THE EFFECT OF FRUSTRATION REDUCTION TECHNIQUES ON SELF-REPORTED MOOD SCALES AND PHYSIOLOGICAL RESPONSES

by

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DEDICATION

This thesis is dedicated to my thesis advisor, Dr. Eric Waldon, my thesis committee, and my parents. Thank you all for allowing me to pursue my elaborate, far-fetched goals and supporting me in every step along the way.

The Effect of Frustration Reduction Techniques on Self-Reported Mood Scales and Physiological Responses

Abstract

by Emily H. Broadhurst

University of the Pacific
2014

The purpose of this study was to explore treatment options for aggression-related disorders. Two activities were examined to validate their use as frustration-reduction techniques —yoga and therapeutic drumming. Twenty-two college students were randomly assigned to participate in one of three groups—yoga, drumming, or silence (control)—following experimentally-induced frustration using a computerized Stroop color-word technique. Self-reported emotion levels and physiological responses were tracked at baseline, post-frustration, and post-treatment to measure responses to treatment. Results indicate that self-reported frustration levels were significantly reduced in all experimental groups, but physiologic responses showed no significant changes. A Multivariate Analysis of Variance (MANOVA) indicated no significant difference in lowered frustration for any of the treatment groups, suggesting that they are equally effective. These results also suggest that the passage of time may be key to successful

emotion regulation. Further study should examine control variables and methodology to identify other factors that may be involved in regulating aggressive emotions.

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Chapter 1: Introduction

Every year there are over 700,000 deaths worldwide as a result of acts of aggression (Neumann, Veenema, & Beiderbeck, 2010). Stories of violent tragedies plague the daily news begging the question: How has the world become so full of violence and acts of terror? Over the past several decades, researchers have studied violence portrayed in the media to examine the causal effects they take on society (Anderson et al., 2003). Although the negative outcomes to anger and aggression, like school shootings and terrorist attacks, have been identified in research, little is known about causal factors that lead to aggressive behavior (Fives, Kong, Fuller, & DiGuiseppe, 2011). Several psychiatric disorders, including anxiety- and depression-related disorders have been associated with aggressive behaviors (Neumann, Veenema, & Beiderbeck, 2010). According to Davison et al. (2000), excessive aggression may be due to disturbed emotional regulation. If this is true, then it would appear important to understand the link between social behavior and emotional regulation to properly treat these psychological disturbances (Neumann, Veenema, & Beiderbeck, 2010).

Research Problem

Every day, people are subjected to various forms of violence in TV commercials, music, video games, and movies. Through all forms of media, these violent messages are absorbed and people become desensitized. The popularity of these violent messages is evident through box offices sales and top music charts. In their research of music with rebellious messages, Knobloch-Westerwick, Musto, and Shaw (2008) examined 260 rap,

hip-hop, and rock songs from the *Billboard* top 100 charts between 1993 and 2003. They found that the majority of these songs contained rebellious messages and that the number of songs with violent and defiant messages has steadily increased. These findings lead researchers to explore the reasons people would listen to music that evokes negative emotions. Zillmann and Bryant (as cited in Ruben, West, and Mitchell, 2001) suggest that this may be due to the entertainment values we find in music because of its ability to alter our moods and emotions. They found that although popular and rock music may lead to negative emotions, we listen to it because it increases levels of excitement associated with negative emotions.

These positive feelings associated with aggressive emotions have been long discussed in the field of psychology under the term "catharsis." This debated theory, discussed in later chapters of this paper, suggests that positive feelings follow acts of aggression through biological changes like reduction in blood pressure and reduced physiological arousal (Gordon & Bresin, 2013). Just as this theory is still researched and debated, current research on music and catharsis has not yet concluded whether music contributes to cathartic experiences.

Although we do not fully understand the connections between music and emotions, neurologic research has shed light on the activity in the bran during acoustic experiences. Kraus and Canlon (2012) studied neural activity during acoustic experiences, like sound, noise, and silence to explore neural connectivity. They found that acoustic experiences could affect the limbic regions of the brain in addition to the central auditory system. The limbic system, which is a group of brain structures including the amygdala and hippocampus, contributes to many important tasks such as

sustaining attention, olfaction, memory functions, and regulating affect and drive states. This group of structures encompasses areas of the brain as far apart as the brainstem to the forebrain and implicates important sites in the temporal lobes. The structures form a so-called system due to the anatomically linked networks formed in the brain by its many components. Due to this formation, the structures appear to work together to mediate memory and emotional behavior (Lezak, 1995). Of the limbic structures studied by Kraus and Canlon (2012), the amygdala was found to be particularly sensitive to sound that bared significance to the listener, such as crying or music. Additionally, brain stimulation and lesion studies support these findings, showing limbic structures to be quite sensitive to affective experiences (Weisfeld & Goetz, 2013).

Thaut (2005b) expands on affective experiences as they relate to auditory processing, observing that music listening often leads to strong emotional reactions. Supporting Kraus and Canlon's (2012) findings, Thaut agrees that these reactions indicate that the limbic system in the brain is activated. Thaut implies that music serves as a direct stimulus for activating the brain reward system through "music-evoked emotional peak experiences," (p. 18). The amygdala is proposed to be the site of mediation of these emotional peak experiences, suggesting there are biological roots in the processing of music and behaviors. Matthies et al. (2012), also suggest that the amygdala plays a key role in the modulation of aggressive behaviors. If this is true, then it appears that there could be a connection between aggressive music and corresponding emotions on a biological level.

Similar findings were uncovered by Moore (2013) in her research on the use of music in emotion regulation. Moore found that brain activity differed when listening to

music that was considered pleasant or happy as compared to music that was minor, dissonant, negative, or unpleasant. While listening to pleasant music led to decreased activation of the amygdala, music that was considered negative produced increased activation patterns in this brain structure.

Although research suggests that this connection between music and emotion may exist primarily on a biological level, there is evidence that personality, which can be influenced through environmental factors (Loehlin & Martin, 2013), also may play a role in the attraction to aggressive music. Rubin, West, and Mitchell (2001) further researched the prevalence of violence in popular music by exploring personality traits of the listener. They hypothesized that listeners who preferred violent music evidenced more violent dispositions. In their study, results of various mood inventories determined that listeners who preferred heavy-metal music tended to have higher levels of aggression and anger. They also found that rap listeners evidenced higher levels of aggression and distrust. These findings suggest that listeners of these violent, yet popular, genres may be fundamentally different from those who prefer other music genres. Gridley (2009) expanded on the notion of trait anger influencing music perception and preference using jazz music. In his study, listeners were asked to rate the emotion of a given jazz piece as "friendly" or "angry." Listeners who rated the music as angry had significantly higher trait anger scores than those who rated the music as friendly. There was also a significant correlation between the perception of anger in the song and the scores on the trait anger test. These results suggest that personality traits may influence how listeners perceive music. Jazz music is not typically pinned as violent or aggressive music, yet listeners who with higher trait anger scores perceived the song as having a more violent nature.

These studies both support the idea that high aggression levels stem from the listener on both biological and environmental levels, as opposed to being evoked from the music itself. However, there is a body of research suggesting that violent dispositions are caused by exposure to violent music. Interested in the causal effects of violent music, Craig A. Anderson launched multiple studies of the effects of media violence on young listeners (Anderson et al., 2003; Anderson, Carnagey, & Eubanks, 2003). Anderson's research found that adolescents that listened to songs with violent lyrics experienced an increase in aggressive thoughts and feelings. These findings are explained through a theoretical model developed by Anderson called the general aggression model (GAM). According to the GAM, experiencing violent media on a regular basis can create long-term effects and desensitization over time. Through repeated exposure, we learn about aggressive thoughts, behaviors, and attitudes, which "influences our internal affective and cognitive states" (Anderson, Carnagey, & Eubanks, 2003, p. 969).

If music is capable of shaping behaviors and influencing emotions of the listener, then there is potential that violent music could occasion feelings of violence in the listener, regardless of disposition. In the same line of reason, one could argue that as music has influence on negative behaviors, it is possible for music to influence and shape behaviors positively. As present research on the causal effects of music on negative emotions is inconclusive, focus must shift to ways to regulate aggressive emotions and modify these negative emotions and behaviors. What techniques, particularly music-based, can be used to effectively treat aggressive states? If music is capable of influencing mood and shaping behavior, can it be an effective tool for the reduction of anger and aggression?

Chapter 2: Review of Literature

Anger Reduction Research

As incidents of violence increase in the country, so does the need for treatment and rehabilitation programs to deal with the growing number of people committing these violent acts. Although over-crowded prisons call for a need in rehabilitation and prevention programs, there is a distinct lack of evidence in programs designed to treat anger and aggression. Baker, Van Hasselt, and Sellers (2008) argue that this may be due to lack of a comprehensive definition of the term *anger*. In many studies, the term *anger*, *aggression*, and *hostility* are used interchangeably and lack any distinction in the construct of these emotions.

Aside from discrepancies in measuring the construct of anger, research investigating the effectiveness of anger-reduction programs is equally sparse. The Chromis violence reduction programme at the Westgate Unit in HM Prison Frankland set out to investigate the effectiveness of their correctional program. Tew, Dixon, Harkins, and Bennett, (2012), developers of the British program, based the program on the theory of change stating:

> An individual's response to a situation is based on learnt expectations about behavioural outcomes. The self-regulation process has an impact of what behavior they choose and is affected by their thinking patterns, attitudes, and schema which may make violence a preferred option. (p. 192)

Their treatment program therefore involved learning new skills with a combination of individual and group verbal therapy sessions to help prisoners manage their thoughts and emotions. Although researchers found that prisoners reported a reduction in self-assessed anger and expected incidents of future physical aggression after attending the program, prisoners also experienced higher than expected levels of verbal aggression following the program.

Emotion Regulation

Programs for violence-reduction such as Chromis bring to light a contemporary approach in mental health of helping people to help themselves through emotion regulation. In his integrative review of the field of emotion regulation, Stanford University professor and psychologist James Gross (1998) defines emotion regulation as "the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions," (p. 275). Although emotion-regulation appears to be an internal process only involving the individual, Gross acknowledges that dysregulation of emotions, especially dysregulated levels of hostility, can have effects extending beyond the individual that influence family members and the family environment. Gross poses that emotion regulatory processes can be approached through adaptive coping processes where specific external and/or internal demands are managed through cognitive and behavioral efforts. These efforts may include situation selection (e.g., avoiding people, places, or objects) or cognitive reframing (i.e., reappraising situations to alter the emotional impact), which regulate emotional responses.

Gross (1998) argues that the field of emotion regulation offers both common ground for different approaches to psychology as well as a balance between silencing emotions and giving them complete reign over our actions and behaviors. Although his review of research encompassed only the early years of the emotion regulation movement in mental health, others have more recently expanded on his contributions. According to Koole (2009), more than 700 journal articles have been published since Gross' original article. Further, Koole contends that attention plays an important role in the practice of emotion regulation techniques. These strategies involve attending to stimuli outside of current emotional states and may include physical activities such as breathing and relaxation exercises. He concluded that competencies in emotion-regulation strategies could be improved through directed exercise and practice of these various techniques

Music therapy and emotion regulation. As attention plays an important part in emotion regulation, it is important to find an effective focal point for sustaining attention. Kimberly Moore (2013), researcher and music therapist, expands on the role of attention in emotion regulation by reviewing the neural effects of music on the regulation of emotions. Adding to Gross's definition of emotion regulation, Moore defines emotion regulation as "an internal process through which a person is able to maintain a comfortable state of arousal by modulating one or more aspects of emotion," (p. 199). She proposes that music plays a role in this modulating process, as music is able to evoke emotions in listeners. In her review of research on the use of music in emotion regulation, many studies used music as an alternate engagement, for example, instructing participants to attend to specific musical cues. These strategies effectively removed the focus from the perceived emotional event, thus supporting the use of music to facilitate

emotion regulation. Although these studies support the use of music as a tool for emotional regulation, Moore acknowledges that more studies are needed to evaluate the clinical efficacy of music as a means to regulate emotion.

With the emergence of emotion regulation in the field of mental health, it is important to find accessible ways for patients to learn and practice these skills. Among the various music therapy techniques used to help regulate emotions are music assisted relaxation techniques. According to Robb (2000), these techniques are primarily used for the management of stress and anxiety and fall into two categories: music listening and music combined with physical activity. Gadberry (2011) examined the use of music listening in the reduction of anxiety by reducing musical stimuli to its basic structure—a steady beat. This steady beat, when played on a low-C tone bar, was found to significantly reduce self-reported anxiety levels in individuals subjected to an experimental induction of anxiety.

Although several studies in addition to Gadberry's research have found music listening to effectively reduce anxiety, few studies have examined the role of music combined with physical activities to promote relaxation. Robb (2000) examined the musical and physical aspects of music combined with physical activity—in particular a technique used by music therapists called Music Assisted Progressive Muscle Relaxation —by isolating each variable to determine individual influences on relaxation. In her study, Robb exposed groups to one of four conditions: (a) music listening only; (b) progressive muscle relaxation; (c) combined music and progressive muscle relaxation; or (d) silence (control). Robb found that the musical and physical conditions (i.e., progressive muscle relaxation) were equally effective in significantly reducing anxiety in

undergraduate college students. Additionally, groups that experienced the combined musical and physical conditions through the use of Music-Assisted Progressive Muscle Relaxation did not report any significant difference in lowered anxiety levels than the groups that received musical or physical treatments alone. These findings suggest that there is no difference between musical and physical activities in the effectiveness of reducing emotional states. However, with many musical activities intrinsically linked with movement, such as drumming, the subject warrants further research.

In a study by Krüger (2010) exploring a music-based anger management program for children in residential care, drumming played a central role in learning anger management skills. This music program, established at a residential facility in South Africa, involved interventions to release "pent-up anger" through loud drumming (p. 29). As the session proceeded, walking, marching, jumping, and running to various musical selections were practiced along with various drumming interventions. Pre- and post-test analyses showed that the majority of children involved in this music and movement program showed improvements in appropriate anger management following participation in the program. Although the study does not explain the mechanics behind the combination of music and movement in the emotion regulation, it does support its use as an effective means to address anger management.

Shedding light on the role of music in emotion regulation, Thaut (2010a) explains that the use of music and rhythm helps regulate physiological and behavioral functioning through the process of entrainment, a concept discussed later in this chapter. He proposes that rhythmic stimulation and entrainment has profound effects on timing bodily functions such as motor control. The sensory input of external rhythm provides structure

and organization in the brain, contributing to temporal regulation. As timing cues are important in the process of learning, the rhythmic structure provided by activities such as drumming can engage the brain and enhance both cognitive functioning and motor learning. These findings may explain the success of drumming as a means to learn emotion regulation skills.

Yoga and emotion regulation. Just as many have utilized music as a means to regulate emotions, people have also sought additional forms of therapy in the quest to be of sound body and mind. In an effort to reduce the rising costs of health care, many Americans have turned to complementary and alternative medicines (CAM) to prevent or treat various health conditions. Among these alternative medicines is the practice of yoga. According to Sat Bir Singh Khalsa (2013), although many consider it to be primarily a form of exercise, yoga was originally a spiritual discipline intended help achieve an "ideal state of psychophysiological health and optimal functioning of body and mind" (p. 334). These beliefs have been adapted in the lives of Americans, as many corporations, schools, and workplaces have established wellness programs promoting the use of yoga practices. In a National Health Interview Survey (NHIS) conducted by the Centers for Disease Control (CDC) in 2007, almost 4 out of 10 adults surveyed reported using some form of CAM over the past 12 months (Barnes, Bloom, & Nahin, 2008). Survey results found that elements of yoga practice were commonly reported, including deep breathing exercises (12.7%), meditation (9.4%), and yoga routines (6.1%). These survey results indicated significant increases in each of these practices from 2002 to 2007.

As practice of yoga has become widespread, a growing need for research on the benefits of yoga interventions has also surfaced. Büssing, Michalsen, Khalsa, Telles, and Sherman (2012) reviewed literature to examine the effects of yoga on mental and physical health. The authors noted that the majority of research on yoga's therapeutic use was conducted in India, and is therefore difficult for Western practitioners to attain. This limitation in the quantity and quality of research has highlighted the need to conduct further research in the area to support more conclusive findings. Although research on the benefits of yoga practice is limited, the existing research supports the use of yoga as a treatment for mental health conditions. As reported in the Cochrane Central Register of Controlled Trials, Balasubramaniam, Telles, and Doraiswamy (2013) reviewed several studies supporting the use of yoga in the treatment of mild depression. The authors concluded that even in the absence of pharmacotherapy, acute benefits in the alleviation of depressive symptoms could be found following short-term practice in both men and women of all ages.

Similar studies investigating yoga as a treatment for mental disorders have supported the use of yoga to alleviate symptoms of anxiety by looking at brain activity during practice. Streeter et al. (2010) compared brain activity during yoga and walking to determine the mechanisms at work in the reduction of anxiety symptoms. The authors note that reduced activity in *y*-aminobutyric acid systems, also known as GABA, has been associated with mood disorders and anxiety disorders. Many pharmacologic agents increase activity of the GABA system to improve mood and decrease anxiety. Results indicated that the group that practiced yoga for 12 weeks was found to show greater improvements in mood (measured by the Exercise-Induced Feeling Inventory) and

decreases in state anxiety (measured by the State portion of the Spielberger State-Trait Anxiety Inventory [STAI]), when compared to the group that simply walked for exercise. Additionally, GABA levels of the brain were shown to have higher increases in those practicing yoga. This study marks the first of its kind to find a positive correlation in increases in thalamic GABA levels and STAI scores. These results suggest that yoga could be an effective treatment for individuals with anxiety disorders.

In another study investigating yoga's ability to lower anxiety levels, Telles, Bhardwaj, Kumar, Kumar, and Balkrishna (2012) examined anxiety levels of army recruits after a single yoga session. These recruits were assigned randomly to a group that practiced yoga, a group that listened to a selection of meditation music described as "rhythmic chanting" (p. 971), or a group that practiced breath awareness. Results indicated that state anxiety decreased after yoga and listening to meditation music, but not after breath awareness. This study further supports the use of both yoga and music as effective anxiety-reducers in as little as a single session.

As several psychiatric disorders including anxiety- and depression-related disorders have been associated with aggressive behaviors (Neumann, Veenema, & Beiderbeck, 2010), it is important to investigate potential interventions for these conditions so that they may be incorporated into treatment programs. If yoga is an effective treatment for anxiety disorders, can it also prove helpful in the treatment of aggression? Highlighting the importance of movement in the treatment for aggression, Twemlow, Sacco, and Fonagy (2008) state that, "violent, non-mentalizing individuals who act out aggression do not usually respond to verbal therapeutic approaches alone" (p. 1). These authors see yoga—a form of physically oriented therapy—as a critical means

to reach these individual in combination with psychodynamic psychotherapy. Twemlow and his colleagues believe that when physical movement is combined with psychodynamic psychotherapy, an opportunity to "act out" aggression is provided (p. 29). Movement may provide access to early traumas experienced early in life that are incapable of being directly verbalized in talk therapies. These authors further argue that movement may offer a "physical enactment in the transference that is immediately accessible to therapeutic effort" (p.29).

Catharsis—Musical and Physical

The acting out of aggression described by Twemlow, Sacco, and Fonagy (2008) could also be referred to by another name: catharsis. Catharsis is described by Sigmund Freud, the originator of the term, as an energy or electrical charge invested in a feeling or a mental process (Baker, 1963). Catharsis can be manifested in many ways, including musical and physical forms. In his research on the healing powers of storytelling, Kearney (2007) supports the theory of catharsis through what he calls narrative catharsis. He explains that interpreting a story is a way of making absent things present. He proposed that the task of thinking about and interpreting a story may provide some measure of healing. Since music is often used to tell a story through lyrical and musical content, the ways in which a client interprets and relates to the story can speak volumes about how they see the world. Kearney believes that catharsis exists in story telling because when the reader finds truth in the story, they can potentially release feelings they have been repressing.

Lyrics are not the only aspect of music that can provide a source of catharsis. The structural elements of music, including melody or rhythm, also serve as a source of

emotional release and processing. In this regard, Blackett and Payne (2005) found that patients experienced emotional release and a reduction in stress during group drumming sessions as evident through self-report in journaling following each session. Blackett and Payne concluded that this was due to the emotional processing that occurs while playing the drum. Patients reported that they were able to release their stress and get all of the "emotional badness out" (p. 486).

Although Blackett and Payne support the idea of both musical and physical catharsis through drumming, research shows that there are conflicting views on the matter. Research on catharsis by Freshbach (1984) suggests that in the attempts to reduce aggression through physical cathartic release may increase aggression. Freshbach explains that when one successfully reduces aggressive impulses by having an aggressive catharsis, such as chopping wood, these responses are reinforced. A behavior that is reinforced would be likely to increase, rather than decrease. Therefore, the cathartic acts would increase aggressive impulses instead of decreasing them. This theory parallels Anderson's (2003) general aggression model (GAM), which argues that through repeated exposure, aggressive thoughts, behaviors, and attitudes increase.

While Freshbach and Anderson's theories do not support catharsis as an effective tool to reduce anger, recent research explores the possibility that the effectiveness of catharsis may be dependent on the individual. In their research on anger and aggression, Van Coillie and Van Mechelen (2006) found that there was a considerable amount of variance in participants with regard to the effects of catharsis. Their findings suggested that several factors such as personality, beliefs in the cathartic effect, and expectations of consequences influenced how a person experienced catharsis. With regard to personality,

those who had agreeable personalities as measured by the *Big Five* personality traits were less likely to use aggression for catharsis, as it was not in their nature. Also, those who were considered to be "catharsis-believers" were more likely to experience a decrease in their anger symptoms after the cathartic release. Bresin and Gordon (2013) also support the theory that individual differences influence the cathartic response, adding that biological systems may also play a role in the affective response to aggression.

These findings shed light on the effectiveness of therapeutic drumming and its cathartic effects. Although some may find a great deal of reduced stress after drumming, which is both a musical and physical activity, it is important to fully assess the client's personality and aggression levels before executing such an intervention. Additionally, those that believe they can have a cathartic experience may be more likely to receive the emotion-regulatory benefits than those who do not believe in any form of catharsis.

Mood-Induction Techniques

Although many studies have shown the effectiveness of musical and physical activities in various anger reduction programs, it remains to be seen which factor holds the most weight in the regulation of emotions. In order to examine the effects of various treatments on mood, it is essential to induce experimental mood-states in a valid and consistent manner. Several researchers have examined various mood induction techniques for use in research experiments. Sinclair, Mark, Enzle, Borkovec, and Cumleton (1994) questioned the validity of an early mood induction technique named after its originator, Emmett Velten. The Velten procedure involves having participants read mood-related statements that become progressively more depressed or elated in content, depending on which mood is to be induced. Researchers questioned this

methodology because of the possibility of demand characteristics in participants, where participants hypothesize the true purpose of a study, therefore influencing and biasing their responses. However, despite the presence of these demand characteristics, it was found that true mood changes still result and cannot be completely contributed to this type of error.

Expanding on the use of mood induction in psychological research, Kučera and Haviger (2012) examined the induction of four mood-states: anger, joy, fear, and sadness. Anger was induced using an interactive manipulation technique. The researcher interrupted participants in a classroom, telling them they had to take a performance test involving difficult logical and mathematical questions. The teacher was a confederate to the study and began to argue with the researcher, creating tension in the room. As students filled out the test, they were harassed by the researcher as he made sarcastic comments regarding their incompetence. The test distributed to participants included a self-assessment scale on the last page. The scale asked participants to rate the extent to which they felt tired, happy, angry, sad, afraid, and calm, identified by the researchers as basic emotions. Results indicated that the self-rated scales for the anger-induction had the smallest level of "mixed emotions," meaning that each participant primarily felt the intended emotion—anger. This technique was thought to be the most successful because of the realistic environment. Participants had no knowledge of the true purpose of the study, thus eliminating demand characteristics as a source of error.

Also interested in anger-induction methods, Lobbestael, Arntz, and Wiers (2008) compared four techniques for inducing anger for use in psychological experiments. This experimental study compared four anger-induction techniques: film, stress interview,

punishment, and harassment. Visual analog scales were used to measure anger, fear, embarrassment, frustration, annoyance, sadness, loneliness, impatience, dejection, and alertness. Blood pressure, heart rate, and skin conductance levels were used to measure physiological responses. The harassment and punishment techniques both involved a frustration task based on *Trivial Pursuit,* a competitive trivia board game. Participants answered trivia questions, losing 50% of the trials, regardless of performance. In the punishment condition, participants received both visual and auditory feedback through red crosses displayed on a computer and unpleasant loud tones. In the harassment condition, the researcher added comments to the participants' performance, such as, "You really should try harder" (p. 358). Results indicated that self-reported anger increased significantly in all anger-induction methods. However, all physiological responses were significantly increased in only the harassment condition.

Rhythm and Steady Beats

Using this knowledge on effective mood-induction procedures, Gadberry (2011) induced experimental anxiety in her study of steady beats and state anxiety using a modified Stroop color-word test. In her study, participants were instructed to rapidly name the colored ink of words which spell a non-matching color name (i.e. identifying the color *green* while ignoring the word being spelled out as *blue*). Incorrect responses were marked with buzzer sounds. After the anxiety induction, participants either listened to a steady pulse played on a tone bar or sat in silence. Based on her results, Gadberry suggests that the steady beat alone holds the potential to reduce state anxiety. Assuming this, listening to a steady beat while sitting completely still might have the same effect on a person's mood as an active participation in drumming or yoga—two physical

movement activities revolving around steady beats. Drumming as it pertains to drum circle activities requires synchronization to a steady underlying beat. Ashtanga yoga principals involve the "synchronization of deep, rhythmic breathing and movement" (Shultz, 2006, p. 12). With the same principle of a steady rhythm at the core of each of these activities, will they yield the same results in anger reduction as simply listening to a steady beat in a state of rest? What differences, if any, will be seen between active music making, movement, and rested states?

Thaut's (2005a) proposition that rhythmic stimulation and entrainment have profound effects on timing bodily functions is reflected in current biological psychiatry research. McClung (2013) explores the relationship between the intrinsic rhythms of biological functions and cycles and disruptions in mood. She argues that dysregulation of these rhythms can lead to disorder in a person's life. The majority of people diagnosed with any form of mood disorders also evidence significant disruptions in circadian rhythms, which impact sleep, blood pressure, and hormone secretion. Additional research from Lanfumey, Mongeau, and Hamon (2013) indicates that treatments of mood disorders often involve resynchronizing biological rhythms through pharmacological means. This synchronization may also occur through a process known as entrainment. Similar to definitions of entrainment in biology and physics, musical entrainment involves the pull of one vibrating object to another vibrating object, resulting in a balance or synchronization of the two rhythms (Dimaio, 2010). If balance in biological rhythms increases our overall health, then will entrainment to an external rhythm have any additional positive effects on our health as Thaut suggests?

Purpose of the Current Study

The purpose of this study was to explore treatment options to regulate anger or other negatively-veiled emotion states, such as frustration. Two activities involving rhythm and movement were examined in this study to validate their use as frustration-reduction techniques —yoga and therapeutic drumming. Although rhythm and movement is involved in both activities, yoga was considered primarily a movement activity and drumming primarily a musical activity. Participants were randomly assigned to participate in one of three groups—yoga, drumming, or control—following experimentally-induced frustration using a Stroop color-word technique. It was hypothesized that participants would report lower frustration levels following either treatment condition—yoga or drumming. It was also hypothesized that participants in either condition would report lower frustration levels than the control group, which remained silent and still.

Research questions. The following four research questions were addressed:

Research question #1. To what extent do emotion regulation strategies, as a group, impact self-reported frustration?

Research question #2. To what extent do these emotion regulation strategies, as a group, impact physiological measures?

Research question #3. At post-test, does self-reported frustration vary by specific emotion regulation technique?

Research question #4. At post-test, do physiological measures vary by emotion regulation technique (ie, yoga, therapeutic drumming, and remaining silent and still)?

Chapter 3: Methods

Participants

Twenty-two college students from the Conservatory of Music at the University of the Pacific were approached to participate in the study. Fliers (Appendix A) were also posted throughout the Conservatory buildings asking for volunteers. Additionally, the researcher advertised the study to students in several music therapy and music education undergraduate and graduate classes. Students were offered extra class credit for their participation in the study.

Participants included 19 females and 3 males, ranging in age from 19 to 54 years. Participant ethnicity was diverse, with the majority being of Caucasian, Hispanic, and Asian decent (See Table 1). The majority of participants were music therapy majors with the exception of one speech-language pathology major and one music education major.

Table 1. Summary of Participant Age, Gender, and Ethnic Background.

Variable	Univariate Summary	
Age	*M* = 24.86 years	*SD* = 8.24 years
Gender	Male	3
	Female	19
Ethnicity	Korean	1
	African American/Caucasian	1
	German/Chinese	1
	Caucasian	11
	Vietnamese	1
	Chinese	1
	African-American/Japanese	1
	Hispanic	3
	Filipino	2

Note. $N = 22$; *M* = mean; *SD* = standard deviation. Ethnicities were reported by participants through open-ended question included in questionnaires.

Materials

Instrumentation. A questionnaire (Appendix B) was designed by the researcher consisting of 10 visual analog mood scales, demographic information, and basic health questions. The visual analog scales measured the following 10 mood-states using a 100mm horizontal line: anger, fear, embarrassment, frustration, annoyance, sadness, loneliness, impatience, dejection and alertness. Participants were instructed to make a vertical mark on each line to indicate their current levels of each mood-state. This questionnaire is a modified version of the self-report measure used by Lobbestael, Arntz, and Wiers (2008) in their study of anger-induction techniques. Their analysis of the measure was found to have good internal consistency (Cronbach's alpha = .86). The questionnaire also included health-related items, including reporting hours of sleep,

number of caffeinated beverages consumedper day, and tobacco usage. These items were included to maintain the guise of a health-related study. Additional data was collected using the Wristech Blood Pressure Monitor JB5538 for the measurement of physiological states, including heart rate and blood pressure.

Apparatus. The researcher designed a frustration-induction procedure using a timed and narrated PowerPoint presentation (for the full power-point script, see Appendix C) at the Owen Recording Studio on the University of the Pacific campus. The presentation was run using the Microsoft Office 2011 version of Microsoft PowerPoint on a MacBook Pro laptop computer. The presentation, which participants were told was voice-interactive, leads participants through a self-administration of the frustration induction technique using the Stroop color-word test. Gadberry (2011) used this procedure successfully as a frustration-induction procedure in her study on anxiety reduction techniques. Gadberry's study served as a model for the following procedure for frustration-induction.

The initial slides in the presentation gave the participants directions on correctly responding to items on the Stroop color-word test. After the instructions were given, participants were told to say each word aloud as they appeared on the rapidly changing slides. Participants were led to believe that their responses would be recorded by the voice-interactive software for analysis of performance. Each slide was timed to appear for only 1 second before proceeding to the next slide. At pre-determined slides in the presentation, a buzzer sounded, indicating that the participant gave an incorrect response. These "buzzer noises" sounded regardless of the participant's performance as a means of inducing frustration. Additional feedback regarding "incorrect responses" in the form of

written pop-up statements were also included in the presentation to further assist in frustration induction. This procedure is similar to one used by Lobbestael, Arntz, and Wiers (2008) in their study involving experimentally-induced anger. These provocative statements were included on pre-determined slides using some of the following phrases: "Try harder to concentrate" (after 1 minute) and "You can do better" (after 2 minutes). Once the task was completed, the presentation reported the participants' performance with the comment, "Below Average."

Procedure

Participants met individually with the researcher in a practice room in the Conservatory. The study was conducted in 20-25 minute time-slots between 10:00AM and 3:00PM over a 6-week period. Upon arrival, participants were instructed to have a seat in a chair across from the researcher. A consent form (See Appendix D) explaining the study and highlighting voluntary participation was reviewed and signed. In an effort to disguise the true purpose of the study, participants were told they were a part of a health study. Participants were offered a copy of the consent form to keep. Next, participants were randomly assigned to a group by drawing a paper from an envelope representing one of three conditions: yoga, therapeutic drumming, or control group. Initials were used to represent each group so that participants would not be aware of the group in which they were placed.

The researcher then collected baseline measures, instructing the participant to fill out the questionnaire (See Appendix B, Measure B-1) consisting of 10 visual analog mood scales, demographic information, and basic health questions. Health questions were posed in the effort to maintain the guise of a health study. Physiological measures

were also taken using a digital blood pressure monitoring wristband, including heart rate and blood pressure. The Wristech device was worn by participants on their wrist for about 1 minute to produce a digital blood pressure and heart rate reading.

Next, participants underwent the frustration-induction involving the Stroop color-word test using the aforementioned PowerPoint presentation. The researcher started the presentation before placing the laptop in front of the participant to conceal that the program was not voice-interactive software. A pilot test of the presentation determined that this computer-based method was a convincing approach. Results of the pilot test also indicated an increase in anger levels following administration, although there were too few participants to determine statistical significance. Once the program was started, the researcher gave the simple instruction that the software would lead the participant through a neuropsychological test and left the room to prepare the chosen treatment condition in an adjacent practice room down the hall.

Upon completion of the frustration-induction procedure, the researcher re-entered the room and took the laptop to "record the participant's performance in the software database." The researcher then instructed the participant to fill out the next page of the questionnaire (Appendix B, Measure B-2), consisting of the same 10 visual analog mood scales used in Measure B-1. Scores on this questionnaire measured the participant's emotional state immediately following the frustration-induction procedure. Once completed, the participant joined the researcher in the predetermined treatment condition in the adjacent practice room. For the yoga condition, participants were led through a 7-minute yoga session (For complete session plan, see Appendix E) led by the researcher consisting of simple movements and postures, deep breathing, and mindfulness exercises.

For the therapeutic drumming condition, participants were led through a 7-minute active drumming experience (See Appendix F) led by the researcher. The control group condition was given the instruction to sit quietly for 7-minutes. The researcher left the room during this time.

Following the assigned experimental condition, participants filled out the final page of the questionnaire (Appendix B, Measure B-3). The same visual analog mood scales were used to measure any change in emotional state immediately following each condition. Participants were then informed that their task was complete and were told the true nature of the study. Debriefing sheets (Appendix G) were offered to explain the deception used in the experiment. Contact information for results of the study were given along with resources for counseling services for any psychological distress that may have resulted from the study. Participants were then dismissed.

Data Analysis

Sample size and power analysis. The software *G*POWER 3.1.9* (Faul, Erdfelder, Buchner, & Lang, 2009) was used to calculate the minimum sample size required to address the proposed research questions. Each research question is listed below along with its respective sample size and analysis of power.

Research questions #1 and #2. The following statistical considerations were used: effect size = 0.5, $\alpha = .05$; Power $(1-\beta) = .95$. The sample used for research questions 1 and 2 ($N = 22$) was underpowered as evidenced by the recommended sample size of $N = 45$, $t_{cv}\,(44) = 1.6802$.

Research questions #3 and #4. The following statistical considerations were used: $f = .40$ (detecting a large effect size); $\alpha = .05$, Power $(1-\beta) = .95$, number of groups = 3. The sample size for this research question is $N = 22$. The recommended sample size is $N = 102$, $F_{cv}(2,99) = 3.0882$.

Statistical analysis. The data obtained from participant questionnaire answers was measured, coded, and analyzed using the Statistical Package for Social Sciences *(*SPSS, Version 21, 2012) with the significance level set at .05. Upon entering data into SPSS, a missing data-point was discovered in one participant's questionnaire. After a thorough investigation of this single case, this researcher decided to impute the missing value to create a complete data-set. Penny and Atkinson (2011) suggest that mean imputation of the missing value is appropriate to match the overall mean of the remaining observed data for the single case. As this method errs on the side of caution by underestimating the variance of imputed values, this method was deemed appropriate for dealing with this single missing data-point.

Exploration of inter-item correlation and co-variance of VAS questionnaire items (Appendix B, Measure B-1) was run to determine internal consistency. The original 45-item questionnaire created by Lobbestael, Arntz, and Wiers (2008) yielded good internal consistency (Cronbach's alpha = .86) and consisted of 10 subscales: Anger, Fear, Embarrassment, Frustration, Annoyance, Sadness, Loneliness, Impatience, Dejection, and Alertness. Analysis of these 10 subscales, compiled for use in the current study, also indicated good internal consistency (mean Cronbach's alpha = .79, range .62 to .93).

A principle components analysis with Varimax rotation determined that the VAS item for "Alertness" generated the least correlation with the other questionnaire items in

addition to having the highest standard deviation and lowest factor loading. Further analysis, with the exclusion of "Alertness," determined a 3-factor solution with no variables loading negatively on a single factor, specifically for factor 1. These factor 1 variables include Anger, Embarrassment, Frustration, Sadness, Anxiety, and Dejection. "Annoyance" and "Impatience" loaded together as the 2nd factor group, while "Fear" loaded separately in its own 3rd factor group. Factors 2 and 3 were eliminated from analysis due to separate factor loading. "Embarrassment" was also eliminated from factor 1 due to the lowest correlation between all items. Results of a factor analysis with the five remaining items—Anger, Frustration, Sadness, Anxiety, and Dejection—revealed a one-factor solution, indicating the measurement of an overall construct for all five items (See Table 2). Hence, these five VAS scores were combined into a single score representing frustration.

Table 2. Internal Consistency Analysis and Construct Validity of Variables in Visual Analog Scales (VAS).

	Baseline VAS Scores		
Measures	Factor Loading	*M*	*SD*
Anger	.62	2.45	2.44
Frustration	.92	8.09	14.47
Sadness	.82	5.91	10.94
Anxiety	.90	17.32	19.23
Dejection	.86	5.73	9.99
Total Score		7.90	

Note. $N = 22$; M = mean; SD = standard deviation. VAS items range from 0-100. All VAS items included anger, fear, embarrassment, frustration, annoyance, sadness, anxiety, impatience, dejection, and alertness. Factor analysis of all VAS items indicated high factor loading for anger, frustration, sadness, anxiety, and dejection scores. Scores these individual items were combined into a single measure of frustration. All other VAS items were eliminated due to low factor correlation or separate factor loading.

Research question #1. For the first research question, a paired samples *t*-test was used to examine the impact of emotion regulation strategies on self-reported frustration levels. Total frustration scores (See Table 2) from post-frustration (Appendix B, Measure B-2) to post-treatment (Appendix B, Measure B-3) were compared for all treatment groups combined to determine changes in self-reported frustration. Additional analysis of frustration scores from baseline (Appendix B, Measure B-1) to post-frustration was run to determine if the frustration-induction technique successfully induced experimental frustration—an assumption of the research design.

Research question #2. For the second research question, a Paired Samples *t*-test was run to examine the impact of emotion regulation strategies on each physiological measure—Systolic Blood Pressure, Diastolic Blood Pressure, and Heart Rate. Measures

were compared at post-frustration and post-treatment for all treatment groups combined to determine changes. As with research question #1, additional analysis of physiological measures from baseline to post-frustration was run to determine if the frustration-induction technique successfully induced physiological changes.

Research question #3. For the third research question, a Univariate Analysis of Variance (ANOVA) was executed to examine the variance in self-reported frustration post-treatment for each emotion regulation technique—Therapeutic Drumming, Yoga, or Silence (Control). Total frustration scores from post-frustration to post-treatment were compared to determine variance among groups in self-reported frustration.

Research question #4. For the fourth research question, a Multivariate Analysis of Variance (MANOVA) was executed to examine the variance in physiological measures for each emotion regulation strategy. Measures were compared at post-frustration and post-treatment for each treatment group to determine variances among treatment groups.

Chapter 4: Results

For the first research question, a paired samples *t*-test was conducted to compare effects of all emotion regulation strategies on self-reported frustration levels (See Table 3). Results indicate all treatment groups—Therapeutic Drumming, Yoga, and Silence (Control)—showed significant decreases in self-reported frustration ($M = 4.72$, $SD = 5.46$) at post-treatment measurement, $t(21) = 4.61$, $p = .000$. Additional analysis of frustration scores from baseline to post-frustration resulted in significant increases in self-reported frustration ($M = 19.20$, $SD = 18.87$) for all treatment groups, $t(21) = -3.52$, $p = .002$. These findings indicate successful induction of experimental frustration—an assumption of the research design. Omnibus Analysis of Variance (ANOVA) of these tests indicate that mean frustration levels following induction did not differ by treatment groups, $F(2, 19) = .68$, $p = .52$. These results indicate that no single group became more frustrated than another. Therefore, no post-hoc tests were performed to detect differences between levels of the independent variable.

Table 3. Changes in Self-Reported Frustration for All Treatment Groups.

					95% CI	
Total Frustration	*M*	*SD*	*MΔ*	*t*	Lower Limit	Upper Limit
Baseline	7.90	10.17				
Post-Frustration	19.20	18.87	-11.30	-3.52*	-17.99	-4.61
Post-Treatment	4.72	5.46	14.72	4.61**	7.95	21.00

Note: N = 22; *df* = 21*; M* = mean; *SD* = standard deviation; *MΔ* = mean change; CI = Confidence Interval. Visual Analog Scale items of anger, frustration, sadness, anxiety, and dejection were summed to represent one unit of Total Frustration. Baseline to Post-Frustration scores and Post-Frustration to Post-Treatment scores were compared to determine Paired Differences between each group. **p* = .002. ***p* = .000.

For the second research question, a Paired Samples *t*-test was run to compare effects of all emotion regulation strategies on each physiological measure—Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and Heart Rate (HR). Results (See Table 4) did not indicate significant differences in SBP ($M = 118.36$, $SD = 16.99$), $t(21) = 1.52$, $p = .15$, DBP ($M = 76.59$, $SD = 15.38$), $t(21) = -.10$, $p = .92$, or HR ($M = 76.36$, $SD = 11.23$), $t(21) = -.35$, $p = .73$, for all treatment groups. Additional analysis of physiological measures from baseline to post-frustration did not result in significant increases of SBP ($M = 124.50$, $SD = 17.05$), $t(21) = .27$, $p = .79$, DBP ($M = 76.32$, $SD = 8.57$), $t(21) = .41$, $p = .69$, or HR ($M = 75.91$, $SD = 12.61$), $t(21) = .66$, $p = .52$. These findings indicate that no physiological measures significantly changed following frustration-induction.

Table 4. Changes in Physiological Measures for All Treatment Groups.

Physiological Measures	*M*	*SD*	*MΔ*	*t*	95% CI Lower Limit	95% CI Upper Limit
Baseline						
SBP	125.36	14.93				
DBP	77.55	14.02				
HR	76.82	12.12				
Post-Frustration						
SBP	124.50	17.05	.86	.27	-5.71	7.44
DBP	76.32	8.57	1.23	.41	-5.06	7.52
HR	75.91	12.61	.91	.66	-1.96	3.78
Post-Treatment						
SBP	118.36	16.99	6.14	1.52	-2.29	14.56
DBP	76.59	15.38	- .27	- .10	-6.12	5.58
HR	76.36	11.23	- .46	- .35	-3.16	2.25

Note: N = 22; *df* = 21*; M* = mean; *SD* = standard deviation; *MΔ* = mean change; CI = Confidence Interval; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; HR = Heart Rate. Measurements of SBP, DBP, and HR were taken using the Wristech Blood Pressure Monitor JB5538. Baseline to Post-Frustration measures and Post-Frustration to Post-Treatment measures were compared to determine Paired Differences between each group.

For the third research question, a Univariate Analysis of Variance (ANOVA) was executed to examine the variance in self-reported frustration post-treatment for each emotion regulation technique—Therapeutic Drumming, Yoga, or Silence (Control). Results indicate no significant difference in Total Frustration (See Table 5) at post-treatment between experimental groups, $F(2, 19) = .87$, $p = .44$.

Table 5. Univariate Analysis of Variance in Self-Reported Total Frustration at Post-Treatment Between Experimental Groups.

Source	*df*	Sum of Squares	Mean Square	*F*	*p*
Treatment Group	2	381.50	190.75	.87	.44
Error	19	4167.82	219.36		
Total	22	9160.33			

Note. $N = 22$. Treatment groups included Therapeutic Drumming ($n = 8$), Yoga ($n = 6$), and Silence (Control) ($n = 8$). Visual Analog Scale items of anger, frustration, sadness, anxiety, and dejection were summed to represent one unit of Total Frustration.

For the fourth research question, a Multivariate Analysis of Variance (MANOVA) was executed to examine the variance in physiological measures for each emotion regulation strategy. Results indicate no significant difference in physiological measures (See Table 6) for SBP, $F(2, 19) = .38$, $p = .69$, DBP, $F(2, 19) = .38$, $p = .69$, or HR, $F(2, 19) = .1.51$, $p = .25$ at post-treatment between experimental groups.

Table 6. Multivariate Analysis of Variance in Physiological Measures at Post-Treatment between Experimental Groups.

Dependent Variables	*df*	SS	MS	F	*M*	*SE*	95% CI Lower Limit	95% CI Upper Limit
SBP	2	294.22	147.11	.38				
TD					10.25	6.92	-4.24	24.74
Y					1.00	8.00	-15.73	17.73
C					5.88	6.92	-8.62	20.37
DBP	2	138.99	69.49	.38				
TD					3.00	4.81	-7.07	13.07
Y					-1.50	5.55	-13.12	10.12
C					-2.63	4.81	-12.69	7.44
HR	2	107.37	53.69	1.51				
TD					-3.38	2.12	-7.78	1.03
Y					1.33	2.43	-3.76	6.42
C					1.13	2.11	-7.78	1.03

Note. $N = 22$. SS = Sum of Squares; MS = Mean Square; *M* = Mean; *SE* = Standard Error; CI = Confidence Interval; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; HR = Heart Rate; TD = Therapeutic Drumming; Y = Yoga; C = Control; Treatment groups included Therapeutic Drumming ($n = 8$), Yoga ($n = 6$), and Silence (Control) ($n = 8$). Post-Frustration to Post-Treatment differences for each physiological measure were calculated to determine mean differences in each measure by treatment group.

Chapter 5: Discussion

Results of this experiment support the effectiveness of all emotion regulation strategies for reducing subjective feelings of frustration. Self-reported levels of frustration were successfully induced by the frustration-induction procedure and reduced following each treatment group. It was hypothesized that participants would report lower frustration levels following either treatment condition—yoga or drumming. It was also hypothesized that participants in either condition would report lower frustration levels than the control group, which remained still. However, no differences were seen between any of the experimental groups, suggesting equal effectiveness of all techniques, including sitting in silence and remaining still. Physiological measures of blood pressure and heart rate were not found to change as a result of frustration induction or treatment intervention. As was seen with self-report measures, physiological measures also resulted in no differences between experimental groups.

Results of this experiment are consistent with model studies used to inform this research design. Original research on anger-induction techniques by Lobbestael, Arntz, and Wiers (2008) also found that all induction methods yielded significant increases in self-reported anger levels. Significant physiological changes were only seen in in groups that received some sort of personal contact with the researcher or research assistant. The frustration-induction procedure utilized in the current study had no form of personal contact, as the researcher left the room during the computer presentation to avoid projection of frustration on the researcher—a potential source of carry-over effects that

could confound frustration-reduction procedures. As no changes in physiological measures were seen as a result of frustration-induction, these findings support the original authors' theory that personal contact must be involved to induce physiological changes.

Additional parallels between the original study by Lobbestael, Arntz, and Wiers and the current experiment were seen in instrumentation. Although the current study utilized a 10-item VAS questionnaire modified from the original 45-item questionnaire, comparable levels of internal consistencies were found for both versions. These results further validate the use of the authors' questionnaire for the consistent measurement of frustration levels in addition to providing a more succinct version which measures the same construct.

Replications to Gadberry's (2011) Stroop color-word test mood-induction procedure were also supported in the current experiment. Her original study successfully induced experimental anxiety using the neurological test as a means for mood-induction. The current study also supported successful use of this test as a means to induce experimental mood-states, particularly negatively veiled emotions like frustration. Although the mood-induction procedure in Gadberry's study differed from the current study, the overall effectiveness of the technique was still observed through evidence of increases in self-reported frustration.

Limitations

Although no significant differences were seen in both self-report and physiological measures between treatment groups, results do not necessarily indicate that no differences exist among these groups. Rather, these results call for further refinement of the controlling variables and experimental design. As both the model and current

experiment observed a relationship between the presence of a person to resulting physiological changes in frustration-induction procedures, this should be directly addressed in future research. The use of a research assistant (a "confederate") during the frustration induction could eliminate confounding carry-over effects on the researcher involved in any treatment group. As a confederate to the study, the assistant would provide all verbal provocation and feedback on performance in the computer-based task, replacing these aspects of the presentation. Additionally, the researcher should be present with the participant for all treatment conditions. In the current study, the researcher left the room during the silence (control) condition to eliminate any urges from the participant to talk to the researcher during this time. However, the researcher was present for the drumming and yoga conditions. This modification should be implemented in future studies to control variations that may occur due to this factor.

Further refinement to the computer presentation of the frustration-induction procedure, the Stroop-color word test, would also strengthen future studies with a faster succession of slides. Interviews of participants following the experiment indicated that several participants realized something was off with the computer presentation because they were sure they gave the correct response when given feedback of an incorrect response (buzzer). A quicker succession of slides from 1 second each to .5 seconds each will reduce the amount of processing time for each slide, potentially resulting in reduced confidence in correct answers.

Participant interviews at debriefing asking for guesses on the true purpose of the study also revealed that several participants deduced the intent of the experiment despite levels of deception employed in the research design. Although few participants deduced

that frustration levels were the focus of measurement (most thought the study focused on anxiety levels), the majority gathered that the computer presentation was meant to induce stress. Although several deceptions, including the guise of a health-related study, were utilized to mask the purpose of research, additional precautions could be taken in future studies. Upon examination of the ten VAS items included in questionnaires, it was discovered that the majority of items (all items except for "Alertness") have a negative valence. Although research by Sinclair, Mark, Enzle, Borkovec, and Cumleton (1994) on Velten mood-induction procedures indicates that demand characteristics involved with negatively-veiled words may not account for all variance in mood-induction, these findings do not fully eliminate this as a possible source of error. As the current study reduced VAS frustration measures to a single factor of five items, additional items from the original 45-item questionnaire could be utilized to include VAS measurements with positive valences. The use of positively-veiled mood words along with the negatively-veiled could reduce this demand characteristic even further in addition to the use of deception already employed.

Additional limitations to this study include a small sample size with low experimental variance. All participants were volunteers from various music classes with the vast majority being music therapy majors. Participating in musical activities like drumming are common and enjoyable activities for this sample. Students of different majors may not respond to musical interventions the same way a musician might. This small sample pool also created a dual role for the researcher for many cases, as the researcher also supervised several participants in clinical fieldwork at the time of the study. Confounds to the experimental procedure also involved variations in activity of

adjacent practice rooms while the experiment took place. Several participants were subjected to the sounds of practicing musicians while undergoing the experiment. Others were able to participate with no additional noises.

Implications and Future Research

As self-reported frustration did not differ between experimental conditions, the question remains about which factors are involved in emotion regulation. What self-regulatory components are involved in the reduction of frustration? Results of the current study suggest that movement is not essential to emotion regulation as the control group, which remained still, saw equal reductions in frustration levels. These findings suggest that the passage of time may be the common variable responsible for the observed reduction in frustration. These findings also pose a question about the self-regulatory processes occurring during this time of silence. Robb (2000) found in her study on music assisted relaxation that many participants in the silence condition utilized some form of self-generated technique to enhance their own relaxation. Participants in the current study may also have used self-regulatory techniques to assist in frustration reduction. However, it should be considered that an angry or frustrated person may be unlikely to take this time or even know how to self-regulate without direct instruction. How many typically functioning people give themselves a "time-out" at moments of intense frustration?

It should also be considered that these results were found in a typical population of college students. The passage of time required for self-regulation in times of peak frustration may be more difficult to attain for individuals with anger-regulation problems—the intended population for these emotion-regulation techniques. Twemlow,

Sacco, and Fonagy (2008) state that, "violent, non-mentalizing individuals who act out aggression do not usually respond to verbal therapeutic approaches alone" (p. 1). Simply giving a direction to such an individual to take a few minutes to calm down may not result in the desired reduction of frustration levels. Additional research with the intended population could indicate differences between treatment and control conditions.

An additional explanation to the observed similarities in all treatment conditions may involve another parallel to the Gadberry's (2011) findings in her study on steady beats. Gadberry suggests that the steady beat alone holds the potential to reduce state anxiety. In the control condition, a clock was present in the research room, providing a steady ticking to mark the passage of time. Although this group was intended to sit in silence to control for the movement and rhythms involved with the other treatment groups, they too were subjected to a steady beat. Was the presence of this rhythm responsible for the similarities seen between all experimental groups? Further research eliminating this potential influence could yield differing results.

Although results of this study suggest emotion regulation can be achieved with minimal intervention over the course of as little as seven minutes, applications to real-world settings remain elusive. Anxiety- and depression-related disorders associated with levels of aggression are on the rise and acts of violence are steadily increasing in number (Neumann, Veenema, & Beiderbeck, 2010). Although the causes of aggressive thoughts and actions are unclear, research suggests a connection to disturbed emotion regulation (Davidson et al, 2000). If more research is conducted to enhance our understanding on the use and effectiveness of emotion regulation techniques, proper treatment for these psychological disturbances may be achieved.

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APPENDIX A: FLIER ADVERTISING FOR PARTICIPANTS

Hey You!!! Look Over Here!!!

Interested in research?

Want to know more about your health and wellness?

Today is your lucky day!

You can learn about research first-hand by participating in a quick study on health and wellness. This study will track your physiologic and emotional responses to psychological testing, physical activity, and musical experiences.

Want to hear the benefits of this?

Oh boy, do you *ever*!

You will not only have a chance to participate in cool musical or movement experiences, but you will also learn a few stress-reduction techniques along the way. Who could ask for anything more??

Got a *crazy* schedule?

No worries! Meeting times can be flexible and only require 20 minutes of your time.

For more information

or to sign up to participate, contact:

Emily Broadhurst, MT-BC

(707) 365-5084

e_broadhurst@u.pacific.edu

APPENDIX B: QUESTIONNAIRE

For the following items, place a vertical mark on each line to rate your emotional state at this moment. Refer to the following guide:

Mild Moderate Severe

1. Anger

2. Fear

3. Embarrassment

4. Frustration

5. Annoyance

6. Sadness

7. Anxiety

8. Impatience

9. Dejection

10. Alertness

BP:_____ HR:_____

Health Questionnaire

1. Do you believe you are in good health, generally (circle one)?
   Yes / No

2. How many hours do you sleep each night on average?

   _____

3. How many cups (8 oz.) of water do you drink daily on average?

   _____

4. How many caffeinated drinks (soda, coffee, tea, energy drinks, etc.) do you consume per day on average?

   _____

5. How many days per week do you exercise for 30 minutes or more (walking, weight-lifting, sports, etc.)?

   _____

6. How many times do you eat per day on average (include both meals and snacks)?

   _____

7. Do you use tobacco products (cigarettes, cigars, chewing tobacco, etc) regularly?

   _____

8. Age:

   _____

9. Sex (circle one):
   M / F

10. Ethnicity:

    _____

For the following items, place a vertical mark on each line to rate your emotional state at this moment. Refer to the following guide:

Mild Moderate Severe

1. Anger

2. Fear

3. Embarrassment

4. Frustration

5. Annoyance

6. Sadness

7. Anxiety

8. Impatience

9. Dejection

10. Alertness

BP:_____ HR:_____ Measure B-2

For the following items, place a vertical mark on each line to rate your emotional state at this moment. Refer to the following guide:

Mild Moderate Severe

1. Anger

2. Fear

3. Embarrassment

4. Frustration

5. Annoyance

6. Sadness

7. Anxiety

8. Impatience

9. Dejection

10. Alertness

BP:_____ HR:_____ Measure B-3

APPENDIX C: NARRATION SCRIPT

Audio Narration for PowerPoint Presentation Total show time: approx. 7 minutes, 30 seconds

SLIDE 1:

Welcome to the Smith-Harris Neuroscience Testing series. This portion of the series measures executive functioning.

SLIDE 2:

This software is voice-interactive. We will begin with a sound test to ensure proper audio analysis. Please indicate if you hear the following tone with a clear, "Yes," or "No."

long beep followed by a 5 second pause

Did you hear the tone? Please respond now.

5 second pause

SLIDE 3:

Great. All software is working properly. Let's begin the test.

SLIDE 4:

A series of words will appear on the screen. Your task is to say the word aloud.

SLIDE 5:

Incorrect responses will be noted with the following tone:

loud buzzer

Feedback will be given at the bottom of the screen to help you monitor your progress.

SLIDE 6:

Let's begin the test. Say the name of each word that appears on the screen as quickly as you can. Remember to speak clearly for accurate audio-analysis.

SLIDE 7:

Ready? Let's Begin

SLIDES 8-86:

1 minute, 20 seconds pause

SLIDE 87:

Great. Let's move on to the second task.

SLIDE 88:

A series of colors will appear on the screen. Your task is to say the color aloud as quickly as you can. Remember to speak clearly for accurate audio-analysis.

SLIDE 89:

Ready? Let's Begin

SLIDES 90-168:

40 second pause

Loud buzzer

40 second pause

SLIDE 169:

Great. Let's move on to the final task

SLIDE 170:

A series of words with conflicting color fonts will appear on the screen. Your task is to say the font color aloud as quickly as you can. Research suggests performance on this task is correlated with levels of mental sharpness. Remember to speak clearly for accurate audio-analysis.

SLIDE 171:

Ready? Let's Begin.

SLIDES 172-191:

20 second pause

SLIDE 192:

Loud BEEP

SLIDES 193-203:

10 second pause

SLIDE 204:

Loud BEEP

SLIDE 205-209:

5 second pause

SLIDE 210:

Loud BEEP

SLIDE 211-219:

9 second pause

SLIDE 220:

Loud BEEP

SLIDES 221-229:

9 second pause

SLIDE 230:

Loud BEEP

SLIDES 231-241:

11 second pause

SLIDE 242:

Loud BEEP

SLIDES 243-245:

3 second pause

SLIDE 246:

Loud BEEP

SLIDE 247:

1 second pause

SLIDE 248:

Loud BEEP

SLIDE 249:

1 second pause

SLIDE 250:

Loud BEEP

SLIDE 251*:*

Testing completed.

SLIDE 252:

Your performance was

2 second pause

Below Average

SLIDE 253:

This software is brought to you by Smith-Harris Neuroscience Testing series.

APPENDIX D: INFORMED CONSENT

Health and Wellness: an Exploratory Study
Informed Consent

You are invited to participate in a research study which explores mental and physical health. My name is Emily Broadhurst, and I am a graduate student at the University of the Pacific studying music therapy. You were selected as a possible participant in this study because of your enrollment in research courses or interest in research studies.

The purpose of this research is to explore the health and wellness of college students through various psychological questionnaires and tests as well as physical activities. If you decide to participate, you will be asked to fill out questionnaires, participate in psychological testing, and submit to physiological readings, including heart rate and blood pressure. You may also be asked to participate in physical activities, including a short yoga or drumming session. Your participation in this study will last about 20 minutes.

There are possible risks involved for participants. Physical activities used in the study involve movement and flexibility, increased heart rate, loud sounds, and possible jarring movements. Participants may also experience emotional or psychological stress due to participation in tests used in the study.

There are some benefits to this research, particularly that participants will gain knowledge on psychological disorders and stress-reduction techniques.

If you have any physical concerns regarding participating in a yoga or drumming session, please let the researcher know so that modifications can be given to safely participate or sit out of these activities.

If you have any questions about the research at any time, please call me at (707) 365-5084, or my thesis supervisor, Dr. Eric Waldon, at (209) 946-2419. If you have any questions about your rights as a participant in a research project, please call the IRB Administrator, Research & Graduate Studies Office, University of the Pacific (209) 946-7367.

Any information that is obtained in connection with this study will remain confidential. No identifying information will be collected and all data will be kept secure in the possession of the researcher until it can be stored in a locked file cabinet. The data will be maintained in a locked location and will be destroyed after a period of three years after the study is completed.

Your participation is entirely voluntary and 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.

Your signature below indicates that you have read and understand the information provided above, that you willingly agree to participate, that you may withdraw your consent at any time 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.

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

Signature Date

_____

APPENDIX E: YOGA PROCEDURE

This 7-minute yoga routine was instructed by the researcher to participants randomly assigned to the group.

1. Set up
    a. Participants were given the option to remove their shoes and spread out about an arms-length distance from other participants. No yoga mat or athletic clothing were necessary to participate in the routine.
    b. Selections from the CD "Ayurveda Buddah Lounge," a compilation of yoga music, were played softly in the background.
    c. The researcher faced participant in the practice room to demonstrate poses.
2. Opening
    a. The participant was instructed to stand in place and become aware of his or her breath. The researcher let them focus on their breath for about 30 seconds before starting any movement.
    b. During this time, the researcher told the participant to listen to cues from his or her body to not do any movements that cause pain.
    c. Modifications were provided by the instructor as they were needed.
3. Modified Sun Salutations
    a. Participants raised their arms overhead, bent forward, and touched their toes.
    b. Remaining here for a few breaths, the researcher prompted them to rise back up with arms overhead and then bring hands to a prayer position at the chest.
    c. This was repeated 2 more times.
4. Modified Half Moon Pose
    a. Participants raised their arms overhead and exhaled as they bent their upper body to the right side.
    b. This position was held for 5 breaths before returning to center.
    c. This sequence was repeated to the left and back.
5. Rag Doll Pose
    a. Participants bent forward at the waist, holding on to the elbows with the hands.
    b. They remained in this position, bending and straightening the knees as prompted by the researcher.

6. Closing
    a. Participants settled into a seated position.
    b. Sitting cross-legged, the participant closed by becoming aware of their breath once more.
    c. With hands resting on the knees, the yoga procedure closed with 3 deep breaths in unison with the researcher.

APPENDIX F: DRUMMING PROCEDURE

This 7-minute drumming activity was led by the researcher to participants randomly assigned to the group.

1. Setup
    a. No musical experience was necessary to participate.
    b. Various percussion instruments, including a tambourine, small djembe, and medium sized djembe, were presented for choice.
    c. A rhythm was played using the Garage Band application as the participant was prompted to choose an instrument. The rhythm was played at a steady 4/4 beat at 120 beats per minute.
2. Opening
    a. The researcher prompted the participant to choose an instrument and get acquainted with the instrument by picking it up and exploring different ways to create sound.
    b. The researcher instructed on proper ways to play the instrument (ie: "Use a flat hand with slightly separated fingertips on your drum") and offerred tips for finding new ways to create sound (ie: "Try playing the drum with your fingertips").
    c. This took approximately 1-2 minutes.
3. Play Beat "One" – Entrainment
    a. The participant was instructed to play on beat one, which was demonstrated by the researcher by counting out loud (ie: "ONE, two, three, four, ONE, two…").
    b. Prompts were given to become increasingly louder and to make bigger alternating arm movements for each beat "One."
    c. This continued for 1 minute
4. Increase Speed
    a. As modeled by the researcher, the group was prompted to increase playing by striking the drum on every beat—one, two, three, and four.
    b. Visual prompts were given to play louder or softer during this time.
    c. This continued for 1 minute.
5. Rhythmic Imitation
    a. A simple rhythm (ie: one, two, three-and-a, four) was then played by the researcher with a visual prompt for the participant to mimic the rhythm.
    b. This call and response continued for the next minute.

6. Improvisation until Closing
    a. The last two minutes involved improvisation—the participant was visually cued to play any rhythm they choose.
    b. During this time, the researcher also gave cues to switch instruments by stepping one space over to the right.
    c. The drum circle ended with a quick drum-roll and one final beat in unison.

APPENDIX G: DEBRIEFING

The Effect of Frustration-Reduction Techniques on Self-Rated Mood Scales

Debriefing

Purpose

The purpose of this study is to explore effective treatment options for frustration. Two activities will be examined in this study to validate their use as frustration-reduction techniques—yoga and therapeutic drumming. It is hypothesized that participants will report lower frustration levels following either treatment condition—yoga or drumming. It is also hypothesized that participants in either condition will report lower frustration levels than the control group, which will remain still.

Supporting Research

Did you become angry during this research? That was the idea. To induce experimental frustration you were subjected to a frustration-induction technique—the Stroop color-word technique with added levels of harassment. According to Lobbestael, Arntz, & Wiers (2008), anger induction has the highest success rate when harassment and provocation are involved. The "voice-interactive software" was actually a power-point presentation narrated to give scripted comments regardless of performance on this psychological test to add pressure to this challenging task.

A level of deception was utilized in this study to eliminate flaws in data collection. Kucera & Haviger (2012) found in their study on mood induction procedures that the manipulation of mood, specifically anger, is most successful if the participant believes that the situation is a real experience. Because of this, you were led to believe that the research was a health and wellness survey and that performance on psychological testing—the Stroop color-word technique—was indicative of mental sharpness and overall health. If the true nature of the study were divulged to you from the beginning, the frustration-induction procedure may not have successfully manipulated your mood and your answers on the visual analog mood scales may have been biased.

Psychological Services

If this research has made you feel uncomfortable and you feel that you may want to talk with someone, there are psychological services available to you in the Cowell Wellness Center on campus. The phone number there is (209) 946-2315.

Contact Information

The results of this study will be available in Spring 2014. If you would like further information about this study or have questions regarding this study, do not hesitate to contact the researcher. Emily Broadhurst, MT-BC can be reached at e_broadhurst@u.pacific.edu.

For your knowledge…

Did you know that every year there are over 700,000 deaths as a result of acts of aggression (Neumann, Veenema, & Beiderbeck, 2010)? How has the world become so full of violence and acts of terror? Over the past several decades, researchers have studied violence portrayed in the media to examine the causal effects they take on society (Anderson, et al., 2003). Although the negative outcomes to anger and aggression, like school shootings and terrorist attacks, have been identified in research, little is known about causal factors that lead to aggressive behavior (Fives, Kong, Fuller, & DiGuiseppe, 2011). Several psychiatric disorders, including anxiety- and depression-related disorders have been associated with aggressive behaviors (Neumann, Veenema, & Beiderbeck, 2010). According to Davison et al. (2000), excessive aggression may be due to disturbed emotional regulation. If this is true, then it is important to understand the link between social behavior and emotional regulation to properly treat these psychological disturbances (Neumann, Veenema, & Beiderbeck, 2010).

So What?

Are you stressed out by school, work, or relationships? You are not alone. Next time you feel your blood pressure rising and feel like breaking something, try some of these relaxation techniques:

1. Mindfulness
    a. Find a quiet place where you can sit for a moment. Can't find one? Plug your ears with your headphones to block outside sounds and close your eyes.
    b. Sit comfortably either in a chair or on the floor. Relax your shoulders and rest your hands on your knees.
    c. Let go of all thoughts outside of your space—forget to-do lists, pending assignments, or worrisome thoughts. Imagine those thoughts traveling out of the room and closing the door behind them.
    d. Focus your attention on the sound of your breath. Draw the breath to the back of the throat to create a louder, airier sound. Take deep, long breaths, making each one a little more drawn out than the last.
    e. If your mind wanders, acknowledge the thought and send it out the door. Refocus on your breath.
    f. Do this for at least 5 minutes or longer

2. Square Breathing
    a. Try adding music to your mindfulness exercise. Find a song with a slow, steady rhythm and a simple melody (Think yoga tracks or Enya songs).
    b. Time your breath to match the music. If your breath feels too rushed, try a slower song or slow down your counting.
    c. Inhale for 4 counts—you can send your breath to the back of the throat or breathe normally.
    d. Hold for 4 counts
    e. Exhale for 4 counts.
    f. Hold for 4 counts.
    g. Repeat this, keeping your breath in synch to the music
    h. Continue for the song duration or continue this with several songs.