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EFFECTS OF MUSIC AS A CONDITIONED STIMULUS AND
PROGRESSIVE MUSCLE RELAXATION
IN REDUCING ANXIETY

by

Marie Elaine Clarkson

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Music
School of Music

Western Michigan University
Kalamazoo, Michigan
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EFFECTS OF MUSIC AS A CONDITIONED STIMULUS AND
PROGRESSIVE MUSCLE RELAXATION
IN REDUCING ANXIETY

Marie Elaine Clarkson, M.M.

Western Michigan University, 1991

The primary purpose of this study was to determine whether music could become a conditioned stimulus for lowered muscle tension and/or reduced anxiety.

There were three groups: (1) the PMR group receiving PMR alone, (2) the MUS group receiving music alone, and (3) the PMRM group receiving PMR followed by music. After four training sessions, a posttest was conducted in which all of the groups were given five minutes to relax. The PMR group had silence, the MUS group had music and the PMRM group had music which had previously been heard after relaxation training. Tension and anxiety reduction were then measured using an electromyograph monitor and the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970).

No significant differences were found between the three groups in muscle tension reduction or anxiety reduction. This may have been due to inconsistent relaxation resulting in inconsistent pairing of music and relaxation.

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I am especially grateful to my husband, Gerry, for his typing, encouragement, and support during all of the many phases of this project; and to my daughter, Rebecca, for her understanding and sacrifice.

Marie Elaine Clarkson

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CHAPTER I

INTRODUCTION

Over the past 20 years there has been an increasing interest in developing effective ways of reducing anxiety and producing muscle relaxation (Gatchel, 1982). One method, progressive muscle relaxation (PMR), was developed in the 1930s (E. Jacobson, 1934). PMR employs a systematic deep relaxation process that has been found to be effective in bringing about muscle relaxation (Paul, 1969) and anxiety reduction (Borkovec, Grayson, & Cooper, 1978). More recently, in the 1970s, the process was revised and became one of the more popular methods of muscle relaxation (Bernstein & Borkovec, 1973).

Another method that has been used to promote relaxation and anxiety reduction is passive music listening (Hanser, 1985). Music has been found to be effective in reducing self-reported anxiety (Jellison, 1975) and in causing physiological changes associated with relaxation (Landreth & Landreth, 1974; Peretti & Swenson, 1974). Some evidence suggests the effectiveness of combining these two treatment approaches (Kibler & Rider, 1983; Rider, Floyd & Kirkpatrick, 1985) but further research is needed to support this conclusion. In addition, there is an interest in

determining whether music could become a conditioned stimulus for, and enhance the retention of, PMR in the treatment of state anxiety and muscle tension. Therefore, the problem to be addressed in this study is what effect do PMR and music have on state anxiety and muscle tension, and can music be substituted for PMR as a conditioned stimulus?

Operational Definitions

1. State and Trait Anxiety will be measured using the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970). This inventory is made up of two scales: the A-State scale which measures present anxiety feelings and the A-Trait scale which determines with what frequency symptoms of anxiety are experienced (Spielberger & Diaz-Guerrero, 1986).

2. Muscle tension/relaxation will be measured using an electromyograph (EMG) monitor with the placement of electrodes on the frontalis muscles using conductive gel.

3. Progressive muscle relaxation is a relaxation method which involves the systematic tensing and relaxing of various muscle groups in order to become aware of the feelings associated with tension and relaxation so that tension can be controlled more effectively (Bernstein & Borkovec, 1973).

Research Objectives

The purposes of this study are:

1. To determine whether music can act as a conditioned stimulus in bringing about lowered muscle tension and anxiety (the conditioned response).
2. To determine whether music can aid in the retention of these responses.
3. To determine whether music can enhance the PMR process.
4. To determine whether music listening alone can aid in muscle tension and anxiety reduction.
5. To determine whether there is a significant correlation between state anxiety and EMG reduction.

Conceptual Framework

This research problem has been developed using the theoretical framework of classical conditioning. This theory, explored by Pavlov (cited in Hebb, 1972), involves the pairing of a conditioned stimulus (CS), which initially has little or no effect on the subject, with an unconditioned stimulus (UCS), which causes a physiological response. Eventually the CS alone will produce a conditioned response (CR) that the unconditioned stimulus originally produced (Hebb, 1972). Figure 1 illustrates the conceptual framework.

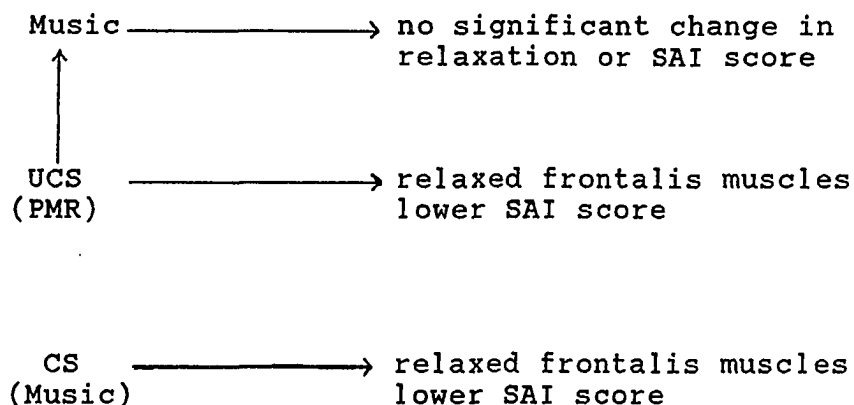


Figure 1. Conceptual Framework of the Study.

Limitations

Limitations of this study include the possibility of novelty effect and experimenter effect (since the experimenter's contact with the subjects was substantial). In addition, it is possible that some compensatory rivalry could take place since subjects may become aware of their differing treatments. Another limitation is the narrow target population of college undergraduates. The results of this study will not be generalizable with any certainty beyond that population.

Assumptions

This study assumed that the subjects had normal hearing, and that subjects had equal experience with relaxation training.

CHAPTER II

REVIEW OF RELATED LITERATURE

Anxiety and Muscle Tension Reduction Methods

A widely used method for the reduction of anxiety and muscle tension has been PMR. The exploration of this method began with Edmund Jacobson in 1934 (Bernstein & Borkovec, 1973), and was later applied to systematic desensitization by Wolpe in the 1950s (Wolpe, 1958). It began to be widely used for research in the early 1970s because of the development of a manual which provided a set of standard procedures that could easily be employed the same way in the various studies (Bernstein & Borkovec, 1973).

PMR is taught either by a live therapist or by recorded instructions. Through a systematic method of tensing and relaxing of specific groups of muscles, the subject becomes increasingly familiar with the tension level of all of the muscles in his body. In addition, by producing tension above the resting level and then releasing it, "a 'momentum' which allows the muscles to drop well below adaptation level" (Bernstein & Borkovec, 1973, p. 20) is created.

PMR has demonstrated greater effectiveness than hypnosis in reducing anxiety and muscle tension (Paul, 1969). It has been effective in the treatment of a variety of anxiety and stress-related problems such as insomnia (Borkovec, Kaloupek, & Slama, 1975), performance anxiety (Nagel, Himle, & Papsdorf, 1989), tension headaches, (Cox, Freundlich, & Meyer, 1975), and test anxiety (Schaer & Isom, 1988). It has also been effective in reducing anxiety in high anxiety subjects (Flanders & McNamara, 1987).

Another method that has been investigated for reducing anxiety and tension is passive music listening. Jacobson (1956) reported that music aided in tension and anxiety reduction of mental patients during dental work. Smith and Morris (1976) discovered that "sedative" music reduced self-reported anxiety more than "stimulative" music or no music. Stoudemire (1975) compared PMR with music alone and found them to be equally effective in reducing state anxiety. Biller, Olson, and Breen (1974) reported that specific kinds of music reduced state anxiety more than no music.

Music and Physiological and Psychological Change

Music has been used in a variety of ways to bring about physiological and psychological changes. Studies have attempted to determine the effect of music on physiological responses that have been linked to relaxation and

anxiety reduction (Hanser, 1985). Though these studies concerning heart rate, respiration rate, blood pressure, and galvanic skin response have been numerous, they have had conflicting results. Some studies reported changes in physiological response that were interpreted as indicating lowered anxiety (Landreth & Landreth, 1974; Peretti & Swenson, 1974); some found no significant physiological changes as a result of listening to music (Fisher & Greenberg, 1972; Rohner & Miller, 1980); and, in some studies, experimenters discovered reduced self-reported anxiety scores but no decreases in pulse rate, blood pressure, or galvanic skin response (Jellison, 1975).

In reviewing the literature investigating music and its influence on heart rate (HR), Davis and Thaut (1989) reported that out of 21 studies reviewed seven indicated that HR increased in response to "stimulative" and decreased in response to "sedative" music; five reported that any music, "stimulative" or "sedative," tended to increase HR; two found that both types had an influence on HR but it was unpredictable; and seven studies reported no influence of music on HR.

More recently, EMG has been used as a measure of reduced muscle tension in response to music with less ambiguous results. Most of these studies, however, paired music with some other method of relaxation or tension

reduction. Scartelli (1982) recorded more tension reduction in cerebral palsied subjects receiving EMG biofeedback and music than EMG biofeedback alone. In a study using college students, Scartelli (1984) found that EMG biofeedback and music reduced muscle tension more than either one alone. He suggested that perhaps music may have acted as a cue. Rider (1985) used both EMG reduction and self-reported pain to measure the effectiveness of various types of music-mediated imagery and reported a significant reduction in pain and EMG levels in all methods with entrainment-mediated imagery being most effective. In comparing simultaneous and sequenced presentations of music and EMG biofeedback, Scartelli and Borling (1986) found a decrease in muscle tension in all combinations of biofeedback and music. In a study involving music listening alone, however, Davis and Thaut (1989) discovered that muscle activity as measured by an EMG monitor increased in response to self chosen, preferred, relaxing music, while SAI scores showed a decrease in anxiety.

Psychological responses to music have also been explored. One area of investigation in this area is that of pain perception. Anxiety reduction and/or EMG levels have been involved in two of these studies employing music. Music aided in reducing the perception of pain for spinal cord injury patients (Rider, 1985) and mothers in labor

(Clark, McCorkle, & Williams, 1981). In another study involving pain perception (Curtis, 1986), there was no significant difference between pain scores of music subjects and non-music subjects. The difference in contentment scores, however, implied that music had a greater effect. Since this difference approached significance ($p < .069$), it seems possible that this feeling of well-being could have a positive effect on the anxiety level and the relaxation of these subjects.

Another area of anxiety research that explored psychological responses to music involved self-reported relaxation and affect change. Thaut (1989), in a study with psychiatric\prisoner patients, found significant increases in self reported relaxation and positive affect after music therapy sessions.

Music and imagery has also been used to promote psychological as well as physical responses. Peach (1984) used this combination to aid in the perceived ability to relax as well as other perceptions of positive psychological responses. This approach produced positive results; however, it was not compared to imagery without music.

Pavlovian Conditioning

Pavlovian conditioning was first explored in controlled laboratory experiments by Ivan Pavlov in the 1920s

(cited in Hulse, Deese, & Egeth, 1975). His first experiments involved studies with dogs and salivation. The dogs were placed in a soundproof room in harnesses with devices attached to their salivary glands that measured their saliva. A tone was presented in the room, followed by meat for the dogs to eat. After this procedure was repeated several times, the tone was presented alone. Pavlov discovered that the tone alone stimulated the saliva. There were four components which he identified in these studies:

1. The unconditioned stimulus (UCS) is something that reliably elicits a response without prior training.

2. The unconditioned response (UCR) is a response that is elicited automatically by the UCS.

3. The conditioned stimulus (CS) is something that develops the ability to elicit a response that it would not ordinarily produce, after being paired with the UCS that elicits this response.

4. The conditioned response (CR) is the response that has been learned through the pairing of the CS and the UCS (cited in Hulse et al., 1975).

Music has been used successfully as a conditioned stimulus in the field of marketing (Gorn, 1982). In an investigation concerning product preferences, Gorn paired a product with preferred and unpreferred music and found that music preferences affected product preferences.

PMR has successfully functioned as an unconditioned stimulus (Bernstein & Borkovec, 1973). In training patients to use PMR, therapists have used words as conditioned stimuli to be paired during relaxation sessions.

In a study investigating test anxiety (Siegel, 1986), anxiety reduction functioned successfully as a CR. Siegel used a glass marble as the CS and music as the UCS. In addition, he used systematic desensitization which involved having the subjects visualize the test-taking situation while holding the marble and hearing the music. Siegel found that the mean difference between pre- and post-anxiety scores was significantly different for treatment and control (no treatment) groups. The treatment group showed a 7% improvement from pre to posttest scores while the control group showed an 11% decrease from pre to posttest scores.

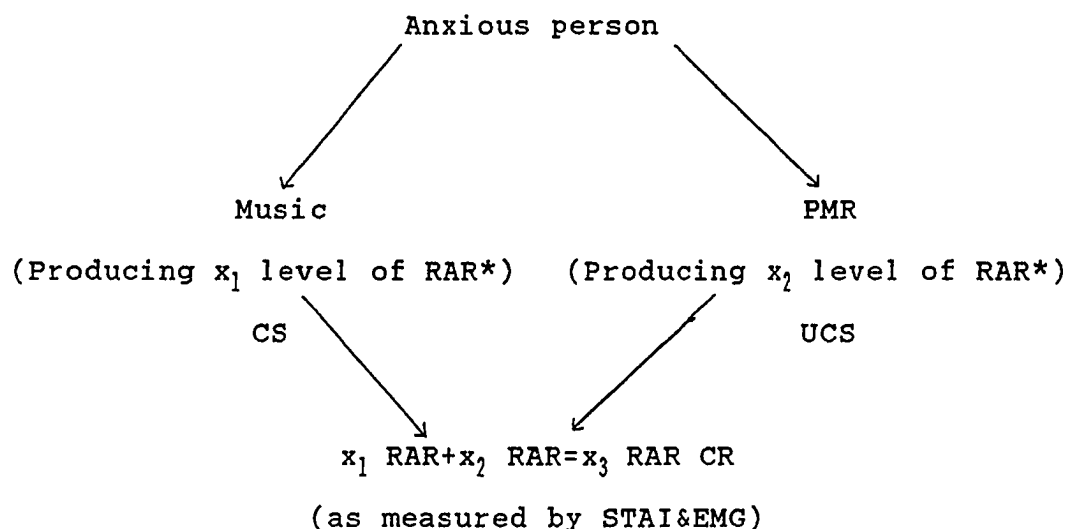
The use of music as a conditioned stimulus with biofeedback as the UCS has been explored using heart rate (HR) biofeedback (Kimmel, Palomba, & Stegagno, 1986). When music was used during training, HR reduction was more effective in a posttest session with no biofeedback than for those who trained with no music. However, although both groups received music during training, only one of the groups received the music for the posttest. The group that received no music in the posttest had a lower posttest

heart rate than those who received music in the posttest. Though these data appear to imply that music was not acting as a conditioned stimulus in this study, the following observation should be considered: Music alone before training caused higher HR than silence. Due to the short training period (one training session), subjects were not given the opportunity to form a strong association with the lowered HR and music. Therefore in the posttest music continued to cause higher heart rate (approximately 1 BPM) than no music. This idea is supported further by the fact that the group that had no music in the training period but music in the posttest had HRs of approximately 3 BPM higher than those who received music for both training and for the posttest showing that some pairing with lowered heart rate did take place.

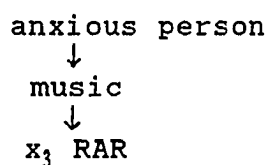
The present study is based on several elements of classical conditioning. The consistent use of the same music will become the cue that the experimenter will attempt to pair with anxiety reduction and muscle relaxation (see Figure 2).

Methods of Measurement

There are many physiological measurements that have been used to attempt to measure relaxation and anxiety reduction. Examples of such measures are heart rate, blood



After the above model has been repeated 6 times the following model will be expected to take place.



*RAR: Relaxation and anxiety reduction

Figure 2. Music and PMR and the Classical Conditioning Process.

pressure, galvanic skin response, electroencephalogram, as well as EMG (Blanchard & Epstein, 1978; White & Tursky, 1982). EMG has been chosen as a measure for this study because it has become widely accepted as an accurate measure of physical tension and, as discussed earlier,

appears to have been the most consistent measure in the literature exploring music and relaxation. There are also various methods for measuring anxiety, such as the Objective-Analytic Anxiety Battery, the Multiple Affect Adjective Checklist, and the State-Trait Anxiety Inventory (all cited in Buros, 1972). The State-Trait Anxiety Inventory (STAI) has been chosen to measure anxiety in this study since it has often been used in music research (Davis & Thaut, 1989; Stoudemire, 1975) as well as research concerning PMR and anxiety reduction (Hickling, Sison, & Vanderploeg, 1986; Townsend, House, & Addario, 1975). Another reason the STAI has been chosen for this study is because of its ability to identify high anxiety subjects by measuring trait anxiety using the trait anxiety portion of the inventory (TAI); as well as determining current anxiety levels by measuring state anxiety, using the state anxiety portion of the inventory (SAI).

State anxiety has been defined as a "transitory emotional state ... characterized by ... feelings of tension and apprehension, and heightened autonomic nervous system activity" (Spielberger et al., 1970, p. 3). Trait anxiety has been defined as "relatively stable individual differences in anxiety proneness" (Spielberger et al., 1970, p.3).

PMR has been effective in the reduction of anxiety in high anxiety subjects (Borkovec et al., 1978; Flanders & McNamara, 1987). Therefore, an attempt was made to use subjects with higher than average anxiety levels. After the subjects were chosen according to trait anxiety scores, state anxiety scores were used to determine the effect of treatment on current anxiety. Johnson and Spielberger (1968) found that state anxiety was effected by PMR and trait anxiety was not. The STAI was the only anxiety inventory that was found that measured both state and trait anxiety and therefore seemed appropriate for this study.

Null Hypotheses

1. There will be no significant difference among groups in their ability to demonstrate a greater EMG reduction in the posttest session than in the pretest session.

2. There will be no significant difference among groups in their ability to demonstrate a greater EMG reduction in the follow-up session than in the pretest session.

3. There will be no significant difference among groups in their tendency to have a greater amount of state anxiety reduction in the posttest session than in the pretest session.

4. There will be no significant difference among groups in their state anxiety reduction in the follow-up session as compared to the pretest session.

5. There will be no significant difference in EMG reduction in the pretest between groups hearing music and those sitting in silence.

6. There will be no significant difference in state anxiety reduction in the pretest between groups hearing music and those sitting in silence.

7. There will be no significant correlation between state anxiety reduction and EMG level reduction.

8. There will be no significant correlation between question 3 of the State Anxiety Inventory (SAI) and EMG level reduction.

9. There will be no significant correlation between question 15 of the SAI and EMG level reduction.

10. There will be no significant difference in the amount of EMG reduction after a PMR session with music (PMRM) and a PMR session.

CHAPTER III

DESIGN AND METHODOLOGY

This study took place in two stages. The first stage identified subjects with higher than average anxiety levels. After they were identified, they were then given the opportunity to participate in the second stage of the study. The second stage compared the effects of three different relaxation training programs on anxiety and muscle tension.

Subjects

The subjects in this study were full-time undergraduates enrolled at Western Michigan University, Kalamazoo. There were 61 participants in Stage 1 of the study. Of these, 45 qualified for Stage 2. These 45 subjects were contacted by phone and 34 of them agreed to participate in the study. However, because of subject attrition and problems with the equipment with one subject, the number of subjects that completed the study was 28. There were 9 in the PMRM group, 8 in the PMR group and 11 in the music (MUS) group. There were a total of 22 females and 6 males. Male distribution was as follows: 3 in the PMR group, 2 in the MUS group and 1 in the PMRM group.

Setting

Sessions took place in the Dalton Center of Western Michigan University, Kalamazoo. A small area with few distractions was created by partitioning off an area in a storage room on the third floor. All sessions were conducted in a recliner with dim indirect lighting. It was winter and the room was about ten degrees cooler than the rest of the building, so a blanket was provided for those who wanted it. The room was usually quiet, except occasionally when a drum, piano, synthesizer, or voices could be heard faintly in the distance.

Instruments

The instrument used to collect data on state and trait anxiety was the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970). The STAI is a 40 item questionnaire which uses a 4 point Likert scale that ranges from "not at all" to "very much so." Twenty items determine state anxiety and 20 determine trait anxiety. The instructions for the state portion ask the respondent to rate how they feel right then; the instructions for the trait portion ask for how they generally feel.

Reliability was determined for this test using test-retest data as well as the alpha coefficient (Spielberger et al., 1970). The test-retest correlations for six

subsets of college undergraduates range from .73 to .86 for the trait scale and from .16 to .54 for the state scale. The correlations for the state scale were expected to be low since subjects were purposely exposed to a variety of situations during the test-retest interval and the state scale is designed to detect day to day changes in anxiety. The alpha coefficients for internal consistency were calculated using Cronbach's formula K-R 20. The alpha coefficients for college undergraduates which were determined using 484 males and females were .90 for the trait portion of the test and .89 for the state portion (Spielberger et al., 1970).

Validity was established by correlating STAI scores with a number of other anxiety related tests (Spielberger et al., 1970).

EMG levels were measured using a portable EMG Monitor (Autogenics model AT33). Muscle activity was recorded from an LED reading. The instruments statistical function was used by taking a 2 minute average at the beginning of each session, a 1 minute average in the middle and another 2 minute average at the end. EMG levels were taken from the frontalis muscles with surface silver silver chloride electrodes.

Music was provided on a Sony portable stereo cassette player (model #CFS-W301) via light weight Realistic headphones.

The posttest session and the follow-up session took place a month apart. The posttest session was one week after the last treatment session. The follow-up was one month after that.

Design

The following diagram illustrates the basic design of this study.

R	O	X1	O
R	O	X2	O
R	O	X3	O

Subjects were randomly matched to the three groups.

Procedures

This study took place in two stages. The purpose of the first stage was to identify subjects with higher than average anxiety levels. This was accomplished by providing undergraduate students enrolled in various classes (Oceanography, Music for the Special Education Teacher, Abnormal Psychology, Child Psychology, Music in the Non-Western World, two Earth Studies classes and six General Psychology classes), with the opportunity to take the trait portion of

the State-Trait Anxiety Inventory (STAI). Those subjects scoring above the standardized mean for college undergraduates were then given the opportunity to participate in the second stage of the study. The purpose of the second stage was to compare three different relaxation training programs.

Subjects were given informed consent forms (see Appendix A) to read and sign at the beginning of each stage. After 45 high anxiety subjects were identified from the first stage they were ranked from highest to lowest according to their Trait Anxiety score. Then the highest three were randomly assigned (one to each of the three groups), then the next highest three, and so on until all subjects were assigned in this fashion. These subjects were then contacted by phone and invited to participate in the second stage. If they agreed, the medical interview (see Appendix B) was conducted and times for orientation sessions were established.

Subjects were asked to attend an orientation session relevant to their group. In the orientation sessions information was given concerning the appropriate treatment condition and the guidelines they were expected to follow (see Appendix C). Subjects were encouraged to practice their method of relaxation at home since some evidence suggests that home practice can enhance anxiety reduction

(Flanders & McNamara, 1987). Those with music as part of their procedure were also given tapes of their music to take home. All subjects were given a log on which to record their home practice (see Appendix D).

The remainder of the study consisted of a pretest session, four training sessions, a posttest session and a follow-up session. Each pretest, posttest and follow-up consisted primarily of a five minute period of relaxation, either while hearing prechosen music or sitting in silence. Before and after this relaxation period, EMG levels were taken and the SAI was administered. Training sessions were conducted in the same way, only a training segment was conducted before the five minute period of relaxation. During that training segment, MUS subjects (those subjects receiving only music in their relaxation procedure) sat in silence for ten minutes and were instructed to get as relaxed as they could. PMR (those receiving only PMR in their relaxation procedure) and PMRM (those receiving both music and PMR in their relaxation procedures) subjects heard a training tape containing relaxation instructions (see Appendix E). In addition, EMG levels were taken between the training segment and the relaxation period in order to determine the effect of each portion of the training session independently. A detailed description of these sessions is given in Appendix F.

All sessions took place individually. The pre and posttest EMG levels were determined by placing silver silver chloride electrodes on the frontalis muscles. Auditory feedback was not given and visual feedback was seen only by the experimenter. PMR was carried out using the procedures described by Bernstein and Borkovec (1973). Instructions were recorded on an audio cassette by a psychology professor who was trained in leading PMR sessions and had several years of experience in this area (see Appendix E). Instructions for the four PMR training session were more specific and used more body parts in the first training session and then became progressively more general in the rest of the sessions. Bernstein and Borkovec (1973) found that subjects develop the ability to generalize more as time goes on.

Music was chosen during the orientation session from five selections of various styles which were selected by the experimenter. Subjects chose from the following selections:

1. For John Muir from Music for Progressive Relaxation by David Kessner & Rudy Helm (1978)
2. Quiet Heart by Richard Warner (1982)
3. Somewhere in Time by John Barry (1980)
4. Brandenburg Concerto No. 1, Adagio by J.S. Bach (1977)

5. Gentle Airs by Paul Goelz (1988).

The first selection was chosen because it was designed specifically for use with relaxation techniques. Selections 2, 3 and 5 were selected to provide a variety in styles that all contained the elements of sedative music put forth by Gaston (1951). Selection 4 was chosen from Bonny and Savary's list of Suggested Classical Recordings (Bonny & Savary, 1983) where it was listed as music with a sedate quality. Subjects were given the opportunity to hear a short segment (30 seconds) of each selection twice and then were asked to choose the one that they liked the most and that they felt would promote relaxation most effectively. Subjects then heard that chosen music consistently every training session.

The STAI was given according to the instructions provided by the manual (Spielberger et al., 1970).

CHAPTER IV

RESULTS

The primary purpose of this study was to determine whether music could become a conditioned stimulus for lowered muscle tension and reduced anxiety; specifically the effect of music paired with relaxation (achieved through PMR) as compared to that relaxation (achieved through PMR or music) alone.

An important factor to consider while reviewing the results is that during the training period when this pairing took place, only 50% of the subjects achieved relaxation (as measured by EMG levels) for half of the training sessions and only 21% for 3/4 of the training sessions. Consequently, the music or silence was not always being paired with relaxation.

Comparison of Music Paired with PMR to Either PMR or MUS Alone

The EMG levels and the SAI (Spielberger, Gorsuch, & Lushene, 1970) scores were analyzed separately using an ANOVA for a two-factor mixed design with repeated measures on one factor. The fixed factor was the three groups and the repeated measures factor was the EMG reduction or the

SAI reduction. Each of these measures was taken at the pretest posttest and follow-up making each of the analyses based on a 3 x 3 design: 3 groups, 3 test scores (difference scores). The data consisted of a 2 minute average before treatment, a 2 minute average at the end of treatment, and a 1 minute average in the middle. Difference scores were measured by determining the difference between those averages before treatment and the averages at the end of treatment. The analysis of the EMG levels (see Table 1) indicated significant differences existed between trials

Table 1

Analysis of Variance Summary Table: EMG Levels

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Total	377.44	83	--	--
Between Subjects	153.28	27	--	--
Conditions	9.98	2	4.99	.87
Error <u>b</u>	143.30	25	5.73	--
Within Subjects	224.16	56	--	--
Trials	53.15	2	26.58	7.80*
Trials x Cond.	.52	4	.13	.04
Error <u>w</u>	170.49	50	3.41	--

* $p < .01$

(pretest, posttest and follow-up), ($p < .01$), across all groups. There were no significant differences between conditions (MUS, PMR and PMRM), ($p > .20$), or for the trial x conditions interaction ($p > .20$). Therefore, it can be concluded that the three treatments were equally effective in reducing muscle tension.

The analysis of the SAI scores (see Table 2) indicated significant differences existed between trials (pretest, posttest and follow-up) ($p < .05$) but not between conditions (MUS, PMR and PMRM), ($p > .20$) or for the trials x

Table 2

Analysis of Variance Summary Table: SAI Scores

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Total	3042.23	83	--	--
Between Subjects	1330.63	27	--	--
Conditions	38.71	2	19.36	.37
Error <u>b</u>	1291.92	25	51.68	--
Within Subjects	1811.60	56	--	--
Trials	257.55	2	128.78	4.73*
Trials x Cond.	193.47	4	48.37	1.77
Error <u>w</u>	1360.58	50	27.21	--

* $p < .05$

conditions interaction ($p < .20$). Therefore, it can be concluded that anxiety reduction occurred fairly equally in all three groups.

The descriptive statistics of this study are presented graphically in Figures 3 and 4. These data give an overall view of the results.

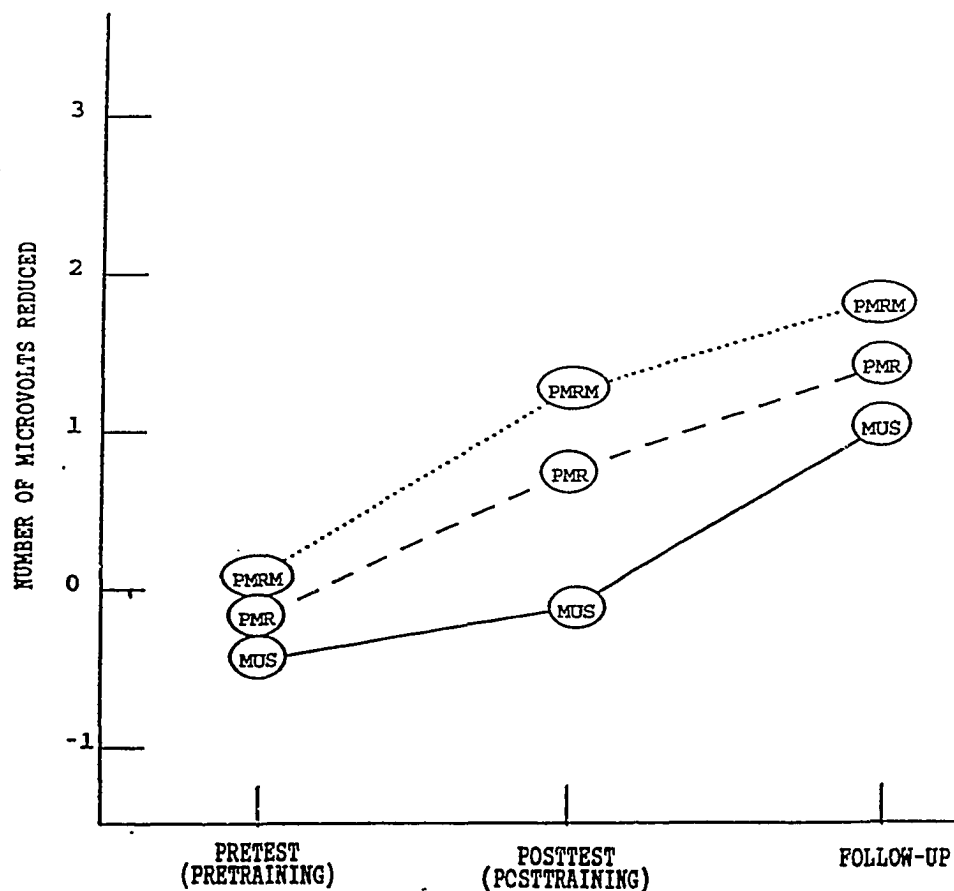


Figure 3. EMG Reduction for All Three Groups From Beginning to End of Sessions.

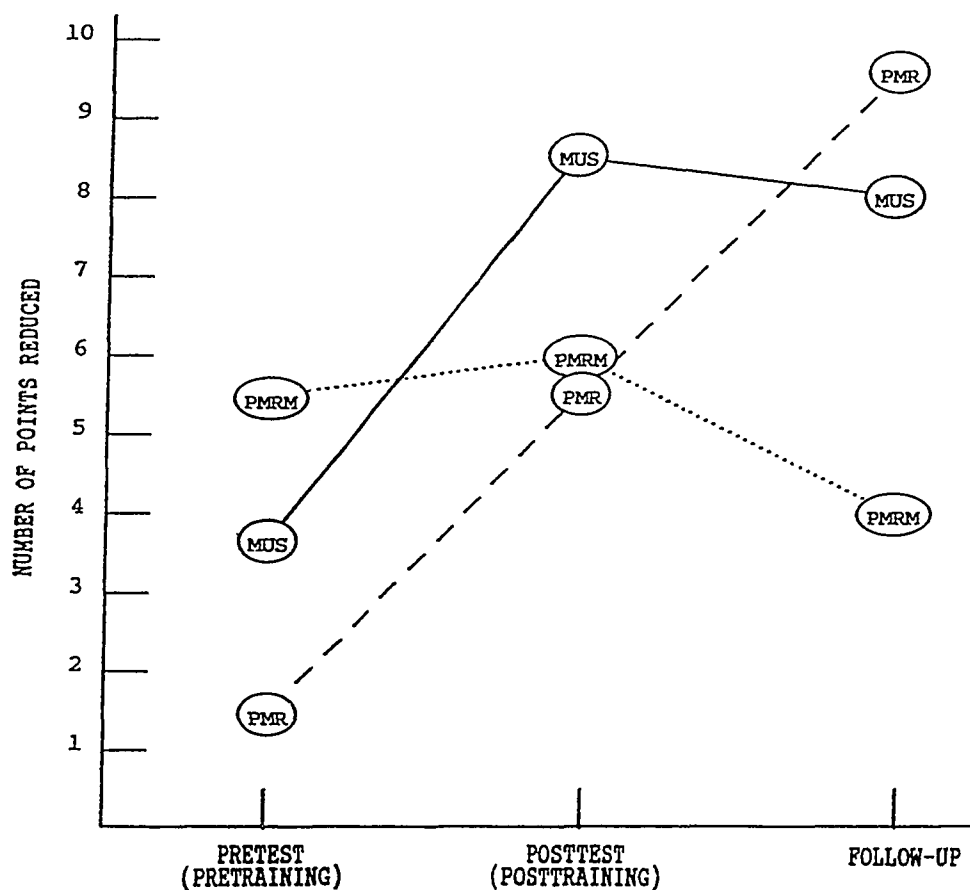


Figure 4. SAI Score Reduction for All Three Groups From Beginning to End of Sessions.

The Effect of Music on Muscle Tension

EMG and SAI reduction in the pretest alone was analyzed separately using a t test for small, unequal samples in order to determine any significant differences in EMG and SAI reduction from the beginning of the pretest to the end of the pretest between subjects who heard music and those who sat in silence. No significant differences were found between groups for either EMG reduction ($t=.377$,

$df=26$, $p < .50$) or SAI score reduction ($t=1.7$, $df=26$, $p < .10$). This indicates that during the pretest, subjects ability to relax was about the same whether they were listening to music or sitting in silence.

Comparison of EMG and SAI Reduction

The two independent variables were also compared to see if the scores of SAI and their change correlated with that of the EMG levels and their change. No significant correlation was found. In fact, the correlation was very low (.091).

Subjective Perceptions of Relaxation Compared to EMG Levels

Questions three and fifteen of the SAI ("I feel tense" and "I feel relaxed," respectively) were also compared to EMG levels and their change. This was examined in order to determine subjects' subjective responses of increased relaxation and/or tension as compared to their actual EMG reduction. Again, there was no significant positive correlation. There was instead a slightly negative non-significant correlation ($EMG \times Q3 = -.045$, $EMG \times Q15 = -.020$). These data suggest that subjects' subjective perceptions of relaxation and/or tension may differ from muscle tension levels recorded on an EMG monitor.

The Enhancement of Music in the Relaxation Process

Data were taken during training sessions to determine further EMG reduction after the addition of music or sitting in silence. A t test was performed to determine any significant differences between the EMG reduction of the PMR group and that of the PMRM group. No significant differences were found ($t=1.03$, $df=15$, $p < .35$). This implies that the addition of music after a PMR session does not improve relaxation any more than silence.

Analysis of Data for Subjects Who Were Successful in Relaxing

Since approximately half of the subjects were unable to relax (as measured by EMG levels) for even half of the training sessions, and since relaxing was necessary in order to determine effectiveness of treatment, the experimenter decided to look at the data of those subjects who did relax for at least half of the training sessions. This group of subjects will be referred to as the "reducers."

Graphs presenting descriptive statistics for reducers may be found in Figures 5 and 6. There appears to be a marked difference for the PMRM group between EMG reduction and SAI reduction. Again, the variance between muscle tension and anxiety level is evident.

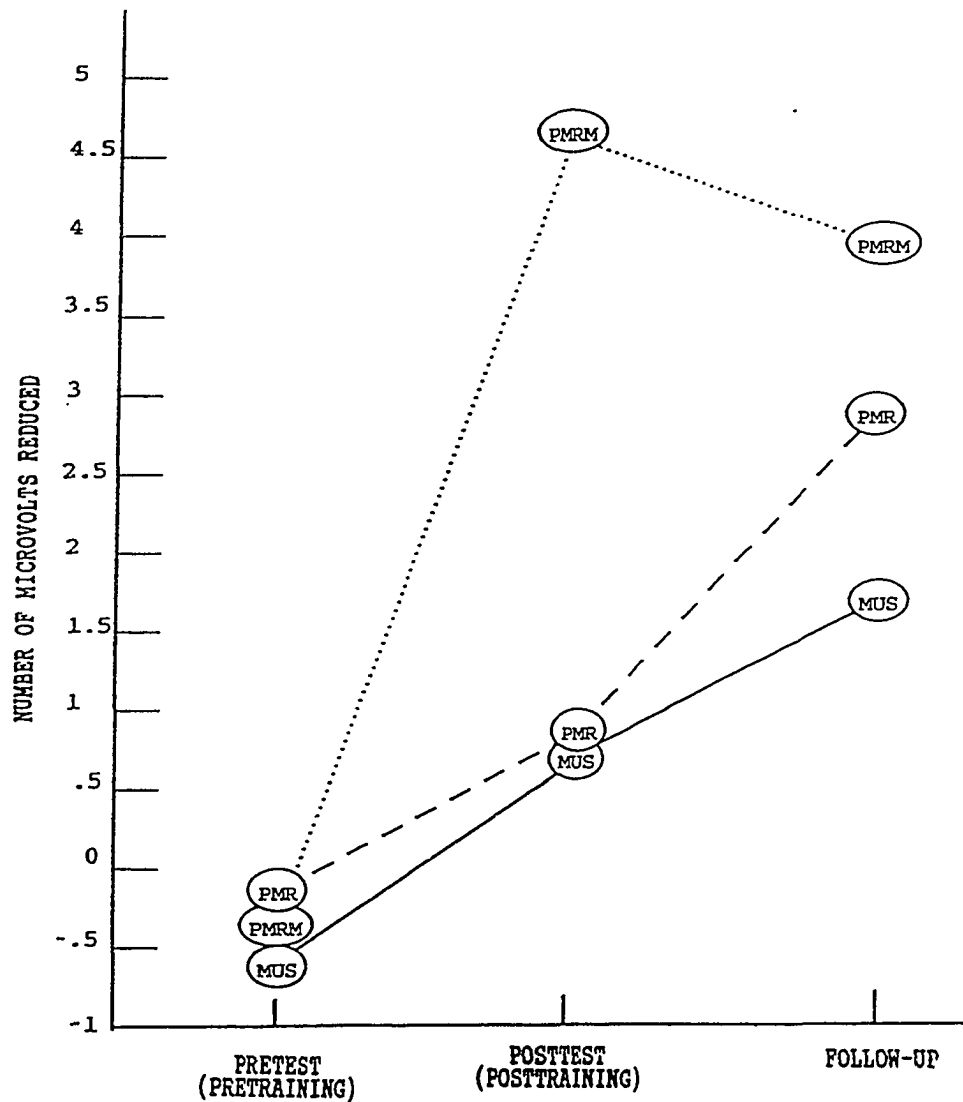


Figure 5. EMG Reduction for Reducers From All Three Groups From Beginning to End of Sessions.

An ANOVA for a two factor mixed design with repeated measures on one factor was used to analyze the data (see

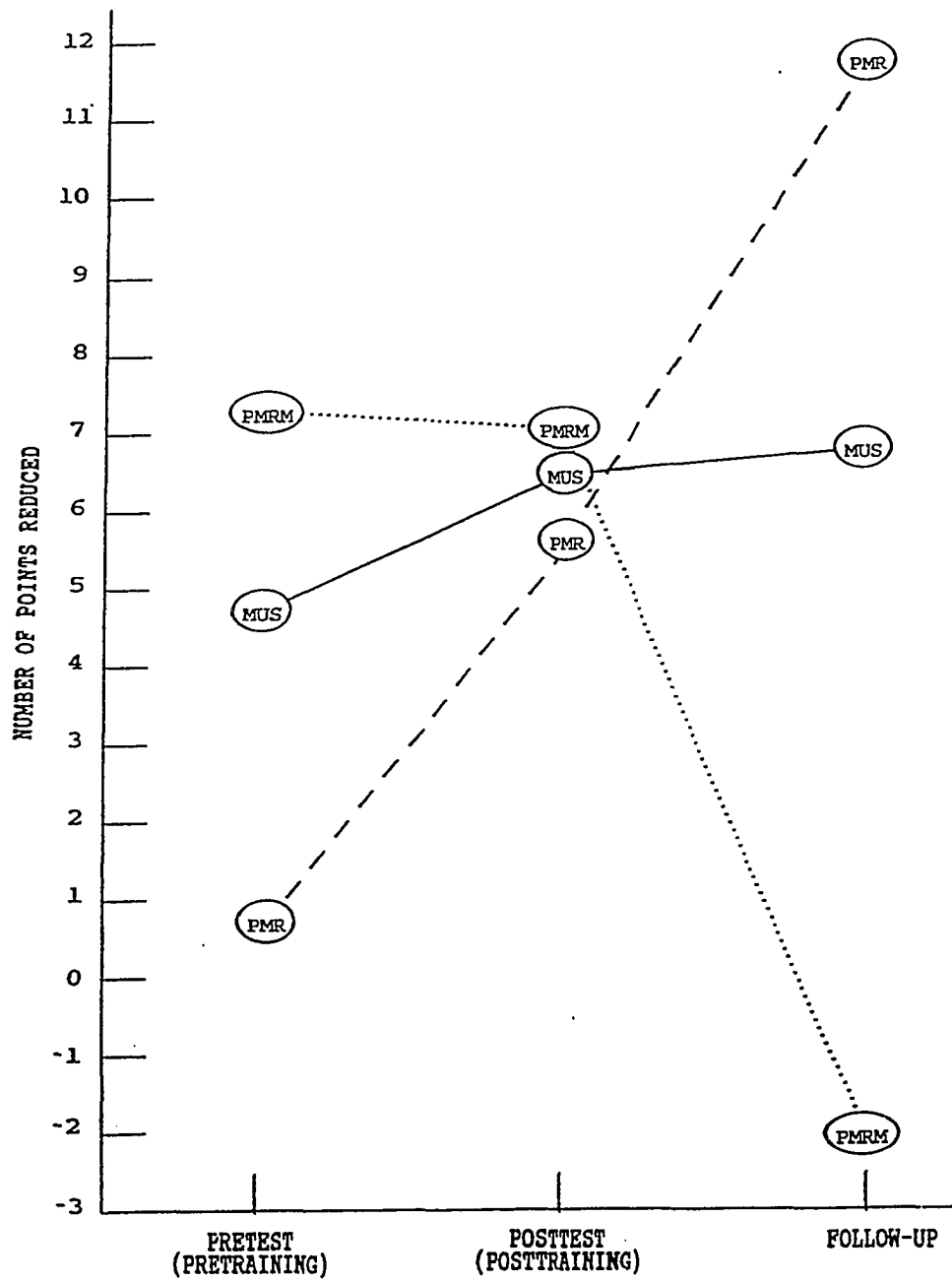


Figure 6. SAI Score Reduction for Reducers From All Three Groups From Beginning to End of Sessions.

Table 3). Again, the fixed factor was the three groups and the repeated measures factor was EMG reduction or SAI

Table 3

Analysis of Variance Summary Table: EMG Reducer Levels				
Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Total	270.86	41	--	--
Between Subjects	121.99	13	--	--
Conditions	28.69	2	14.35	1.69
Error <u>b</u>	93.30	11	8.48	--
Within Subjects	148.87	28	--	--
Trials	63.38	2	31.69	8.61
Trials x Cond.	4.44	4	1.11	.30
Error <u>w</u>	81.05	22	3.68	--

reduction. Although the PMRM data for EMG reduction looks considerably higher on the graph (see Figure 4), especially in the posttest, there were no significant differences between conditions (MUS, PMR, and PMRM). This may have been partially due to the small n and probably was due to the large variance within the PMRM group.

The SAI data was examined using the same statistical test. This analysis revealed no significant differences in either trials (pretest, posttest, and follow-up) or conditions (MUS, PMR, and PMRM) alone. However, there were

significant differences ($p < .05$) in the trials x conditions interaction (see Table 4). This implies that the

Table 4

Analysis of Variance Summary Table: SAI Reducers Scores

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Total	1834.8	41	--	--
Between Subjects	769.3	13	--	--
Conditions	18.6	2	9.3	.136
Error <u>b</u>	750.7	11	68.2	--
Within Subjects	1065.5	28	--	--
Trials	33.2	2	16.6	.606
Trials x Cond.	428.9	4	107.2	3.912*
Error <u>w</u>	603.3	22	27.4	--

* $p < .05$

level of anxiety reduction for PMR reducers was significantly higher than that of the PMRM group.

Practice Log Results

As previously mentioned, logs had been given to encourage home practice. Due to a poor return of these logs, information on frequency of home practice is not complete. A total of 7 forms was returned. Of these subjects, 2 reported having practiced 13 to 14 times, 2 reported having

practiced 5 to 6 times, and 3 reported having practiced somewhere between 1 and 3 times at home.

Summary of Hypotheses and Corresponding Results

Following is a list of the null hypotheses tested and the results:

1. It was hypothesized that there would be no significant difference among groups in their ability to demonstrate a greater EMG reduction in the posttest session than in the pretest session. Not rejected.

2. It was hypothesized that there would be no significant difference among groups in their ability to demonstrate a greater EMG reduction in the follow-up session than in the pretest session. Not rejected.

3. It was hypothesized that there would be no significant difference among groups in their tendency to have a greater amount of state anxiety reduction in the posttest session than in the pretest session. Not rejected.

4. It was hypothesized that there would be no significant difference among groups in their state anxiety reduction in the follow-up session as compared to the pretest session. Not rejected.

5. It was hypothesized that there would be no significant difference in EMG reduction in the pretest between

groups hearing music and those sitting in silence. Not rejected.

6. It was hypothesized that there would be no significant difference in state anxiety reduction in the pretest between groups hearing music and those sitting in silence. Not rejected.

7. It was hypothesized that there would be no significant correlation between state anxiety reduction and EMG level reduction. Not rejected.

8. It was hypothesized that there would be no significant correlation between question 3 of the SAI and EMG level reduction. Not rejected.

9. It was hypothesized that there would be no significant correlation between question 15 of the SAI and EMG level reduction. Not rejected.

10. It was hypothesized that there would be no significant difference in the amount of EMG reduction after a PMRM session and a PMR session. Not rejected.

CHAPTER V

DISCUSSION

The purpose of this study was to examine music in the role of a conditioned stimulus. As discussed in the previous section, this objective was not met because of the low percentage of subjects achieving relaxation during the training period. These low percentages made it difficult to determine whether or not any pairing was taking place between music and the relaxation response. Despite the small n , the data for those 14 subjects who were able to "relax" in at least half of their training sessions were examined separately. This group of 14 subjects (6 MUS subjects, 3 PMRM subjects and 5 PMR subjects) was referred to as the "reducers." Although the PMRM group was still not significantly more effective in bringing about EMG reduction in the posttest and follow-up than the PMR or MUS groups, there was a trend in this direction. More importantly, the trend for PMRM reducers was greater than that of the PMRM reducers and nonreducers together. This implies that when music was paired with EMG reduction in the training period it became more effective as a conditioned stimulus in the posttest and follow-up for these selected subjects.

Possible Reasons for Inconsistent EMG Reduction

At this point, it seems appropriate to examine possible reasons for the inconsistent EMG reduction in an attempt to rectify problems in further research. These possible reasons will be listed and then discussed individually.

The first possible reason for inconsistent EMG reduction is that subjects may not have been sufficiently tense at the beginning of sessions for any further relaxation to occur. Second, the subjects may not have been consistent enough in their high anxiety, or they may have had consistent high trait anxiety but inconsistent high EMG levels. Third, subjects may have needed a more extensive PMR training period before being able to lower muscle tension using this method. Fourth, PMR may have been an ineffective relaxation method for some people. Fifth, those who heard music may have become more aroused by the music instead of more relaxed.

Insufficient Tension

Although there was an attempt to obtain high anxiety subjects by choosing those who scored high on the Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970), there was still a problem with inconsistent and often low initial EMG levels and SAI scores. This may have been due

to a tendency for some people to have high trait anxiety without high muscle tension. In addition, high trait anxiety does not guarantee consistently high state anxiety. Subjects with higher initial state anxiety and muscle tension may have been more consistent in their SAI and EMG reduction. Perhaps the best solution would be to obtain subjects from mental health agencies, focusing on clients who are often agitated and hysterical, or to induce agitation or anxiety in subjects who have slightly high trait anxiety scores. Then, perhaps, the comparative effectiveness of the relaxation methods could be better determined.

It appears that relaxation procedures were more effective for those experiencing a period of extreme stress, agitation and/or anger. In reviewing the posttest data, the person who had the highest pre-session EMG level (a PMRM subject) was able to reduce this level considerably more than anyone else: over 10 microvolts (a 69% change), while the average reduction for all others was .45 (a 14% change). Likewise, the two highest pre-session SAI scorers were able to reduce their scores considerably as well: the highest (a MUS subject) went from 61 to 38 (23 pt. reduction; a 38% change), the second highest (a PMR subject) went from 52 to 33 (a 19 pt. reduction; a 37% change). These two highest scorers were also the highest SAI reducers. Although these various reductions do not point at any

one of the groups being a greater overall reducer, it appears that a study with subjects with higher initial state anxiety and muscle tension would have more consistent and marked results.

Inconsistent Measures of Anxiety

The experimenter assumed that if subjects had high trait anxiety, they would have high EMG levels as well. There is no way of knowing exactly how accurate this assumption was since they were never measured simultaneously. It appears, however, since many subjects maintained a relatively low EMG level from the beginning to the end of each training session, that these subjects, who had been identified as high anxiety subjects, as evidenced by their high trait anxiety scores, were not exhibiting this anxiety in the level of tension in their frontalis muscles (as measured by EMG levels). This problem may have been avoided by screening potential subjects for high EMG levels as well as high trait anxiety when they were chosen.

Lack of Response to Training

Other possible reasons for inconsistent EMG reduction concerned the inconsistent response to PMR as a relaxation method. This problem could be resolved by having a more flexible training schedule in which people proceed more at

their own pace, and by withholding the music listening until muscle tension reduction was achieved. This pairing after relaxation would then determine if an association between music and the relaxation response could be formed and utilized.

In addition, the training used in this study was an abbreviated version of the standard training program. This study utilized four training sessions and a standard program would utilize about ten training sessions. The ideal training program would progress at the appropriate rate for each individual with more frequent or less frequent sessions depending on the subjects' progress. Since this is difficult in a study such as this from the standpoint of control, it would be advisable to merely increase the number of training sessions in order to include more of those who progressed more slowly. Another variable in the training program is whether to use live or recorded instructions. In the present study recorded instructions were used in the interest of practicality; however, there has been research that suggests that live instructions may be more effective. Therefore, this was another factor that may have effected the ability of subjects to relax.

Music's Possible Effects

In previous research (Ellis & Brighthouse, 1952), it was found that some people became more aroused by some music rather than becoming more relaxed. It could be that since there were only five selections of music from which the subjects could choose that the selections may have created arousal in some subjects. In addition, some subjects may have been "tuning in" more to the music than tuning in to their relaxation responses. This could have caused more arousal as well. If this study were replicated, it would be advisable to increase the number of styles represented in the selections to more than five, and to stress the importance of focusing on the relaxed state of the body while listening to the music rather than becoming too involved in the music.

Relationship Between EMG and SAI

Another notable finding in this study is the lack of relationship between EMG levels and state anxiety levels. As previously mentioned, a correlation between the two measures was very low, and the correlation between the specific questions concerning tension and relaxation was slightly negative. It appears that the subjective perception of relaxation levels was different than the objective EMG monitor indicated. The PMRM group as a whole thought

that their anxiety level was going up while EMG recordings showed a reduction in their muscle tension. This suggests several possible implications. Possibly, muscles really were relaxed; however, this made them feel vulnerable and anxious. Or, perhaps muscles were relaxed but subjects were unaware of the relaxation taking place. Another possibility, in view of the lack of correlation between EMG and SAI scores, is that muscle tension and anxiety levels were totally unrelated to each other.

Suggestions for Further Research

It is recommended that this study be replicated with appropriate alterations in the design and perhaps the subject make-up. As mentioned earlier, it is essential for the purpose of the study that music be heard only after relaxation has taken place. In addition, the experimenter feels that relaxation and anxiety reduction would be more consistent if tension were induced at the beginning of each trial and/or the subjects were more consistently agitated and tense. Finally, it is recommended that the training period be longer to allow for those who do not respond to the relaxation procedures readily.

Summary

Further research in this area could benefit the field of music therapy. If music were found to be an effective conditioned stimulus, its role could be expanded to help maintain the benefits of relaxation training in several areas: (a) daily anxiety and tension, (b) clinical agitation, and (c) tension due to pain from conditions such as cancer or childbirth. In addition, perhaps we may further understand the influence of music on human behavior.

The use of music as a conditioned stimulus could have some practical value as well. If people such as business men or air traffic controllers could elicit relaxation responses more quickly or more effectively by eliciting them with music which has been paired with relaxation, then perhaps this method could be of some use in chronically high-stress professions. In addition, perhaps people could incorporate this method easily into their everyday lives since music is already a vital part of the daily routine of many people.

It is recommended that the possibility of music becoming a conditioned stimulus be further explored in a study using subjects in an agitated state and allowing music listening only after relaxation has taken place.

Appendix A
Informed Consent Forms

Informed Consent Form 1

Purpose:

The purpose of the first stage of this study is to determine day to day anxiety levels of college undergraduates. Specifically students with higher than average anxiety will be identified and then given the opportunity, if they choose, to participate in the second stage of the study. This stage will explore various methods of promoting relaxation and anxiety reduction.

Confidentiality of Data:

The following steps will be taken in order to assure confidentiality: 1) a numerical coding system will be used to identify each subject, 2) both the coding system and the subjects file will be kept locked in the investigators file cabinet accessible only to the investigator and 3) names will be removed when the subjects participation in the study is complete.

Benefits / Risks:

Stage 1 of this study will provide subjects with information concerning their day to day anxiety level. There are no expected risks involved.

Subject Participation:

Participation in stage 1 requires approximately 10 minutes of your time in order to fill out a 20 item questionnaire.

I understand that I am being asked to participate as a subject in the graduate research as it has been described above. I understand that in the event of injury resulting from this research, financial compensation is not available, but emergency medical treatment will be provided to me at no cost to me or my family. If I have any further questions I can contact Marie Clarkson at 381-9536. I have read and understand the information above and I agree to participate in this study.

Participant

Date

Witness

Date

Informed Consent Form 2a

Purpose:

The purpose of this study is to explore various methods of promoting relaxation and anxiety reduction.

Confidentiality of Data:

The following steps will be taken in order to assure confidentiality: 1) a numerical coding system will be used to identify each subject, 2) both the coding system and the subjects file will be kept locked in the investigators file cabinet accessible only to the investigator and 3) all names will be removed upon the receipt of posttest data.

Benefits / Risks:

Benefits: The benefits of participation in this study include training in relaxation techniques that have been found to be effective in reducing anxiety.

Risks: There are no expected risks involved.

Subject Participation:

Subjects will be participating in 4 weeks of sessions in which music is used to promote relaxation. There will be two sessions per week ranging in length from 15 to 30 minutes except for the first two which will last about one hour. There will also be one half hour follow up session 4 weeks after the last regular session. Subjects may choose to terminate at any time. There will be no penalty for termination except that only subjects who continue participation to the end of the study will receive \$5.

I understand that I am being asked to participate as a subject in the graduate research as it has been described above. I understand that in the event of injury resulting from this research, financial compensation is not available, but emergency medical treatment will be provided to me at no cost to me or my family. If I have any further questions I can contact Marie Clarkson at 381-9536. I have read and understand the information above and I agree to participate in this study.

Participant

Date

Witness

Date

Informed Consent Form 2b

Purpose:

The purpose of this study is to explore various methods of promoting relaxation and anxiety reduction.

Confidentiality of Data:

The following steps will be taken in order to assure confidentiality: 1) a numerical coding system will be used to identify each subject, 2) both the coding system and the subjects file will be kept locked in the investigators file cabinet accessible only to the investigator and 3) all names will be removed upon the receipt of posttest data.

Benefits / Risks:

Benefits: The benefits of participation in this study include training in relaxation techniques that have been found to be effective in reducing anxiety.

Risks: Muscle tension will be measured using a standard EMG monitor involving the placement of electrodes on the frontalis muscles. These electrodes sense levels of muscle tension and do not cause any pain. Progressive muscle relaxation (PMR) presents minimal risks. These procedure involves tensing and relaxing muscles. Occasionally when a subject tenses muscles too tightly, muscle cramps can occur. This can be remedied by modifying the tensing strategy.

Subject Participation:

Subjects will be participating in 4 weeks of sessions in which PMR is used to promote relaxation. There will be two sessions per week ranging in length from 15 to 30 minutes except for the first two which will last about one hour. There will also be one half hour follow up session 4 weeks after the last regular session. Subjects may choose to terminate at any time. There will be no penalty for termination except that only subjects who continue participation to the end of the study will receive \$5.

I understand that I am being asked to participate as a subject in the graduate research as it has been described above. I understand that in the event of injury resulting from this research, financial compensation is not available, but emergency medical treatment will be provided to me at no cost to me or my family. If I have any further

questions I can contact Marie Clarkson at 381-9536. I have read and understand the information above and I agree to participate in this study.

Participant Date Witness Date

Informed Consent Form 2c

Purpose:

The purpose of this study is to explore various methods of promoting relaxation and anxiety reduction.

Confidentiality of Data:

The following steps will be taken in order to assure confidentiality: 1) a numerical coding system will be used to identify each subject, 2) both the coding system and the subjects file will be kept locked in the investigators file cabinet accessible only to the investigator and 3) all names will be removed upon the receipt of posttest data.

Benefits / Risks:

Benefits: The benefits of participation in this study include training in relaxation techniques that have been found to be effective in reducing anxiety.

Risks: Muscle tension will be measured using a standard EMG monitor involving the placement of electrodes on the frontalis muscles. These electrodes sense levels of muscle tension and do not cause any pain. Progressive muscle relaxation (PMR) presents minimal risks. These procedure involves tensing and relaxing muscles. Occasionally when a subject tenses muscles too tightly, muscle cramps can occur. This can be remedied by modifying the tensing strategy.

Subject Participation:

Subjects will be participating in 4 weeks of sessions in which music and PMR is used to promote relaxation. There will be two sessions per week ranging in length from 15 to 30 minutes except for the first two which will last about one hour. There will also be one half hour follow up session 4 weeks after the last regular session. Subjects may choose to terminate at any time. There will be no penalty for termination except that only subjects who continue participation to the end of the study will receive \$5.

I understand that I am being asked to participate as a subject in the graduate research as it has been described above. I understand that in the event of injury resulting from this research, financial compensation is not available, but emergency medical treatment will be provided to me at no cost to me or my family. If I have any further questions I can contact Marie Clarkson at 381-9536. I have

read and understand the information above and I agree to participate in this study.

Participant Date Witness Date

Appendix B
Medical Interview

Medical Interview

Questions that will be asked in an interview before subjects enter stage two of the study:

1. Do you have any serious medical condition that would cause you to be at risk, such as a heart condition, hypertension, epilepsy, etc.?

If so, name them.

2. Do you use any medications that may effect your mood or behavior such as tranquilizers, sedatives, etc.?

If so, name them.

Appendix C
Orientation Sessions

Orientation Sessions

PMRM Group

1. Training sessions were described briefly so that subjects would know what to expect during sessions.
2. The two measuring instruments were described: the SAI and the EMG monitor. The EMG monitor was demonstrated on the experimenter.
3. PMR was described and a rationale given explaining why it works the way it does. The importance of practicing was explained. The following excerpt from Paul (1969, p. 427) was read to support these things:

The way in which we'll do this is to have you systematically focus your attention on the various gross muscle groups throughout your body, first tensing each group for a few seconds--holding them long enough for you to identify exactly where you feel tension, and what it feels like. Then, when I say "relax," I want you to immediately let go--to stop tensing--and merely focus your attention on what those muscles feel like as relaxation takes place. By first tensing your muscles, the level of tension increases over your current operating level, such that when you release the muscles, the level of tension drops below the point where you started. Each time you tense and release a muscle group, the resulting level of tension becomes progressively lower and lower--to the point where no tension is present at all. By focusing your attention on this process as it takes place, with practice, you can eventually reach the point where just thinking or recalling the experience of release is sufficient to bring about relaxation itself.
4. PMR was demonstrated on the hands and forearm of the subjects.
5. The following miscellaneous guidelines were given:
 - a. Please do not discuss the procedures used for you with any other participants in the study.
 - b. Please reschedule your session if you have a severe and persistent cough or a high fever.
 - c. If at all possible , please wear comfortable clothing.

- d. If you wear hard contacts you may want to remove them before your session.
- e. Please be on time.
- f. Each person was issued a confidential number.
- g. Scheduling was explained.

6. Music was chosen. The following instructions were given:

Try to sit comfortably in your chair and try to relax; see if you can determine which selection you can relax to most effectively as well as which one you like most. If you have to choose between one that seems relaxing and one that you like, choose the one that's relaxing unless you don't like it."

Subjects then wrote down the number of the selection they had chosen.

7. Then the informed consent was passed out and explained. Subjects signed these and returned them.

PMR Group: Same as PMRM except step #6 was deleted.

MUS Group: Same as PMRM except step #3 and #4 were deleted.

Appendix D
Daily Log

Number _____

Minutes Spent

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Appendix E
Relaxation Instructions

Relaxation Instructions
(for training sessions)

Overview of the relaxation session using 16 muscle groups. Each muscle group was tensed and relaxed twice. Instructions for the first muscle group were as follows:

1. "Now, I'd like you to focus your attention on the muscles of your dominant hand and forearm. By making a tight fist, I'd like you to tense the muscles now. Feel the tension, hold it, tighter, feel the muscles pull, hold it...and relax, letting all the tension go, focusing on these muscles as they just relax completely. Noticing what it feels like as the muscles smooth out, unwind, and relax. Calm...peaceful...and relaxed." (then the same muscles were tensed and relaxed again in the same manner). Then the following muscle groups were tensed and relaxed using the same sort of instructions:

2. Dominant biceps, by pressing your elbow against the arm of the chair.

3. Non-dominant hand and forearm, by making a tight fist.

4. Non-dominant biceps, by pressing your elbow against the arm of the chair.

5. Muscles of the forehead, by raising your eyebrows.

6. Upper cheeks and nose, by squinting your eyes and nose tightly.

7. Lower cheeks and jaws, by making an exaggerated smile and gritting your teeth.

8. Neck and throat, by pulling your head forward as though you would touch your chin to your chest, but not allowing it to touch.

9. Chest, shoulders and upper back, by taking a deep breath and pulling your shoulder blades together.

10. Muscles of the stomach region, by taking a deep breath and making your muscles tight by pulling them toward your back.

11. Dominant thigh, by making these muscles very tight.

12. Dominant calf, by pulling your foot toward your head.

13. Dominant foot, by pointing your toe inward and turning your toes under and taking a deep breath.

14. Non-dominant thigh, by making these muscles very tight.

15. Non-dominant calf, by pulling your foot toward your head.

16. Non-dominant foot, by pointing your toe inward and turning your toes under and taking a deep breath.

The next session used seven muscle groups. This combined steps 1 & 2, 3 & 4, 5-7, 8 alone, 9 & 10, 11-13, and 14-16. The third session used four muscle groups. This combined steps 1-4, 5-8, 9 & 10, and 11-16. The fourth and last training session utilized counting alone. This involved reviewing all of the parts of the body while counting from one to ten. The subject was not asked to tense any muscles, but just to make sure that every muscle was relaxed remembering the feelings of relaxation that they had achieved in previous sessions.

Appendix F
Procedures

Procedures

These pretest posttest and follow-up sessions consisted of the following:

1. Each subject was asked to sit in the reclining chair and recline to a comfortable position.
2. Because of the cool temperature of the room each subject was offered a blanket.
3. Electrodes were attached on the frontalis muscles and headphones (for music groups) positioned. During this time the experimenter engaged in everyday conversation with the subject.
4. Then these instructions were given: "I want to get a baseline of your resting state. So just sit quietly. Then I will ask you to try to relax in a minute."
5. Subjects rested for 4 minutes. The first two minutes no data was recorded. The second two minutes the mean, range and standard deviation was recorded separately for each of these minutes.
6. The state anxiety inventory was given with instructions to fill it out based on how they felt right then.
7. Subjects were asked to get as relaxed as they could in the next 5 minutes. Then they either heard pre-chosen music or sat in silence. During this period the experimenter went behind a partition and returned just before the five minutes were over.
8. EMG levels were taken for two minutes and again the average, the range and the standard deviation for each of these minutes was recorded.
9. The state anxiety inventory was given again with the same instructions.
10. Electrodes were removed and the subject was asked to sign up for their next session. (Except at the follow-up at which time they received \$5.)

Training Sessions

1. Same as 1-5 of Pretest.
2. PMRM and PMR heard PMR training tape with relaxation instructions (see Appendix E). MUS group sat in silence for 10 minutes and were instructed to get as relaxed as they could. Experimenter went behind partition for this time.
3. EMG levels taken for one minute (mean, range and standard deviation).
4. PMRM and MUS heard five minutes of prechosen music. PMR group sat in silence for five minutes with instructions to sit and relax for 5 more minutes. Experimenter went behind partition for this time. All groups were informed that experimenter would be coming back and taking levels at the end of this period and to remain relaxed.
5. Same as 8-10 of Pretest.

Appendix G

Human Subjects Institutional Review Board Approval Form



WESTERN MICHIGAN UNIVERSITY

Date: December 13, 1989

To: Marie Clarkson

From: Mary Anne Bunda, Chair *Mary Anne Bunda*

This letter will serve as confirmation that your research protocol, "Effects of Music as a Conditioned Stimulus and Biofeedback-Assisted Relaxation in Reducing Anxiety", has been approved as full by the HSIRB. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the approval application. You must seek reapproval for any change in this design.

Please note that emergency treatment mentioned in the Consent Form must be provided at the expense of the researcher. The researcher can not presume that the University is responsible for the provision of services to the participants in your study.

The Board wishes you success in the pursuit of your research goals.

xc: B. Wilson, Music Therapy

HSIRB Project Number 89-08-11

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