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THE EFFECTS OF TESTING ENVIRONMENTS ON THE
INTERRELATIONSHIPS OF STATE ANXIETY
AND SKILL TEST PERFORMANCE

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee

Vera Ellen Henken

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DEDICATION

to my father whose life modeled the excellence he believed was possible from his children and whose death forced me to mature, accepting the challenge of excellence and accepting the loss of a friend.

to my mother, myself, both images of the other. In a time when the future was questionable, we forded separate paths - though different the same. Both paths were filled with uncertainty, doubt, and fear, yet we continued our journey accepting the challenges of the unknown road. For you Mom, with my never ending love. Take comfort always in the faith you taught your children and know the road will always lead you home.

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ABSTRACT

Both Sarason (1960) and Singer (1980) focused their research studies on the adverse affects of anxiety in individuals. Sarason (1960) discussed how high test anxious individuals had poorer performances than low test anxious individuals on ability tests. In conjunction, Singer (1980) discussed how high levels of anxiety would be harmful to performance on psychomotor skill tasks. Therefore, this study was designed to investigate the effects of two music conditions on anxiety level during the performance of complex and simple skill tests. Forty-one college volunteers from three beginning racquetball classes were used to test the effects of state anxiety on low and high anxious students during skill test performance with a music condition present. The skills used in this study were a serve and a rally racquetball test. According to their scores on the trait form of the State-Trait Anxiety Inventory (STAI), the students were assigned to either the low anxious or high anxious group. The groups were required to participate in two separate testing situations. The protocol for one testing situation consisted of a rally and a serve test administration. Before each test, the students completed the state form of the STAI. During the second test administration, the low anxious group received the high intense music and the high anxious group received the low intense music while testing. The results of a correlated

t test for state anxiety/skill performance and music indicated the following from the first to second test administration:

(a) state anxiety level in low and high anxious students was not different for complex and simple skill tasks, (b) high intense music for low anxious subjects appeared to be beneficial to performance on simple tasks but not on complex tasks, and (c) low intense music for high anxious students did not enhance performance on complex or simple skill tasks. A t test for independent samples revealed that low anxious students did not perform better than high anxious students on complex or simple skill tasks on the first test administration.

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CHAPTER I

INTRODUCTION

Anxiety is a phenomenon that researchers have investigated for many years. Test anxiety is one branch of the broad topic of anxiety. The area of test anxiety has been researched for over thirty years. Because of the damaging effects of test anxiety in anxious individuals, researchers have focused their attention on the effects, causes, and the treatments of this very complex issue. Although, the topic of test anxiety has been the focus of numerous research studies, new evidence regarding this area is continuously appearing in the literature today. The first study was completed by S. Sarason in 1952 at Yale University, in which, students were asked to complete a questionnaire that related to test anxiety. According to the results from the questionnaire, students were grouped as either high or low anxious (Sarason & Mandler, 1952).

Mandler and Sarason (1952) interpreted these performances on the questionnaire to be learned "psychological drives" of two types: (a) task-directed drives, which include behaviors that reduce the drive by completing the task, and (b) anxiety drives which were either positive or negative in nature. Positive anxiety drives stimulated task-relevant behavior to finish the task and reduce anxiety. In contrast, negative anxiety drives stimulated task-irrelevant behavior which

resulted in feelings of helplessness, inadequacy and/or loss of self esteem. It was the task-irrelevant behaviors that often impaired a person's performance in the testing situation (Mandler & Sarason, 1952).

Liebert and Morris (1967) proposed that test anxiety consisted of two components, worry and emotionality. According to Liebert and Morris, worry referred to cognitive expression regarding performance, and emotionality referred to autonomic reactions such as perspiration and accelerated heart rate.

Historically, researchers have attributed test anxiety to either cognitive or behavioral components (Liebert and Morris, 1967). However, Spielberger (1972), concluded that both cognitive and behavioral components contributed to test anxiety.

Although many studies focused on the components of test anxiety, Martens focused his concerns on the arousal-performance relationship. It was theorized that the arousal-performance relationship affected anxiety. Martens (1971) stated that the inverted-U hypothesis is usually discussed in terms of arousal. He further stated that performance improves up to a certain point as arousal increases and then performance is hindered. However, Schmidt (1980) discussed how both the terms anxiety and arousal "implied a highly energized state" (p. 130). Thus, he elaborated and suggested how cues are affected by arousal, i.e., that selection of cues

is poor during low levels of arousal. Also, he suggested that when arousal tends to increase there is a tendency to overlook cues; therefore, many relevant cues are excluded, thus hindering performance (Schmidt, 1980). This theory was in conjunction with Wine (1971) who described how test anxiety affected performance, by attention being divided between task-relevant and task-irrelevant cues.

Nideffer (1981) discussed the concept of arousal and the narrowing of attention; implying that arousal and attention played a role in performance. He suggested that by knowing how a person might focus their attention, one could help the performer to minimize error in performance. Nideffer (1981) stated that some research suggested that behavior could not be measured attentionally across a diversity of life situations. However, Nideffer alleged that research in the area of psychology, appeared to contradict the notion that existing trait theories could not measure the relevancy of behavior in life situations (Nideffer, 1981). Nideffer discussed how an individual's ability to concentrate on relevant cues while ignoring others was critical to effective performance on cognitive or psychomotor tasks. Nideffer (1981) professed that attention could be "thought of as having both state and trait components" (p. 24).

A literary review completed by Hembree (1988), in which he collected and analyzed over 560 research studies on test anxiety, brought about the following conclusions: (a) test

anxiety and test performance are significantly inversely related, (b) the relationship of test anxiety and performance seems to be stronger for worry than emotionality, (c) there appears to be no difference between males and females in regard to test anxiety, (d) high test anxious students tend to feel controlled by outside forces, and (e) high test anxious students experience more difficulty when learning and more cognitive interference when tested (pp. 72-73).

Hembree (1988) stated that test anxiety can be reduced by a number of cognitive and behavioral treatments. For example, the use of "testwiseness" training, counseling to cope with worry, study skills training, and relaxation techniques, are just a few of the anxiety reduction methods mentioned. Hembree (1988), also found the use of unobtrusive classical music to be effective in enhancing performance on IQ and aptitude tests in high test anxious students.

Drawing from the results previously stated, concerning the relationship between cognitive and behavioral anxiety, it might be speculated that the presence of background music would cause a change in performance on skill-related tasks, since it affects performance in cognitive related testing. Also, since some classical music is considered relatively unobtrusive (Hembree, 1988), then it could be easily introduced into a skills testing situation with little interference.

Purpose of the Study

The purpose of this study is to determine if state anxiety level would be differentially affected by types of background music in high and low anxious student performance on simple and/or complex tasks.

Hypotheses

1. Under the high intense music condition, the following effects will occur for low anxious students: (a) an increase in performance on the second test session (experimental session) complex skill test score as compared to the first test session (control session) test score, (b) no difference in performance on the experimental simple skill test score as compared to the control test score, (c) no difference in state anxiety level from the control to experimental test.
2. Under the low intense music condition, the following effects will occur in high anxious students: (a) an increase in performance on the experimental complex skill test score as compared to the control test score, (b) an increase in performance on the experimental simple skill test score as compared to the control test score, (c) no difference in state anxiety level from the control to the experimental test.

3. For the control session on both the simple task and complex task tests, the low anxious students will have better performances than the high anxious student.

Definition of Terms

In the following section, the terms are defined according to how they are used in this study. When appropriate, both theoretical and operational definitions are stated.

Type of background music- musical sound present at a relatively constant low level at a specific location. In this study, two types of background music were examined:

Low intense music- This music is classified as having a relatively stable, low intense beat (certain classical pieces fit this description). A piece by Handel is classified as music in this category according to a survey of four local record stores. In this study, Handels' piece was played at a volume of 76 decibels as measured by a Sound Level Meter. This level was considered unobtrusive by several graduate students.

High intense music- This music is considered to have a pounding beat (heavy metal music). From a survey of four local radio stations, the bands Kiss, Def Leppard, and Van Halen are classified as playing music in this category. In this study, the heavy metal song "Rock of Ages" (not the hymn) by Def Leppard was used as the high intense music. In this study, Def Leppards' piece was played at a volume of 76

decibels as measured by a Sound Level Meter. This level was considered unobtrusive by several graduate students.

Type of Task- the nature of task demands reflect characteristics such as how many, degree of environment/performer stability, degree of environmental variability. The testing situations used the racquetball skills tests administered at the University of Tennessee, Knoxville as the tool to measure performance. The task conditions were of two types:

Simple task- a simple task is one where few signals are present and task demands are relatively stable and consistent; for example, a closed skill (Poulton, 1957; Gentile, 1972). To meet these needs, the racquetball serve test was administered without a time factor.

Complex task- a complex task is one where many different signal sources are present and many different task demands are possible; for example, an open skill in which the environment is constantly changing and requires a high degree of rapid activity (Poulton, 1957; Gentile, 1972). To meet these needs, the racquetball rally test was administered with a time factor involved.

State anxiety- a transitory emotional state in humans, often seen as consciously perceived feelings of fear of the unknown (Spielberger, Gorsuch, & Lushene, 1970). State anxiety was measured using the A-State form of the State-Trait Anxiety Inventory, i.e., STAI (Spielberger, Gorsuch, & Lushene, 1970).

Trait anxiety- the general emotional state of humans

(Spielberger, Gorsuch, & Lushene, 1970). Trait anxiety was measured using the A-Trait form of the State-Trait Anxiety Inventory, i.e., STAI (Spielberger, Gorsuch, & Lushene, 1970). In this study, subjects were categorized as high or low anxious.

High anxious- individuals scoring at or above the 60th percentile on the A-Trait form of the STAI (Spielberger, Gorsuch, & Lushene, 1970).

Low anxious- individuals scoring at or below the 40th percentile on the A-Trait form of the STAI (Spielberger, Gorsuch, & Lushene 1970).

Assumptions

1. The State-Trait Anxiety Inventory (Spielberger, 1970) is a valid and reliable measure of state and trait anxiety levels.
2. The Rally Test and Serve Test (Issacs, Lumpkin, & Schroer, 1984) are valid and reliable racquetball skill tests.
3. The students will be able to understand directions.
4. The students will understand the purpose of the study and volunteer freely.
5. The students will give honest answers to all questions.

6. The subjects will attempt to perform as well as possible on the skill tests under both the control and experimental situations.

Limitations

1. This study is limited to one type of activity class, racquetball.
2. This study cannot be generalized over various age groups.
3. The music condition was set at a level comfortable to several graduate students.

Significance of Study

Realizing the potential harm anxiety had on an individual while testing, facilitated the need to devise possible treatments to alleviate the negative affects of anxiety. The alleviation of anxiety while testing was one way to obtain a true measure of student skill test performance. Thus, music was used as one possible way to help low anxious and high anxious students to improve their skill test performances.

CHAPTER II

REVIEW OF LITERATURE

Since anxiety has been the topic of research studies for many years, it could be suggested that there are many aspects of this concept which still need to be explored. Therefore, in order to delve into this concept further, this review of literature includes the following areas: (a) the concept of anxiety, (b) the effects of anxiety on performance, and (c) the effects of music on anxiety and performance.

The Concept of Anxiety

Morris and Liebert (1970) used two separate studies to determine the relationship of worry and emotionality to the concept of test anxiety. The hypotheses tested within the two studies included: (a) pulse rate would be found to be closely associated with emotionality but not with worry, (b) a negative relationship would exist between worry and test performance, and (c) expectancy would be more negatively correlated with worry than with emotionality.

In the first study (Morris & Liebert, 1970), 95 college students were used to test the above hypotheses. Each subject was asked to take a 15 second pulse rate reading at the beginning of class and four preceding times early in the school year. Before the examination, the pulse rate reading as well as the 10 items on the Test Anxiety Questionnaire were

completed. After an examination, the students again were asked to take their pulse rates.

In the second study (Morris & Liebert, 1970), 91 high school seniors followed the same procedure as in the first study with one exception. In test two, the pulse rate reading and questionnaire were taken after an examination.

According to Morris and Liebert (1970), both studies supported the hypothesis concerning the negative relationship between worry and test performance. Also, the hypothesis suggesting that expectancy would be more negatively correlated with worry than with emotionality was supported by both studies. These findings were significant at the $p < .05$ level. However, the hypothesis concerning pulse rate being closely associated with emotionality, but not with worry, was not supported by either study. Thus, Morris and Liebert (1970) concluded that worry affected test performance more than emotionality. Also, worry, was more highly correlated with expectancy level than was emotionality.

Spielberger (1972) stated that he "regards anxiety as a construct" (p. 341). Thus, he not only considered the emotional or psychological side of anxiety, but also, the physiological side, making anxiety one whole entity. Building upon this idea, Spielberger divided anxiety into two separate states. The first state, an anxiety state (A-State), is invoked when people feel a certain situation is potentially threatening to them; this state varies over time, as well as,

in relation to the amount of stress on the individual. The second state Spielberger discussed was trait anxiety (A-Trait), which is not necessarily related to behavior, but rather to the intensity and frequency of an individual's A-State over time.

Singer (1980) defined state anxiety as a transitory state explaining how a person feels at a particular time in response to a stimulus. He defined trait anxiety as the general way a person responds to stress, which is a fairly stable characteristic.

Schwarzer, Van der Ploeg, and Spielberger (1982) concurred that state and trait anxiety were linked to situations that were perceived and thought to be potentially threatening to the individual. They related that test anxiety was a personality trait that occurred in a specific situation and contained a cognitive component called "worry" and an affective component termed "emotionality". The authors defined worry as a cognitive concern about performance, failure, and negative self-evaluations, which seemed to be the factor which impairs performance. In addition, emotionality referred to the physiological effect that test anxious people experience such as sweaty palms. The authors concluded that the cognitive, or worry component, appeared to be the element that affected performance, more so, than the emotionality component. Schwarzer et al. (1982) also indicated the fact that previous research showed inconsistencies, in the effects

of emotionality and worry on performance. Thus, the authors were not positive that worry and emotionality should be studied separately.

Becker (1982) agreed that state and trait anxiety would be an advantage when studying test anxiety. However, he stated that the most widely known measurement of test anxiety primarily concentrated on trait anxiety, thus, leaving a gap for future research in the area of worry and emotionality. Also, Becker determined that perceived pressure for achievement and the probability of failure were two constructs significant ($p < .01$) to test anxiety. He further stated that only the worry component seemed to be related to achievement. However, Becker suggested that this relationship should not be accepted unconditionally because the worry component related to level of competence which was reviewed in his study.

Schwarzer and Cherkner-Julkowski (1982) suggested that test anxiety was learned helplessness and that test anxiety tended to be more cognitively oriented. The authors concluded that a person's feelings about themselves or their abilities contribute to the general notion of anxiety, thus, affecting the individual's competencies.

Summary

Most researchers tended to agree that anxiety should be divided into two components, state and trait anxiety (Spielberger, 1972; Schwarzer, Van der Ploeg, & Spielberger, 1982; and Becker, 1982). Singer (1980) defined state anxiety

as a transitory emotional state, and trait anxiety as a general emotional state. However, Spielberger (1972) defined state anxiety as how a person responds to a potentially threatening situation, and trait anxiety as the intensity and frequency of those responses to state anxiety over time. Schwarzer, Van der Ploeg, and Spielberger (1982) agreed that state and trait anxiety are linked to situations people perceive as threatening. Also, these authors referred to test anxiety as a personality trait that occurs in response to a certain situation.

According to Morris and Liebert (1970) and Van der Ploeg (1982), test anxiety, like anxiety, can be divided into two components: (a) a cognitive component (worry), and (b) an affective component (emotionality). Consequently, these two components were studied to see which component was most affected by anxiety. The cognitive/worry component appeared more detrimental to achievement than the affective/emotionality component (Morris & Liebert, 1970; Schwarzer & Cherkner-Julkowski, 1982). Although Becker (1982) also found that worry was related to performance, he cautioned that this finding may be due to the level of competence in his subjects. However, it was clear from the research that how a person feels about himself/herself or their expectancy level tended to influence their performance (Becker, 1982; Schwarzer & Cherkner-Julkowski, 1982).

The Effects of Anxiety on Performance

Sarason (1960) stated that people who scored high on measures of test anxiety tended to perform poorly on various ability tests when compared to their low anxious counterparts. Sarason further commented that high test anxious people seem to have a problem with the threat of evaluation, which caused these people to perform poorly.

Singer (1980) suggested that high levels of anxiety would be harmful to performance. Singer supported the notion that there were inconsistencies with the research in this area. Singer further suggested, the inconsistencies may have been due to various testing procedures used by the experimenters. Although he related these inconsistencies to various testing procedures, he did state that on tasks of low complexity, no difference was expected between low and high anxious groups. However, on more complex tasks, studies generally showed that high anxious people had poorer performances, than low anxious people.

Landers (1980) discussed in an extensive article, the arousal-performance concept. He indicated that the term motor performance was often closely associated with arousal. Also indicated was the idea that the term arousal could be used interchangeably with various energy terms such as drive, tension, and activation. Although these terms were used to describe an energy release, Landers indicated the term arousal

could be classified into categories such as cognitive, behavioral, or physiological responses to stress.

Landers (1980) further explained that there have been two theories used to explain the arousal-performance relationship: the drive theory and the inverted-U theory. Drive theory worked on the predication that as arousal increased, there was a parallel increase in performance. However, the inverted-U theory worked on the assumption that as arousal increased, performance increased, but only to a certain point; after which, performance was hindered as arousal increased.

Landers (1980) further discussed how arousal affects the narrowing of attention. He stated that narrowing occurred as a result of arousal interfering with one's capacity to process information. Also, narrowing appeared to be affected by the complexity of the task. Thus, with an environment that called for more task relevant cues, performance decreases were predicted because of narrowing of attention (Landers, 1980).

Weinberg and Genuchi (1980) used 30 male collegiate golfers to investigate the relationship between competitive trait anxiety, state anxiety, and golf performance. From this investigation, the validity of two theories was tested, i.e., that: (a) golf performance would be optimal during low levels of arousal, and Sports Competitive Anxiety Test (SCAT), and (b) golfers scoring low on the SCAT would have lower levels of state anxiety prior to competition and would have better performances than moderate and high SCAT golfers. According

to this study, the subjects were divided equally and assigned to either the high, moderate, or low anxious group, based on their scores on the SCAT. A practice round preceded each competitive round of golf. Three competitive rounds of golf were played, with an administration of the SCAT before each practice round. State anxiety was measured by Spielberger, Gorsuch, & Lushene's (1970), State-Trait Anxiety Inventory (STAI). The STAI was administered before every practice round and on the first and last day of competition. To determine the relationship between SCAT, state anxiety, and performance; a Pearson product moment correlation was utilized. The significant results indicated a strong correlation between anxiety and performance with $p < .001$ and $p < .05$ respectively. Also supported statistically ($p < .001$) by Scheffe's post hoc test, was the theory that low levels of anxiety are optimal for golf performance (a precision skill). Finally, when Competitive Trait Anxiety (CTA)-performance and state anxiety performance scores were combined with CTA-state anxiety scores, the results supported the theory that stated low SCAT golfers would have better performances and lower state anxiety than moderate and high SCAT golfers (Weinberg & Genuchi, 1980).

Van der Ploeg (1982) used 154 males and females at the secondary age level to study the relationship between emotionality and worry to school/academic performance, with special attention given to differences in age groups for males

and females. Also, 179 college students with a mean age of twenty were tested. In this study, both age groups were asked to complete the Dutch form of the Test Anxiety Inventory (TAI-D) and the Dutch Adaptation of the State Trait Anxiety Inventory (STAI-DY). Both groups were also asked to complete the State-Anxiety Scale with the instructions to the subjects to pretend they were completing an important examination. From Van der Ploegs' (1982) study, the following conclusions were statistically evident at the $p < .05$ level. First, performance and anxiety are almost always negatively correlated. Second, there were gender differences in regard to the emotionality and the worry components; with worry being associated with males and emotionality associated with females. Third, TAI-D was a reliable measure for all subjects twelve years old and above. Fourth, TAI-D for emotionality and worry are both good predictors of decreases in performance.

Adam, Wieringen, and Piet (1983) used 60 male college physical education students to study the relationship between state anxiety and motor performance. In order to evaluate the study, one task with three varying elements was used:

(a) throwing tennis balls overhand at a target without limitations as to when the balls should be thrown, (b) a time factor was added, and (c) time and location were added factors. The methodology involved a division of the subjects into three equally sized groups which were classified as low,

moderate, or high anxious according to their state anxiety scores. They completed 20 trials each on the three elements of the task described above, as well as, an adapted version of Spielberger's State Anxiety Inventory. On the task, four dependent variables were computed: (a) Location Score, (b) Constant Time Error (CTE), (c) Variable Time Error (VTE), and (d) Absolute Time Error (ATE). The statistical analysis revealed, after a Newman-Keuls post-hoc test, that CTE for the moderate state anxiety group was better than the low and high state anxious groups ($p < .10$). Also, VTE for the high state anxious group was greater than VTE for the other two groups ($p < .10$). Thus, the results of the study showed that on the third task which called for a time and a location factor, a slight significance was found in regard to the influence of state anxiety on two of the three time error scores (Adam et al., 1983).

Plass and Hill (1986) wanted to investigate the role of a "rate-by-accuracy" dimension in performance differences. One hundred seventy three elementary age children were used to complete the study. According to their scores on the Test Anxiety Scale for Children (TASC) and the Lie Scale for Children (LSC), the students were placed in one of three experimental groups: (a) low, (b) middle, or (c) high anxious. Second, the students were randomly assigned to one of two experimental conditions, time pressure or control group. Each group was asked to complete a test booklet

containing arithmetic problems. The time pressure group was given a certain number of minutes to finish the task, whereas, the control group had no time limit. For statistical purposes an analysis of covariance was conducted on the two dependent variables, performance accuracy and performance rate. Highly significant ($p < .001$) was the triple interaction for test anxiety, time pressure and sex for the following conditions: (a) under time pressure, both high and middle anxious males and females had poorer performances than low anxious children, and (b) the removal of time pressure improved performance for high anxious males. Thus, Plass and Hill (1986) concluded that timed tasks are detrimental to males and females who are categorized as high anxious.

Dion and Toner (1988) used 312 college psychology students from the University of Toronto to test the hypothesis that Chinese students would have higher test anxiety levels than students of other ethnic origins, due to the expectations placed on Chinese youth to achieve. In this study, the students were asked to complete the Test Anxiety Scale (TAS). Significant results ($p < .05$) showed that Chinese students did score higher on the measure of test anxiety than students of other ethnic origins. Dion and Toner (1988) stated that high anxiety levels affected performance and Chinese students were prone to high anxiety pressures, thus, affecting their performance.

Hembree (1988) conducted extensive research in the area of test anxiety. He reviewed over 560 studies in the area of test anxiety to attempt to determine causes, effects, and treatments. A second purpose for this study focused on the use of the results to help solve some of the theoretical problems that surround the topic of test anxiety. Therefore, the procedure used to collect the information involved computer searches, data base searches, direct author sources, and previous cited sources. The information obtained from these sources had to meet a set of specific criteria before the information could be used in the study. After statistically analyzing the information collected regarding test anxiety, Hembree (1988) revealed some important conclusions all found significant at the $p < .01$. First, test anxiety was significantly related to performance from grade 3 and above. Also, the two components had an inverse relationship and seemed stronger for the worry element than for the emotionality element. Second, no differences appeared between male and female students in regard to test anxiety. Third, only performance differences existed between high and low anxious students on tests perceived to be difficult. Fourth, test anxiety was correlated with fear and dislike for tests. Finally, scores of high anxious students benefited from the use of unobtrusive classical music during testing. According to Hembree (1988), the above results were all significant ($p < .01$).

Summary

The literature reviewed in this section provided evidence that the concept of anxiety was detrimental to performance (Sarason, 1960; Singer, 1980; and Plass & Hill, 1986). Furthermore, there was evidence that high anxious people tend to perform more poorly than their low anxious counterparts (Singer, 1980; Sarason, 1960). Also, it seemed evident that time pressure plays a role in causing high anxious people to have a decrease in performance (Plass & Hill, 1986). Also, of significance from the research presented was Weinberg and Genuchi's (1980) study that concluded that the nature of the task (task complexity) tended to have an affect on performance of high and low anxious subjects.

One important finding that supported the research in the first section was Dion and Toner's (1988) study on ethnic differences. From the results of their study, it was evident that higher levels of expectancy to achieve creates greater levels of anxiety. This was clear from the fact the Chinese students who had high expectancy levels were found to be prone to high anxiety levels which affected their performance.

Although there was some evidence to support gender differences with regard to anxiety and performance (Plass & Hill, 1986), this could be due to the nature of the test the subjects were asked to perform. Therefore, Hembree's (1988) findings concerning the worry/emotionality elements, gender differences, perceived test difficulty, and the use of

unobtrusive classical music were of greater significance due to the number of research studies examined.

The Effects of Music on Anxiety and Performance

Ellis and Brighthouse (1952) investigated the influence of music on respiratory and cardiac activity. The purpose behind the study centered around the use of music as a therapeutic resource. In this study, 36 college student volunteers were randomly selected from undergraduate psychology courses. Each subject was exposed to three different musical selections lasting thirty minutes for each session. Respiration and cardiac activity were measured by an pneumograph and electrocardiograph respectively. For accurate readings, the subjects were asked to relax in a separate room and were decoyed into believing they were taking a reading test. A pre-music administration was given before the actual test. Statistically significant ($p < .05$) was the increase in the respiration rate from pre, during, and after music. However, there were no significant changes in heart rate when comparing pre, during and after music rates. For this study, a clear conclusion was not evident from the statistical results. The increase in the respiration rate tended to support music as a therapeutic agent; whereas, the lack of change in heart rate indicated the limitations of music as a therapeutic agent. Ellis and Brighthouse (1952) concluded that the complexity of

heart rate and individual reaction to music make the study of music as a therapeutic agent difficult. Thus, they concluded their article by stating that the effects of music as a therapeutic agent needed further research.

Fisher and Greenberg (1972) used 90 college females to study the effects of exciting and calm music on the moods of women. Also, a discussion of the differences music played on structured and unstructured psychological tests was presented. The subjects were randomly assigned to one of three experimental groups: (a) exciting music, (b) calm music, or (c) no music. For this study, an administration of several psychological tests, to which the subjects were asked to respond, were given to the subjects as they listened to the music. After the music administration, the subjects were then asked to report their mood by completing the Nowlis Mood Adjective Check List (NMACL). After analyzing the NMACL, the results indicated that the amount of anxiety caused by the exciting, calm, and no music was significantly different ($p < .01$). Also highly significant ($p < .001$) was the result that exciting music produced more anxiety than the calm music. The results of the analysis of variance completed on the task which compared structured vs unstructured tests indicated a significant finding at the $p < .02$ level. Fisher and Greenberg (1972), stated that this finding implied that music enhanced performance on structured and unstructured psychological tests.

Stoudenmire (1975) used 108 undergraduate psychology students to investigate the effects of relaxing music, as well as, muscle relaxation training on the reduction of anxiety. In this study, the subjects were divided equally and randomly assigned to either the music group or to the muscle relaxation group. Equalization of the groups were based on the pretreatment state-anxiety and trait-anxiety scores. A pretest and a posttest were given, before the first session and after the third session. Measures of state and trait anxiety were respectively taken by having students complete the State-Trait Anxiety Inventory (STAI) at the completion of the session. Results of a 2 x 2 analysis of variance on Stoudenmire's (1975) two anxiety measures showed that state anxiety can be reduced by the use of certain anxiety reducing techniques, but that trait anxiety was not affected. The results that music and muscle relaxation were both effective methods in reducing state anxiety were significant ($p < .01$). Also, the results implied that only music was an effective temporary reducer of state anxiety. Therefore, music should be used as the technique for reducing anxiety in situations where anxiety is present only temporarily.

Brown, Sherrill, and Gench (1981) indicated that the purpose of their study was to investigate the effects of a physical education program integrated with music on pre-school age childrens' perceptual motor performance. For this study, 30 children were used who ranged in age from 4 to

6. The children were divided equally and randomly assigned to one of two groups: the experimental group or the control group. In this study, an integration of physical education and music education was used for the experimental group. The control group received traditional instruction, as well as movement education, but no music was involved. The use of the perceptual-motor performance test titled the Yellow Brick Road included four types of tests: (a) motor, (b) visual, (c) auditory, and (d) language skills. Several significant ($p < .01$) results were determined following the conclusion of Brown, Sherrill, and Gench's (1981) study. First, there was significant improvement on all four test batteries for the experimental group with music than in the control group without music. Second, this study supported the integration of music into the physical education environment. Finally, this study provided evidence that musical accompaniment enhances motor learning as well as perceptual-motor skills.

Daoussis and McKelvie (1986) investigated musical preferences in extroverts and introverts, as well as, the effects of music on reading comprehension of extroverts and introverts. It was hypothesized that extroverts and introverts would be affected differently on cognitive tasks with a musical stimulus present. For example, extroverts would perform better on cognitive tasks with musical stimuli present, than would introverts. Two separate studies were conducted to determine the results. First, to determine

musical preferences a survey and a personality inventory were completed using 48 college males and females. According to their scores on the Eysenck Personality Inventory (EPI), each subject was classified as extroverted or introverted. The subjects were then asked to respond to a survey which described what kind and how much music the subjects listened to when they studied. The second study centered around reading comprehension. Again, 48 college males and females were chosen and classified as extroverts or introverts, according to their scores on the Eysenck Personality Inventory. For this study, half of the extroverts and introverts listened to rock music while a recall test was administered. The other half of the subjects received no music while the recall test was administered. Results from a Newman-Keuls test, showed a significant affect ($p < .01$) concerning the preference of the music. Both extroverts and introverts preferred listening to rock music. Also significant ($p < .05$), was that both groups preferred soft playing music, rather than loud playing music, when studying. The statistical results from the reading comprehension test were not as definite. However, Daoussis and McKelvie (1986) drew one important conclusion, i.e., the effects of music on cognitive tasks is often subject dependent.

Burton (1986) investigated the effects of music on problem-solving with subjects of varying personality types. In this study, 64 college students were used who ranged in age

from 18 to 21 years. The subjects were divided into four equal personality categories, according to their scores on the Myers-Briggs Type Indicator. The four categories were as follows: (a) sensing-thinking, (b) sensing-feeling, (c) intuitive-feeling, and (d) intuitive-thinking. In each category, there was an equal number of male and female subjects. With background music present, each subject was individually administered the Group Embedded Figures Test to test visual-problem solving ability. The results of Burton's (1986) study indicated that problem solving tasks were not affected by the presence or absence of music. However, Burton suggested that behavior in problem-solving activities could be altered through the use of music. As for reductions in anxiety or improvement in memory, insufficient evidence was found.

Summary

Concluding from the literature in this section, there was some conflict in evidence. For example, the concept that music does reduce anxiety is supported by Stoudenmire (1975). However, Stoudenmire (1975) stated that this evidence does not necessarily support the theory that performance is enhanced due to music. Therefore, performance enhancement is supported by the studies of Burton (1986) and Brown (1981). The research further brought out the notion that calm or soft music would produce less anxiety (Daoussis & McKelvie, 1986; Fisher & Greenberg, 1972). Therefore, the statement that

scores of high test anxious students would be enhanced in the presence of classical music (Hembree, 1988) was supported by the literature.

Although Daoussis and McKelvie's (1986) research indicated that rock music is preferred when studying. Also of importance, was the finding that exciting music causes more anxiety than calm music (Fisher & Greenberg, 1972). One final note, Brown, Sherrill, and Gench's (1981) study provided evidence that improvement in performance can be attained on perceptual-motor tasks through the use of music.

CHAPTER III

PROCEDURES

This study is designed to investigate the effects of two music conditions on anxiety during test skill performance. The procedures used in this study included the following: (a) the selection of subjects, (b) the test design, (c) the selection of skill tasks, and (d) the testing procedure.

Selection of Subjects

Forty-one college student volunteers from three beginning racquetball activity classes, at the University of Tennessee, Knoxville, participated in this study. Each volunteer was asked to complete a statement of informed consent before participating in the study (Appendix A).

Design

For the purpose of this study, a quasi-experimental design was used. The reason for the use of a quasi-experimental design was due to the lack of random assignment of subjects to the two trait anxiety categories. All classes were taught by the same instructor. Therefore, no difference in instruction was expected between the classes.

Selection of Skill Tasks

The skill tasks selected for this study were the serve test and the rally test used as a regular part of the beginning racquetball classes. The serve test was used as the simple task in this study and the rally test was used as the complex task in this study as each met the criteria within the respective definition for types of tasks (see definition for types of tasks on page 7).

Testing Procedures

For the purpose of this study, certain procedures were followed. The procedures included: (a) an administration of the A-Trait anxiety form, (b) a two-day pretest with an administration of the A-State anxiety form before each test, and (c) two separate administrations of the serve and rally test with an administration of the A-State anxiety form before each test.

Trait Anxiety Administration

Each class was asked to complete the trait form of the State-Trait Anxiety Inventory, i.e., STAI (Spielberger, Gorsuch, & Lushene, 1970). This process took place prior to the pretest for the serve and rally tests. For this process, the instructions on the trait form were read aloud with special emphasis placed on the term "generally" (Appendix B).

Once the instructions were read, the students were informed that the term "generally" refers to how they usually feel in day to day life. After this explanation, the students were asked to complete the A-Trait form. Once the students completed the form, the forms were collected by the administrator. Following the A-Trait administration: (a) the A-Trait scores were calculated for all students, (b) the scores were ordered from low (subjects who scored in the 40th percentile or lower) to high (subjects who scored in the 60th percentile and higher) and were compared to the standardized scores for undergraduate students on the STAI, (c) students were assigned to either the high anxious ($n = 13$) and low anxious ($n = 26$) groups (see definitions for high and low anxious subjects on page 8). Subjects whose scores did not fall into the high or low anxious range were still tested for the study. Those who signed informed consent statements were administered the A-State form and the classes took both skill tests both times. Thus, the class perspective of testing was held in a realistic atmosphere.

Test Session 1 (Control Session) Administration

On the first day of test session 1, the criteria for the racquetball serve test was explained to the subjects (Appendix C). After the explanation for the serve test, the subjects were given a testing number and were told to remember their number. After the assignment of numbers, the subjects were asked to sit in a certain order, pertaining to their trait

anxiety scores. The low anxious were assigned a seat, followed by the high and nonanxious students respectively. This assignment was representative of the order in which the students were tested. After the students were seated, the state form of the STAI was read with the phrase "at this moment" emphasized (Appendix D). The first five students in the seating order were asked to go to the testing court. Once at the testing court the students were asked to reread the directions on the state anxiety form. Once the directions were reread, the subjects were asked to complete the state anxiety form just prior to entering the court. One student at a time was tested on the court marked off for the skills test. Their score was recorded on a score sheet. After the student was tested, the next student followed until all had been tested. On the second day of test session 1, the same protocol as for the first day was followed with the exception that the criteria for the rally test was read (Appendix E).

Test Session 2 (Experimental Session) Administration

On the day for test session 2, the same protocol was used as for test session 1. The only difference was that under the testing condition, a music condition existed. With the music condition present, the subjects were not informed as to which group they were assigned; either high or low anxious. The music condition was assigned as follows:

1. Test Session 1 Day 1- on the serve test, all the low and non anxious group received the high intense music while

being tested. The high anxious group received the low intense music while being tested. The music was played from a compact radio/tape recorder lowered into the court via a rope attached to a metal pole located above the testing court. The music was played continuously from the time the subject entered the testing situation until he/she left.

2. Test Session 1 Day 2- on the rally test, the low and non anxious group received the high intense music during testing. The high anxious group received the low intense music during testing. The same procedure as for Day 1 was followed for inclusion of the music.

CHAPTER IV

RESULTS

This study was designed to investigate the effects of testing environments on the interrelationships of trait and state anxiety and skill test performance. Trait anxiety was represented by the score on the trait form of the State-Trait Anxiety Inventory, i.e., STAI (Spielberger, Gorsuch, & Lushene, 1970). State anxiety was represented by the score on the state form of the STAI. Skill test performance was represented by the score on the serve and rally racquetball skills tests regularly used in racquetball classes. Subjects served as their own control; i.e. the racquetball rally (complex) and serve (simple) tests were administered; (a) as a normal class event, which was the control condition, and (b) as a normal test but with the theorized facilitating music condition, which was the experimental condition. Data for 41 subjects were collected and analyzed. In order to present the statistical findings, the results were organized into seven categories to coincide with the hypotheses set forth at the beginning of the study (see stated hypothesis on pages 5-6).

Low Anxious Students

To address the relationship between the dependent variables (anxiety and task performance) and the independent variable (music), a Pearson product moment correlation was

utilized to calculate the correlated t test for each of the hypotheses set forth in the study (see stated hypothesis on pages 5-6).

Hypothesis 1a

To determine the difference between the control and experimental conditions for the low anxious students complex skill task with high intense music, the following values for test 1 ($M = 14.9259$, $s = 4.4456$, $s_x = .8556$) and test 2 ($M = 15.3704$, $s = 4.4389$, $s_x = .8543$) were calculated $t = -.5869$, $df = 26$, $p = .5624$ (Figure 1). Although there was a significant correlation of the rally test scores between the first (control) and second (experimental) test sessions ($r = .61$, $p = .0008$), the correlated t test designed to evaluate the effect of the experimental music condition was nonsignificant ($p > .05$). Therefore, the hypothesis of an increase in performance on a complex skill test for low anxious students from the control test session to the experimental test session was not supported (Figure 1).

Hypothesis 1b

To determine the relationship between simple skill test in low anxious subjects and high intense music, the following values for the control condition ($M = 22.6293$, $s = 8.3673$, $s_x = 1.6103$) and the experimental condition ($M = 27.5556$, $s = 7.7922$, $s_x = 1.4996$) produced a correlated $t = -3.0130$, $df = 26$, $p = .0057$ (Figure 2). There was a significant

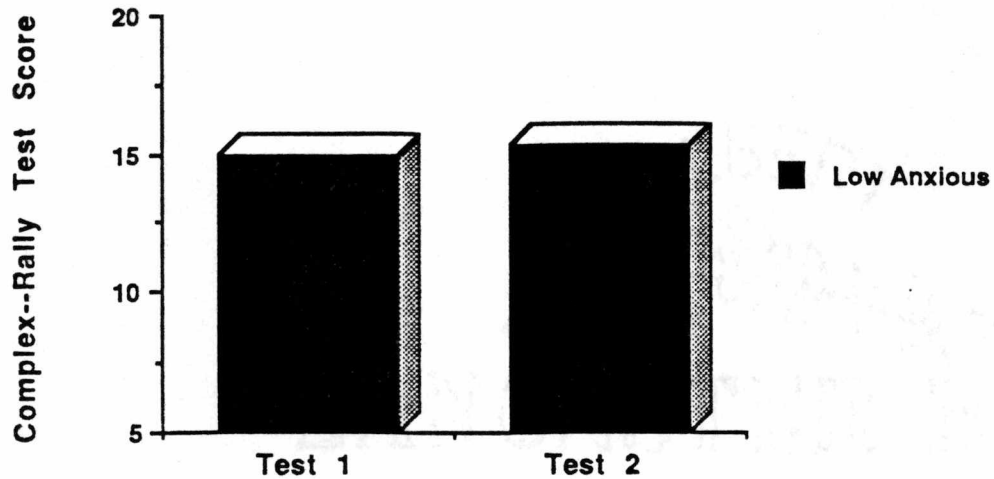


Figure 1. Low Anxious Complex-- Rally Test Score. Nonsignificant ($p = .5624$) difference, control to experimental

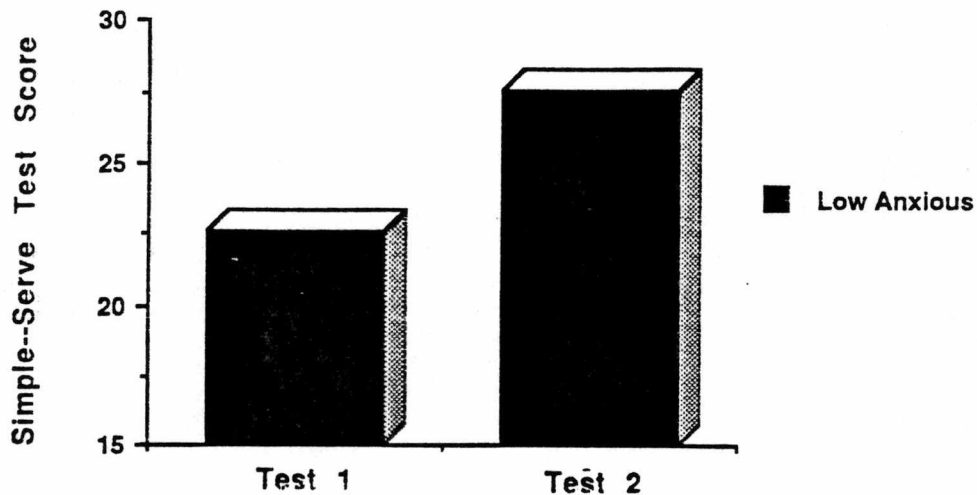


Figure 2. Low Anxious Simple-- Serve Test Score. Significant ($p = .0057$) difference, control to experimental

relationship between the serve test scores from the first and second test session ($r = .45$, $p = .0186$). The low anxious students performed significantly ($p < .05$) better in the experimental condition with high intense music than in the control condition (Figure 2). Therefore, the null hypothesis for performance on the simple skill test for low anxious subjects from the control session to the experimental test session was rejected.

Hypothesis 1c

To determine if there were differences in state anxiety for low anxious subjects with high intense music present during the performance of complex and simple tasks, the following values were calculated. First, for the complex skill task, the values for test 1 ($M = 40.8889$, $s = 27.7327$, $s_x = 5.3372$) and test 2 ($M = 46.9630$, $s = 30.1885$, $s_x = 5.8098$) produced a correlated $t = .8675$, $df = 26$, $p = .1214$ (Figure 3). Second, for the simple skill task, the values for test 1 ($M = 50.0370$, $s = 30.8227$, $s_x = 5.9318$) and test 2 ($M = 43.1852$, $s = 30.1497$, $s_x = 5.8023$) produced a correlated $t = .9376$, $df = 26$, $p = .1242$ (Figure 4). The relationship for state anxiety with both the complex and simple skill tests for the control test session as compared to the experimental test session was significant ($r = .77$, $p = .0001$; and $r = .73$, $p = .0001$; respectively). On both the complex (Figure 3) and simple (Figure 4) skill tasks, no significant difference for state anxiety in low anxious

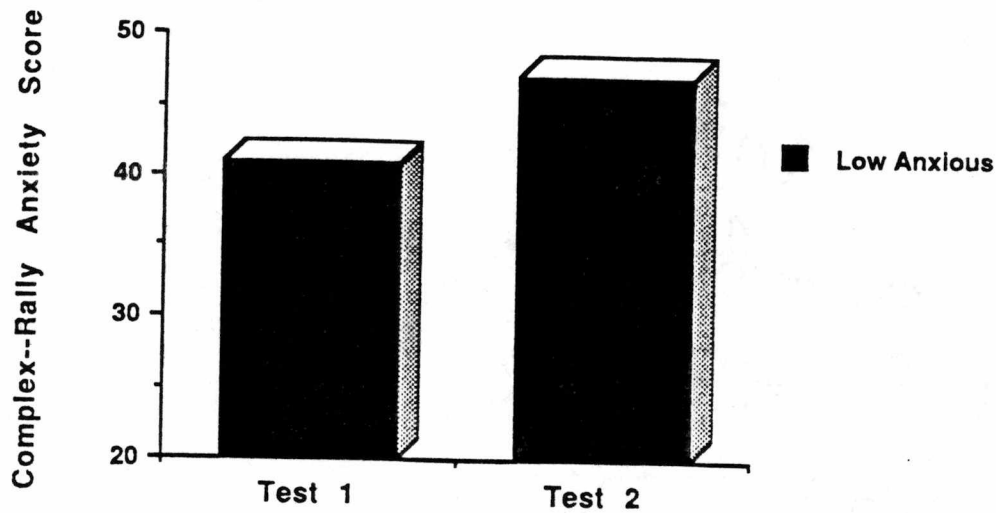


Figure 3. Low Anxious Complex-- Rally Anxiety Score. Nonsignificant ($p = .1214$) difference, control to experimental

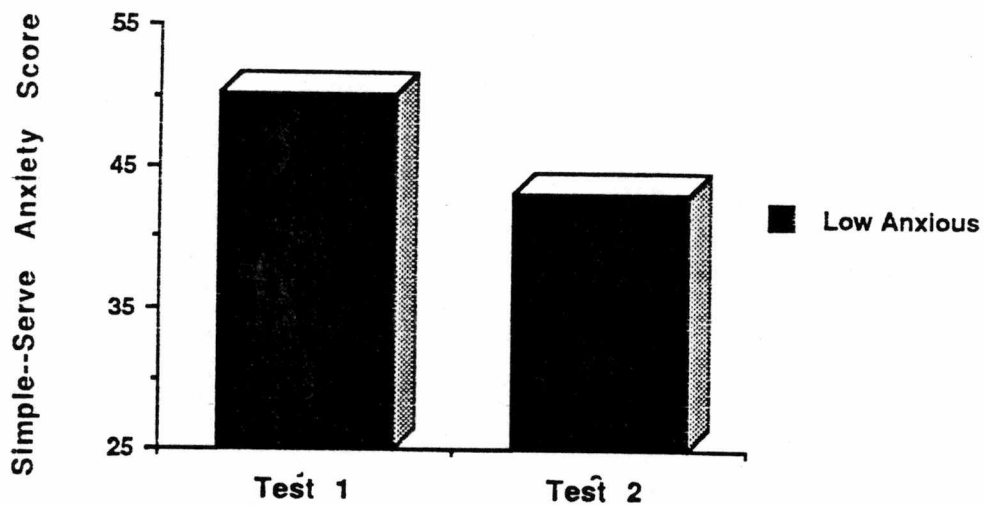


Figure 4. Low Anxious Simple-- Serve Anxiety Score. Nonsignificant ($p = .1242$) difference, control to experimental

subjects was achieved ($p > .05$), thus, the null hypothesis of no difference in state anxiety on complex and simple skill tasks from first test session as compared to the second test session was supported.

High Anxious Students

To address the relationship between the dependent variables (state anxiety and task performance) and the independent variable (music), A Pearson product moment correlation was utilized for each of the above hypotheses.

Hypothesis 2a

An evaluation of the relationship between the complex skill task in high anxious subjects and low intense music for test 1 ($\bar{M} = 13.3571$, $\underline{s} = 4.1807$, $\underline{sx} = 1.1173$) and test 2 ($\bar{M} = 14.8571$, $\underline{s} = 4.5380$, $\underline{sx} = 1.2128$), produced a correlated $t = 1.5637$, $df = 13$, $p = .1419$ (Figure 5). Although the relationship from the first test session to the second test session was significant ($r = .61$, $p = .0096$), the high anxious students did not perform significantly ($p = .1419$) better in the experimental condition for the simple task (Figure 5). However, some improvement was seen but the improvement was not enough to be statistically significant ($p > .05$). Thus, the hypothesis that low intense music would be beneficial to high anxious students on complex skill tests was not supported.

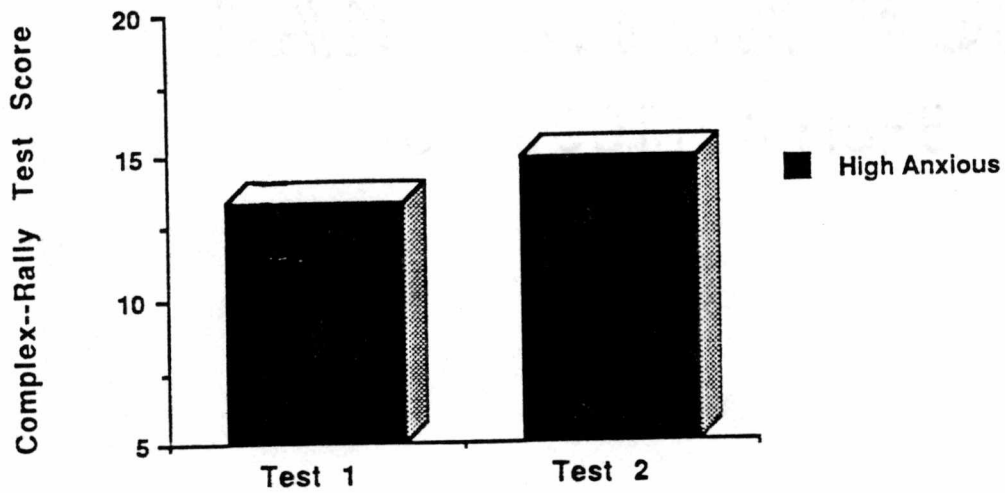


Figure 5. High Anxious Complex-- Rally Test Score. Nonsignificant ($p = .1419$) difference, control to experimental

Hypothesis 2b

An evaluation of the difference between simple skill test performance for high anxious subjects with no music during test 1 ($\bar{M} = 24.4286$, $\underline{s} = 8.8901$, $\underline{sx} = 2.3760$) and with low intense music during test 2 ($\bar{M} = 27.7857$, $\underline{s} = 6.6585$, $\underline{sx} = 1.7796$), disclosed a correlated $\underline{t} = -1.7079$, $\underline{df} = 13$, $\underline{p} = .1114$ (Figure 6). Indicated by the results was the significant positive correlation between the first and second test session ($\underline{r} = .59$, $\underline{p} = .0279$). However, the high anxious students did not perform significantly ($\underline{p} > .05$) better in the experimental condition as compared to the control condition (Figure 6). Thus, the hypothesis of performance enhancement in high anxious subjects on a simple skill test due to the presence of low intense music was not supported ($\underline{p} > .05$).

Hypothesis 2c

To ascertain the relationship between state anxiety of high anxious students during performance on complex and simple skill tests with low intense music present, the following values were determined. First, there was no significant difference in the level of state anxiety during the testing for the complex skill test, as test 1 produced $\bar{M} = 82.1429$, $\underline{s} = 14.8524$, $\underline{sx} = 3.9695$; and test 2 produced $\bar{M} = 78.2857$, $\underline{s} = 16.2264$, $\underline{sx} = 4.3367$; and the correlated $\underline{t} = 1.5414$ with $\underline{df} = 13$, and $\underline{p} = .1472$ (Figure 7). Results indicated a significant positive correlation between the first and second

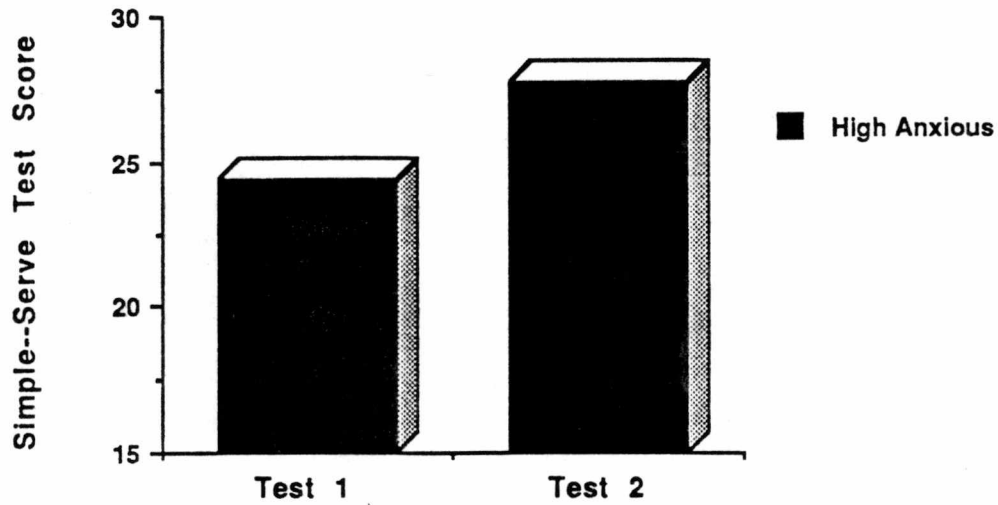


Figure 6. High Anxious Simple-- Serve Test Score. Nonsignificant ($p = .1114$) difference, control to experimental

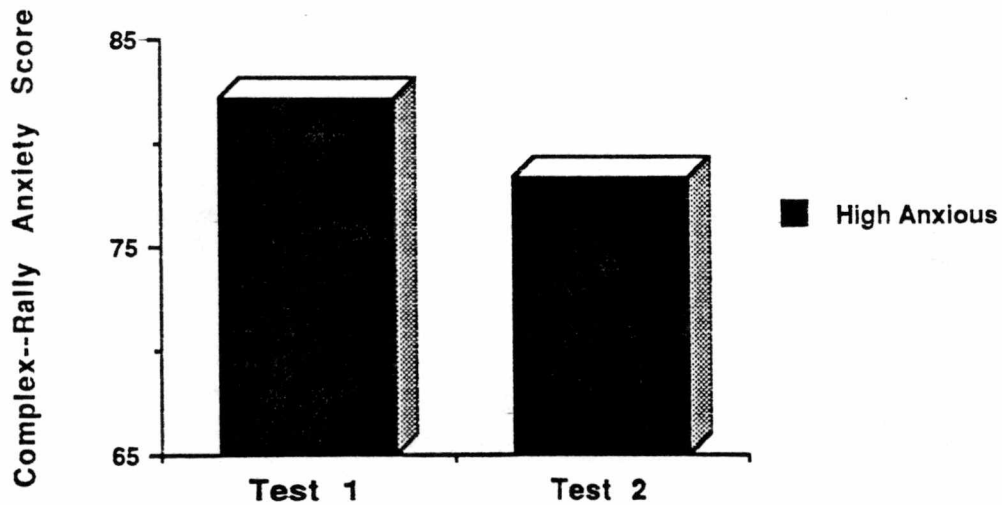


Figure 7. High Anxious Complex-- Rally Anxiety Score. Nonsignificant ($p = .1472$) difference, control to experimental

test session ($r = .82$, $p = .0003$). Second, there was no significant difference in the level of state anxiety during the testing for the simple skill test, as test 1 produced $M = 83.7857$, $s = 13.3427$, $s_x = 3.5660$; and test 2 produced $M = 82.8571$, $s = 12.2403$, $s_x = 3.2714$; and the correlated $t = .3078$, with $df = 13$, and $p = .7631$ (Figure 8). The results of the analysis concerning the relationship between the first and second test session was significantly correlated ($r = .61$, $p = .0196$). Therefore, the hypotheses of no difference in state anxiety on a complex or simple skill test condition were supported ($p > .05$).

Low vs High Anxious Students

A t test on independent samples was used to determine if low anxious subjects had superior performances on both the complex and simple skill tests than high anxious subjects. First, on the complex skill test the following results were produced for low anxious students ($M = 14.9259$, $s = 4.4456$, $s_x = 1.6103$) and high anxious students ($M = 13.3571$, $s = 8.8900$, $s_x = 2.3760$) resulting in $t = 1.0927$, and $p = .2812$ (Figure 9). Second, on the simple skill test the following results were produced for low anxious students ($M = 22.6296$, $s = 8.3673$, $s_x = 1.6102$) and high anxious students ($M = 24.4285$, $s = 8.8900$, $s_x = 2.3760$) resulting in $t = -.6392$, and $p = .5264$ (Figure 10). The results on both the complex and simple skill tests were nonsignificant

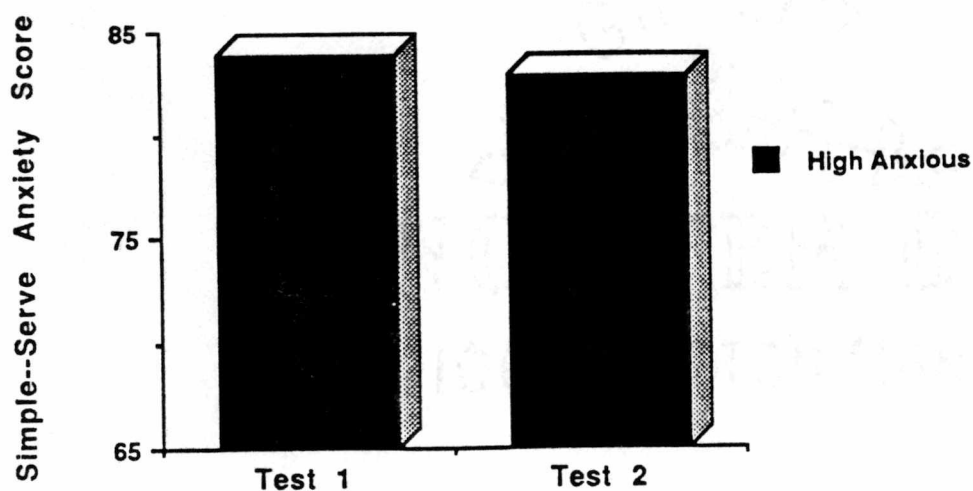


Figure 8. High Anxious Simple-- Serve Anxiety Score. Nonsignificant ($p = .7631$) difference, control to experimental

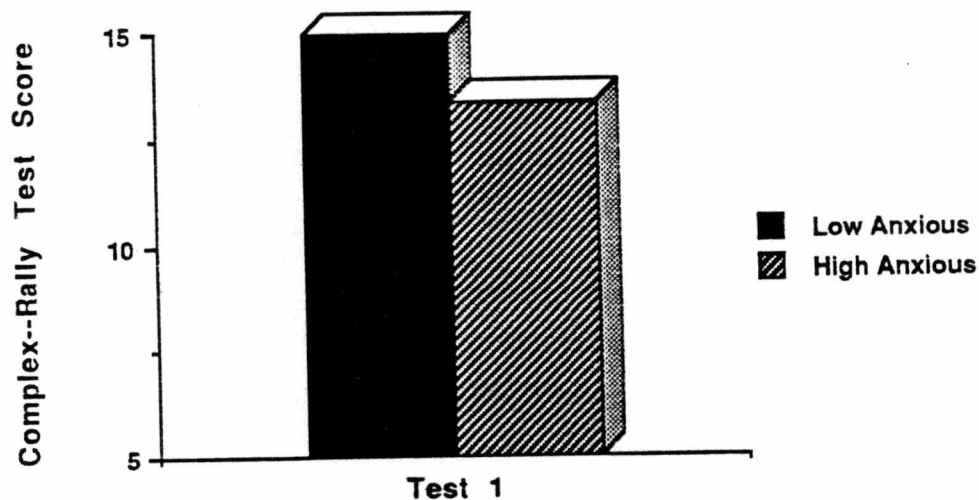


Figure 9. Low vs High Anxious Complex-- Rally Test Score. Nonsignificant ($p = .2745$) difference between anxiety groups

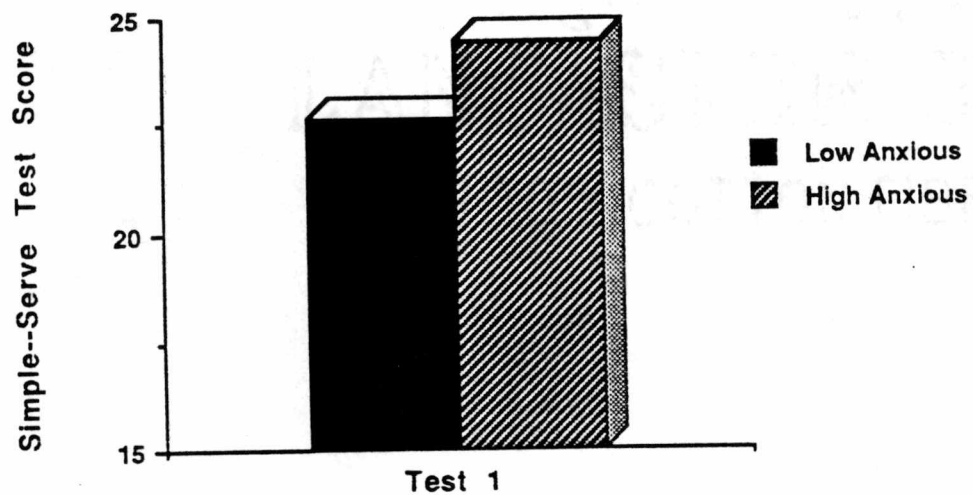


Figure 10. Low vs High Anxious Simple-- Serve Test Score.
Nonsignificant ($p = .5356$) difference between anxiety groups

($p > .05$). The low anxious subjects did not perform significantly better on complex (Figure 9) or simple (Figure 10) skill tasks in the control condition than the high anxious subjects. Therefore, the directional hypotheses indicating that low anxious students would have better performances than high anxious students on both the complex and simple skill test were not supported.

CHAPTER V

DISCUSSION

It has been documented in numerous research studies that anxiety affects performance (Sarason, 1960; Singer, 1980; and Dion & Toner, 1988). Consequently, several treatments for reducing test anxiety were studied. These treatments have included: (a) "testwiseness" training, (b) counseling to cope with worry, (c) study skills training, and (d) relaxation techniques (Hembree, 1988). The possibility of reducing test anxiety through the use of music was the topic of only a few research studies. This previous research has been exemplified primarily with regard to cognitive tasks, only one study was found by (Brown et al., 1981) that utilized tasks in the psychomotor domain. Therefore, the need for more studies in the psychomotor domain was necessary.

The purpose of this study was to determine if state anxiety level would be differentially effected by types of background music in high and low anxious student performance complex and/or simple skill tasks. This chapter was designed to relate the results of this study for the following:

(a) the effects of background music in low anxious subjects state anxiety level from the control to the experimental testing situation on complex and simple skill tasks, (b) the effects of background music on high anxious subjects state anxiety level from the control to the experimental testing

condition on complex and simple skill tasks, and (c) the superior performances by low anxious students on complex and simple skill tasks in the control condition as compared to the high anxious students.

Low Anxious

To address the hypothesis of no difference in state anxiety in low anxious subjects on both the complex and simple skill tests, a correlated t test was calculated. The results of the analysis indicated a significant relationship but no significant difference between the first and second test session state anxiety level. Singer (1980) defined state anxiety as a transitory state explaining how a person feels at a particular time in response to a stimulus. This definition indicated a possible change in anxiety from one test session to another since state anxiety is dependent on the situation. However, considering the fact that as the situations were the same for both test sessions during state anxiety testing and that the subjects were aware of the task demands, it was hypothesized that the subjects would respond to the state anxiety questionnaire in the same manner from the first to second test session. Although Stoudenmire (1975) reported that music was an effective temporary reducer of state anxiety, the music condition in this study did not exist until after the state anxiety form had been completed by the subject. Therefore, the hypothesis of no difference in state

anxiety in low anxious students between testing sessions on complex and simple skill tasks was supported (Figures 3 & 4; p. 39).

In order to determine if there was an effect of high intense music for low anxious subjects on their performance of a complex skill task, a correlated t test was calculated. The correlation calculated revealed a significant relationship between the two test sessions. On the t test designed to evaluate the effect of the experimental music condition, the relationship between the variables was not significant. This result was in conflict with the Landers (1980) discussion of the arousal-performance relationship. It was theorized that high intense music would stimulate the anxiety level in low anxious subjects, thus, enhancing performance. However, the results indicated that music did not facilitate a positive change in performance.

One possible explanation for why this hypothesis was not supported may be that the music chosen was not stimulating. A number of subjects in the study commented that the music was annoying. Although the music was classified according to the variables for high intense music, the song chosen may not have been appropriate for the task and/or the group because Daoussis and McKelvie's (1986) study found that music preference of the subjects was an important factor in creating positive effects to performance. Since, the heavy metal song "Rock of Ages" (not the hymn) was not considered popular by

the subjects, the piece might have been inappropriate for this group of low anxious subjects and/or for the task.

Weinberg and Genuchi's (1980) study discussed task complexity as an issue of concern when considering performance. To address the possibility of the task complexity, a review of the Poulton (1957) and Gentile (1972) papers was conducted. Both Poulton and Gentile stated that for a task to be considered complex, the task must have a constantly changing environment and a high degree of rapid activity. For the racquetball rally test, the above criteria were met. One other possibility for the nonsignificant result, revolved around the anxiety level of the subjects. Although, the low anxious subjects were categorized according to their trait anxiety score, some of the low anxious subjects recorded very high state anxiety scores at the second testing session (Figure 3, p. 39). Thus, another possible explanation of the lack of change in performance in the music condition was that given some subjects were a little more anxious, the music was not facilitative to improved test performance (Figure 1, p. 37).

The effect of high intense music and low anxious subjects on a simple skill test was determined through the use of a correlated t test. Contrary to the predicted hypothesis of no difference in performance on a simple skill test, the results indicated a significant increase in performance due to the music. Poulton (1957) and Gentile (1972) indicated that a

simple skill task consisted of a relatively stable environment where few signals are present. For the serve test used in this study, the criteria for a simple task stated by Poulton and Gentile were met. Singer (1980) stated that no difference was expected between low and high anxious groups on tasks of low complexity. However, Weinberg and Genuchi (1980) found that low levels of anxiety were optimal on a precision task. Therefore, it could be concluded that the low anxious subjects had optimal performances on a precision task such as the serve test.

The increase in performance on the second test session simple skill task could be attributed to the fact that there was little task variability in the simple task from one test session to the next. Also, it was theorized that these beginning racquetball players were more highly skilled in the simple tasks of the serve, than in the rally racquetball task. Also, of consideration, was Stoudenmire's (1975) finding that music reduces anxiety by helping the individual relax, but it does not necessarily enhance performance. Finally, after reviewing the anxiety scores for the two serve test sessions (Figure 4, p. 39), it was evident that the subjects scored higher in anxiety on the first test session as compared to the second test session. Therefore, the subjects' first test performance could have been affected adversely, by the high anxiety score, thus, affecting an improvement in performance on the second test session (Figure 2, p. 37).

High Anxious

Singer (1980) defined state anxiety as a transitory state explaining how a person feels at a particular time in response to a stimulus. As with state anxiety level in low anxious students, it was speculated that subjects' state anxiety scores would vary from one administration to the next. Again, knowing that the subjects were aware of the task demands, and the music condition was not present during taking the A-State form, it was understandable that there was no difference in state anxiety from one administration to the next. A correlated t test indicated that no significant change in state anxiety from the first test administration to the second test administration was evident. Therefore, the hypothesis of no difference in state anxiety in high anxious students on both complex (Figure 7, p. 43) and simple (Figure 8, p. 45) skill tasks from the first to second test session was supported.

Plass and Hill (1986) concluded that timed tasks were detrimental to males and females categorized as high anxious. Singer (1980) also stated, that on tasks of higher complexity, that high anxious subjects had poorer performances than low anxious subjects. Task complexity tended to play a major role in performance by high anxious subjects. One possible reason for the decreases in performance of the high anxious subjects was outlined by Landers. Landers (1980) discussed how arousal

level (which is increased in high anxious subjects) interfered with a persons capacity to process information. Also suggested was that narrowing of attention appeared to be affected by the complexity of the task. Thus, when the environment called for more task relevant cues, performance decreases were predicted because of the narrowing of attention (Landers, 1980). However, one finding suggested that scores of high anxious students were facilitated by the use of unobtrusive classical music (Hembree, 1988). The use of classical music in the present study, was in response to Fisher and Greenberg's (1972) finding that exciting music produced a greater increase in the level of anxiety than calm music. Thus, the use of classical music was used in the present study to possibly eliminate the narrowing of attention and/or to facilitate test performance.

Therefore, to investigate the relationship between high anxious subjects on a complex skill test under a no music and a low intense music condition, a correlated t test was utilized. The results of the correlated t test, did not provide support for the directional hypothesis that low intense music would be beneficial to high anxious students on a complex skill test (Figure 5). One explanation for this finding centered around the number of high anxious subjects ($n = 13$) involved in the test. A review of the correlation indicated that p was approaching significance (Figure 5,

p. 41). It was speculated that additional subjects may have reduced the variability, thus, creating a significant p value. Again, music preference, as indicated by Daoussis and McKelvie (1986) could have had an affect on the subjects.

In order to be successful on the racquetball serve test, the student must be able to enlist some problem-solving capabilities; for instance: (a) to determine at what angle on the front wall does one need to hit the ball to achieve the desired direction, (b) to decide how hard to contact the ball to produce the desired speed, and (c) at what angle does one need to hold the racquet in order to hit different types of serves. Burton (1986) concluded from her study that behavior in problem-solving activities can be modified through the use of music. Therefore, referring back to Daoussis and McKelvie's (1986) study, it was reported that calm or soft music would produce less anxiety.

To determine the relationship between high anxious students on a simple skill test under a no music and a low intense experimental music condition, a correlated t test was calculated. However, the results did not support the directional hypothesis of increased performance on a simple skill task by high anxious subjects due to the music condition. Again, it could be speculated that the number of high anxious students ($n = 13$) was a factor in the rejected hypothesis, since p was approaching the criterion alpha level (Figure 6, p. 43). Schwarzer et al. (1982) linked state

anxiety to situations people perceive as threatening. Thus, as part of the instruction for the beginning racquetball course, students were oriented to the skill test procedures at the beginning of the semester. Therefore, these subjects were not affected by the task demands or task difficulty and thus, were unaffected by the music condition. Consequently, music did not enhance performance in high anxious subjects on a simple skill task (Figure 6, p. 43).

Low vs High Anxious

Sarason (1960) stated that people who scored high on measures of test anxiety tended to perform poorly on various ability tests when compared to their low anxious counterparts. Also, it was stated that low levels of anxiety would be optimal for performance on precision skill task (Weinberg & Genuchi, 1980). Of even greater significance was the negative correlation between test anxiety and performance (Van der Ploeg, 1982). This finding indicates that low anxious individuals would have better performances than high anxious individuals since higher levels of arousal hinder performance (Landers, 1980). Therefore, to determine if there was a difference between low anxious and high anxious subjects on both complex and simple first test session scores, a t test on independent samples was utilized. Contrary to the literature, no significant difference in performance was found between low anxious and high anxious subject performances on the complex

or simple racquetball tests (Figures 9 & 10; p. 45 & p. 46). This finding might be attributed to the degree of within subject variability found for the beginning skill level of the subjects involved in the study. Thus, due to the high levels of within subject variability there was little chance to show a difference between the anxiety groups on each task. One possible explanation for this finding could be found in Singer's (1980) statement which revealed no performance differences were expected between low and high anxious groups on tasks of low complexity. Another reason for no difference appearing could be due to the unequal n between the low anxious ($n = 26$) and for high anxious ($n = 13$) groups. Also, since each anxiety group was oriented to the skill test demands for both the complex and simple tasks overtime and were comfortable with the testing perspective, Schwarzer's et al. (1982) conclusion that state anxiety is linked to situations people perceive as threatening was not functioning. Thus, the hypothesis was not supported.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The first study regarding the concept of test anxiety was completed in 1952 (Sarason & Mandler, 1952). Several researchers outlined the detrimental affects that anxiety had on individuals that were classified as low or high anxious (Sarason, 1960; Singer, 1980; and Adam, Weringer, & Piet, 1983). Consequently, several research studies attempted to devise treatments that could help combat the harmful effects on test performance caused by anxiety. One of the treatments devised was the use of classical music to reduce anxiety level in high anxious students (Hembree, 1988). Therefore, this study was designed to investigate the effects of two music conditions on anxiety level during skill performance.

Fifty-four college student volunteers from three beginning racquetball classes were initially used to test the hypotheses set forth on pages 5-6. However, only 41 subjects were used after a review of the initial data. According to the data, some volunteers were disqualified for this study on the following basis: (a) subjects did not complete all necessary testing sessions, (b) subjects did not test in the correct order, and/or (c) subjects did not

qualify for either the low or high anxious group. The subjects were divided into two groups, low anxious ($n = 26$) or high anxious ($n = 13$), according to their scores on the trait form of the STAI (Spielberger, Gorsuch, & Lushene, 1970).

In this study, the low and high anxious groups served as their own control. The groups were required to participate in two separate testing situations. The protocol for one testing session consisted of a rally and a serve test administration. Before each test, the subjects completed the state form of the STAI. The administration of the first set of tests served as the control condition; no music was present. The administration of the second set of tests served as the experimental condition; music was present. Under the experimental music condition, the low anxious group received the high intense music and the high anxious group received the low intense music, while taking the serve and rally tests. The subjects were required to take the tests in a specific order, with the subjects taking the serve then the rally test in sequence. It was hypothesized that background music during skill test performance would enhance the performance of low and high anxious students.

A correlated t test was calculated for the dependent variables (state anxiety and skill performance) and the independent variable (music) for the low anxious group and for the high anxious group. To test the difference in

performance during tests on simple and complex skill tasks, a t test for independent samples was calculated.

The results of the present study indicated the following: (a) state anxiety level in low and high anxious students was not different from the control to experimental condition for complex and simple skill tasks, (b) high intense music for low anxious subjects appeared to be beneficial to performance on simple tasks but not on complex tasks from the control to the experimental condition, (c) low intense music for high anxious students did not enhance performance on complex or simple skill tasks, and (d) low anxious subjects did not perform better on complex or simple skill tasks in the control condition as compared to high anxious subjects.

Conclusions

Based on this study the following conclusions were drawn:

1. High intense music task does not significantly increase test performance on a complex skill task for low anxious students.
2. High intense music does significantly increase test performance on a simple skill task for low anxious students.
3. Low intense music does not significantly increase performance on a complex skill tasks in high anxious students.

4. Low intense music does not significantly increase performance on a simple skill task in high anxious students.
5. State anxiety level does not change on a complex or a simple skill tasks for high anxious students.
6. Low anxious students do not perform significantly better than high anxious students during the control condition of a complex or a simple skill task.

Recommendations

After reviewing the results of this study, the following are suggested ideas for future research in this area:

1. Use popular high intense and low intense music as chosen by the subjects and/or by each subject.
2. Add another testing session after the experimental condition to test for learning.
3. Use control groups of both high anxious and low anxious students with no music to control for learning and testing effects.
4. Replicate the study in another field testing environment which allows for the music condition during the taking of the A-State form to determine effect on anxiety.

REFERENCES

REFERENCES

- Adam, J.M.E., Wierengen, V., & Piet, C.W. (1983). Relationships between anxiety and performance on two aspects of a throwing task. International Journal of Sports Psychology, 14, 174-185.
- Becker, P. (1982). Towards a process analysis of test anxiety: Some theoretical and methodological observations. In R. Schwarzer, H.M. van der Ploeg, C.D. Spielberger (Eds.), Advances in test anxiety research (pp. 11-17). New Jersey: Lawrence, Erlbaum, & Associates.
- Brown, J., Sherrill, C., & Gench, B. (1981). Effects of an integrated physical education/music program in changing early childhood perceptual-motor performance. Perceptual and Motor Skills, 53, 155-162.
- Burton, L. (1986). Relationship between musical accompaniment and learning style in problem solving. Perceptual and Motor Skills, 62, 48-50.
- Daoussis, L., & McKelvie, S.J. (1986). Musical preferences and effects of music on a reading comprehension test for extroverts and introverts. Perceptual and Motor Skills, 62, 283-289.
- Dion, K.L., & Toner, B.B. (1988). Ethnic differences in test anxiety. The Journal of Social Psychology, 128, 165-172.
- Ellis, D.S., & Brighthouse, G. (1952). Effects of music on respiration and heart rate. American Journal of Psychology, 65, 39-47.
- Fisher, S., & Greenburg, R. (1972). Selective effects upon women of exciting and calm music. Perceptual and Motor Skills, 34, 987-990.
- Gentile, A.M. (1972). A waking model of skill acquisition with application to teaching. Quest, 3-22.
- Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. Review of Educational Research, 58, 47-77.
- Issacs, L.D., Lumpkin, A., & Schroer, D. (1984). Racquetball everyone. Winston-Salem, NC: Hunter Textbooks.

- Landers, D.M. (1980). The arousal-performance relationship revisited. Research Quarterly for Exercise and Sport, 51, 77-90.
- Liebert, R., & Morris, L. (1967). Cognitive and emotional components of test anxiety: A distinction and some initial data. Psychological Reports, 20, 975-978.
- Mandler, G., & Sarason, S. (1952). A study of anxiety and learning. Journal of Abnormal and Social Psychology, 47, 166-173.
- Martens, R. (1971). Anxiety and motor behavior: A review. Journal of Motor Behavior, 3, 151-180.
- Morris, L.W., & Liebert, R.M. (1970). Relationship of cognitive and emotional components of test anxiety to physiological arousal and academic performance. Journal of Consulting and Clinical Psychology, 35, 332-337.
- Nideffer, R.M. (1981). The ethics and practice of applied sport psychology. Ithaca: Movement Publications.
- Plass, J.A., Hill, K.T. (1986). Children's achievement strategies and test performance: The role of time pressure, evaluation anxiety, and sex. Developmental Psychology, 22, 31-36.
- Poulton, E.C. (1957). On prediction in skilled movements. Psychological Bulletin, 54, 467-78.
- Sarason, I.G. (1960). Empirical findings and theoretical problems in the use of anxiety scales. Psychological Bulletin, 57, 403-415.
- Sarason, S., & Mandler, G. (1952). Some correlates of test anxiety. Journal of Abnormal and Social Psychology, 47, 810-817.
- Schmidt, R.A. (1980). Attention and performance. Motor control and learning (pp. 99-137). Champaign, IL: Human Kinetics Publishers.
- Schwarzer, C., & Cherkas-Julkowski, M. (1982). Determinants of test anxiety and helplessness. In R. Schwarzer, H.M. van der Ploeg, & C.D. Spielberger (Eds.). Advances in test anxiety research (pp. 33-43). New Jersey: Lawrence, Erlbaum, & Associates.

- Schwarzer, R., Ploeg, H.M. van der, & Spielberger, C.D. (Eds.). (1982). Advances in test anxiety research (vol. 1). New Jersey: Lawrence, Erlbaum, & Associates.
- Singer, R.N. (ed.). (1980). Motor learning and human performance: An application to motor skills and movement behaviors (3rd ed.). New York: Macmillan Publishing.
- Spielberger, C.D. (ed.). (1972). Anxiety: Current trends in theory and research (vol. 2). New York: Academic Press.
- Spielberger, C.D., Gorsuch, R.L., & Lushene, R.E. (1970). The state-trait anxiety inventory (STAI). Test manual. Palo Alto, California: Consulting Psychologist Press.
- Stoudenmire, J. (1975). A comparison of muscle relaxation training and music in the reduction of state and trait anxiety. Journal of Clinical Psychology, 31, 490-492.
- Van der Ploeg, H.M. (1982). The relationship of worry and emotionality to performance in Dutch school children. In R. Schwarzer, H.M. Van der Ploeg, & C.D. Spielberger (Eds.). Advances in test anxiety research (pp. 55-66). New Jersey: Lawrence, Erlbaum, & Associates.
- Weinberg, R.S., & Genuchi, M. (1980). Relationship between competitive trait anxiety, state anxiety, and golf performance: A field study. Journal of Sport Psychology, 2, 148-154.
- Wine, J. (1971). Test anxiety and direction of attention. Psychological Bulletin, 76, 92-104.

APPENDICES

APPENDIX A

INFORMED CONSENT

I understand the purpose of this study is to further explain the interrelationships among state/trait anxiety and skill testing situations.

I understand that I will be expected to take two racquetball tests, a serve test and rally test, several times before the final exam period that will be regular parts of the racquetball class whether I agree to participate in the study or not. I understand that these tasks are like racquetball practice and I give permission for my regular class scores on these tests to be released to the researcher.

I understand that I will be asked to complete a brief questionnaire prior to each test, and I understand that I may or may not be having music played during one or more of my testing sessions.

I understand that my choice to participate or not to participate in the study will have no affect on my class standing or class participation. And, I understand that I may ask questions at any time and/or I may withdraw from this study at any time without penalty.

I understand that all my scores will remain completely confidential and only group data will be used in reporting the results.

I understand that my participation in this study is strictly voluntary, and that I have not been coerced in any way. And, I am willing to participate in this study.

Your Signature _____ Date _____

Witness _____ Date _____

Ellen Henken
334 HPER Building
974-5111

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338 HPER Building
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APPENDIX B

PROTOCOL FOR ADMINISTRATION OF A-TRAIT FORM

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 generally feel. 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 how you generally feel.

APPENDIX C

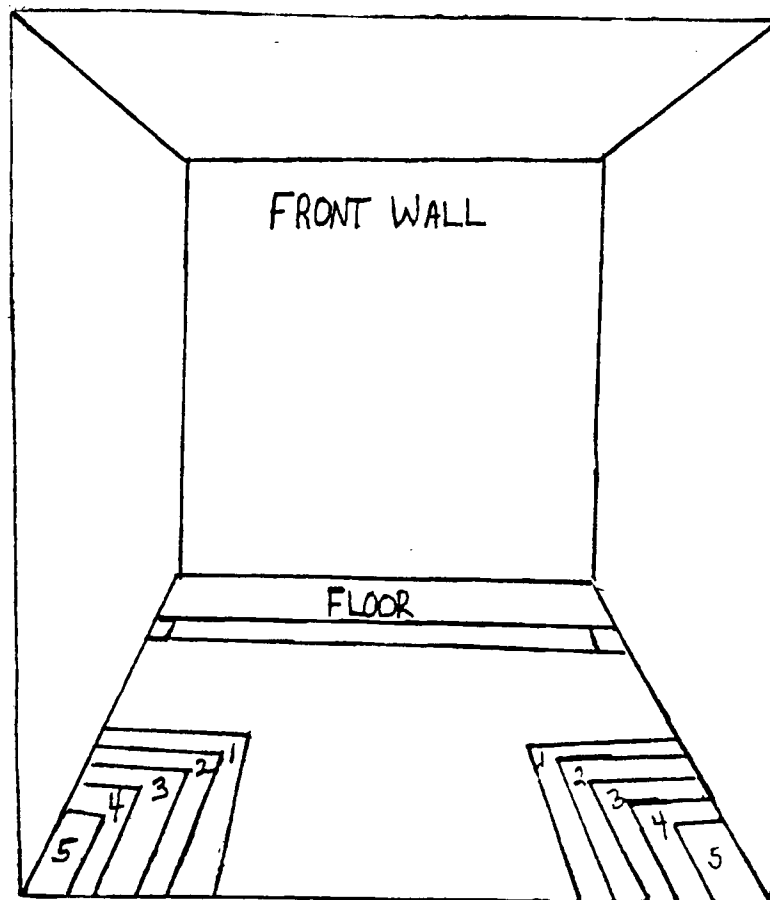
PROTOCOL FOR ADMINISTRATION OF THE SERVE TEST

Each of you will be required to direct 5 legal serves toward both the right and left back wall corners. Any one or combination of serves presented in this class can be utilized for this test. You may stand anywhere you wish in the serving zone. For each service trial you are permitted two attempts as specified by the rules of play including the following restrictions:

1. If a "fault" serve occurs on the first attempt, then a second attempt will be allowed. On the second attempt, you may elect to utilize a different type of serve.
2. If either an "out" serve or two "fault" serves are hit, then a zero score is awarded for that trial.
3. If a valid serve is executed on your first attempt, then a second try is not permitted for the purpose of obtaining a higher score.

Scoring- each legal serve will be awarded a score ranging for 0 to 5 points. The score for each attempt will be the point value indicated by where the ball lands on the marked court. The score will be taken from where the ball lands on the second bounce. Any valid serve rolling out from the side wall-floor crotch will be automatically awarded 5 points

irrespective of where the ball contacts the scoring zone on its second bounce. The total point value from the 10 attempted serves will determine your score (Issacs, Lumpkin, & Schroer, 1987).



APPENDIX D

PROTOCOL FOR ADMINISTRATION OF THE A-STATE FORM

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.

APPENDIX E

PROTOCOL FOR THE ADMINISTRATION OF THE RALLY TEST

While standing behind the short line you will hit the ball off the front wall as many times as possible within a 30 second time period. You will start the test with two balls in your possession so that if you lose control of the first ball you can immediately put the second ball in play. Your shots may hit any combination of walls as long as the ball hits the front wall before touching the floor.

Scoring- one point will be awarded for each legal hit against the front wall. A legal hit is defined as any stroke within the rules that is contacted behind the short line. If the ball skips on the way to the front wall, bounces twice before it is hit, or is contacted inside the short line, that attempt will not be counted (Issacs, Lumpkin, & Schroer, 1987). A total of 20 legal hits in the 30 second time period is considered an automatic "A".

VITA

Vera Ellen Henken was born in Slidell, Louisiana, on February 22, 1965, to Mr. and Mrs. Theodore F. Henken. She attended elementary school in Huntsville, Alabama, and was graduated from Huntsville High School in June, 1983. The following August she entered Troy State University, Troy, Alabama, and in June 1988 she received a Bachelor of Science degree in Physical Education. In the Spring of 1988, she accepted a graduate teaching assistantship in the Department of Physical Education and Dance at the University of Tennessee, Knoxville, and began study toward a Master of Science degree with a concentration in Pedagogy. She expects to receive the Master of Science degree in August 1989.