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THE EFFECTS OF VOCAL VS. INSTRUMENTAL MUSIC ON STRESS RELIEF AS MEASURED THROUGH ANXIETY LEVELS

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THE EFFECTS OF VOCAL VS.INSTRUMENTAL MUSIC ON STRESS RELIEF AS MEASURED THROUGH ANXIETY LEVELS

By

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ABSTRACT

THE EFFECTS OF VOCAL VS.INSTRUMENTAL MUSIC ON STRESS RELIEF AS MEASURED THROUGH ANXIETY LEVELS

By

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This study examined the difference in stress relief between musicians and non-musicians under conditions of instrumental music, vocal music and silence. Fifty one university students, 24 musicians and 27 non-musicians were randomly assigned to one of these conditions. Participants completed the state portion of the State and Trait Anxiety Test (STAI) before and after each experimental condition. An additional question asked participants about relaxation techniques that they regularly used. Only vocal music listeners were asked to rate the effect of the lyric content on their relaxation. Paired sample *t*-tests revealed that both music listening groups reported significant decreases in anxiety level (p=.000), but no significance with the silence group (P=.110). The results of the 2-way ANOVA comparing 3 treatments on one axis and music training on the other showed a statistically significant difference between groups for state anxiety (F=6.095, P=.005). On the other hand there was no significant difference between musicians and non-musicians across conditions (F=1.922, p=.173). Numerical mean score differences in anxiety levels showed that the instrumental music condition resulted in the greatest decrease in anxiety, over both the vocal music and silence conditions.

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CHAPTER I

INTRODCTION/LITERATURE REVIEW

Background

Stress is a normal part of life in today's fast-paced environment. Responses to stress can have a positive effect, spurring one's motivation to cope with challenging situations, but they also can have negative effects when a person faces continuous challenges without good coping strategies for stress (Burns & Labbe, 2002). Emotional stress, characterized by anxiety, apprehension, and nervousness, can induce physiological complications if not relieved (Salamon, Kim, Beaulieu, & Stefano, 2002). Individuals have looked for ways to cope with stress and have identified such coping strategies as regular physical exercise, deep breathing, or yoga. Music, too, has been used to manage stress and anxiety for a variety of individuals (Biley, 2000; Robb, 2002; Burns, Labbe, Willams, & McCall, 1999; Hanser, 1985; Mornhinweg, 1992). Listening to music has been shown to be an effective means of inducing a positive state of mind, as well as derive wellness benefits by facilitating relaxation and stress management (Krout, 2007; Labbe, Schmidt, Babin, & Pharr, 2007).

While many studies have found that music effects stress relief, appropriate music selections are an essential component in facilitating relaxation response. The author's personal and musical experiences had fostered curiosity regarding the investigation of different effects on relaxation, particularly in comparing instrumental and vocal music on relaxation. However, a limited number of studies have studied the effects of instrumental versus vocal music on stress relief.

Purpose of this study

The purpose of this study is to investigate the difference in stress relief between non-musicians and musicians under three conditions: instrumental music, vocal music and silence. The research problem of this study is to examine whether instrumental or vocal music has more psychological effect on stress relief, and to discover whether non-musicians and musicians respond differently from each other to stress reduction procedures using different types of music.

Literature Review

A number of studies have found that music can serve as a helpful distraction from a stressor and can result in beneficial physiological effects that are consistent with reduced stress (Bartlett et al., 1993, Bernard et al., 2006, Chlan, 1998, Lai, 2004; Salamon et al., Robb, 2000; Salamon et al., 2003; Scheufele, 2002). Scheufele (2000) concluded that subjects in a music group had lower heart rates and experienced more distraction from a stressor after listening to music. Bartlett, Kaufman, and Smeltekop (1993) found that preferred music listening as "perceived sensory experiences" produced a significant decrease in levels of interleukin-1 and cortisol, which are closely associated with immune system's response to stress. Several researchers have reported that subjects listening to classical music or self-selected music experienced lower skin temperature, lower respiration rate, lower blood pressure, and higher finger temperature, than those who listened to hard rock music or sat in silence (Biley,

2000; Burns & Labbe, 2002; Lai, 2004; Chafin, 2004; Salamon et al., 2003), but there were no differences in the heart rates and frontalis muscle tension between the classical music group and the hard rock music group(Burns et al, 1999). Therefore, physiological changes to different types of music were not always consistent, and physiological indicators might be variable in their sensitivity to stress factors.

Contrary to other researchers, Bernardi et al. (2006) found that a randomly inserted pause in music induced greater relaxation than simply the exposure to music. Bernardi concluded that music with slower rhythms and inserted pauses can be used to reduce arousal as shown through decreased heart rates, blood pressure, and ventilation tests.

Previous studies have found that music has positive effects on psychological relaxation. Mornhinweg (1992) showed that listening to different types of music made a difference in the level of perceived relaxation. People who listened to Mozart's "Eine Kleine Nachtmusik" reported more stress relief and lower negative emotions than those who listened to either New Age music or those who read popular magazines (Smith & Joyce, 2004).In addition, college undergraduate students who listened to classical music, self-selected music, or sat in silence appeared themselves to be more relaxed and less anxious than those who listened to hard rock music. The findings suggested that hard rock music has an effect on the cognitive component of stress response which may obstruct an individual's ability to relax or make them become anxious (Burns & Labbe, 2002). The Labbe et al. (2007) study found that individuals who listened

to heavy metal music after exposure to stress experienced a greater level of state anxiety than those who listened to classical music or self-selected relaxing music. Ibrahim (2004) compared the psychological effects of classical music and popular music on female high school students. This researcher found that music with quick rhythms was liked by the subjects and had positive effects on removing stress and inducing peace of mind. Previous studies found that preferred self-selected music rendered significant relaxation responses (Davis &Thaut, 1989; Wolfe et al. (2002); Pelletier, 2004; Smith & Joyce, 2004; Labbe et al, 2007). The Labbe et al. (2007) study reported that the preferred music chosen as relaxing by the individual might foster feelings of personal control. However, Pelletier (2004) mentioned that subject- preferred music may induce listener distraction through increased stimulation, so would have less effect in increasing relaxation. The author also stated that familiarity and preference with music are different. She suggested that repeated exposure to preferred music in a relaxation condition may bring optimum increased in relaxation response.

Psychological and physiological responses to music during relaxation can be both interactive and independent of one another (Robb, 2000). Music therapy intervention for stress management generally begins with physically based relaxation exercises. Scheufele (2000) and Robb (2000) found that subjects in music assisted progressive muscle relaxation were reported to be more relaxed and less stressed than subjects experiencing Mozart music or Silence. The Progressive Relaxation techniques combine muscle tensing-relaxing exercises while listening to verbal instructions contained on the tape (Scheufele, 2000).

The narrated relaxation instructions are believed to elicit imagery and cognitive responses which may affect the limbic system (Krout, 2007). Progressive Relaxation has had the greatest effects on psychological and behavioral measures of relaxation. From previous findings, the best considerations for relaxation music might be listening to familiar and preferred music in a stress-free environment.

Related studies

Music as a method of reducing psychological stress has been found in a number of papers. The important factor in music selection may be to identify the musical characteristics that contribute to perception of relaxation. Wolfe et al. (2002) examined specific musical elements that were considered to be relaxing from participants' verbal and written responses. Participants identified slow tempo, consistent dynamics, small numbers of instruments, and softer sounds as relaxing musical characteristics. In her study Lai (2004) selected soothing music with slow tempo, controlled variation in volume and speed, and sustained melodic quality without lyrics at 60 to 80 beats per minute. Hanser (1985) concluded that music has considerable potential to reduce stress, and that the selection of music can affect the therapeutic effect of music.

Many studies found that certain types of music, such as classical music and New Age music, have consistently produced physiological and psychological benefits. Bartlett et al (1993) selected music for their research based on the relaxation studies that suggested the importance of musical elements such as

non-percussive, legato, slower tempo, and a soft dynamic. Four options of classical and New Age music were offered as choices for relaxation by the university student subjects. Smith and Joyce (2004) reported that Mozart listeners appeared to experience more psychological relaxation than New Age listeners, characterized by peace and lower negative emotion, in the Smith R-State Inventory (SRSI), but both groups of music listeners showed higher levels of Thankfulness and Love. Mornhinweg(1992) found that New Age music was statically significant in its effect in inducing relaxation. New Age music was developed during the 1960s to help humans operate at a higher level of efficiency and to decrease the stresses of everyday events. New Age music has no central theme, no strong beat, and no recognizable melody and has static harmonic structure. This bland and mellow style of music has been shown to help alter mood in a positive direction and produce an environment of relaxation (Mornhinweg, 1992).

Little research has examined the difference between the effects of vocal and instrumental music. Standley (1986) determined that slow, quiet and nonvocal music generally lowered physiological responses associated with stress, while fast music heightened physiological responses. In Krout's study, he suggested that processing of the meanings of the lyrics or word texts may stimulate emotional responses, which may bring about a contrary effect, considering the goal of relaxation. Biller et al. (1974) found no significant differences in trait anxiety between listening to sad and happy music defined by musical harmonies, but sad music decreased state anxiety more than happy

music. Davila & Menendez (1986) noted in the literature that instrumental music was more effective in reducing excessive anxiety and stress than vocal or no music during dental procedures. However, the studies above did not systemically study vocal music's effects.

Many studies have monitored relaxation levels using various physiological measurements, such as heart rate, muscle tension, skin or finger temperature, before and after exposure to a music intervention, or in silence. The investigators told participants to close their eyes and sit quietly while listening to music (Burn & Labbe, 2002; Chafin, 2004; Salamon et al., 2003, Lai, 2004; Biley, 2000).

Smith and Joyce (2004) gave participants a choice of preferred-relaxation activities from among Mozart music, New Age music and reading magazines. Before and after each session, the Smith R-States Inventory (SRSI) asked participants to report their relaxation-related states with a 30-item self-report inventory that assessed stress states as reflected in reports of somatic signs, worry, and negative emotions. Several studies have used the Spielberger State Anxiety Inventory (STAI) to measure stress level. Robb (2000) used STAI with a 20-item self-report questionnaire that evaluated how respondents felt at the present moment. Perceived relaxation was measured using a visual analog scale (VAS) labeled "completely relaxed" in the right anchor and "completely unrelaxed" in the left anchor of the scale. Pre-and posttest differences were compared for significant change in relaxation relief. STAI is a reliable test and has been used generally in research and clinical practice.

Bernardi (2006) found that there were significant differences between musicians and non-musicians in physiological responses. Musicians had a significantly lower baseline respiratory rate ($p < 0.05$) and increased breathing rate with increasing tempo. The results of the meta-analysis by Pelletier (2004) indicated that subjects with musical experience were more affected by music-assisted relaxation techniques due to their understanding, greater involvement, and comfort level with music. On the other hand, Fredrickson (2000) concluded that musicians and non-musicians responded with similar perceptions of their tension elicited by the same musical selections. In the study by Wolfe et al. (2002), musicians and non-musicians showed similarities in ratings across musical selections.

The results of my pilot study demonstrated that instrumental music appeared to elicit a greater decrease in negative feelings and increase in positive feelings than vocal music or silence. There were no major differences between musicians and non-musicians among groups, but mean differences on stress levels indicated that musicians appeared to show a marked decrease in stress in both vocal and instrumental music listening groups. Therefore, the results suggested that musicians might be more responsive under conditions of relaxation with music than are non-musicians.

The hypotheses for this study are as follows 1. Participants who listen to music will report greater levels of stress relief as measured by the state anxiety Scale of the STAI-Y form than those who are in a condition of silence. 2. Participants who listen to instrumental music will experience lower levels of

stress than those who listen to music with discernable lyrics. 3. Musicians will experience more stress relief in music assisted relaxation than non-musicians.

CHAPTER II

METHOD

Participants

Fifty-one college student volunteers from Michigan State University participated in this study. Participants' age range varied from 19 to 52 with a mean age 27.4 years. Participants were recruited and randomly assigned to one of three relaxation conditions. Seventeen students participated in each condition. Eight musicians and nine non-musicians were placed in an instrumental music listening group, eight musicians and nine non-musicians were placed in a vocal music listening group, and eight musicians and nine non-musicians were placed in a silence group. The categories of musician and non-musician were defined as follows: Musicians are those who have had 1) previous private music instruction at the high school or college level, and 2) participation in at least one performing ensemble at high school or college level, and non-musicians are those who do not fit the two criteria above and who have limited musical experiences, defined as less than 2 years in music training. Musicians turned out to be all music majors, and non-musicians turned out to represent various college majors outside of music.

Materials

Participants took the State portion of the State and Trait Anxiety inventory (STAI), using the 20 item self-report questions that evaluated how they felt at the moment of the test administration. The scale of the test was labeled "Not at all" to

"Very much so". The scales were converted into numerical scores as follows: "Not at all"=1, "Somewhat"=2, "Moderately so"=3, "very much so"=4.

The music was selected from similar styles of instrumental New Age music and vocal New Age music which were thought to be a neutral musical genre for musicians and non-musicians. The music had pleasant rhythms and melodies with a tempo of 80 to 100 beats per minute. Vocal music selections include *Beautiful, You*, and *My Angel* composed by Jim Brickman and *Amarantine* and *It's in Rain* sung by Enya. Instrumental music includes *A walk in the forest* by Brian Crain, *Eternity* by Yuriko Nakamura, *Dance of the Dragonfly* by Kevin Kern, *Landscape* by Isao Sasaki, and *Angel Eyes* by Jim Brickman. (http://www.iTunes.com)

Procedure

Each group was conducted separately in a classroom at the Music Building at different times during finals week, a time considered to be high-tension for college students. The author introduced the study to the group members and asked them to read and sign the consent form to participate in this study.

Each participant in the two music groups took the STAI as a pretest measure. Upon completion of pretest measures, lighting in the testing room was dimmed. The receptive listening groups were seated in classroom desks with eyes closed and to listen to the music for 20 minutes. The music stimulus contained 15-second pauses between music tracks. Participants were asked to answer a questionnaire about whether or not they have regularly used relaxation

techniques to cope with stress. The vocal music group was asked to rate the effect of lyric content on their relaxation using the same rating scale from 1 to 4.

The control group took the STAI measure before and after the silence. The participants were instructed to sit in silence for 20 minutes in the testing room. Participants were not allowed to talk or read anything during the silence.

Measurement

In order to examine changes in anxiety states, pre and posttest scores for the stress anxiety level were compared within and across each of the conditions to determine the effectiveness of each experimental condition. To evaluate the magnitude of these changes, the difference of stress level as measured by anxiety was calculated by subtracting the posttest rating from the pretest rating.

To determine whether instrumental music or vocal music had a differential effect on stress relief, paired sample *t*-tests were calculated for pre and posttest differences on the vocal and instrumental groups. A two-way analysis of variance (ANOVA) was used in statistical analysis, with treatments on one axis and musician/non musician on the other to compare differences between music types and level of music experience. The open-ended question about relaxation techniques that they regularly used was analyzed by calculating the percentage of each technique compared to the whole.

CHAPTER III

RESULTS

Pre and posttest scores for the anxiety level (STAI) were compared within each group to verify the effectiveness of each experimental condition. The differences of anxiety level were calculated by subtracting the pretest mean scores from the posttest mean scores. Raw score means for anxiety level showed a decreased state of anxiety for all groups (see Figure 1).

FIGURE 1
Changes of Anxiety Level for each group condition

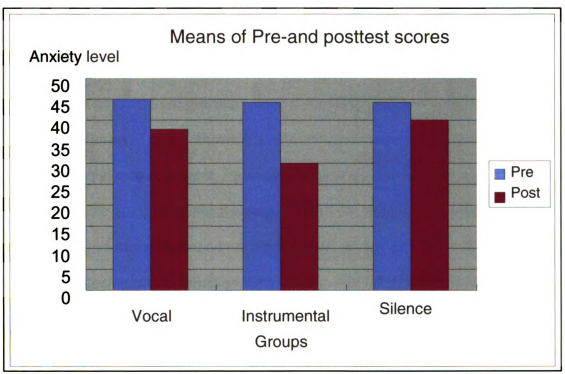


TABLE 1
Paired sample t-tests by groups

Group	Mean	SD	t	df	2-tails Significance
Vocal music (N=17)	Pre: 44.94 Post:37.82 Pre-post: 7.12	9.32 6.96	6.691	16	P=.00
Instrumental (N=17)	Pre: 44.18 Post: 30.06 Pre-post:14.12	7.89 4.37	6.6061	16	P=.00
Silence (N=17)	Pre: 44.18 Post: 40.06 Pre-post:4.12	8.00 8.79	1.694	16	P=.110

Note. STAI: lower scores indicate lower levels of state anxiety.

As shown in Table 1, instrumental music listeners showed the greatest decrease amount from pre to posttest in anxiety level, even more than vocal music listeners. Table 1 shows that the post mean score for anxiety in the instrumental music group is 7 points lower than the post mean score for that of vocal music group. Statistical analysis of paired sample *t*-test revealed that there was a significant difference in anxiety scores across two of the conditions. Both music listening groups showed significantly reduced anxiety scores, t=6.691, P=.000 for the vocal music group, and t=6.6061, p=.000 for the instrumental music group. On the other hand, the silence group had no significant difference in anxiety level, t=1.694, p=.110 (See Table 1).

TABLE 2
Results of Two-way ANOVA

Within Subjects Source	df	Mean Square	F	Significance
Corrected Model	5	212.55	2.97	0.021
Intercept	1	3547.08	49.51	0.000
Group	2	436.64	6.095	0.005
Mus Trg	1	137.67	1.922	0.173
Group x Mus Trg	2	14.88	0.208	0.813
Error	45	71.64		

Note. Mus Trg=Musical Training

Two-way analysis of variance was conducted for data analysis to compare differences between musicians and non-musicians within each of the groups (see Table 2). The results of the ANOVA showed significant differences between groups for state anxiety, F=6.095, p=.005, but it indicated that there was no significant difference between musicians and non-musicians, F=1.922, p=.173. In addition, as shown in Figure 2, non-musicians appeared to experience more relaxation than musicians across each experimental treatment condition. Figure 3 indicates that there were no interactions between groups and music trainings, F=0.208, P=0.813.

FIGURE 2
Mean score difference between musicians and non-musicians

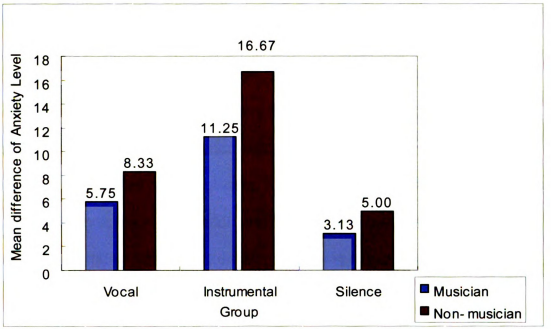
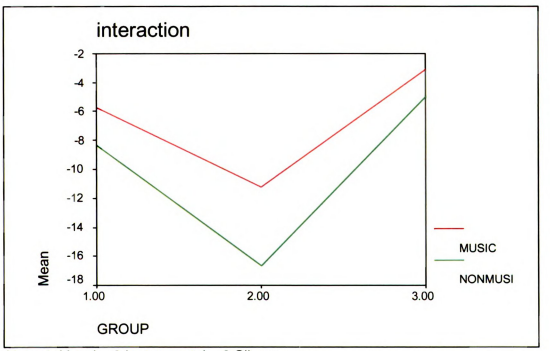


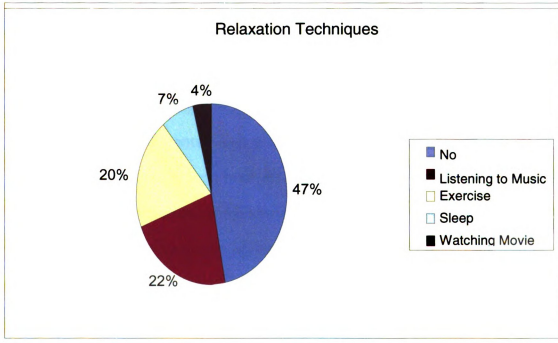
FIGURE 3
Interaction between group and Music Trainings



Note. 1. Vocal 2.Instrumental 3.Silence

The vocal music listening group was asked to rate on a questionnaire how the lyric content of the music selections affected their state of relaxation. The mean of ratings on a 4-point scale indicated 2.3, which is close to the scale number 2, indicating "somewhat affected". Musicians (2.6) reported that they were more influenced by lyric content than non-musicians (2.0). The additional questionnaire also collected information on relaxation techniques that were regularly being used by the subjects. Results showed that 47% of the participants used no techniques for relaxation and 53% of them used self-relaxation techniques: music listening, exercising, watching movie, and sleeping (see Figure 4).

FIGURE 4
Relaxation techniques shown on written data



CHAPTER IV

DISCUSSION AND CONCLUSIONS

The results of this study partially supported the hypothesis that participants of music listening groups showed a larger decrease in anxiety levels than those who engaged in a silence group. These findings are consistent with previous studies in which subjects in music listening groups showed significant stress relief in comparison with a silence group. (Burns & Labbe, 2002,; Pelletier, 2004; Robb, 2000). The instrumental music group achieved the most relaxed state among the three conditions based on comparisons of mean scores. Some participants of the instrumental music group commented that they enjoyed the music selections and felt much more relaxed. The vocal music group reported slightly reduced anxiety levels as compared with instrumental groups. Based on the survey responses obtained from the vocal music group, the lyric content might affect to the participants' relaxation responses.

Mean score differences showed that state anxiety levels were numerically decreased in all three groups from pre to posttest, although significant differences were not found in the silence group. All three groups appeared consistently to have moderate anxiety levels very close to one another on the pretest, as defined in the STAI manual. As stated in the Robb study (2000), higher pretest anxiety levels might contribute to the score changes between pre- and posttest, because participants had greater potential for change.

This finding suggests that sitting quietly may help people to be relaxed and reduce anxiety level. Participants in the silence group might have fallen asleep during the experiment, giving them a chance to escape stress from final exams for a moment. As Robb (2006) mentioned, sleep can be an avoidant reaction to get away from stressful events and thoughts.

Previous studies by Pelletier (2004) and Bernardi (2006) found that subjects with musical experience were more affected by music-assisted relaxation techniques than those without music experience. They also appeared to have significant respiratory sensitivity in response to music rhythm and tempo. However, there were no major differences between musicians and non-musicians in this study. The results of this study may be interesting because the non-musicians appeared to have more greatly reduced anxiety levels than musicians. It might be due to individual variations in cognitive perception of music, even though the researcher attempted to control the possible variables. The results lead the researcher, based on personal and anecdotal evidence, to suggest that musicians may respond to music in an analytical way; on the other hand, non-musicians may respond to music in an emotional way.

There were some factors which might have influenced the results of this study. One factor is the relative quality of the sound. Participants were not exposed to full surround sound; music was projected from the front of the classroom. Another factor for consideration was the lack of consistent environmental conditions. The instrumental group was engaged in the experiment with natural sunlight coming through the windows, and the other

groups were tested in classrooms with artificially dimmed light. It would be important to create coherent experimental conditions at the same location and time of day. Also using the same music for both instrumental music and the music with lyrics could bring more accurate outcomes, but it would be important to use unfamiliar music that does not cause distraction to subjects from previous associations. These limitations of this study should be addressed in future studies.

Sample size was evenly distributed, but relatively small for each of the groups. Therefore, for future studies it is recommended to increase the number of subjects, and use physiological measurements as well as psychological measurement to get more objective and comprehensive results.

In conclusion, music therapists may select music for relaxation based on client preference, which has proven to be effective for relaxation in many studies, but the results of this study may be valuable to consider, in that music with lyrics may be less beneficial for clients for relaxation than instrumental music. Therefore, music therapists may choose to play music without lyrics from the client's preferred music selections for optimum music relaxation. In this study, musicians and non-musicians appeared to show no significant difference in the effect of music perception on reducing anxiety. These results can support the Wolf et al. (2002) study, which indicated that both musicians and non-musicians showed a similar response to music considered to be relaxing. It may be concluded that music carefully chosen by a music therapist, based on the acoustic and musical characteristics, can be effective in influencing clients'

relaxation responses. Recent studies have mostly focused on the considerations of music preferences, music genres, or characteristics of music used in relaxation. However, the results of this study can provide meaningful information which has not been thoroughly addressed in the literature, indicating that instrumental music may more successfully contribute to relaxation responses than vocal music or silence.

APPENDICES

APPENDIX A

Consent Form

CONSENT FORM

THE EFFECTS OF VOCAL VS.INSTRUMENTAL MUSIC ON STRESS RELIEF AS MEASURED THROUGH ANXIETY LEVELS.

Dear Participant,

My name is Hye-Eun Noh and I am a graduate student under the direction of Prof. Roger Smeltekop in the Music Therapy Department in the College of Music at Michigan Sate University. I am conducting a research study to examine THE EFFECTS OF VOCAL VS.INSTRUMENTAL MUSIC ON STRESS RELIEF. The purposes of this study are to investigate the effectiveness of different styles of music on relieving stress and the difference in stress relief between non-music majors and music majors.

This study is not designed to generate stress artificially, but will seek to understand how to influence the normal everyday stress that people experience. You will be asked to take The State and Trait Anxiety inventory (STAI), State Form, for a pre-test and post-test. The pre-test and post-test will be taken before and after listening to 20 minutes of vocal or instrumental New Age music. Participants who are in a control group will be asked to take STAI test before and after a period of 20 minutes of silence. Your participation in this project is voluntary. If you choose not to participant or to withdraw from the study at anytime, you will not be penalized. The results of the research study may be published, but the records of this study will be confidential and your privacy will

be protected to the maximum extent allowed by law. Research records will be stored securely in a locked area, and only researchers will have access to the records.

There are no known risks to you if you agree to participate in the study. If you feel uncomfortable at any time, you may stop the session. Potential benefits are those that arise from participation in enjoyable musical experiences.

If you have any questions regarding this study, please contact me, by phone, 512-417-1904, or by email, nohhye@msu.edu, or Associate Professor Roger Smeltekop, 517- 355-6753, smeltek3@msu.edu. If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Michigan State University's Human Research Protection Program at 517-355-2180, Fax at 517-432-4503, e-mail to irb@msu.edu, or regular mail at 202 Olds Hall, MSU, East Lansing, MI 48824.

Thank you for your cooperation and assistance with this research.

Sincerely,

Hye-Eun Noh, MT-BC

* * * * * * *

Participant Consent

I have reviewed the above information. I agree and voluntarily consent to participate in the research project.

Signature:_____ Date: _____

APPENDIX B

Additional Questionnaire

Appendix B

Questionnaire for more information

1. I regularly use relaxation techniques to cope with stress

   Yes / No

   If you have, what kinds of techniques are you using?

2. For **Vocal music listening group ONLY**,
   I was affected by the lyric content of music selections.

1	2	3	4
Not at all	Somewhat	Moderately so	Very much so

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