1997

The Effects of 50 Beat Per Minute Music to Decrease Anxiety and Lower Heart Rates in a Select Group of College Students

Laura E. Burnell

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LAURA E. BURNELL, R.M.T.-B.C.

An Abstract Presented to the Faculty of the
Graduate School of Lindenwood College
in Partial Fulfillment of the
Requirement for the Degree of
Master of Arts
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The purpose of this study was to assess the affect of experimenter chosen 50 beat per minute music composed especially for stress and anxiety reduction on a select group of college students, and to examine its usefulness in promoting relaxation. The rationale for the study was based on research done in the area of using music to promote relaxation, and on the composer's claims that this music has been effective on a variety of populations for such purposes. Thirty subjects comprised of 17 males and 13 females ranging in age from 18 to 25 years participated in the study. This was a sample of convenience consisting of health class students from a small midwestern college who were interested in maintaining wellness. The music used for the study consisted of a specially designed 50 beat per minute composition created to slow heart rate and to decrease present or state anxiety. Psychological data were assessed through the Spielberger State Anxiety Inventory (STAI). Subjects were given pre and posttests, and also recorded their heart rates before and after listening to the music. The study was done on a one time basis with the entire session lasting one hour. The results of the study showed a lowering of state anxiety scores for all participants. Analysis of the data indicated that the differences in state scores between pre and

post-testing were statistically significant. Overall, the results showed that listening to selected music may be of some benefit to persons dealing with stress and anxiety.

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ACKNOWLEDGMENTS

I am most grateful to Dr. Marilyn Patterson, Dr. Pam Nickels, and the entire faculty of the Professional Counseling Program of Lindenwood College for their direction, encouragement, and support.

DEDICATION

This research project is dedicated to my daughter, Patty. It has involved many hours of preparation time which I was unable to spend with her. I am grateful for her support and understanding.

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CHAPTER ONE

Introduction

Anxiety, depression, and chemical abuse have reached epidemic proportions in our society. More than twenty-five years ago the U.S. Office of the Surgeon General reported that extreme stress levels could be harmful to an individual's physical and psychological well being. Other experts at that time reported that nearly 80% of all medical conditions may be stress related, and nearly 25% of all Americans suffered from serious psychological and physical problems due to stress (Albrecht, 1979). Extensive research has demonstrated that when the stress arousal becomes chronic or very intense, stress related disorders are likely to occur (Thaut & Davis, 1993).

For thousands of years the stress response played a vital part in helping human beings to survive in hostile environments. The human body needed to 'gear up' when danger was imminent. This stress response involved a variety of physiological changes such as increased heart rate, heightened alertness, and the diversion of blood to the muscles of the skeletal system. These rapid changes helped humans to cope with danger and endure the hardships of their environment.

Stressful situations experienced by early humans were often short lived. The physiological changes quickly returned to normal once the danger had passed. The body was not equipped to handle chronic stressors. People in today's advanced societies are expected to cope with today's long term stressors using those physiological responses which were once used most effectively in situations of immediate danger. In our present environments this 'gearing up' is not an effective response to the stress producing situations in daily life (Thaut & Davis, 1993).

Today's stressors are of longer duration. Chronic reactions to stress can lead to a number of psychological problems and the long-term elevation of many physiological processes. Extended stress arousal has led to a number of serious illnesses including cancer, heart disease, and ulcers, along with reduced efficiency of the immune system (Albrecht, 1979, Everly & Sobelman, 1987).

The harmful effects of stress on the human body are well documented, and many strategies have been developed in recent years to alleviate the effects of stress. Some of the most common methods have included cognitive techniques that help individuals change the way they perceive stressful events, exercise programs, and a vast array of relaxation practices. Some of these practices include progressive and autogenic

muscle relaxation, guided imagery, and the use of music alone or in conjunction with other relaxation strategies (Davis & Thaut, 1989, Hanser, 1985, Neufeld, 1989).

The terms anxiety, stress, and tension have appeared interchangeably in research and popular literature, which has led to confusion and varying descriptions of each of these states. There have been many models constructed to explain the relationship between physiological and psychological variables, but the nature of their interaction remains unclear (Robb, Nichols, Rutan, Bishop, & Parker, 1995).

Anxiety has emotional and physiological components. According to the psychological theory of stress developed by Lazarus (1966), anxiety is characterized by subjective, consciously perceived feelings of tension and apprehension which are associated with autonomic nervous system arousal. Some behavioral indicators of anxiety might include restlessness, shortness of breath, trembling, fearful facial expressions, muscular tension, and fatigue. Some physiological responses might include increased blood pressure, respiration rate, metabolism and peripheral vasoconstriction (Biley, 1992). Factors that contribute to a person's level of anxiety can include fear, environmental influences, and outside stressors.

Stress, as a part of the basic human condition, has suffered from the paradox of being too well known, and too little understood (Seyle, 1980). In spite of problems achieving agreement on definitions for terms like stress, anxiety, and tension, many mental health professionals, including music therapists, provide therapeutic interventions for anxiety and stress-related illnesses. There has been considerable research published in a wide variety of disciplines which seeks to establish a foundation for clinical procedures to promote relaxation training and stress management (Sandrock & James, 1989). The premise is that individuals who learn to monitor and control their levels of stress and anxiety are better able to cope with the challenges of living in our fast-paced and stress-filled world.

Statement of Purpose

The purpose of this study was to determine whether or not listening to 50 beat-per-minute music for a period of fifteen minutes could help reduce state anxiety levels for a select group of college students, male and female ranging in age from 18 to 25 years. The following research questions were addressed:

a) Does listening to music metered at 50 beats-per-minute for 15 minutes have a significant impact on reducing anxiety levels in the listener?
b) Does listening to music metered at 50 beats-per-minute for 15 minutes have a significant impact on lowering the heart rate of the listener?

Hypotheses:

1) There is no relationship between listening to 50 beat-per-minute music for 15 minutes and the lowering of state anxiety levels in the listener.
2) There is no relationship between listening to 50-beat-per-minute music and the lowering of heart rates in the listener.

CHAPTER TWO

Literature Review

Stress and Anxiety Defined

The stress system may be described as a complex of hormonal, neuronal, and immunological responses. Physiological and/or psychological stress provokes the brain, which causes the hypothalamic centers to secrete a hormone which stimulates the pituitary gland. Sandrock and James (1989) present four theoretical perspectives on stress.

The cognitive-behavioral theory proposes that stress and anxiety are individual reactions to current events in individuals' lives (Beck, 1976). These events evoke responses which are later reinforced by internal or psychological, or external, or environmental stimuli. An event perceived as stressful to one person may be perceived as pleasant to another. Spielberger's Trait- Anxiety Theory (1983) notes that events must be evaluated by each person as being either physically or psychologically threatening before being viewed as stressful. Stress can also be viewed as those events that challenge a person's coping abilities, which in turn result in perceptions of threat. By focusing on the individual's appraisal of potentially stressful events, coping skills, and frustration tolerance,

cognitive behavioral theory offers specific guidelines for therapeutic interventions (Sandrock & James, 1989).

Developmental theorists see the various stages of developmental tasks as stressful, anxiety-producing events. Their focus of treatment is on helping individuals develop healthy coping mechanisms rather than trying to avoid stressful events. They maintain that by using effective coping strategies to confront and resolve these tasks, stress and anxiety will be lessened. This concept concurs with Seyle's (1980) concept that stress is an unavoidable reaction to stimuli, and that stress and anxiety are a result of ineffective, unhealthy, or absent coping strategies (Sandrock & James, 1989).

Neurobiological theories on stress emphasize the role of biological imbalances within individuals. There are neurochemical and neuroendochrinological systems that are activated (or inactivated) during the stress response. The relationship between various neurotransmitters such as epinephrine and norepinephrines and human emotions is well documented (Sandrock & James, 1989). Music therapists have become more and more interested in studying the relationship between musical stimuli and the neurochemical mechanisms involved in relaxation (Hanser, 1985; Rider, 1985).

Cognitive therapists see affect (feelings) as a result of cognitive processes, and thereby try to change negative thoughts or perceptions to achieve emotional change. A growing number of research findings, however, supports the role of moods and emotions in influencing motivational states, learning, and social behaviors and cognitive functioning such as decision making, problem solving, and thoughts about self (Thaut, 1989). For example, in negative mood states low self-esteem, negative thoughts, and low motivation levels are more likely to occur. In positive mood states, more positive thoughts and better coping strategies are more likely to be present. Some scientists, therefore, have suggested broadening the concept of behavior modification to include techniques of affect modification, which feed directly into, and facilitate change in, the affective system (Rachman, 1984).

Effects on the Human System

A variety of neuropeptides and substances such as serotonin and acetylcholine play a vital role in the stress response. Catecholamines, in particular, play an important role in an individual's emotional state. Depression may also be related to a deficiency in catecholamines (Hammer, 1996). Psychoneuroimmunologists believe that these catecholamines are responsible for the mixing of proper endocrine

secretions. An over-release of them during stress tends to disrupt the homeostasis in the immune response (Tsao, Gordon, Maranto, Lerman, Murasko, 1991). This psychoendochrine response to stress alters the individual's perception of the environmental situation. The related physiological affects are largely determined by the person's individual coping responses or stress avoiding tactics (Hammer, 1996).

Researchers have studied physiological responses to musical stimuli since the late 19th century. Many of these studies have supported the idea that music influences physiological processes (Davis & Thaut, 1989).

Hypotheses about the interactions between the immune system and the central nervous system date back to Aristotle (Hammer, 1996). The link between psychological and physical health has been established, along with much documentation on how the central nervous system helps to regulate immunity. Studies have shown repeatedly the possible immune effects of a variety of psychosocial stressors, including increased stress, bereavement, anxiety disorders, and mood disorders. These psychosocial factors are believed to change the physiological status of the stressed individual. Emotions can affect a person's health (Hammer, 1996).

It has been consistently observed that prolonged emotional stress can

render an individual more susceptible to psychological and physiological dysfunction. Conversely, it has been demonstrated that a positive emotional state which evokes relaxation, humor, and a generalized sense of well-being may contribute to the enhancement of the immune response (Csikszentmihali, 1990). Extensive research by Csikszentmihali and his colleagues revealed that people who learn to control their inner experience will be able to determine the quality of their lives (Csikszentmihali, 1990).

Assessment Tools

There are a number of tools available to measure particular psychological states and constructs as they relate to anxiety and stress. These tests are primarily self-reports which enhance their use by professionals in a variety of disciplines, including music therapy. There is minimal training required for administration of these tests, since they are self-reportive. The data obtained from them is relatively straightforward and therefore easily applied to evaluating outcomes of treatment.

The State-Trait Anxiety Inventory (STAI) is a self-administered questionnaire originally developed by Spielberger, Gorusch, and Lachene (1970). Its format uses two 20-item scales which distinguish between two types of anxiety, state versus trait. Trait anxiety refers to the individual's

characteristic or long-standing pattern of anxious reactions. State anxiety refers to subjective feelings of anxiety, tension, and/or apprehension which a person is currently experiencing.

The current test form (form Y) incorporates changes designed to enable the STAI to correlate less with measures of depression, thereby improving its discriminate validity (Spielberger, 1983). The STAI has been widely used in studies documenting the influence of stress management training and thus demonstrating its usefulness to music therapists conducting music-assisted relaxation groups.

Spielberger (1983), developer of the STAI, notes that conceptual advances have clarified anxiety as a theoretical construct. The term "anxiety," as it is currently used, refers to at least two related, but logically different, constructs. Anxiety is most often used to describe an unpleasant emotional state of condition. The term is also used to describe a relatively stable personality trait of some who are more prone to being anxious. It is suggested that state anxiety is probably more amenable to short term measurement than is trait anxiety.

The psychometric properties of the STAI show that it is a reliable and valid measure of anxiety. Internal consistency correlations are .80 and .90 for state and trait anxiety, respectively. Test-retest reliability is .72 for

trait anxiety, but lower for state anxiety at .61, which is a more transient and less stable construct (Anastasi, 1982). The STAI manual offers detailed information regarding validity and provides normative data for use in comparisons.

Music therapists who employ assessment tools for measurement of stress and anxiety should thoroughly review pertinent literature, which will enable them to select the proper instrument for their population, setting, and expertise. Music therapists who conduct music-assisted relaxation groups should have a clear understanding of the various theoretical perspectives of anxiety and stress. Also, clinicians must be prepared to choose appropriate instruments that will document treatment need and treatment effectiveness. Studies in this area which are carefully documented with accurate testing tools may offer considerable insight into the relaxing, calming potential of certain musical stimuli.

Assessment tools that use observance and self-report documentation of behavioral symptoms are useful to neurobiological theorists. The physical symptoms which are most commonly noted in relation to anxiety are increased heart rate, increased blood pressure, and constriction of peripheral blood vessels which result in cold hands and feet. These behavioral checklists are a common component of comprehensive

assessments of anxiety and stress (Sandrock & James, 1989).

How Music Therapy Works

The basic elements in music are rhythm, melody, and harmony. The music therapist uses these elements in particular ways to help clients heal. These elements in music naturally lend themselves to healing and assisting to move an individual toward homeostasis.

Music therapy in its broadest sense can be defined as the use of music in the accomplishment of therapeutic aims: the restoration, maintenance, and improvement of mental and physical health (National Association for Music Therapy, Inc., 1980). The therapy in music activities comes largely from the involvement of the individual (client) in a therapeutically oriented activity, rather than from merely talking about this environment. Music therapy clients are actually involved in doing something which provides experiences needed to help make them healthier (Wheeler, 1983).

Music is the medium used to help individuals become aware of their feelings. This non-verbal media can tap emotional rather than cognitive processes and help to restore emotional equilibrium so clients may function as closely as possible to their normal levels of homeostasis (Wheeler, 1983). Music is the stimulus that evokes changes which occur

in perception. These changes are dictated by a kind of tension/release mechanism within the music by melodic line, instrumental color, and rhythmic sequences which together may raise emotions and feelings within the listener. Images relating to the five senses may emerge from the listener and thus become the basis of the musical experience (Bonny, 1990).

Music, which is basically ordered auditory information, helps organize the mind that is engaged in listening. Listening to music alleviates boredom and anxiety, and when seriously contemplated, can induce optimal flow experiences (Csikszentmihali, 1990). Music plays an important role in internal balancing processes. It can hold attention, challenge the intellect, and modify emotional states, regardless of preferences of knowledge of music. It can demand moment by moment involvement of listeners, altering their perceptions of time (Wigram, 1995). Music can also be used as a grounding mechanism that makes it easier for an individual to 'let go'.

In every culture, the ordering of sound in ways that give pleasure or serve a particular function has been used to improve the qualify of life. The non-verbal characteristics of music enable it to filter through the auditory cortex to the central part of the limbic system, bypassing cerebral

interpretive delays to the unconscious (Hammer, 1996).

The intrinsic appeal of rhythm may be due to the fact that our entire existence is governed by cycles, rhythms, and pulses, (i.e. tides, seasons, cycles, circadian rhythms, and vital body functions). Muscular energy has been reported to increase or decrease depending on music's rhythm. Also, breathing and heart rate may alter in response (Hammer, 1996).

The tension/release principle in music imitates the arousal processes in real life. The difference with musical stimuli lies in the fact that musical tension-relief is usually pleasant and provided within the same medium. This pleasant arousal enhances the human nervous system and helps promote homeostasis (Hammer, 1996).

Respiration rate may be notably affected by music, showing increased rate with stimulation by music and slowing with more sedate music. Increases and decreases in Electro Dermal Activity (EDA) have been noted to stimulating and calming music. In other studies heart rates have been recorded and contradictory results obtained on the effects of music in reducing heart rates (Wigram, 1995).

Current Research Reviewed

Many recent studies have demonstrated the positive emotional effects of music on the function of immune system. Many of these studies

strengthen the evidence that mechanisms like relaxation, music, and guided imagery can have a positive impact on the immune response (Tsao et al., 1991). Tsao et al. (1991) investigated the effects of music and biological imagery on immune response. Results showed the secretory IgA levels were enhanced by conscious thought and the use of music.

Research observing the effects of calming, sedative music have reported encouraging results regarding anxiety reduction and the use of relaxation music to alleviate state anxiety (Hammer, 1996). The relaxation response, like the stress response, is triggered by the autonomic nervous system (Hammer, 1996). According to Hammer (1996) there is no physical symptom that is not affected to some degree by the mind.

Hammer (1996) conducted a research investigation into the effects of Guided Imagery through Music (GIM) and relaxation on state and trait anxiety levels on sixteen randomly selected subjects. All subjects in the study described themselves as "high strung," "stressed out," or "anxious," and all subjects suspected that they suffered from some stress-related physical disorders. These sixteen individuals participated in ten treatment sessions. A control group received no treatment. The STAI

was used to evaluate results. A T test was used to see if the two groups were comparable. The results showed a significant difference between the two groups, with the experimental group showing a larger reduction in stress levels (state scores). There were no differences found in symptomatic responses for either group with measured trait characteristics.

The results of this study suggest that GIM used as a stress management tool may have an effect on changing state level anxiety for some individuals who are experiencing both acute and chronic stress. There are also implications that this type of program may have an overall effect on improving one's ability to react to stressful situations, improve concentration, and relax (Hammer, 1996).

Research has supported the notion that musical stimuli, when perceived as relaxing and pleasant, can enhance the psychological processes of relaxation in wellness programs with a variety of clinical populations (Davis & Thaut, 1989; Hanser, 1985; Thaut, 1989). Stratton and Zalanowski (1984) compared the effects of five different precategorized types of music and a no-music condition on perceived relaxation. These investigators determined that there was no one style of music that was more effective than another in increasing relaxation. The

most important determinant seemed to be how well the subject liked the music. In an earlier study Hanser (1985) demonstrated that the combination of patient-selected and experimenter-selected music reduced pain perception and increased relaxation in expectant mothers. Davis and Thaut (1989) reported that state anxiety was decreased for college students, while perceived relaxation was heightened for college students who selected their own preferred music.

Within the past thirty years a vast array of music has been composed specifically to help people relax, relieve tension, and in general, to promote well being. This music is generally categorized as sedative, due to its slow tempo, quiet melodic lines, and loosely structured phrasing. Marketing for such music claims that this music can be more effective in promoting relaxation than other styles of music.

There is some debate that the individual selecting music to reduce anxiety and assist with relaxation considers factors such as familiarity, preference, cultural context, and past associations with the music in addition to its structural aspects (Davis & Thaut, 1989). These considerations would not be present in specially composed relaxation music. There have been studies which support both opinions.

A research project conducted by Thaut and Davis (1993) compared

the effects of subject-selected music and experimenter-chosen music on measures of state anxiety, perceived relaxation, hostility, and depression. The experimenter-chosen music was specifically composed to induce relaxation. The experiment was conducted with fifty-four randomly chosen college undergraduates who were assigned to either a music group or control group. Psychological data was assessed using the Spielberger State Anxiety Inventory, the Multiple Adjective Checklist, and a visual analog scale. The results revealed that only the anxiety measures showed a significant difference in favor of both music conditions over the control group which received no music. The choice of music did not make a significant difference. Therefore, the findings from this study do not support marketing claims concerning the unique quality of certain music to induce relaxation.

Thaut (1989), using music relaxation as therapy techniques, found significantly improved scores for relaxation, moods, and thoughts about self in a study done with psychiatric prisoner-patients. The results showed a significant change ($p<.05$) in self-perceived ratings across all scales after music therapy. The music and relaxation group used progressive muscle relaxation combined with listening to sedative music which was selected by patients. In this study the music therapy elements

have the strongest impact on self-perceived relaxation states, followed by improved mood/feeling states and positive thoughts about one's own life (Thaut, 1989).

Rachman (1984) reported larger numbers of subjects reaching a predetermined mood change criteria, along with stronger subjective mood ratings using musical mood induction compared to verbal methods. Pignatiello et al. (1986) reported the superiority of the use of music to induce mood without the strong demand characteristics and gender differences associated with verbal relaxation induction techniques.

Musical mood induction has had effects on other behaviors, such as the effect of emotion (affect) on cognition and behaviors. Sutherland et al. (1982) found that subjects could eliminate unwanted and intrusive thoughts, which are dominant features of clinical depression, from their minds more quickly in an elated mood than in a depressed mood. These findings were significantly stronger with musical relaxation induction as compared to the verbal induction. This suggests the possibility of musical mood induction being used in the treatment of depression. The affective quality inherent in the process of music perception addresses emotional experiences directly. Emotions and moods are actually experienced in the music therapy process, rather than merely being verbalized (Thaut,

1989).

Music has been used in similar manner as a conditioning stimulus to decrease fear in the treatment of animal phobias. The use of happy and sad music has helped induce moods in chronic headache sufferers, who found a reduction in headache intensity during elated mood induction, and the reverse during sad music (Thaut, 1989).

Pignatiello and colleagues (1989) compared the two frequently used mood induction techniques - Velten's statements, and music, at a psychophysiological level. Thirty-six subjects were given either of the two mood induction techniques. Heart rates, systolic and diastolic blood pressure, finger pulse amplitude, and respiration rates were simultaneously recorded.

The Velten method consisted of each subject being given a series of 60 self-referential statements designed to induce mood states of elation, depression, or neutrality. Examples of such statements included "I feel refreshed", "just a small effort tires me out", and "it was cheaper to go by plane than by boat." Statements were presented on 3 x 5 cards for twenty-second time periods to each subject in the Velten group. For the musical experiment three twenty-minute tapes were used, based on the musical characteristics of pitch, rhythm, volume, melody, and tempo.

These pieces were instrumental, and all began with 'neutral' music, then progressed from neutral to becoming more elated, depressed, or they remained neutral.

The results showed that elated subjects had significantly lower scores than the neutral and depressed subjects on the Depression Adjective Checklist. There were significant differences in heart rates and systolic blood pressures, showing increased levels in sympathetic nervous system activity participants in elated groups (Pignatiello et al. 1989, p. 140).

The remarkable similarity between heart rate and systolic blood pressure responses for participants in music groups indicates that psychophysiological responses to the elements of tempo and rhythm may be significantly linked to an individual's own body rhythms (Rosenfield, 1985). E. Thayer Gaston (1968), a pioneer in the field of music therapy, names rhythm as the most potent and dynamic element in music. Rosenfield (1985) noted that humans normally have heart rates of 70 to 80 beats per minute, and that by some strange coincidence, most Western music is paced at that tempo. If Rosenfield and Gaston are correct, sedative music, which is often paced below 70 or 80 beats per minute, should slow down heart rates, and stimulating music should accelerate it.

In addition to the characteristics of music, another significant point is that the Velten method is verbally (left hemisphere) oriented, whereas the music used in the study was non-verbal, and is right hemisphere oriented. Right brain experiences have been linked to emotions (Rosenfield, 1985).

Holistic techniques designed to reduce stress, such as relaxation training and music therapy, have been used in medical/surgical units and in critical care practice. A study conducted by Guzzetta (1989) was done to determine if relaxation and music therapy were effective in reducing stress in patients admitted to a coronary care unit with a presumptive diagnosis of acute myocardial infarction. In this study 80 patients were randomly assigned to relaxation group, music therapy group, or a control group. The relaxation and music therapy groups participated in three sessions over a two day period. Stress was evaluated by apical heart rates, peripheral temperatures, cardiac complications, and patient self-assessment data. The results showed that the patients in the relaxation and music therapy groups had lowered apical heart rates, raised peripheral temperatures, and incidences of cardiac complications were lower. In qualitative analysis most subjects believed that music and relaxation therapy was helpful (Guzzetta, 1989).

The goal of music therapy is to reduce psychophysiological stress,

pain, anxiety, and isolation (Schulberg, 1981). With soothing music, a hypometabolic response resembling relaxation occurs during which cardiovascular, respiratory, and neurologic systems are altered (Guzzetta, 1989). Reduced heart rates, greater relief from pain, and positive psychological ratings have been observed in intensive care and surgical patients participating in music therapy sessions. Mind modulation is the natural process by which thoughts, feelings, attitudes, and emotions are converted in the brain to neurohormonal messenger molecules which are sent to all body systems. This modulation process exists in the autonomic, immune, endocrine, and neuropeptide systems in the body, thereby making them responsive to mental healing suggestions promoted by the music used for relaxation purposes (Guzzetta, 1989).

In Guzzetta's (1989) research investigation it was determined that not only were verbal relaxation training and music therapy more effective than no intervention at all, but that music therapy was more effective than relaxation training alone. There was also an observable cumulative effect over time, revealing that apical heart rates were lower after the third session than after the first two (Guzzetta, 1989). Relaxation is an acquired skill. Therefore, the more individuals practice the techniques, the more effective they may become in producing therapeutic changes in

clients' psychophysiology. Guzzetta (1989) observed that one reason why music therapy may have been more effective than relaxation alone is that it is easier for clients to concentrate on the constant flow of relaxation music, as opposed to focusing on a series of words. This flow helps to quiet abstract thinking and to achieve a hypometabolic response. These studies suggest investigating music as a therapeutic stimulus which effectively reaches human affective systems, induces affective change, and thereby offers helpful emotional/mood experiences which may initiate, facilitate, and support therapeutic change (Thaut, 1989).

Conclusions

Music therapy sessions may become behavioral laboratories where clients can (re)learn and rehearse desired behaviors using musical activities. Therapeutic tasks of decreasing anxiety, learning to cope with traumatic experiences, and adapting positive attitudes toward personal change are mediated through affective (musical) experiences. In this mediation process the client's affective/motivational system is tapped into and positive mood/emotional/motivational changes may be induced. This process may facilitate the client's access to positive thoughts, and attitudes, about his environment (Thaut, 1989).

Janalea Hoffman is a music therapist who has studied with Helen

Bonny and the Institute for Consciousness and Music. She spent many years working with clients on a daily basis using music and relaxation training to help them learn to decrease their own levels of stress and anxiety. Her clients have sought natural remedies for a variety of stress-related problems.

Hoffman discovered through her work that rhythmic aspects of music are a powerful tool to slow the body so the mind can also slow long enough to develop new insights (Hoffman, 1995). She found it difficult to locate music metered at less than 60 beats per minute to facilitate this slowing down process, so she wrote her own music. Her Musical Hypnosis tape (Hoffman, 1993) contains music that starts at 80 beats per minute, and in the course of twenty-five minutes, slows to 50 beats per minute. The premise is that as the body tries to synchronize to the beat of the music, heart rate and blood pressure are lowered (Hoffman, 1995). She maintains that slow, rhythmic music can slow body rhythms dramatically. When she plays 50 beat-per-minute music the listener's heart rate responds to this external stimuli of slow, steady rhythm in the music, and the heart rate begins to synchronize. This phenomenon is called entrainment (Hoffman, 1995, p. 3).

Entrainment happens between all living beings in response to music or

with anything that creates rhythm. A scientific explanation of entrainment states that any two living, vibrating bodies will try to synchronize with each other. This phenomenon was first noted by a Dutch scientist who noticed the pendulums of two grandfather clocks had a tendency to swing in synchronicity when placed close to each other (Hoffman, 1995). A metronome that is set at 60 beats per minute will slow down body rhythms because the body tries to harmonize, or entrain, with the external rhythm. Sixty beats per minute is an average relaxed heart beat (Hoffman, 1995).

Research Rationale

Although some data in the literature review advocates the heightened effectiveness of client-chosen over experimenter-chosen music to facilitate relaxation , this writer chose to use specifically composed 50 beat-per-minute music in the study. Reasons for choosing this specially formulated music were to test the validity of claims that entrainment causes body rhythms to slow down with the music. Research supports the hypotheses that the inherent properties of sedative music can greatly enhance relaxation and therefore assist with the reduction of stress and anxiety in participants. Other considerations for using experimenter-chosen music include the logistics of the study. Large numbers of subjects listening to music in the same room at the same time would

render it impossible to use client-chosen music.

College students who are making developmental transitions into late adolescence and early adulthood have their own unique types of stressors. It is a time of breaking away from family and establishing autonomy, addressing gender identity issues, and beginning to establish career goals. These young adults are beginning to internalize their value systems and personal morality, and to explore intimate relationships. College students are no longer children, but they are not yet fully autonomous adults. This can be an extremely stressful period for them as they deal with pressures of academic life and trying to establish their personal and career paths. This development stage may well produce anxiety, and feelings of fear and insecurity about the present and the future (Newman & Newman, 1995).

The literature review for this study addressed stress and anxiety related to populations with medical complications, and adults with emotional and psychological stressors. The uniqueness of the developmental challenges of college students may be just as anxiety-producing for them. For that reason the subjects and their responses to the experimental design are of particular interest to this investigator.

CHAPTER THREE

Method

This study attempted to examine whether a listening experience using specially composed sedative music metered at 50 beats-per-minute could decrease perceived state anxiety levels and lower heart rates in participating college students enrolled in a health class. Specifically, this study attempted to answer the following questions: a) will there be a significant difference indicated on self-reported psychological measures of perceived situational anxiety and stress? and b) will there be a reduction in participant's heart rates in response to listening to 50 beat-per-minute music?

Subjects

The subjects for this study were thirty undergraduate college students from a small midwestern university. They were all students in a health class. Subjects were a sample of convenience. They were selected due to the uniqueness of stressors faced by young people between the ages of 18 and 25 in dealing with developmental tasks transitioning into adulthood, as well as the anxiety produced by academic challenges they experienced at midyear.

There were 17 males and 13 females ranging in age from 18 to 25 years. There were 6 freshmen, 12 sophomores, 6 juniors, and 6 seniors who participated. All participants were volunteers. There were 31 students present for the study. One male student chose not to participate, but was asked to remain in the classroom for the duration of the session by his instructor. A data sheet was provided for each participant who was identified with a number between one and thirty. Each participant was asked to indicate their gender, age, and class ranking.

Descriptive data indicating the dependent, nominal variable of gender and the dependent ordinal values of age and class rank are provided. The mean, or average age of participants was 20.2 years with the median age of 20.0. The mode, or most frequently occurring age was 21.2. In examining the relatedness of the mean, mode, and median, one might observe close symmetry. The frequency distribution for age is unimodal, positively skewed, and shows a relatively normal distribution. The ascending line on the normal plot, and the absence of scatter on the detrended normal plot also indicate a normal distribution.

A chi square comparison of age by gender showed the majority of the population to be 21 year old females (5) and 19 year old males (5). The

chi square comparison of age by class rank indicated the majority of participants to be sophomores. There were 12 male sophomores and 5 female sophomores included in the study. By gender there was an even distribution of males (3) to females (3) in both freshman and senior classes. Juniors were comprised of a 2:1 ration of males to females (4 males and 2 females).

Materials

A simple data sheet was given to each participant in order to collect basic demographic and pertinent information on each subject (See Appendix I). The instrument used to measure state anxiety was the State-Trait Anxiety Inventory (STAI), form Y (Spielberger, 1983). The STAI measures the individual's state (situational) as well as trait (characteristic) anxiety. For this study the state portion only was recorded. The STAI measures the cognitive-verbal components relating to the subject's perceived anxiety. The STAI is a widely used test, and since 1987 has 2600 references covering a vast area of research (Hammer, 1996). This instrument was chosen based on a review of measures used in previous studies, ease, accessibility of measures to the investigator, and on its proven reliability.

The STAI is a self-administered pencil and paper checklist.

Responses are recorded on a Likert type scale with intervals of one to four, with four being the most anxiety-producing state. Questions one, three, five, eight, eleven, fifteen, sixteen, nineteen and twenty are reverse scored from four to one, since they indicate levels of calmness and relaxation. There are twenty questions on the STAI portion of the checklist which were used for this study. The test claims to measure two characteristics: anxiety in specific, transitory circumstances, or state anxiety, and trait anxiety, or general level of anxiety within the subject. In this study both characteristics were measured, but only state anxiety results were used due to study limits.

Normative Data

Subjects used for Spielberger's normative data included 1,387 males and 451 females employed by the Federal Aviation Administration. They were mostly white collar workers closely related in age and education level (Spielberger, 1983). Form Y normative data indicated the median Chrombach alpha coefficients were .93 for the State-Anxiety Scale, and .90 for the Trait-Anxiety Scale. There were low stability coefficients for the State-Anxiety scale ranging from r =.16 to r =.30 as might be expected considering the situational nature of this part of the instrument.

Spielberger reported that test-retest correlation for the Trait-Anxiety

Scale ranged from r =.65 to r =.75. The overall median alpha coefficients given by Spielberger for the State-Trait Anxiety Scales for the normative samples were r =.92 and r =.90 respectively.

The items included on the STAI were selected from the Taylor Manifest Anxiety Scale, the Welsch Anxiety Scale and the IPAT Anxiety Scale (Spielberger, 1983). The author notes that validations for trait scores were estimated by correlating the scores with the IPAT Anxiety Scale, and the Affect Adjective Checklist. For 126 college females, coefficients were .75, .80, and .52, respectively. For criterion-based validity, high scores on the Trait scale were confirmed by diagnosticians using the Diagnostic and Statistical Manual of Mental Disorders, Third Edition Revised (DSM III-R) of the American Psychiatric Association (Spielberger, 1983). Regarding construct validity, the constructs by which previous tests were devised were accepted for the questions on this test. The test manual itself assures that temporal stability of the trait factor proved reliable.

The test-retest correlation for the Trait-Anxiety Scale were reasonably high for the college students, ranging from .73 to .86 for six subgroups, but somewhat lower for high school students, ranging from .65 to .75. The median reliability coefficients for the Trait-Anxiety Scale for college

and high school students were .765 and .695, respectively (Spielberger, 1983).

Variations in the State-Anxiety factors are to be expected due to the nature of the test. Internal consistency also proved to be high. Alpha coefficients for the form Y State-Anxiety and Trait-Anxiety Scales were computed by Formula KR-20 (coefficient alpha) and have medial scores of .93 and .90, respectively (Spielberger, 1983).

Use of the STAI includes assessing clinical anxiety in medical, surgical, and psychiatric patients. Spielberger also notes that the T-Anxiety Scale has been used to screen high school and college students, as well as military recruits for anxiety problems. It is also used to evaluate psychotherapeutic outcomes. In experimental and clinical research the STAI-T Anxiety Scale has been deemed useful for identifying people with high levels of neurotic anxiety (Spielberger, 1983).

The music used for the study was a cassette tape of a specially designed 50 beat-per-minute music composition entitled Rhythmic Medicine: Music With A Purpose (Hoffman, 1995). This music was created by Janalea Hoffman, RMT-BC, a board certified, registered music therapist who has used this music effectively for the past five years with adult clients who wished to learn ways to better handle their stress. This

particular music was chosen based on the investigator's personal experience with it, and also due to Hoffman's claims that entrainment of body rhythms occurs within the listener when this slower tempo music is played. The music was played on a Sony stereo portable cassette tape player.

Method

Selected students participated in a one time sixty minute session which included a pretest and a posttest. All testing was done by this investigator. Participants were assigned a number from one to thirty which they were to use on all forms provided in order to identify themselves. They were asked to complete a brief data sheet on which they recorded their identification number, and indicated their gender, age, and class ranking. Gender and class ranking were noted by participants circling appropriate numbers, i.e. males = 1 and females = 2. Class ranking was indicated as freshman = 1, sophomore = 2, junior = 3, and senior = 4. This method was used for ease in tabulating date.

Subjects were merely told that they were going to listen to music for 15 minutes. They were asked to complete the Spielberger State Anxiety Inventory (STAI) as a pretest measure of current anxiety levels. Following this they checked and recorded their resting heart rates.

Students were instructed to find their pulse, count it for 30 seconds, then multiply the number of counted heart beats by two to determine their present resting heart rate. The heart rates were recorded on the upper right hand corner of the STAI pretest sheet.

Next, the students were asked to become as comfortable as they could while seated in their desks. They were asked to uncross arms and legs, take a few deep, slow breaths, and to bring their focus of attention to the present moment. They were asked to become aware of how their bodies felt sitting in their desks. They were invited to close their eyes if comfortable for them to do so, and to just listen to the music. This investigator then played the specially composed 50 beat-per-minute music tape on a portable stereo cassette player. Participants listened to the music for exactly 15 minutes.

When the music stopped, students were asked to open their eyes, bring their awareness back to the room, and to again check their resting heart rates and record them. They were then asked to complete the STAI as a posttest measure, indicating their perceived current levels of anxiety and stress.

After the recording was completed this investigator told the participants why they were chosen to participate in the study and what the

music was intended to do for the listener. Many students expressed that they enjoyed the music and felt more relaxed after listening. Some indicated that they did not like the music at all and, in fact, some stated that it actually made them feel more anxious. The results, however, indicated a decrease in state anxiety in all participants, whether they enjoyed listening to the music or not.

CHAPTER FOUR

Results

The data that resulted from this study show a significant decrease in anxiety levels for the majority of subjects. Twenty-nine of the thirty participants showed a decrease in perceived state anxiety after the music listening experience. The results of the pre and posttests for heart rate decrease while listening to the music were not as significant, although 18 of 30 subjects showed a decrease in heart rate.

Statistical analyses were run to compare nominal and ordinal variables of gender and age to class ranking in correlation to changes in anxiety levels and increase or decrease in heart rates. There were no significant correlations of differences between gender, age, or class ranking in the results. Raw data including subject number, age, gender, class ranking, STAI pre and posttest scores, and pre and post heart rate scores can be found in Table I. All data were analyzed using the SPSS software program. A T-test for matched pairs was done to compare pre and post STAI anxiety levels and pre and post heart rate scores for each participant. The sample size remained the same on all variables for all subjects included in the study (n = 30).

Table I

RAW DATA

Subject	Age	Gender	Class	STAI Pre	STAI Post	HR Pre	HR Post
1	21	1	2	49	41	60	60
2	21	2	4	31	21	68	60
3	18	1	1	36	31	62	58
4	20	1	2	56	46	72	68
5	19	1	1	23	22	96	56
6	22	1	3	66	52	70	76
7	19	1	2	32	20	60	64
8	21	1	3	35	25	62	52
9	23	1	3	43	34	70	64
10	19	1	2	38	30	58	62
11	18	2	1	23	20	70	70
12	20	1	2	35	28	70	70
13	23	1	4	30	23	84	82
14	19	2	2	51	27	68	64
15	19	2	1	38	23	94	82
16	21	2	4	38	27	54	58
17	21	2	3	53	28	72	62
18	20	2	2	37	28	50	56
19	18	2	1	63	29	68	72
20	19	1	2	30	23	70	72
21	25	1	3	20	20	56	60
22	20	2	2	55	45	48	50
23	18	2	2	42	26	62	56
24	22	1	4	39	32	62	60
25	21	1	4	22	20	58	62
26	19	1	1	36	24	62	58
27	19	2	2	34	20	60	58
28	21	2	3	24	20	68	62
29	21	1	2	29	24	74	68
30	21	2	4	34	27	72	74

The primary null hypotheses were that a) there would be no significant difference in anxiety levels for subjects who listened to 50 beat-per-minute music for 15 minutes, and b) there would be no significant difference in heart rates of these same subjects as a result of the music

listening experience.

The T-test mean score for STAI preanxiety of subjects was 38.067. The mean score for STAI postanxiety on the same subjects was 27.86. The mean difference was 10.20. the T value of 7.68 was calculated using 29 degrees of freedom (30-1). The degrees of freedom (df) were the same for each T-test in the study. Since the T value falls within the 95% confidence interval for the mean difference of 7.485 - 12.915, the T-test failed to reject the null hypothesis that there are no significant differences between the pre and postanxiety scale scores.

Table II: T-test Comparison of Preanxiety and Postanxiety

Variable	Pairs	Corr	2-tail sign.	Mean	SD	SE of Mean
Preanxiety				38.067	11.97	2.186
	30	.802	.000			
Postanxiety				27.866	8.33	1.522
Paired Differences						
	Mean	SD	SE of Mean	T-value	df	2-tail sign.
	10.200	7.270	1.327	7.68	29	.000
95% confidence interval: (7.485, 12.915)						

The mean score for the T-test on pre heart rates was 66.67, and the mean score for post heart rate was 63.53. The mean difference was 3.13. The T value of 1.93 was calculated with 29 df. The T value falls within the 95% confidence interval for mean difference of -.188 - 6.455. The T test may reject the null hypothesis that there is no difference between the

mean scores for pre and post heart rates.

Table III: T-test Comparison of Pre Heart Rate and Post Heart Rate						
Variable	Pairs	Corr	2-tail sign.	Mean	SD	SE of Mean
Pre Heart Rate				66.67	10.83	1.978
	30	.591	.001			
Post Heart Rate				63.53	8.08	1.475
Paired Differences						
	Mean	SD	SE of Mean	T-value	df	2-tail sign.
	3.133	8.893	1.624	1.93	29	.063
95% confidence interval: (-.188, 6.455)						

A sign test was run on the interval variables of pre and postanxiety level scores as determined by the STAI. The sign test is a nonparametric procedure used with paired samples to test the hypothesis that the distribution of variables is the same. This test does not require any assumptions about the shape of the distributions. With an alpha level of .05 (p. .05), the two tailed, binomial sign test level is p = .025. The results of the sign test indicate a significant difference in pre and posttest anxiety level with a score of .0000. There was not a significant difference in pre and posttest heart rates, with a two-tailed significance of .4414.

Table IV: Sign Test Comparing Preanxiety and Postanxiety		
PREANXIETY COMPARED WITH POSTANXIETY		
Cases		
29 -	Diffs (Postanxiety Lt Preanxiety	
0 +	Diffs (Postanxiety Gt Preanxiety)	
1	Ties	Binomial
		2-tailed P = .0000
30	Total	

Table V: Sign Test Comparing Pre Heart Rate with Post Heart Rate		
PRE HEART RATE COMPARED WITH POST HEART RATE		
Cases		
16 -	Diffs (Postanxiety Lt Preanxiety	
11 +	Diffs (Postanxiety Gt Preanxiety)	
3	Ties	Binomial
		2-tailed P = .4414
30	Total	

CHAPTER FIVE

Discussion

Based on the results of this study, listening to 50 beat-per-minute music is effective in decreasing state anxiety and promoting relaxation within the listeners. Music listening, when used for relaxation, has been traditionally employed as an adjunct to enhance stress reduction techniques such as progressive muscle relaxation, imagery, and deep, slow breathing exercises. In this study, however, the main stimulus used to promote relaxation and decrease anxiety was the music alone. Because this study did not use a population with pathological symptoms, one may surmise that moderate decreases in anxiety may have been a result of enjoyment of the music. There were several students who commented that they did not like the music, and that it in fact made them feel less at ease. The state anxiety scores did not reflect this. Twenty-nine of the subjects had a significant reduction in their post anxiety scores. Only one subject remained the same. None of the scores indicated any raising of anxiety.

The subjects used for the study were young adults assumed to be going through normal developmental transitions. The implications from

this study also suggest that this kind of musical intervention, which has proven effective with hospitalized and institutionalized patients, can also be effective with normal, healthy and high-functioning populations to decrease state anxiety levels, assist with effective coping strategies, and help individuals gain more control over their environments.

Recommendations for Further Research

The results of this study suggest that listening to music metered at 50 beats per minute for a designated period of time may have an effect on changing state level anxiety for some individuals experiencing normal, everyday stress. This may be extended to help others who are experiencing acute or chronic stress and anxiety as well. There are implications that this type of musical experience, when incorporated into one's lifestyle, may have an overall effect on improving the listener's ability to relax and to react more positively to stressors.

Although the need for stress management using music is mentioned throughout research literature, there are few approaches offered that incorporate a standard working model for treatment and appropriate tools for accurate assessment. In a short-term study such as this one, it would be interesting to do a follow-up analysis to assess maintenance of the effects of treatment. An extended study similar to this one could be done

to determine the long-range effects of this type of music listening on trait anxiety as well as on state anxiety levels. Ongoing brief sessions such as the one done in the study could be administered to the same subjects over a certain period of time to determine long-range results.

Further research might investigate the differences between males and females, and their abilities to use this type of music experience to reduce stress and anxiety, both short-term and long-term. It might be interesting to evaluate whether persons with high pretest scores would benefit more significantly than those with lower pretest scores. Seasonal reactions to stress levels might be investigated with this music listening method.

In summary, this study explored the benefits and effectiveness of listening to 50 beat-per-minute music to reduce state level anxiety in young adults included in the study. The effects noted in the study include decreased perceived state anxiety and increased relaxation for participants. This music listening technique may prove to be a useful tool for ongoing stress management to help increase coping strategies which will enable the listener to become more actively involved in the maintenance of their stress and anxiety levels to promote and maintain wellness.

APPENDIX I

PARTICIPANT IDENTIFICATION NUMBER _____

DATA SHEET

1. YOUR AGE _____

2. GENDER (circle one number)

   1 = MALE

   2 = FEMALE

3. YEAR IN COLLEGE

   1 = FRESHMAN

   2 = SOPHOMORE

   3 = JUNIOR

   4 = SENIOR

APPENDIX II

SELF-EVALUATION QUESTIONNAIRE

Developed by Charles D. Spielberger
in collaboration with
R.L. Gorsuch, R. Lushene, P.R. Vagg, and G.A. Jacobs

STAI Form Y-1

Name _____ Date _____ S _____
Age _____ Sex: M _____ F _____ T _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I feel strained	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel satisfied	①	②	③	④
9. I feel frightened	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel indecisive	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel confused	①	②	③	④
19. I feel steady	①	②	③	④
20. I feel pleasant	①	②	③	④

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REFERENCES

Albrecht, K. (1979); Stress and the manager. Englewood Cliffs, N.J.: Prentice Hall.

Anastasi, A. (1982). Psychological testing.(5th ed.) N.Y.: MacMillan Publishing.

Benson, H. (1976). The relaxation response. New York, N.Y.: William Marrow & Company

Biley (1992). Use of music in therapeutic care. British Journal of Nursing I, 178-180.

Bonny, H. (1994). Twenty-one years later: GIM update. Music Therapy Perspectives, 12 70-74.

Bonny, H. & Savary, L. (1990). Music and your mind (Second ed.) Barrington N.Y.: Station Hill Press.

Csikszentmihali, M. (1990). Flow, the psychology of optimal experience. New York: Harper & Row.

Everly, S. & Sobelman, S. (1987). Assessment of the human stress response. New York: AMS Press.

Gaston, E.T. (1968). Music in therapy. New York: MacMillan Publishing.

Guzzetta, C. (1989). Effects of relaxation and music therapy on patients in a coronary care unit with presumptive acute myocardial infarction. Heart & Lung. 18, (6) 609-616.

Hammer, S. (1996). The effects of guided imagery through music on state and trait anxiety. Journal of Music Therapy, 33, (1) 47-70.

Hanser, S. (1985). Music therapy and stress reduction research. Journal of Music therapy, 22, 193-206.

Hoffman, J. (1995). Rhythmic medicine: music with a purpose. Leawood, KS: Jamillan Press.

Lazarus, R. (1966). Psychological stress and the coping process. New York: Springer-Verlag.

National Association for Music Therapy Incorporated (1980). A career in music therapy. Lawrence KS.

Newfield, W.ed (1989). Advances in the investigation of psychological stress. New York: John Wiley & Sons.

Newman, B. & Newman P. (1995). Human Growth and Development. California: Brooks/Cole Publishing Co.

Patterson, R. & Newfield R. (1989). The stress response and parameters of stressful situations. In R. Newfield (Ed) Advances in the investigation of psychological stress. New York: John Wiley & Sons.

Pignatiello, M., Camp, C., & Rasar, L. (1986). Musical mood induction: an alternative to the Velten technique. Journal of Abnormal Psychology, 95, 295-297.

Rachman, S. (1984). A reassessment of the "primacy of affect". Cognitive Therapy and Research, 8, 579-584.

Rider, M. (1985). Entrainment mechanisms are involved in pain reduction, muscle relaxation, and music mediated imagery. Journal of Music Therapy, 22, 183-192.

Robb, S., Nichols, R., Rutan, R., Bishop, B., & Parker, J. (1995). The effects of music assisted relaxation on preoperative anxiety. Journal of Music Therapy, 32, 2-21.

Rosenfield, A. (1985). Music, the beautiful disturber. Psychology Today, 48-56.

Sandrock, D. & James, M. (1989). Assessment instruments for music assisted relaxation training. Music Therapy Perspectives, 7, 44-49.

Schulberg, C. (1981). The music therapy sourcebook. New York: Human Science Press.

Sears, W. (1968). Processes in music therapy. In E.T. Gaston (ed) Music in Therapy, New York: MacMillan.

Spielberger, C.D. (1983). Manual for the state-trait anxiety inventory. Palo Alto CA: Consulting Psychologists Press.

Stratton, V.N., & Zalonski A.H. (1984). The relationship between music, degree of liking, and self-reported relaxation. Journal of Music Therapy, 21, 184-192.

Sutherland, G., Newman B., & Rachman, S., (1982). Experimental investigations of the relations between mood and intrusive, unwanted cognitions. British Journal of Medical Psychology, 55, 127-138.

Sutterly, D.C. (1979). Stress and health: a survey of self-regulation modalities. Topics in Clinical Nursing, 1, 1-9.

Thaut, M. (1989). The influence of music therapy intervention on self-rated changes in relaxation, affect, and thought in psychiatric prisoner-patients. Journal of Music Therapy, 26, (3) 155-166.

Thaut, M. (1989). Music therapy, affect modification, and therapeutic change: towards an integrative model. Music Therapy Perspectives, 7, 55-62.

Thaut, M., & Davis, W. (1993). The influence of subject-selected versus experimenter-chosen music on affect, anxiety, and relaxation. Journal of Music Therapy, 30 (4), 211-223.

Thaut, M., & de l'Etoile, S. (1993). the effects of music on mood state-dependent recall. Journal of Music Therapy, 30 (2) 70-80.

Tsao, C.C., Gordon, T., Maranto, C., Lerman, C., & Murasko, D. (1991). The effects of music and directed biological imagery on immune response. (s.-IgA. In C.D. Maranto (Ed) Applications of Music in Medicine, 85-121. Washington D.C.: National Association of Music Therapy, Inc.

Wheeler, B. (1983). A psychotherapeutic classification of music therapy practices: a continuum of procedures. Music Therapy Perspectives, 1 (2) 8-12.

Wigram, J. (1995). the psychological and physiological effects of low frequency sound and music. Music Therapy Perspectives, 1, 16-23.

Zimmerman, L.M., Pierson, M.A., Marker, J. (1988). Effects of music on patient anxiety in coronary care units. Heart and Lung, 17, 560-566.