bella, S., Roy, M., Peretz, I., & Lupien, S. J. (2003). Effects of relaxing music on salivary cortisol level after physiological stress. *Annals of the New York Academy of Sciences, 999*(1)*,* 374-376. https://doi.org/10.1196/annals.1284.045

Kim, M. J., Loucks, R. Al, Palmer, A. L., Brown, A. C., Solomon, K. M., Marchante, A. N., & Whalen, P. J. (2011). The structural and functional connectivity of the amygdala: From normal emotion to pathological anxiety. *Behavioural Brain Research, 223*(2)*,* 403-410. https://doi.org/10.1016/j.bbr.2011.04.025

Klassen, J. A., Liang, Y., Tjosvold, L., Klassen, T. P., & Hartling, L. (2008). Music for pain and anxiety in children undergoing medical procedures: A systematic review of randomized controlled trials. *Ambulatory Pediatrics, 8*(2)*,* 117-128. https://doi.org/10.1016/j.ambp.2007.12.005

Knappe, S., & Pinquart, M. (2009). Tracing criteria of successful aging? Health locus of control and well-being in older patients with internal diseases. *Psychology Health & Medicine, 14*(2)*,* 201-212. https://doi.org/10.1080/13548500802385717

Knight, W. E. J., & Rickard, N. S. (2001). Relaxing music prevents stress-induced increases in subjective anxiety, systolic blood pressure, and heart rate in healthy males and females. *Journal of Music Therapy, 38*(4)*,* 254-272. https://doi.org/10.1093/jmt/38.4.254

Knobloch, S., Weisbach, K., & Zillmann, D. (2004). Love lamentation in pop songs: Music for unhappy lovers? *Zeitschrift für medienpsychologie, 16,* 116-124 [German]. https://doi.org/10.1026/1617-6383.16.3.116

Knösche, T. R., Neuhaus, C., Hauerisen, J., Alter, K., Maess, B., Witte, O. W., & Friederici, A. D. (2005). Perception of phrase structure in music. *Human Brain Mapping, 24*(4)*,* 259-273. https://doi.org/10.1002/hbm.20088

Koelsch, S., Fritz, T., Cramon, D. Y. V., Müller, K., & Friederici, A. D. (2006). Investigating emotion with music: An fMRI study. *Human Brain Mapping, 27*(3)*,* 239-250. https://doi.org/10.1002/hbm.20180

Koelsch, S., Offermanns, K., & Franzke, P. (2010). Music in the treatment of affective disorders: An exploratory investigation of a new method for music-therapeutic research. *Music Perception, 27*(4), 307-316. https://doi.org/10.1525/mp.2010.27.4.307

Koelsch, S., Fritz, T., & Schlaug, G. (2008). Amygdala activity can be modulated by unexpected chord functions during music listening. *NeuroReport, 19*(18)*,* 1815-1819. https://doi.org/10.1097/WNR.0b013e32831a8722

Krahé, B., & Bieneck, S. (2012). The effect of music-induced mood on aggressive affect, cognition, and behavior. *Journal of Applied Social Psychology, 42*(2)*,* 271-290. https://doi.org/10.1111/j.1559-1816.2011.00887.x

Kreutz, G., Quiroga Murcia, C. & Bongard, S. (2012) Psychoneuroendocrine research on music and health: An overview. In R. MacDonald, G. Kreutz, & L. Mitchell (Eds.), Music, health, and wellbeing (pp.457-476). New York: Oxford University Press

Landis-Shack, N., Heinz, A. J., & Bonn-Miller, M. O. (2017). Music therapy for posttraumatic stress in adults: A theoretical review. *Psychomusicology: Music, Mind, and Brain, 27*(4)*,* 334-342. https://doi.org/10.1037/pmu0000192

Lee, K. S., Jeong, H. C., Yim, J. E., & Jeon, M. Y. (2016) Effects of music therapy on the cardiovascular and autonomic nervous system in stress-induced university students: A randomized controlled trial. *The Journal of Alternative and Complementary Medicine, 22*(1)*,* 59-65. https://doi.org/10.1037/t06065-000

Leftcourt, H. M. (1976). *Locus of control: Current trends in theory and research.* Lawrence Erlbaum Associates.

Legge, A. W. (2015). On the neural mechanisms of music therapy in mental health care: Literature review and clinical implications. *Music Therapy Perspectives, 33*(2), 128-141. https://doi.org/10.1093/mtp/miv025

Lerner, Y., Papo, D., Zhdanov, A., Belozersky, L., & Hendler, T. (2009). Eyes wide shut: Amygdala mediates eyes-closed effect on emotional experience with music. *PLoS ONE, 4*(7)*,* 1-17. https://doi.org/10.1371/journal.pone.0006230

Levitin, D. J. (2013). Neural correlates of musical behaviors: A brief overview. *Music Therapy Perspectives, 31*(1)*,* 15-24. https://doi.org/10/1093/mtp/31.1.15

Lewis, S. J., & Harder, D. W. (1988). Velten's mood induction technique: "Real" change and the effects of personality and sex on affect state. *Journal of Clinical Psychology, 44*(3)*,* 441-444. https://doi.org/10.1002/1097-4679(198805)44:3<441::AID-JCLP2270440321>3.0.CO;2-D

Linehan, M. M. (2015). *DBT skills training manual* (2nd ed.). Guilford Press.

Linehan, M. M. (2015). *DBT skills training handouts and worksheets* (2nd ed.). Guilford Press.

Liu, Y., Huang, H., McGinnis-Deweese, M., Keil, A., & Ding, M. (2012). Neural substrate of the late positive potential in emotional processing. *The Journal of Neuroscience, 32*(42)*,* 14563-14572. https://doi.org/10.1523/JNEUROSCI.3109-12.2012

Lothes II, J. E., & Mochrie, K. (2017). The "What" and "Hows" of mindfulness: Using DBT's mindfulness skills to reduce test anxiety. *Building Healthy Academic Communities Journal, 1*(2)*,* 10-20. https://doi.org/10.19061/bhac.v1i2.6029

Lundqvist, L.-O. et al. (2009). Emotional responses to music: Experience, expression, and physiology. *Psychology of Music, 37*(1)*,* 61-90. https://doi.org/10.1177/0305735607086048

Madson, A. T., & Silverman, M. J. (2010). The effect of music therapy on relaxation, anxiety, pain perception, and nausea in adult solid organ transplant patients. *Journal of Music Therapy, 47*(3)*,* 220-232. https://doi.org/10.1093/jmt/47.3.220

Masao, I. (2004). "Nurturing the brain" as an emerging research field involving child neurology. *Brain and Development, 26*(7)*,* 429-433. https://doi.org/10.1016/j.braindev.2003.02.001

Matney, B. (2017). The effect of specific music instrumentation on anxiety reduction in university music students: A feasibility study. *The Arts in Psychotherapy, 54,* 47-55. https//doi.org/10.1016/j.aip.2017.02.006

McCauley, E., Berk, M. S., Asarnow, J. R., Adrian, M., Cohen, J., Korslund, K., Avina, C., Hughes, J., Harned, M., Gallop, R., & Linehan, M. M. (2018). Efficacy of Dialectical Behavior Therapy for adolescents at high risk for suicide: A randomized clinical trial. *JAMA Psychiatry, 75*(8)*,* 777-785. https://doi.org/jamapsychiatry.2018.2137

McFerran, K., Roberts, M., & O'Grady, L. (2010). Music therapy with bereaved teenagers: A mixed methods perspective. *Death Studies, 34*(6), 541-565. https://doi.org/10.1080.07481181003765428

McFerran, K.S., Garrido, S., O'Grady, Grocke, D., & Sawyer, S. (2014). Examining the relationship between self-reported mood management and music preferences of Australian teenagers. *Nordic Journal of Music Therapy, 24*(3)*,* 187-203. https://doi.org/10.1080.08098131.2014.909842

McFerran, K. S., Hense, C., Koike, A., & Rickwood, D. (2018). Intentional music use to reduce psychological distress in adolescents accessing primary mental health care. *Clinical Child Psychology and Psychiatry, 23*(4). 567-581. https://doi.org/10.1177/1359104518767231

McFerran, K. S., & Saarikallio, S. (2014). Depending on music to feel better: Being conscious of responsibility when appropriating the power of music. *The Arts in Psychotherapy, 41*(1)*,* 89-97.

McMillan, J. H., & Schumacher, S. (2010). *Research in education* (7th ed.). Pearson Education.

McRae, K., Hughes, B., Chopra, S., Gabrieli, J. D. E., Gross, J. J., & Ochsner, K. N. (2010). The neural bases of distraction and reappraisal. *Journal of Cognitive Neuroscience, 22*(2)*,* 248-262. https://doi.org/10.1162/jocn.2009.21243

Menon, V., & Levitin, D. J. (2005). The rewards of music listening: Response and physiological connectivity of the mesolimbic system. *NeuroImage, 28*(1)*,* 175-184. https://doi.org/10.1016/j.neuroimage.2005.05.053

Metzner, S. (2016). Psychodynamic music therapy. In J. Edwards (Ed.), *Oxford Handbook of Music Therapy* (pp. 448-471). Oxford University Press.

Millett, C. R., & Gooding, L. F. (2017). Comparing active and passive distraction-based music therapy interventions on preoperative anxiety in pediatric patients and their caregivers. *Journal of Music Therapy, 54*(4)*,* 460-478. https://doi.org/10.1093/jmt/thx014

Miranda, D., & Claes, M. (2009). Music listening, coping, peer affiliation and depression in adolescence. *Psychology of Music, 37*(2)*,* 215-233. https://doi.org/10.1177/0305735608097245

Mitterschiffthaler, M. T., Fu, C. H. Y., Dalton, J. A., Andrew, C. M., & Williams, S. C. R. (2007). A functional MRI study of happy and sad affective states induced by classical music. *Human Brain Mapping, 28*(11)*,* 1150-1162. https://doi.org/10.1002/hbm.20337

Mizuno, T., & Sugishita, M. (2007). Neural correlate underlying perception of tonality-related emotional contents. *NeuroReport, 18*(16)*,* 1651-1655. https://doi.org/10.1097/WNR.0b013e3282f0b787

Mori, K., & Iwanaga, M. (2015). General reward sensitivity predicts intensity of music-evoked chills. *Music Perception: An Interdisciplinary Journal, 32*(5)*,* 484-492. https://doi.org/10.1525/mp.2015.32.5.484

Moscovitch, D. A., Gavric, D. L., Senn, J. M., Santesso, D. L., Miskovic, V., Schmidt, L. A., McCabe, R. E., & Anthony, M. M. (2012). Changes in judgment biases and use of emotion regulation strategies during cognitive behavioral therapy for social anxiety disorder: Distinguishing treatment responders from nonresponders. *Cognitive Therapy & Research, 36*(4)*,* 261-271. https://doi.org/10.1007/s10608-011-9371-1

National Institute of Mental Health. (2017). *Any Anxiety Disorder: Statistics.* https://www.nimh.nih.gov/health/statistics/any-anxiety-disorder.shtml

National Institute of Mental Health. (2018, January). *Mental health information: Statistics.* https://www.nimh.nih.gov/health/statistics/index.shtml

Neacsiu, A. D., Eberle, J. W., Kramer, R., Wiesmann, T., & Linehan, M. M. (2014). Dialectical Behavior Therapy skills for transdiagnostic emotion dysregulation: A pilot randomized controlled trial. *Behaviour Research and Therapy, 59*, 40-51. https://doi.org/10.1016/j.brat.2014.05.005

Nguyen, T., & Graham, J. (2017). Mind your music: The effects of music-induced mood and arousal across different memory tasks. *Psychomusicology: Music, Mind, and Brain, 27*(2)*,* 81-94. https://doi.org/10.1037/pmu0000178

Nilsson, U. (2008). The anxiety- and pain-reducing effects of music interventions: A systematic review. *The Journal of the Association of Perioperative Registered Nurses, 87*(4)*,* 780-807. https://doi.org/10.1016/j.aorn.2007.09.013

Nimarko, A. F., Garrett, A. S., Carlson, G. A., & Singh, M. K. (2019). Neural correlates of emotion processing predict resilience in youth at familial risk for mood disorders. *Development and Psychology, 31*(3)*,* 1037-1052. https://doi.org/10.1017/S0954579419000579

Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. *TRENDS in Cognitive Sciences, 9* (5)*,* 242-249. https://doi.org/10.1016/j.tics/2005.03.010

O'Toole, M. S., Mennin, D. S., Hougaard, E., Zacharie, R., & Rosenberg, N. K. (2015). Cognitive and emotion regulation change processes in cognitive behavioural therapy for social anxiety disorder. *Clinical Psychology & Psychotherapy, 22*(6)*,* 667-676. https://doi.org/10.1002.cpp.1926

Otte, C. (2011). Cognitive Behavioral Therapy in anxiety disorders: Current state of the evidence. *Dialogues in Clinical Neuroscience, 13*(4)*,* 413-421. https://doi.org/10.31887/DCNS.2011.13.4/cotte

Pallersen, K. J., Brattico, E., Bailey, C. J., Korvenja, A., Koivisto, J., Gjedde, A., & Carlson, S. (2010). Cognitive control in auditory working memory is enhanced in musicians. *PLos One, 5*(6)*,* 1-12. https://doi.org/10.1371/journal.pone.0011120

Panskepp, J. (2006). Emotional endophenotypes in evolutionary psychiatry. *Progress in Neuro-Psychomarmacology and Biological Psychiatry, 30*(5)*,* 774-784. https://doi.org/10.1016/j.pnpbp.2006.01.004

Pavlov, A., Kameg, K., Cline, T. W., Chiapetta, L., Stark, S., & Mitchell, A. M. (2017). Music therapy as a nonpharmacological intervention for anxiety in patients with a thought disorder. *Issues in Mental Health Nursing, 38*(3)*,* 285-288. https://doi.org/10.1080.01612840.2016.1264516

Pignatiello, M., Camp, C. J., Elder, S. T., & Rasar, L. A. (1989). A psychophysiological comparison of the Velten and musical mood induction techniques. *Journal of Music Therapy, 26*(3)*,* 140-154. https://doi.org/10.1093/jmt/26.3.140

Pincham, H. L., Bryce, D., & Pasco Fearon, R. M. (2015). The neural correlates of emotion processing in juvenile offenders. *Developmental Science, 18*(6)*,* 994-1005. https://doi.org/10.1111/desc.12262

Pittman, S., & Kridli, S. (2011). Music intervention and preoperational anxiety: An integrative review. *International Nursing Review, 58*(2)*,* 157-163. https://doi.org/10.1111/j.1466-7657.2011.00888.x

Plener, P. L., Sukale, T., Ludolph, A. G., & Stegemann, T. (2010). "Stop cutting- Rock!": A pilot study of a music therapeutic program for self-injuring adolescents. *Music and Medicine, 2*(1)*,* 59-65. https://doi.org/10.1177/1943862109356928

Rasia-Filho, A. A., Londero, R. G., & Achaval, M. (2000). Functional activities of the amygdala: An overview. *Journal of Psychiatry & Neuroscience, 25*(1)*,* 14-23.

Rempel-Clower, N. L. (2007). Role of orbitofrontal cortex connections in emotion. *Annals of the New York Academy of Sciences, 1121*(1)*,* 72-86. https://doi.org/10.1196/annals.1401.026

Robb, S. L., Hanson-Abromeit, D., May, L, Hernandez-Ruiz, E., Allison, M., Beloat, A., Daugherty, S., Kurtz, R., Ott, A., Oyedele, O. O., Polasik, S., Rager, A., Rifkin, J., & Wolf, E. (2018). Reporting quality of music intervention research in healthcare: A systematic review. *Complementary Therapies in Medicine, 38,* 24-41. https://doi.org/10.1016/j.ctim.2018.02.008

Rosenthal, R. (1994). Parametric measures of effect size. In H. Cooper, L. V. Hedges, & J. C. Valentine (Eds.), *The handbook of research synthesis*. (pp. 231-244). Russell Sage Foundation.

Saarikallio, S. (2012). Development and validation of the Brief Music in Mood Regulation scale (B-MMR). *Music Perception: An Interdisciplinary Journal, 30*(1)*,* 97-105. https://doi.org/10.1525/mp.2012.20.1.97

Saarikallio, S., & Erkkilä, J. (2007). The role of music in adolescents' mood regulation. *Psychology of Music, 35*(1)*,* 88-109. https://doi.org/10.1177/0305735607068889

Salimpoor, V. N., Benavoy, M., Larcher, K., et al. (2011). Anatomically distinct dopamine release during anticipation and experience of peak emotion to music. *Nature Neuroscience, 14*(2)*,* 257-262. https://doi.org/10.1038/nn.2726

Satoh, M., Takeda, K., Nagata, K., Hatazawa, J., & Kuzuhara, S. (2001). Activated brain regions in musicians during an ensemble: A PET study. *Cognitive Brain Research, 12*(1)*,* 101-108. https://doi.org/10.1016/S0926-6410(01)00044-1

Schore, A. N., (2001). The effects of early relational trauma on right brain development, affect regulation, and infant mental health. *Infant Mental Health Journal, 22*(2)*,* 201-269. https://doi.org/10.1002/1097-0355(200101/02)22:1<201::AID-IMHJ8>3.0.CO;2-9

Schulze, L., Schmahl, C., & Niedtfeld, I. (2016). Neural correlates of disturbed emotion processing in Borderline Personality Disorder: A multimodal meta-analysis. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, 79*(2)*,* 97-106. https://doi.org/10.1016/j.biopsych.2015.03.027

Sehatti, M., Nasab, A. A., & Yousefian, Z. (2019). The efficiency of emotion regulation and distress tolerance based on Dialectical Behavior Therapy on anxiety sensitivity and emotion regulation difficulties in women with irritable bowel. *Social Behavior Research & Health, 3*(1)*,* 298-308. https://doi.org/10.22037/sdh.v4i3.22819

Sena Moore, K. (2013). A systematic review on the neural effects of music on emotion regulation: Implications for music therapy practice. *Journal of Music Therapy*, *50*(3), 198–242. https://doi.org/10.1093/jmt/50.3.198

Sena Moore, K. (2017). Understanding the influence of music on emotions: A historical review. *Music Therapy Perspectives, 35*(2)*,* 131-143.

Sena Moore, K., Hanson-Abromeit, D. (2018) Feasibility of the Musical Contour Regulation Facilitation (MCRF) intervention for preschooler emotion regulation development: A mixed methods study. *The Journal of Music Therapy, 55*(4)*,* 408-438.

Sena Moore, K., & Hanson-Abromeit, D. (2015). Theory-guided therapeutic function of music to facilitate emotion regulation development in preschool-aged children. *Frontiers in Human Neuroscience, 14*(9)*,* https://doi.org/10.3389/fnhum.2015.00572

Shatin, L. (1970). Alteration of mood via music: A study of the vectoring effect. *The Journal of Psychology. 75*(1)*,* 81-86. https://doi.org/10.1090/00223980/1970/9916808

Sheppes, G., Scheibe, S., Suri, G., & Gross, J. J. (2011). Emotion-regulation choice. *Psychological Sciences, 11*(2)*,* 1391-1396. https://doi.org/10.1177/0956797611418350

Spielberger, C. D. (1972). *Anxiety: Current trends in theory and research: 1.* Academic Press.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P.R., & Jacobs, G.A. (1983). *State-Trait Anxiety Inventory for Adults*. Canada: Consulting Psychologists Press, Inc.

Spielberger State Trait Anxiety Inventory. (1984) In B. S. Plake & J. C. Impara (Eds.), *The mental measurements yearbook.* Buros Institute of Mental Measurements.

Stevens, F. L., Hurley, R. A., Taber, K. H., & Hayman, A. (2011). Anterior cingulate cortex: Unique role in cognition and emotion. *The Journal of Neuropsychiatry and Clinical Neurosciences, 23*(2)*,* 121-125. https://doi.org/10.1176/jnp.23.2.jmp121

Stratton, V. N., & Zalanowski, A. H. (1991). The effects of music and cognition on mood. *Psychology of Music, 19*(2), 121-127. https://doi.org/10.1177/0305735691192003

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Sage Publishing.

Strehlow, G., & Linder, R. (2016). Music therapy interaction patterns in relation to borderline personality disorder (BPD) patients. *Nordic Journal of Music Therapy, 25*(2)*,* 134-158. https://doi.org/10.1080.08098131.2015.1011207

Tam, W. W., Wong, E. L., & Twinn, S. F. (2008). Effects of music on procedure time and sedation during colonoscopy: A meta-analysis. *World Journal of Gastroenterology, 14*(34)*,* 5336-5343. https://doi.org/10.3748/wjg.14.5336

Tan, X., Yowler, C. J., Super, D. M., & Fratianne, R. B. (2010). The efficacy of music therapy protocols for decreasing pain, anxiety, and muscle tension levels during burn dressing changes: A prospective randomized crossover trial. *Journal of Burn Care and Research, 31*(4)*,* 590-597. https://doi.org/10.1097/BCR.0b013e3181e4d71b

Thomson, C. J., Reece, J. E., & di Benedetto, M. (2014). The relationship between music-related mood regulation and psychopathology in young people. *Musicae Scientiae, 18*(2)*,* 150-165. https://doi.org/10.1177/1029864914521422

Unkefer, R. (2005). *Music therapy win the treatment of adults with mental disorders: Theoretical bases and clinical interventions*. Barcelona Publishers.

Van den Tol, A. J. M., & Edwards, J. (2014) Listening to sad music in adverse situations: How music selection strategies relate to self-regulatory goals, listening effects, and mood enhancement. *Psychology of Music, 43*(4)*,* 473-494. https://doi.org/10.1177/0305735613517410

Vitasari, P., Abdul Wahab, M. N., Herawan, T., Othman, A., & Sinnadurai, S. K. (2011). Re-test of State Trait Anxiety Inventory (STAI) among engineering students in Malaysia: Reliability and validity tests. *Procedia Social and Behavioral Sciences, 15,* 3843-3848. https://doi.org/10.1016/j.sbpro.2011.04.383

Vuoskoski, J. K., & Eerola, T. (2012). Can sad music really make you sad? Indirect measures of affective states induced by music and autobiographical memories. *Psychology of Aesthetics, Creativity, and the Arts, 6*(3)*,* 204-213. https://doi.org/10.1037/a0026937

Watts, S. E., Turnell, A., Kladnitski, N., Newby, J. M., & Andrews, G. (2015). Treatment-as-usual (TAU) is anything but usual: A meta-analysis of CBT versus TAU for anxiety and depression. *Journal of Affective Disorders, 175*(1)*,* 152-167. https://doi.org/10.1016/j.jad.2014/12/025

Wolfe, D. E., O'Connell, A. S., & Waldon, E. G. (2002). Music for relaxation: A comparison of musicians and nonmusicians on ratings of selected musical recordings. *Journal of Music Therapy, 39*(1)*,* 40-55. https://doi.org/10.1093/jmt/39.1.40

Wurjatmiko, A. T. (2019). The effects of music therapy intervention on the pain and anxiety levels of cancer patient: A systematic review. *International Journal of Nursing Education, 11*(1)*,* 14-18. https://doi.org/10.1016/j.ijrobp.2017.05.003

Zhao, W., Chen, L., Zhou, C., & Luo, W. (2018). Neural correlates of emotion processing in word detection task. *Frontiers in Psychology,* https://doi.org/10.3389/fpsyg.2018.00832.

APPENDIX A: INFORMED CONSENT FORM

University of the Pacific, Conservatory of Music
RESEARCH SUBJECT'S CONSENT TO PARTICIPATE IN RESEARCH
Effects of One Directional Mood Vectoring Playlists and Musical Contour Regulation Playlists on Emotion Regulation Skills

Lead Researcher: Kate Bautch, MT-BC
Faculty Advisor: Linda Webster, Ph.D.

Your consent is being sought to participate in a research study, and your participation is entirely voluntary.

A. Purpose of Research. You are invited to participate in a research study which will look at the effectiveness of different types of personalized playlists in support of emotion regulation. My name is Kate Bautch, and I am a graduate student in Counseling Psychology at University of the Pacific. While research shows that music therapy is effective, there is no research about people using their personalized playlists. If effective, this would extend the benefits of music therapy and allow interventions to be used when most needed by the client.

B. Duration of Participation. Your participation in this study will involve two online meetings lasting no more than 45 minutes, and over the course of 2 weeks you will take part in the treatment protocol for up to 20 minutes each day. The meetings will include creation of the playlist, questionnaires, and a concluding interview.

C. Research Procedures. If you decide to participate, you will be asked to participate in two online meetings, lasting no more than 45 minutes in total. With your approval, the concluding interview in the final in-person meeting will be audio recorded. The initial meeting will include a pretest questionnaire, how to complete the protocol, and the creation of the playlist. After the initial meeting, you will complete the treatment protocol lasting no more than 20 minutes every day for 2 weeks. At the conclusion of the study, there will be a final 45 minute meeting, during which you will take the posttest questionnaire, and there will be a final interview during which you have the opportunity to share your experiences and any barriers that you may have experienced.

If at any time you experience anxiety symptoms that you have difficulty controlling, you can text CONNECT to 741741 to speak with a crisis counselor free of charge

D. Foreseeable Risks. There are some possible, minimal risks involved for participants. They include **Psychological**- You may feel more anxiety because you're being asked to think about it more. If any particular song in your playlist seems to increase your anxiety, you are free to skip that song. **Sociological**- You may feel a sense of embarrassment if you do not follow the directions exactly, or you may not feel sure whether you are following it correctly. During the initial meeting, you will be reassured that I, as the researcher, will remain

non-judgmental and supportive. **Loss of confidentiality**- There is a possibility that your participation in this study will become known. Any information that is obtained in connection with this study and that can be connected to you will remain confidential and be disclosed only with your permission. Additionally, your name will not be used and your identity will not be connected with any of your responses or results.

E. Benefits. There are no known benefits to this research. There could be a potential benefit that participants may experience a reduction in anxiety symptoms and/or gain tools with which to better regulate their emotions, but this is not certain.

I. CONFIDENTIALITY

We will take reasonable steps to keep confidential any information that is obtained in connection with this research study and that can be identified with you. Measures to protect your confidentiality are: All digital data (e.g., audio recordings, typed transcription of final interview, and online treatment logs) will be kept on my password-protected external hard drive, which will be kept in a locked cabinet in my office. All signed consent forms (which have your signed name on it) will be kept in a safe, locked location, and destroyed after three years following the study.

II. PARTICIPATION

You were selected as a possible participant in this study because you contacted me, and you are an adult (18 years or older), and report experiencing symptoms of anxiety. We expect to have up to 20 participants take part in this study. Please feel free to ask any questions you may have.

Your decision whether or not to participate will involve no penalty or loss of benefits to which you are otherwise entitled. If you decide to participate, you are free to discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

III. EXPERIMENTAL PROCEDURES

The implementation of the treatment protocol is an experimental procedure, as it involves examining the effectiveness of an intervention in the management of emotions.

IV. COLLECTION OF INFORMATION OR BIOSPECIMENS

Information (in the form of audio recordings, transcriptions of interviews, treatment logs, emails, and questionnaire responses) will be de-identified and will be destroyed after 3 years.

V. UNIVERSITY CONTACT INFORMATION

I am the lead researcher in this study and I am a graduate student at the University of the Pacific, School of Education. This research study is part of my dissertation for my EdD in Counseling Psychology.

If you have any questions about the research at any time, please contact me at (209) 661-5885 or by email at k_bautch@u.pacific.edu, or my advisor, Dr. Linda Webster, at (209) 946-2197 or by email at lwebster@pacific.edu.
If you have any questions about your rights as a participant in a research project or wish to speak with an independent contact, please contact the Office of Research & Sponsored Programs, University of the Pacific at (209) 946-3903 or by email at IRB@pacific.edu.

VI. NO COMPENSATION &NO COMMERCIAL PROFIT

No compensation is being offered for participating in this study. Your information will not be used for commercial profit.

VII. ACKNOWLEDGEMENT AND SIGNATURE

I hereby consent: (Indicate ***Yes*** or ***No***)

- To be audio recorded during this study.
  ___Yes ___No

You will be offered a copy of this form to keep.

Your signature below indicates that you have read and understand the information provided above, that you have been afforded the opportunity to ask, and have answered, any questions that you may have, that your participation is completely voluntary, that you understand that you may withdraw your consent and discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled, that you will receive a copy of this form, and that you are not waiving any legal claims, rights or remedies.

Signed:_____ Date:_____

Research Study Participant (Print Name): _____

Participant's Legally Authorized Representative (Print Name):
_____

Description of Representative's Authority:
_____

*Researcher Who Obtained Consent (Print Name):*_____

APPENDIX B: RESULTS BY PARTICIPANT

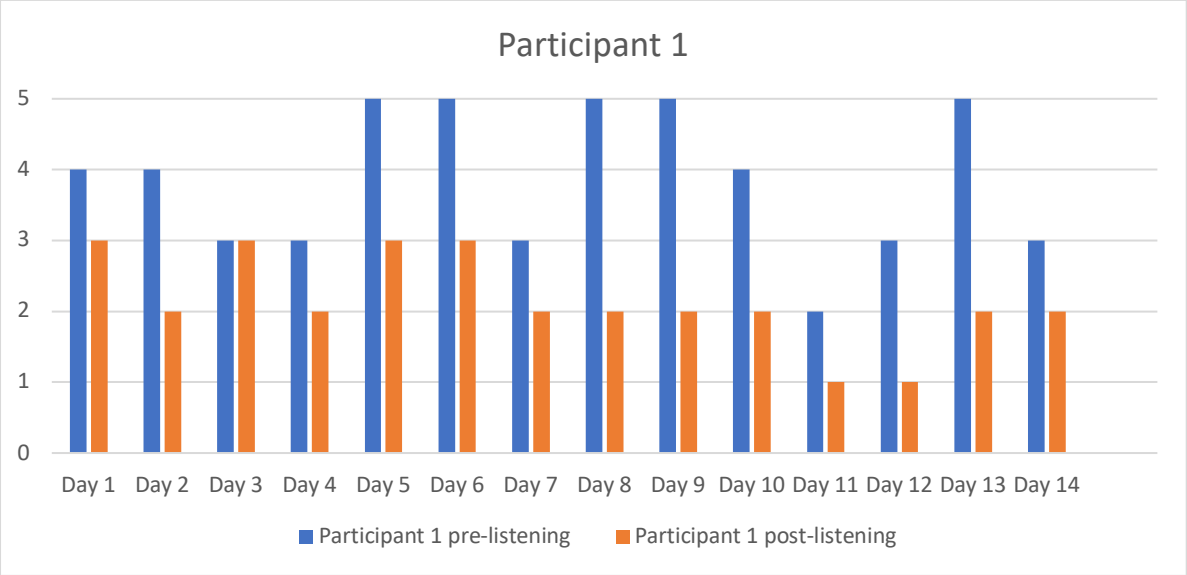

Figure 8. Participant 1 pre to post listening anxiety.

Table 12
Participant 1 Data

Measure	Participant 1	Group Mean
Mean pre-intervention	3.86	2.90
Mean post-intervention	2.14	1.99
Mean difference	1.71	0.92
STAI trait pretest	94	79.9
STAI trait posttest	80	77.8
STAI state pretest	77	77.2
STAI state posttest	48	56.6

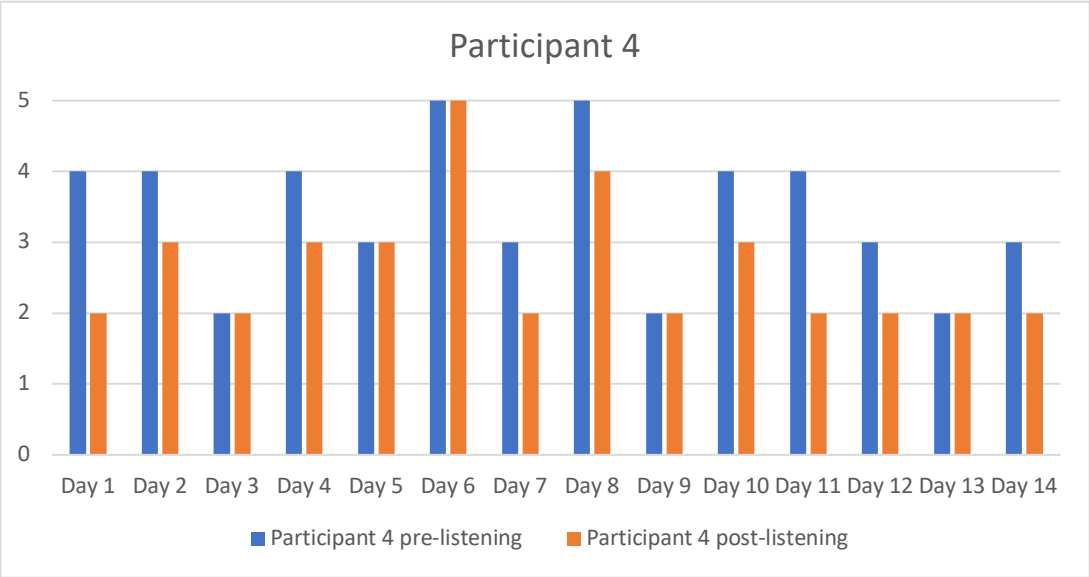

Figure 9. Participant 4 pre to post listening anxiety.

Table 13
Participant 4 Data

Measure	Participant 4	Group Mean
Mean pre-intervention	3.43	2.90
Mean post-intervention	2.64	1.99
Mean difference	0.79	0.92
STAI trait pretest	98	79.9
STAI trait posttest	92	77.8
STAI state pretest	92	77.2
STAI state posttest	87	56.6

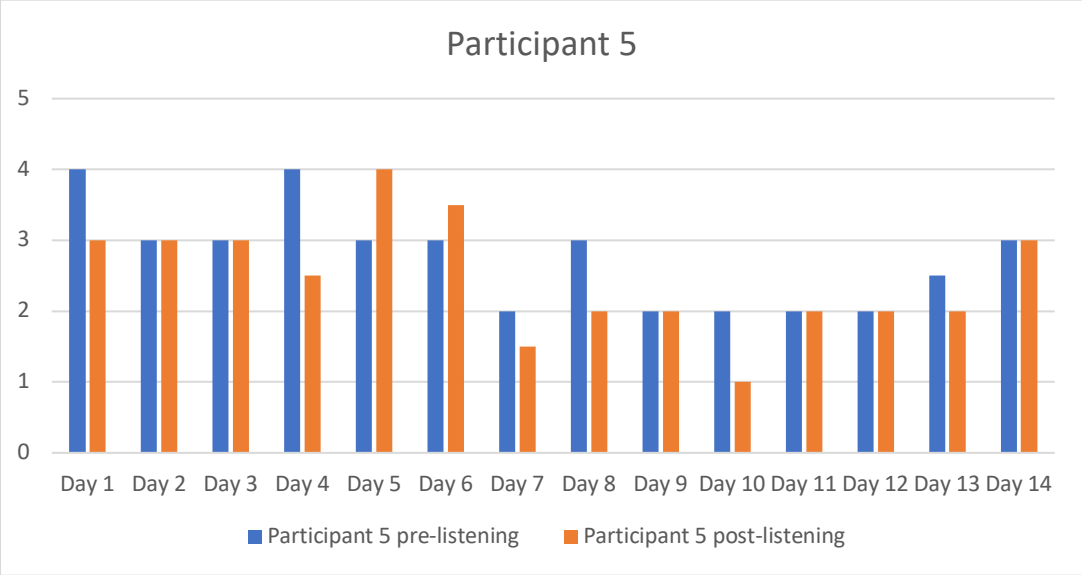

Figure 10. Participant 5 pre to post listening anxiety.

Table 14
Participant 5 Data

Measure	Participant 5	Group Mean
Mean pre-intervention	2.96	2.90
Mean post-intervention	2.65	1.99
Mean difference	0.31	0.92
STAI trait pretest	95	79.9
STAI trait posttest	93	77.8
STAI state pretest	87	77.2
STAI state posttest	73	56.6

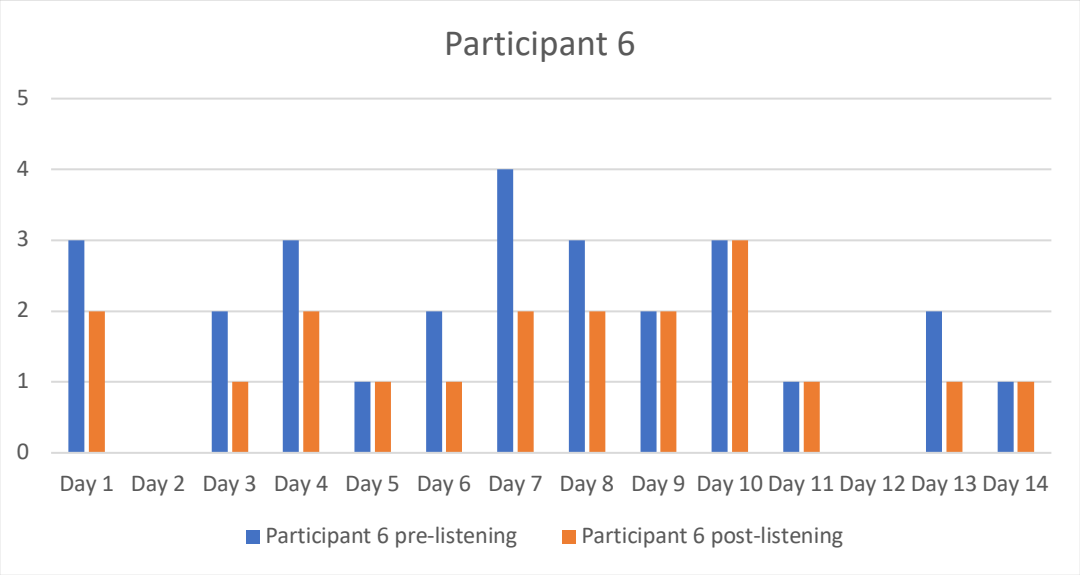

Figure 11. Participant 6 pre to post listening anxiety.

Table 15
Participant 6 Data

Measure	Participant 6	Group Mean
Mean pre-intervention	2.25	2.90
Mean post-intervention	1.58	1.99
Mean difference	0.67	0.92
STAI trait pretest	42	79.9
STAI trait posttest	54	77.8
STAI state pretest	30	77.2
STAI state posttest	40	56.6

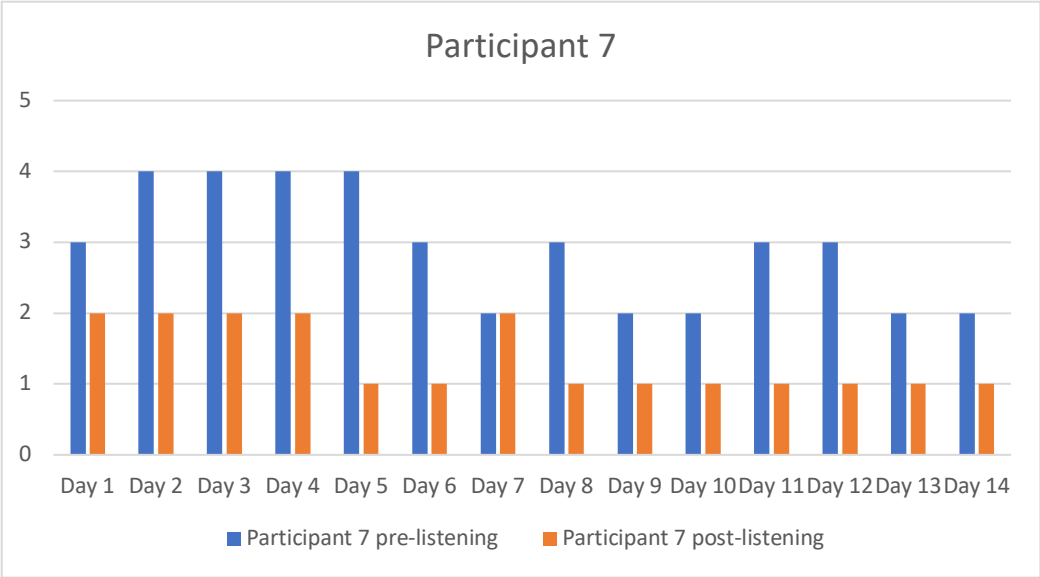

Figure 12. Participant 7 pre to post listening anxiety.

Table 16
Participant 7 Data

Measure	Participant 7	Group Mean
Mean pre-intervention	2.93	2.90
Mean post-intervention	1.36	1.99
Mean difference	1.57	0.92
STAI trait pretest	99	79.9
STAI trait posttest	89	77.8
STAI state pretest	98	77.2
STAI state posttest	72	56.6

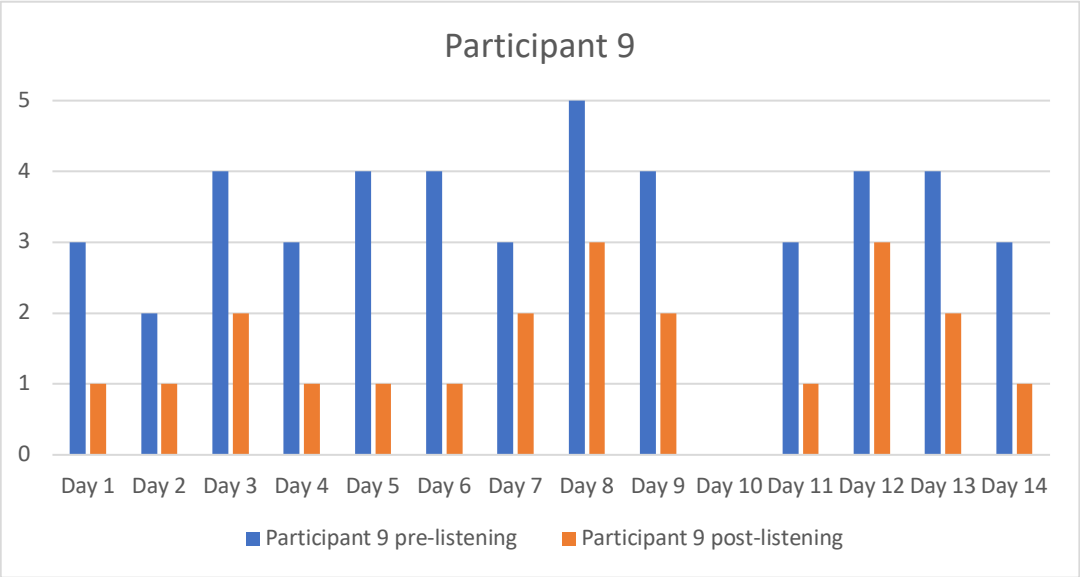

Figure 13. Participant 9 pre to post listening anxiety.

Table 17
Participant 9 Data

Measure	Participant 9	Group Mean
Mean pre-intervention	3.54	2.90
Mean post-intervention	1.62	1.99
Mean difference	1.92	0.92
STAI trait pretest	100	79.9
STAI trait posttest	100	77.8
STAI state pretest	99	77.2
STAI state posttest	32	56.6

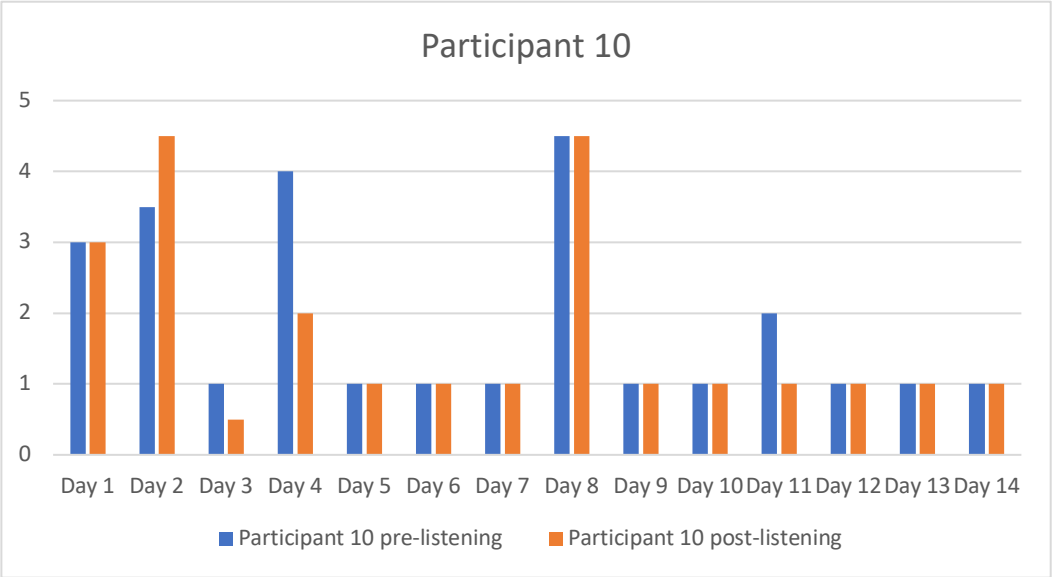

Figure 14. Participant 10 pre to post listening anxiety.

Table 18
Participant 10 Data

Measure	Participant 10	Group Mean
Mean pre-intervention	1.86	2.90
Mean post-intervention	1.68	1.99
Mean difference	0.18	0.92
STAI trait pretest	4	79.9
STAI trait posttest	24	77.8
STAI state pretest	70	77.2
STAI state posttest	4	56.6

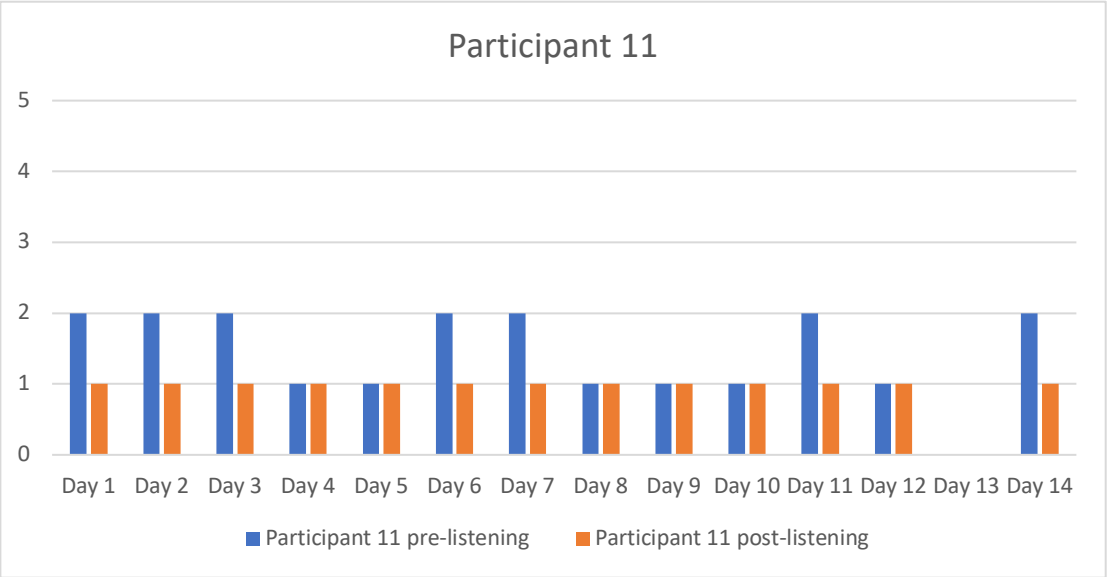

Figure 15. Participant 11 pre to post listening anxiety.

Table 19
Participant 11 Data

Measure	Participant 11	Group Mean
Mean pre-intervention	1.54	2.90
Mean post-intervention	1	1.99
Mean difference	0.58	0.92
STAI trait pretest	80	79.9
STAI trait posttest	80	77.8
STAI state pretest	59	77.2
STAI state posttest	76	56.6

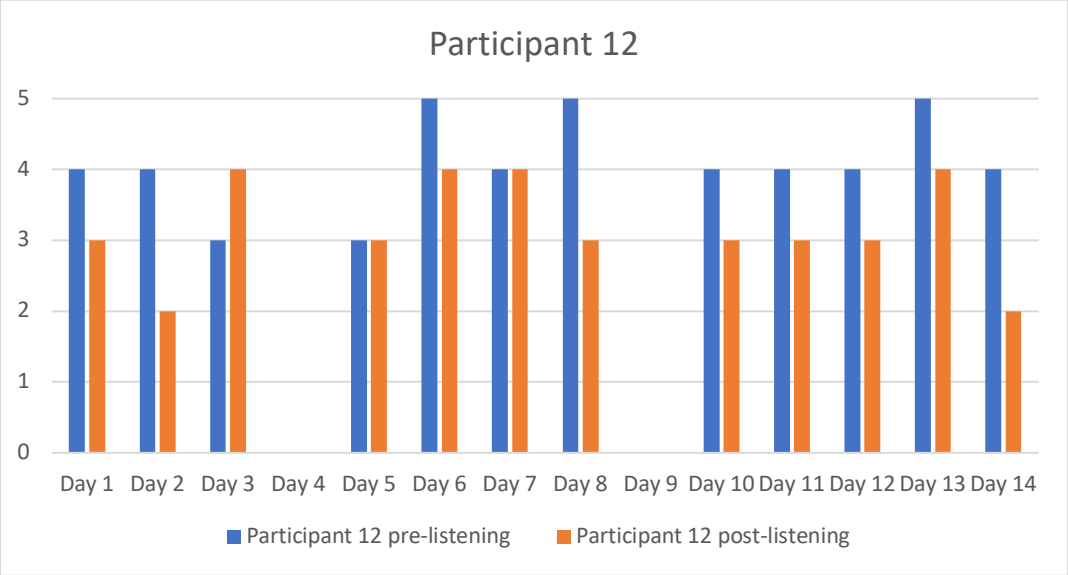

Figure 16. Participant 12 pre to post listening anxiety.

Table 20
Participant 12 Data

Measure	Participant 12	Group Mean
Mean pre-intervention	4.08	2.90
Mean post-intervention	3.17	1.99
Mean difference	0.92	0.92
STAI trait pretest	89	79.9
STAI trait posttest	69	77.8
STAI state pretest	73	77.2
STAI state posttest	56	56.6

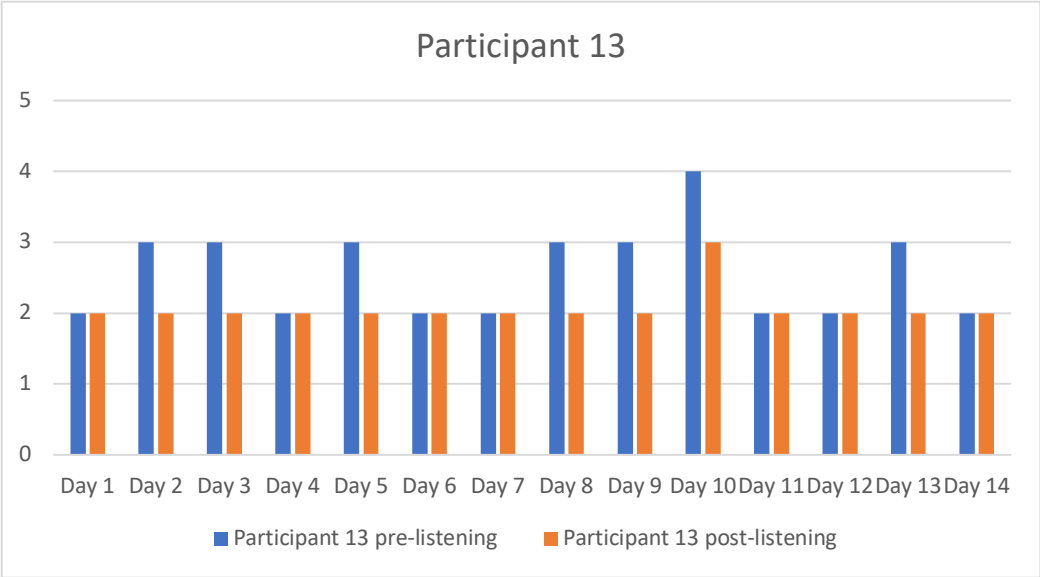

Figure 17. Participant 13 pre to post listening anxiety.

Table 21
Participant 13 Data

Measure	Participant 13	Group Mean
Mean pre-intervention	2.57	2.90
Mean post-intervention	2.07	1.99
Mean difference	0.50	0.92
STAI trait pretest	98	79.9
STAI trait posttest	97	77.8
STAI state pretest	87	77.2
STAI state posttest	78	56.6