

ABSTRACT

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This study examined the effects of relaxation techniques on the anxiety, self-esteem, and performance levels of 20 Ss from the Women's Cross-Country Team at the University of Wisconsin-La Crosse over a 6 wk period. During the first three weeks, the entire 40 member team remained as one large group to establish standardization thus serving as their own control group. The team was then divided into a relaxation group and a mental imagery group. The STAI and SEI tests were administered before and after the 3 wk control period and then again after the 3 wk experimental period. A two-way ANOVA with repeated measures was utilized to make comparisons between the two experimental groups and with the relaxation group itself. The significance of the change over time within the relaxation group was analyzed using the Scheffe post-hoc test. The null hypothesis was not rejected in regard to the self-esteem or physical performance levels of the Ss in the relaxation group. The relaxation techniques caused a significant decrease $P < .05$ in the state and trait anxiety levels of the Ss. There was no significant difference $P > .05$ between the two experimental groups in reducing the state and trait anxiety levels or increasing the self-esteem levels of the Ss.

THE EFFECTS OF RELAXATION ON THE ANXIETY, SELF-ESTEEM,
AND PERFORMANCE LEVELS OF FEMALE INTERCOLLEGIATE
CROSS-COUNTRY RUNNERS

A Thesis Presented
to
The Graduate Faculty
University of Wisconsin - La Crosse

In Partial Fulfillment
of the Requirements for the
Master of Science Degree

by
Marcia S. Pitcock
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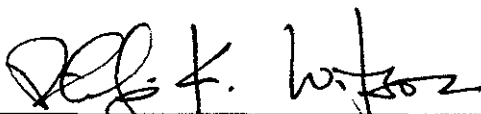
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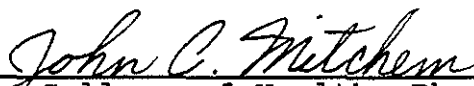

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of encouragement to see things in a more positive perspec-

tive. I appreciated his patience with me along with his

determination to see this project through to completion.

as source of strength in living

as source of my life for the

with grace, love, and

to not suffer from

and, finally

DEDICATION

I would like to dedicate this thesis to my Best Friend, Jesus Christ. He has been my source of strength in living each day to the fullest during the course of my life for the past 13 years. I know He is always by my side no matter the day or the hour. Without His abundant grace, love, and wisdom this project would never have been completed.

Do not fear, for I am with you; do not anxiously look about you, for I am your God. I will strengthen you, surely I will help you, surely I will uphold you with My righteous right hand.
Isaiah 41:10 NSB

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CHAPTER 1

INTRODUCTION

Health is a quality of life that is difficult to define and virtually impossible to measure. It is more than just the absence of disease. It is the result of a life-style (Brynteson & Cundiff, 1979). Wellness is a holistic approach to health which takes into account the physical, social, emotional, and spiritual aspects of an individual (Combs, Hales, & Williams, 1983). Each of these components are closely related to one another, so if one is out of proportion the others are also affected.

During recent years, there has been a growing interest in finding possible relationships between an individual's psychological and physiological functioning. Collingwood (1972) examined the effects of a four-week physical training program on the personal attitudes and physical, intellectual, and emotional behaviors of 25 male rehabilitation clients. He found that the experimental group demonstrated significantly greater increases over a matched control group in physical fitness performance, body attitude, positive self-attitude, self-acceptance, and positive physical, intellectual, and emotional interpersonal behaviors.

The notion of "sound body, sound mind" can offer many implications for the rehabilitation and development of more integrated and healthy behavior. Through its focus of sound body as improved physical fitness and sound mind as improved self-attitudes, the previously mentioned study by Collingwood (1972) lends further support for this idea and for the potential of physical training as a facilitative mode.

Recent research has consistently shown that vigorous physical exercise is associated with a reduction in state anxiety which is anxiety experienced at the time of measurement, as opposed to anxiety as a personality trait (Driscoll, 1976). Markoff, Ryan, and Young (1982) showed that acute reductions in anxiety and depression are associated with exercise. These results have many implications for using exercise as a psychotherapeutic agent in stress management.

Many researchers have looked only at physical manipulations to explain the changes in personal feelings and attitudes which occur as a result of the implementation of a physical training program. However, self-concept theorists have suggested looking at the conscious or unconscious perceptions of an individual's body as the cause of such changes. Heaps (1978) found that participants' perceptions of their fitness levels were positively related to feelings of self-acceptance and negatively to anxiety about body functioning. He concluded from the data obtained that although there is a definite psychological benefit following

consistent exercise and physical change, this benefit is actually due to the psychological perception of the physical and personal value of continued exertion.

Research on the complex interrelationship between the psychological and physiological aspects of performance indicates that the psychological variables of stress and anxiety may have a significant effect on athletic performance. Based on this research, athletic coaches, who have traditionally emphasized physiological refinements for the optimal execution of complex motor tasks, now realize that heightened levels of psychological stress and anxiety may adversely affect performance (Tutko & Tosi, 1976; Garfield, 1984; Krenz, 1984). Thus, in order to minimize the detrimental psychological reactions to negative stimuli, many athletic coaches have initiated mental training programs which have benefited athletic performance.

In conclusion, there appears to be a close relationship between an individual's physiological and psychological functioning. The mind is a powerful tool and plays a significant role in how a person perceives himself/herself. The premise underlying this investigation is as follows: if an individual is performing exercise such as running, in a negative or distress state, performance will be hindered and the physical and psychological benefits will not be as great as if the experience is perceived as positive.

Purpose

The purpose of this study was to determine the effects of relaxation on the anxiety, self-esteem, and performance levels of female intercollegiate cross-country runners at the University of Wisconsin-La Crosse.

Need for the Study

Stress is a normal occurrence in everyday life and the body has its own coping mechanisms. Stress is not necessarily detrimental in itself. In fact, a certain amount of stress is needed to strengthen both body and mind. For efficient coping with stress, the body and mind must be kept in good condition by physical exercise and a positive outlook on life (Jencks, 1977).

Exercise, biofeedback, relaxation, and mental imagery have all been effective in reducing stress. Numerous studies have been done to validate their effectiveness (Ziegler, 1980; Ziegler et al., 1982; Garfield, 1984; Krenz, 1984). In recent years, much recognition has been given to the fact that an athlete's thought processes before, during, and after competition can greatly influence his/her performance. Emotional stress such as worry, anxiety, and self-doubt can be extremely detrimental in competition. These negative emotions can diminish mental concentration; thus, the athlete will not be able to perform up to his/her potential (Tutko & Tosi, 1976; Garfield, 1984; Syer & Connolly, 1984). Since the mind and body are intertwined,

the athlete has the potential of becoming his/her own worst enemy.

Few studies have been done comparing mental imagery and relaxation as methods to reduce stress and enhance athletic performance especially in regard to college-age females. The majority of the literature has evaluated exercise, bio-feedback, and mental imagery as methods to decrease or cope with stress in various adult populations. Recently, this investigator and a colleague saw a need to look more closely at the effectiveness of relaxation techniques alone versus a combination of relaxation and mental imagery techniques in reducing the negative stress associated with athletic performance.

As a result, this particular study was designed to determine the effects of relaxation techniques on the reduction of anxiety levels and the improvement of self-esteem and performance levels of female intercollegiate trained runners. The colleague conducted a similar study assessing the effects of both relaxation and mental imagery techniques on the same three parameters. The colleague's research group in that which follows will be referred to as the mental imagery group. In addition, only the mental imagery techniques will be mentioned in reference to this group.

Null Hypothesis

It was hypothesized that there would be no significant differences in the anxiety, self-esteem, and performance

levels of the female cross-country team at the University of Wisconsin-La Crosse as a result of the relaxation techniques.

Assumptions

The assumptions for this study were as follows:

1. The State-Trait Anxiety Inventory (STAI) and Coopersmith Self-Esteem Inventory (SEI) were valid tools because of their high test-retest reliability and the subjects answered each test honestly.
2. The athletes' physiological variables (i.e., nutrition, injury prevention) were standardized and correlated to the pre- and post-tests of the self-esteem and anxiety inventories to establish the study's self-comparison control group.
3. The participants practiced the relaxation techniques as instructed.
4. The subjects were honest in reporting the number of times per week they performed the relaxation techniques.
5. The dropout rate of the subjects was due to other causes besides dissatisfaction of the training program (i.e., injury, personal reasons, etc.).
6. The significant changes between the control group and the experimental group were due to the treatment of the experimental group.
7. The participants were motivated and participated to 100% of their ability.
8. The relaxation techniques utilized in this study were valid as methods to induce a state of relaxation.

9. The 1000 and 2000 meter runs performed during practice at the middle and end of the season reflected a peaking of physical performance in each individual on the women's cross-country team.

Delimitations

The following were recognized as delimitations of this study:

1. The study was conducted for a period of six weeks. The time frame of the total study was arbitrarily decided upon through readings about various relaxation programs and consultation with published professors in the area of relaxation and mental imagery.

2. The State-Trait Anxiety Inventory (STAI) and Coopersmith Self-Esteem Inventory (SEI) were used to assess the anxiety and self-esteem levels of the subjects.

3. The subjects ranged in age from 18-21 years.

4. The subjects were all volunteers from the Women's Cross-Country Team at the University of Wisconsin-La Crosse during the 1985 season.

5. The personality and gender differences of the two investigators may have affected the learning and implementation of the techniques presented.

Limitations

The following limitations were acknowledged by this investigator:

1. The general anxiety, self-esteem, and performance levels varied with each subject in both groups.
2. The amount of exercise engaged in by each participant varied in both groups.
3. Motivational factors from one runner to another and pre- to post-test may have varied.
4. The physiological control of nutrition, injury prevention, and conditioning philosophy may not have facilitated a maximal physiological performance peak in all of the athletes at the same desired time in the season.
5. The two investigators were not official members of the coaching staff of the women's cross-country team which may have affected their ability to gain the subjects' acceptance and cooperation and to effectively teach the techniques.
6. The two investigators were dependent upon the team's coach for his cooperation in arranging the introduction, teaching, and technique practice sessions, test administration, and the team's compliance with attendance.
7. The subjects' attendance at the daily relaxation and mental imagery sessions led by the investigators was contingent upon various conflicts (i.e., class schedules, work, injury problems, other commitments).
8. The physical performance of the subjects in the relaxation group was assessed by the coach of the women's cross-country team based on individual performances in the various meets throughout the season.

Definition of Terms

The following terms have been defined to clarify their use in the study:

Anxiety - An uneasiness of the mind due to an anticipated danger or threat which may often be irrational. It is accompanied by a sense of helplessness due to the individual feeling unable to find a solution to the problem (Hurlock, 1974).

Distress - A harmful, unpleasant stress which involves the fight or flight reflex without process of this reflex (Selye, 1974).

Eustress - A positive stressor which doesn't involve the fight or flight mechanism (Selye, 1974).

Mental Imagery - The use of positive suggestion through visualization to change a mental and/or physiological state. When one creates a mental picture, his/her body can actually respond to the visualization as if were a real experience.

Relaxation - A temporary withdrawal from activity which has the potential of enabling the individual to recharge and make full use of one's physical, mental, and emotional energy (Syer & Connolly, 1984).

Self-esteem - A generalized concept of what an individual believes he/she is. It includes one's perception of appearance, recognition of abilities and disabilities, identification of role and status in life, and values, beliefs, and aspirations (Hurlock, 1974).

Stress - A complex psychobiologic process generally initiated by a stimulus or situation that is potentially harmful or dangerous (Sarason & Spielberger, 1980).

Wellness - A holistic approach to health which takes into account the physical, psychological, social, emotional, and spiritual aspects of an individual (Combs et al., 1983).

CHAPTER II

REVIEW OF RELATED LITERATURE

Stress is both necessary and desirable. It helps each individual adjust to the demands of life. However, if the stress response is set off inappropriately, it can have a detrimental effect on the body (Curtis & Detert, 1981). Emotional stress such as worry, anxiety, and self-doubt can be detrimental to an athlete during competition (Tutko & Tosi, 1976; Ziegler, 1980; Garfield, 1984; Krenz, 1984; Syer & Connolly, 1984). Thus, the purpose of this study was to determine the effects of relaxation techniques on the reduction of anxiety levels and the improvement of self-esteem and performance levels of female intercollegiate cross-country runners.

Various modes of stress reduction have been investigated, i.e., exercise, mental imagery, relaxation. This literature review will entail discussion of these topics plus the concept of total well-being, stress, and stress as it relates to athletics.

Total Well-Being

Just as life is more than the absence of death, health is more than the absence of disease. Health implies a quality of well-being. It is the result of a positive life-

style. Thus, to be free from an illness requires a conscious effort on the part of every individual (Brynteson & Cundiff, 1979).

Most health professionals today view health as multi-dimensional. Concern with the health of an individual needs to focus on that person's emotional, mental, social, spiritual, and physical well-being. These dimensions are inter-related and interdependent in the functioning of the whole person (Curtis & Detert, 1981).

Health professionals have conceptualized various states of good and ill health as points on a continuum. At one end is an early and needless death. At the other end is optimal health which some people refer to as "high level wellness." Most people are somewhere in the center of this spectrum--not sick enough to require medical attention, yet not well enough to live each day with zest and vigor (Combs et al., 1983).

Wellness means different things to different people. Curtis and Detert (1981) define wellness as that state in which an individual feels good enough about oneself to regularly assess his/her life, to intervene whenever necessary, and to find or develop the necessary reinforcement and motivation to continue one's movement toward personal growth, development, and utilization of his/her potential.

Wellness involves the total person. It is a process that encourages the individual to examine and become more actively involved with life. Wellness is a life-style that

is positively and consciously directed toward maintaining balance within oneself and with the external environment (Curtis & Detert, 1981).

The cornerstone of the wellness process is self-responsibility. Individuals need to take responsibility for the way they look, feel, think, and live. Wellness is a process that is started, maintained, directed, and when necessary, redirected by the individual. In fact, it is possible to be healthy by accepted medical standards while not experiencing a high degree of wellness (Curtis & Detert, 1981).

Total well-being is a condition that arises from an overall state of physical and emotional equilibrium in one's life. There are numerous benefits of total well-being. Some of them include the following: (1) more personal energy, (2) less depression, (3) a better self-image, (4) fewer physical complaints, and (5) greater ability to handle domestic and job-related stress (Cooper, 1982). Thus, achievement of total well-being can make an individual happier and more productive which in turn affects all areas of one's life.

Stress

Stress is a normal occurrence in everyday life, and the body has its own coping mechanisms. Stress is not necessarily detrimental in itself. In fact, a certain amount of stress is needed to strengthen both mind and body. For

efficient coping with stress, the mind and body must be kept in good condition by physical exercise and a positive outlook on life (Jencks, 1977).

Curtis and Detert (1985) define stress as a number of normal reactions for self-preservation. According to Selye (1974),

Stress is the nonspecific response of the body to any demand made upon it . . . in addition to their specific actions, all agents to which we are exposed also produce a nonspecific increase in the need to perform adaptive functions and thereby to reestablish normalcy . . . the nonspecific demand for activity as such is the essence of stress. (pp. 27-28)

Not all stress arises in negative circumstances, although this is a prevalent misconception. It has been found that events which most people consider positive or pleasurable, i.e., a marriage, a promotion, a vacation can be as stress inducing as those that are considered negative.

These events require a person to adapt or change, taxing one's physical and mental adaptive mechanisms as much as negative stressors do. Any alteration in an individual's life requires one to adjust, and when these adjustments must be made too frequently in a brief period of time, tension and stress are the results (Pelletier, 1977).

Thus, activity associated with stress may be pleasant or unpleasant. Eustress is healthy and pleasant, whereas distress is damaging or unpleasant (Selye, 1974). The way in which a certain stimulus will be received depends upon its intensity and the demand it makes on the adaptive capacity of the body.

Selye (1974) implied that life stress is on a continuum which can be quantified and measured. This measurement will indicate when stress becomes distress. If distress is not replaced with eustress, over time disease will result. He goes on to say that attitude determines whether an individual perceives any experience as pleasant or unpleasant, and adopting the right one can convert a negative stress (distress) into a positive one (eustress).

Stress can be thought of as the interrelationship between the stressor (the cause) and the stress response (the effect). A stressor is a demand, situation, or circumstance that disrupts an individual's equilibrium and initiates the stress response. There are many different kinds of stressors. Life is full of them, and it is perfectly normal for a person to encounter many stressors each day (Curtis & Detert, 1981).

Stressors can be grouped into five categories: (1) social, i.e., crowding, (2) psychological, i.e., anxiety, (3) psychosocial, i.e., death of a spouse, (4) biochemical, i.e., heat, cold, pollutants, and (5) philosophical, i.e., value system conflict (Curtis & Detert, 1981). A primary stressor is one that initiates the stress response. Secondary stressors are events that result from the first stressor and keep the stress response activated. Disappointment, frustration, and anger are examples of secondary stressors that can feed primary-secondary cycles and keep the response elicited (Curtis & Detert, 1981).

Typically, the following three things trigger the stress response: threat, change, and/or uncertainty. Individuals define their own stressor based on their perception and reactions. Two individuals may encounter the same stimulus with one finding it stressful and the other finding it unstressful and even enjoyable. Stress is clearly defined by the individual's reaction to the event (O'Brien & Sothers, 1984).

To further understand stress, one must recognize it as a physical reaction. Selye (1974) pioneered the research on physiological stress. His animal experiments were the basis for his theory on biological stress labeled the General Adaptation Syndrome (G.A.S.).

The G.A.S. is composed of three stages: (1) the alarm reaction, (2) the stage of resistance, and (3) the stage of exhaustion. These stages are the body's attempt to adapt to the stressor in order to restore equilibrium. During the alarm reaction the cells of the adrenal cortex discharge hormones, the fluid content of the blood decreases, the chloride level of the blood diminishes, and general tissue breakdown occurs. During the stage of resistance, the cells of the adrenal cortex become rich in secretory granules, the fluid content of the blood increases, an excess of chloride is found in the blood, and general building up of tissues occurs which brings the body back to normal weight. The stage of exhaustion occurs when a stressor is overwhelming by being too strong or acting too long, or by other

stressors being added. This stage may lead to death of the organism (Jencks, 1977).

When an individual perceives a threatening situation and sets off the stress response, a variety of physiological changes occur: (1) increased sympathetic nervous system activity, (2) increased body metabolism which is evidenced by increased heart rate, blood pressure, breathing rate, oxygen consumption, and cardiac output, (3) increased muscular tension, (4) decreased blood clotting time, and (5) increased blood flow to the major muscle groups involved in the "fight or flight" mechanism. These physiological changes, which occur almost instantaneously, prepare one for the physical exertion that may occur during the "fight or flight" response (Curtis & Detert, 1985).

Appropriate elicitation of the stress response does not cause problems, but simply enables each individual to deal positively with stress. When stress is perceived in this way, it is referred to as eustress. However, when the stress response is set off too often and at improper times, it can have a detrimental effect on the body and is referred to as distress. Neither fighting or fleeing is an appropriate response to most modern stressors, which are not life threatening but occur frequently (Curtis & Detert, 1981).

Each individual has a baseline of tolerable stress. If one functions within these limits, there seems to be no serious impairment to a balanced state. On the other hand, if an individual's perception of an event or situation

causes one to overreact the response is inappropriate. It is inappropriate because the "fight or flight" response may be intensified with each exposure and reaction to a stressor. A primary-secondary stress cycle is initiated, stress hormones accumulate, and the body does not have a satisfactory way to rid itself of the byproducts secreted during the elicitation. When this type of response occurs over a prolonged period, the stress level rises which can lead to illness and lowered body resistance (Curtis & Detert, 1981).

A study by Greenberg (1981) compared the effect of life event changes in 308 college students to the development of illness and disease in the college student population. The data revealed a strong positive relationship between the stress scores on the College Schedule of Recent Experience (CSRE) and illness/disease.

Nuernberger (1981) specifically addressed the issue of coping with stress as follows:

The biggest reason for our failure to deal adequately with stress is that we've been looking in the wrong direction. We have been operating under the false assumption that stress is a result of adverse environmental factors, and we therefore expect to find the source of stress in organizational structures, in poor communication, . . . or in a thousand and one other places. Consequently, we expect to eliminate by manipulating the environment, by manipulating reinforcement contingencies, and by altering physical symptoms artificially.

Learning how to make our environment more peaceful for ourselves and others is certainly not a futile or useless practice, but it does not solve the major problem---our inner reactionary patterns. We must

recognize that external events provide only the potential stimuli for change in stress levels. They do not actually produce stress, for this is done internally. When we realize this, we can consciously choose whether or not we do something about it. (pp. 82-83)

By understanding that the individual may be the main source of his/her own stress, a solution to the stress can be obtained. An important first step is to gain self-knowledge. A key to self-knowledge is an awareness of how strongly habits control a person's mind, body, and behavior. Thoroughly engrained habits are largely carried out by the unconscious mind. Habits control actions only to the extent they are allowed to operate at the unconscious level. As soon as one is conscious of his/her behavior, he/she can consciously choose not to act according to the old pattern. Habits can be good or bad. The mind that formed the destructive habits is also the most powerful tool to break such habits and replace them with healthy, constructive habits (Nuernberger, 1981).

Individuals need to give themselves permission to feel stress and not spend so much energy trying to eliminate it. As previously mentioned, a certain amount of stress is necessary for daily living. By accenting the positive stress (eustress) and minimizing the negative stress (distress), individuals can begin using stress to their advantage. People can make stress a friend rather than an enemy (O'Brien & Sothers, 1984).

Thus, in dealing with stress management, it is important to treat the cause rather than just the symptoms. If only the symptoms are dealt with, the relief will be temporary.

Stress and Athletic Performance

Athletic performance is mainly dependent upon four major groups of factors: (1) the natural ability, capacity, and physical endowment an individual receives via genetic inheritance, (2) the acquisition of the specific skills required for excellence in a particular task or sport, (3) the specific type and level of physical fitness mandatory for that task or sport, and (4) the general psychological makeup of the person in terms of personality, motivational, and emotional strengths. All motor performance, regardless of a person's ability level, is a function of the meshing of these four dimensions (Alderman, 1974).

Regardless of how much ability, skill, or fitness a person possesses for a particular task or sport, the success or quality of one's performance will in the final analysis, probably depend on his/her particular psychological makeup. In other words, it will depend to a large extent on the personality structure of the individual, how motivated he/she is to succeed, and how much emotional control one possesses (Alderman, 1974). Thus, it is important for an athlete to understand the relationship between one's thoughts, feelings, and physical performance. The emotions

related to competition must be put in proper perspective before an athlete can achieve his/her maximal potential (Garfield, 1984).

It is a well-accepted premise that some anxiety is useful in increasing arousal levels and in activating the athlete. However, when anxiety gets out of control it can have a detrimental effect on performance (Tutko & Tosi, 1976; Ziegler, 1980; Garfield, 1984; Syer & Connolly, 1984).

During the past several years, researchers interested in sport have devoted a great deal of energy toward understanding the fears of athletes. They have found that all individuals, including athletes, are characterized by two types of fears or anxieties: (1) a person's general level of anxiety which is a personality trait and (2) a short-term condition of fearfulness reflecting an individual's reaction to specific situations which is called state anxiety (Cratty, 1984). In other words, trait anxiety (A-trait) indicates a somewhat stable characteristic of anxiety that is exhibited across many situations while state anxiety (A-state) denotes an individual's situational reaction to some perceived threat. State anxiety is particularly important when assessing the athlete's feelings prior to, during, and following competition (Cratty, 1984).

Researchers have found some important information concerning the role of stress and anxiety on performance. When confronted with a stressful situation in sport, the body begins to undergo varying emotional shifts. An

increase in the athlete's anxiety level occurs. This results in he/she feeling rushed and out of control. Many physiological changes begin to take place. The sympathetic nervous system becomes activated and the athlete begins to exhibit overt signs, i.e., sweating or cold hands, an acidity sensation in the stomach, clenching of the jaw. In addition, there is a stage of psychological reactivity when the athlete experiences hidden cognitive anxiety. If the anxiety state is maintained over a long period of time, the athlete experiences a decrease in concentration, judgment, and performance which only adds to the increased anxiety state. Thus, the athlete is caught in a vicious anxiety cycle (Ziegler, 1980).

Garfield (1984) found that emotional stress such as worry, anxiety, and self-doubt can be extremely detrimental in competition. These emotions cause constriction of blood flow to the athlete's brain thus the individual tends to focus on the last error or loss, rather than the goal at hand. Negative emotions of this kind have a hypnotic influence.

Fear is another negative emotion which can cause problems for the athlete. Once activated, fear can cause the physiological reactions associated with the stress response. These physiological reactions can then become entangled or even over power the more subtle learned signals that are required to execute athletic performances (Garfield, 1984).

Some of the physical signs and symptoms of negative emotions include: (1) disrupted coordination, (2) proneness to injury, (3) impaired vision, (4) cramped or knotted muscles, (5) muscle fatigue, and (6) loss of flexibility. According to Soviet researchers, all athletes experience at least some of the preceding physical symptoms in the face of negative emotional stimulation. They found through their studies that mental training techniques such as relaxation not only combated negative reactions, but also threw open the doors to hidden reserves of energy and endurance (Garfield, 1984).

As mentioned previously, research on the complex inter-relationship between the psychological and physiological aspects of performance indicates that the psychological variables of stress and anxiety may have a significant effect on athletic performance (Krenz, 1984). As a result, numerous studies have examined the trait personality profiles of various athletes.

Gruber and Beauchamp (1979) measured the changes in pre- and post-match A-states of college women basketball players. They showed a significant A-state reduction after victory, but after defeat A-state remained at a high level. Moreover, the more crucial games elicited higher pre-match anxiety levels. They concluded that changes in A-state were not only contingent upon the outcome of the competition, but also upon the perceived importance of the competition. Similar findings were reported by Sanderson and

Ashton (1981) who examined pre- and post-match A-states of top level colt badminton players. There was found to be a significant decrease in the female players' anxiety after winning matches.

Sanderson and Reilly (1983) explored the relationships between state/trait anxiety and competitive cross-country running performance for males and females. A-trait and A-state pre- and post-competition were monitored in 38 females and 26 males at major races. The females' A-trait was correlated with pre-race A-state which was itself correlated significantly with race performance. A significant post-race A-state reduction occurred only with the better runners. The correlation between A-trait and pre-race A-state was also found in the male athletes while A-trait significantly correlated with race performance. A-state was significantly reduced post-race, the greatest decrease being observed in the top performers. It was concluded that trait as well as temporary dispositions are relevant when psychological determinants of performance are considered.

According to Tutko and Tosi (1976), it is not the intrinsic challenges of sports that do most of the damage. It is the exaggeration of pressures that causes one to suffer far more anxiety than is warranted. Such disproportionate social and personal pressures to perform end up defeating their own purpose. The answer lies in the individual's ability to channel emotions appropriately and control one's own game.

It is possible for athletes to gain control over their anxiety reaction. This is possible through the development of coping skills that are acquired through practice, i.e., progressive relaxation, biofeedback, visuo-motor behavior rehearsal (VMBR).

Ziegler, Klinzing, and Williamson (1982) studied the effects of two stress management programs on the cardio-respiratory efficiency of eight male cross-country runners. The subjects were divided into three groups based on the results of a maximal and submaximal treadmill run. The three groups were as follows: (1) control, (2) stress inoculation training (SIT), and (3) stress management training (SMT). Subjects in both training groups completed a mental training program including electromyographic relaxation training, cognitive coping strategies, and one type of imagery training. Following the conclusion of the treatment programs, the subjects in all three groups were again given a submaximal treadmill run test. The results indicated significant differences in the maximal oxygen consumption between the control group ($M=36.68$) and the two treatment groups, SIT ($M=33.69$) and SMT ($M=32.11$). No differences emerged between the training groups. This gives further validity to support the use of stress management techniques in athletics.

The mind and body are intertwined. An athlete's emotional state can enhance or hinder his/her performance. Research has shown that mental training is an important

asset to an athlete's training regimen. It allows the individual to deal with negative emotions appropriately and heightens physical performance.

Exercise

Cooper (1982) has defined aerobic exercise as those activities that require extra oxygen for prolonged periods and place such demands on the body that it is required to improve its capacity to handle oxygen. In general, aerobic exercise programs have the greatest impact on an individual's cardiovascular fitness. Specifically, some benefits which result include: (1) weight loss, (2) increased ability to handle physical and emotional stress, (3) increased productivity, and (4) prevention of heart disease.

Most people who exercise regularly are healthier with less cardiovascular disease, have fewer medical expenses, and have stronger muscles than those who do not exercise. Even so, most people who exercise miss the stress-relieving benefits of it because they aren't mentally involved in the exercise, and do not properly relax their muscles (Nuernberger, 1981).

Whenever the mind isn't involved, the exercise itself will yield fewer benefits. In fact, merely pushing one's body without paying attention to it can cause stress. A classic example of someone whose exercise adds stress is the hard-driving personality who is told by his/her doctor to start jogging every day. In true form, the individual

compulsively sets up a jogging schedule, trying to achieve certain goals as quickly as possible. The individual runs against the clock just as he/she works against the clock and thus adds another stress to the day. Working or jogging, his/her mental attitude creates stress (Nuernberger, 1981).

Sheehan (1980) indicated that when exercise becomes play, it becomes a self-renewing compulsion. The fitness that ensues is simply a bonus. In fact, if fitness remains the primary purpose and the play is never discovered, in all likelihood the fitness program will fail.

As stated previously, exercise has been found to be beneficial in helping an individual handle stress if it is utilized correctly. H. deVries (1981) found that there is a tranquilizing effect associated with rhythmic exercises of appropriate intensity and duration. It is this tranquilizing effect which brings balance to the individual's stressful state.

Schafer (1978) cited the following seven specific benefits of running as a way of managing stress: (1) releases tensions that build up in daily life, (2) helps build a stronger, healthier body in turn contributing to a better stress filter, (3) offers a personal stability zone, (4) creates a sense of competence and control, (5) provides a time for creative problem-solving or for making difficult decisions, (6) provides an experience of the excitement and rewards attainable through self-directed mobilization of

stress toward a useful good, and (7) provides an opportunity to heighten fine-tuned awareness of the body.

Sime (1977) examined the effectiveness of exercise in reducing physiological signs of stress in 48 university students. The subjects were selected based upon manifestations of anxiety symptoms concerning a forthcoming stressor; for example, a written examination. Subjects were then randomly assigned to one of three conditions: a treadmill exercise group, a meditation group, or a placebo pill group. All three treatment groups demonstrated a significant decrease in muscle tension and blood pressure. Resting heart rate and electrodermal responses, however, were more significantly reduced by subjects in the exercise condition relative to the meditation and the placebo pill conditions. He concluded that mild exercise, and in some cases meditation, can be effective in reducing the physiological signs of stress and anxiety.

Glasser (1976) viewed running as a positive addiction because of the numerous psychological and physiological benefits. He went on to say that a positive addiction increases one's mental strength and is the opposite of a negative addiction which seems to sap the strength from every part of one's life except in the area of the addiction. There are two major categories of positive addiction: (1) the physical, led by the runners and (2) the mental, dominated by the meditators. People who are positive addicts have an added strength so they live with more

confidence, more creativity, more happiness, and are usually in much better health (Glasser, 1976).

However, Sheehan (1978) indicated that the health benefits derived when aerobic exercise was performed in a state of distress were qualitatively of less benefit than when performed in a state of eustress. Thus, if running isn't being viewed as a means to achieve positive health or is thought of as a chore, then the exercise will be perceived as a stressor and the individual may self-destruct (Morgan, 1979).

Mental Imagery

In addition to exercise, another way to reduce stress is through mental imagery. Thus, it can play an important role in achieving the balance of total well-being.

Mental imagery has been employed successfully in the following areas: (1) to increase concentration, (2) to increase self-esteem and confidence, (3) to promote an enduring positive mental attitude, (4) for relaxation, and (5) for health and healing (Curtis et al., 1985).

The knowledge obtained regarding mental imagery has been successfully utilized in various clinical settings. Crowther (1983) compared the effectiveness of stress management training combined with relaxation imagery (SMT) versus relaxation imagery alone (RI) versus a control procedure in the treatment of essential hypertension in 34 individuals. The control procedure consisted of weekly blood pressure checks.

Subjects in the SMT group received 8 one-hour individualized training sessions once a week. The first three sessions consisted of training in the relaxation imagery technique. After the third session, the subjects were also asked to practice the techniques daily at home. In the fourth session, subjects in the SMT group began receiving stress management training. The first 20 minutes of the fourth to eighth sessions still consisted of relaxation training. The stress management procedures employed emphasized the use of relaxation and positive self-statements.

Subjects in the RI group also received eight, weekly, 45-minute individualized relaxation training sessions. Subjects in this group received training in the relaxation imagery technique and were also instructed to practice at home.

Subjects in the third group received eight, weekly, 15-minute blood pressure checks. They were provided with the rationale that weekly blood pressure monitoring enhances adherence to standard medical treatment for essential hypertension.

Blood pressure measurement procedures during the treatment phase were identical for the SMT and RI groups. The procedure consisted of taking three consecutive blood pressures prior to and immediately after the relaxation training session. Five consecutive blood pressures were taken in all 34 subjects pre- and post-treatment and then 1, 3, and 6 months after the completion of the treatment.

At post-treatment, the systolic blood pressure measurements of the SMT and RI groups were significantly lower than those of the control group ($p < .05$ for both comparisons), but did not differ significantly from each other. A significant difference in systolic blood pressure existed among the three groups at the 1- and 3-month follow-up periods, but the between-group differences were not powerful enough to be isolated by the Newman-Keuls analyses. The diastolic blood pressures of the SMT and RI groups were significantly lower than those of the control group at post-treatment ($p < .01$ for both comparisons) and 3-month follow-up ($p < .01$ for both comparisons), but not significantly different from each other. At the 1-month follow-up, only the diastolic blood pressure of the RI group was significantly lower than those of the control group ($p < .01$). Thus, the results indicated that both stress management training plus relaxation imagery and relaxation imagery alone were significantly more effective than weekly blood pressure checks in reducing systolic and diastolic blood pressure during treatment and in maintaining diastolic blood pressure reductions during follow-up.

Schandler and Dana (1983) examined changes in targeted and general tension behaviors as well as reductions in physiological tensions associated with cognitive imagery and electromyographic biofeedback relaxation procedures in 45 female college students. Considered as a whole, the results suggested a rather clear superiority of the imagery

procedures over the other treatments. They concluded that a systematically combined physiological feedback and imagery approach might possibly provide a highly effective stress control and treatment protocol.

In recent years, much recognition has been given to the fact that athletes' thought processes and emotions immediately before, during, and after competition can greatly influence their present and future accomplishments. These thought processes may work for or against the athlete (Singer, 1982). Thus, the technique of mental imagery in the rehearsal of skills and the reduction of anxiety and tension is helping athletes cope with the pressures of performance (Garfield, 1984; Syer & Connolly, 1984).

As stated previously, mental imagery can be utilized in various situations to reduce stress and anxiety and thus improve performance, concentration, and self-esteem. In recent years, much work has been done in the area of mental training and athletics. The mind is a powerful tool and through the use of mental training techniques hidden reserves of energy and endurance can be tapped.

Relaxation

Syer and Connolly (1984) define relaxation as a temporary and deliberate withdrawal from activity which has the potential of enabling the individual to recharge and make full use of one's physical, mental, and emotional energy. Curtis, Detert, Schindler, and Zirkel (1985) define

relaxation as a systematic means of bringing about physiological changes in the body that counter the effects of the stress response. Relaxation exercises serve as a systematic means to relax both the mind and the body.

The following physiological changes occur during the relaxation response: (1) increased parasympathetic nervous system activity, (2) decreased sympathetic nervous system activity, (3) decreased body metabolism manifested by decreased heart rate, blood pressure, breathing rate, oxygen consumption, and cardiac output, (4) decreased muscular tension, and (5) increased blood clotting time (Curtis & Detert, 1985).

Researchers have found that people who relax on a regular basis are: (1) more psychologically stable, (2) more physiologically stable, (3) less anxious, (4) feel in greater control of their lives, and (5) achieve a faster return to homeostasis or normal state after reacting to stress (Curtis & Detert, 1985).

Perhaps the quieting effect that relaxation has on the cerebral cortex helps the individual to perceive stressors as less threatening and thus avoid overreaction. There is then a lower emotional arousal which seems to explain why some individuals do not overreact to stressors (Curtis & Detert, 1981). Relaxation keeps the autonomic nervous system and the endocrine system functioning within reasonable limits.

There is increasing evidence that performing relaxation techniques on a regular basis can be beneficial to one's

health. Some possible results of relaxation include the following: (1) increased levels of physical energy, (2) increased ability to concentrate, (3) increased ability to handle problems and increased overall efficiency, (4) increased social satisfaction, (5) decreased symptoms of illness such as headaches, nausea, diarrhea, (6) improved sleep onset, and (7) retraining the nervous and endocrine systems to reduce high blood pressure, spastic colitis, bronchial asthma, tension headaches, and other stress related disorders (Curtis & Detert, 1985).

Research findings suggest that it is possible to positively alter the neurophysiology of the body so that it returns to a more balanced state. Benson, Rosner, and Marzetta (1974) have demonstrated how relaxation can lower high blood pressure. The 22 subjects in their study were borderline hypertensives who practiced meditation for relaxation twice daily for twenty minutes. During the control period, blood pressures averaged 146.5 mmHg systolic and 94.6 mmHg diastolic. During the experimental period, they decreased to 139.5 mmHg systolic and 90.8 mmHg diastolic. As a result, comparison of the blood pressures of the premeditation-control period to those of the postmeditation period yielded highly significant differences for both systolic ($p < .001$) and diastolic pressures ($.001 < p < .002$).

Honsberger and Wilson (1973) studied the effects of relaxation skills (meditation) in improving airway resistance on 22 asthmatic patients. Half of the subjects began

the practice of Transcendental Meditation for three months, while the other half read related material daily but did not meditate. Daily symptoms and meditation information were kept in diaries and pulmonary-function data was obtained at 0, 3, and 6 months. Ninety-four percent of the 11 patients who meditated had improved airway resistance. In addition, the severity of symptoms was reduced in the meditation group.

A study was conducted by Peters, Benson, and Porter (1977) to assess the effectiveness of daily relaxation breaks on five self-reported measures of health, performance and well-being. The 136 subjects were all employees of the same company. After four weeks of baseline measurement, the volunteers were divided randomly into Groups A, B, and C. Group A was taught Benson's method for eliciting the relaxation response. Group B was instructed to take a relaxation break by sitting quietly, but were asked not to use any special technique to help them during the break. Group C received no instructions about what to do during their breaks. Members of groups A and B were asked to take two 15-minute relaxation breaks each day for eight weeks. Group C took no special relaxation breaks. After the eight-week experimental period, Groups A and B showed the greatest improvement and Group C the least improvement on the five indices which were symptoms, illness, performance, sociability-satisfaction, and happiness-unhappiness. There was a marked tendency for the amount of improvement on each of the indices to decrease in order from Group A through Group C.

The findings of the previous study (Peters et al., 1977) indicated that it is feasible for office-workers to incorporate relaxation breaks into their daily routines. Compared to following one's "normal" routine, taking such relaxation breaks may be associated with improvements in the perception of one's health, performance, and self-satisfaction. In addition, practicing a relaxation technique during these breaks is associated with greater improvements than merely sitting quietly without using special relaxation techniques.

Social psychologists and health educators have debated the relationship of attitudes to behavior, of beliefs to behavior, and of attitudes to beliefs for several years (Riddle, 1980). Fishbein and Ajzen (1975) theorized that as a person formulates a belief about an object or behavior, the person also develops an attitude toward that object or behavior. The attitude predisposes the individual to behave in accordance with that attitude.

Each individual develops a life-style that is determined by his/her values, attitudes, beliefs, and circumstances. The underlying key to one's attitude and behavior is his/her belief about the relevant object or behavior.

Thus, if individuals believe the use of exercises to elicit the relaxation response is one of the positive things they can do to cope with stress, they will have a positive attitude toward spending time performing them. As positive changes occur the behavior is reinforced. People

feel better about themselves and they gain some confidence in their ability to control and direct the forces affecting their lives.

Summary

A review of the literature examined the concepts of: (1) total well-being, (2) stress, and (3) stress as it relates to athletics. Modes of stress reduction were also discussed which included: (1) exercise, (2) mental imagery, and (3) relaxation.

The mind and body are interdependent. As a result, there is a close relationship between an individual's physiological and psychological functioning. Most health professionals today view health as multidimensional which includes a person's emotional, mental, social, spiritual, and physical well-being (Curtis & Detert, 1981). Wellness is similar to yet distinct from health. It involves the total person and encourages a positive life-style (Curtis & Detert, 1981). The cornerstone of the wellness process is self-responsibility. Individuals need to take responsibility for the way they look, feel, think, and live (Curtis & Detert, 1981; Combs et al., 1983).

Stress is a normal part of daily living and thus isn't necessarily detrimental in itself (Jencks, 1977). Stress can be thought of as the interrelationship between the stressor (the cause) and the stress response (the effect). Threat, change, and/or uncertainty typically trigger the

stress response. Individuals define their own stressor based on their perception and reactions (O'Brien & Sothers, 1984). Appropriate elicitation of the stress response does not cause problems, but simply enables each individual to deal positively with stress. When stress is perceived in this way, it is referred to as eustress. However, when the stress response is set off too often and at improper times, it can have a detrimental effect on the body and is referred to as distress (Selye, 1974; Curtis & Detert, 1981).

It is a well-accepted premise that some anxiety is useful in increasing arousal levels and in activating the athlete. However, when anxiety gets out of control it can have a detrimental effect on performance (Tutko & Tosi, 1976; Ziegler, 1980; Garfield, 1984; Krenz, 1984). Other negative emotions, i.e., worry, fear, self-doubt can also cause problems for the athlete. According to Tutko and Tosi (1976), it is not the intrinsic challenges of sports that do most of the damage. Instead, it is the exaggeration of pressures that causes one to suffer far more anxiety than is warranted. They feel that the answer lies in the individual's ability to channel emotions appropriately and control one's own game. Research has shown that mental training is an important asset to an athlete's training regimen (Ziegler, 1980; Ziegler et al., 1982; Garfield, 1984; Krenz, 1984). It allows the individual to deal with negative emotions appropriately and heightens physical performance.

Most people who exercise regularly are healthier with less cardiovascular disease, have fewer medical expenses, and stronger muscles than those who do not (Nuernberger, 1981). Exercise has been found to be beneficial in helping an individual handle stress if it is utilized correctly (Schafer, 1978; Cooper, 1982). H. deVries (1981) found that there is a tranquilizing effect associated with rhythmic exercises of appropriate intensity and duration. It is this tranquilizing effect which brings balance to the individual's stressful state. On the other hand, if exercise is perceived as a chore, it becomes a stressor and is detrimental to the individual (Morgan, 1979).

Mental imagery has been found to be effective in reducing stress and anxiety. It also improves performance, concentration, and self-esteem (Curtis et al., 1985). Mental imagery has been successfully utilized in various clinical settings, i.e., athletes, college students, and hypertensive individuals (Ziegler et al., 1982; Crowther, 1983; Schandler & Dana, 1983; Garfield, 1984).

Relaxation reverses the effects of the stress response (Curtis et al., 1985). It has the potential of allowing the individual to withdraw for a short time and recharge (Syer & Connolly, 1984). Research findings suggest that it is possible to positively alter the neurophysiology of the body so that it returns to a more balanced state (Honsberger & Wilson, 1973; Benson et al., 1974). There are several beneficial effects of relaxation (Curtis & Detert, 1985).

The benefits are generally associated with the motivation and purpose a person takes into the relaxation exercise (Curtis & Detert, 1981).

In conclusion, people need to take responsibility for the way they look, feel, think, and live (Curtis & Detert, 1981; Combs et al., 1983). It is important to realize that even though many of life's situations are out of one's control, an individual does have control over how he/she chooses to react. In order to channel stress more positively, it is important for each individual to learn appropriate coping techniques (Curtis & Detert, 1981).

CHAPTER III

METHODS

The purpose of this study was to determine the effects of relaxation techniques on the reduction of anxiety levels and the improvement of self-esteem and performance levels of female intercollegiate cross-country runners. A colleague of this investigator conducted a similar study assessing the effects of mental imagery techniques on the same three parameters. This chapter will present the methods, experimental treatment, and procedures employed for subject selection, teaching the relaxation techniques, and utilization of the State-Trait Anxiety Inventory (STAI) and the Cooper-Smith Self-Esteem Inventory (SEI).

Subject Selection

A total of forty, healthy, female cross-country runners ranging in age from 18-21 years from the University of Wisconsin-La Crosse participated in the study. As previously stated, this investigator determined the effects of relaxation techniques on the anxiety, self-esteem, and performance levels of the subjects. A colleague of this investigator conducted a similar study assessing the effects of mental imagery techniques on the same three

parameters. The sample size for this investigator's part of the study was 20, with the subjects serving as their own control group. Permission was obtained through the coach of the cross-country team to involve the athletes in this study. All of the subjects signed an informed consent form (Appendix A).

Development of Instrumentation

The two psychological tests utilized in this study were the State-Trait Anxiety Inventory (STAI) (Appendix B) and the Coopersmith Self-Esteem Inventory (SEI) in the Adult Form (Appendix C). The STAI test was used to assess the state and trait anxiety levels of the subjects. The SEI test was used to measure the self-esteem levels of the subjects. A discussion of each test follows which includes validity and reliability information.

State-Trait Anxiety Inventory

The STAI test was developed by Spielberger, Gorsuch, and Lushene (1970) to provide operational measures of A-State and A-Trait. Each scale contains twenty statements that describe symptoms of anxiety or indicate the absence of anxiety. The STAI A-State scale requires respondents to indicate the intensity of their feelings of anxiety at a particular moment by rating themselves on a four-point Likert scale. The SEI A-Trait scale requires individuals to report how they generally feel by indicating on a four-point scale, the frequency with which they have experienced

specific anxiety symptoms. Thus, the subjects respond to each STAI item by blackening the appropriate number to the right of the item-statement on the test form. The validity of the STAI test rests upon the assumption that the subjects have a clear understanding of the different instructions for each part of the inventory so they must be read carefully (Spielberger et al., 1970).

State anxiety (A-State) is conceptualized as a transitory emotional state or condition of the human organism that is characterized by subjective, consciously perceived feelings of tension and apprehension, and heightened autonomic nervous system activity. A-States may vary in intensity and fluctuate over time (Spielberger et al., 1970).

Trait anxiety (A-Trait) refers to relatively stable individual differences in anxiety proneness, that is, to differences between people in the tendency to respond to situations perceived as threatening with elevations in A-State intensity (Spielberger et al., 1970).

In general, it would be expected that those who are high in A-Trait will exhibit A-State elevations more frequently than low A-Trait individuals because they tend to react to a wider range of situations as dangerous or threatening. High A-Trait individuals are also more likely to respond with increased A-State intensity in situations that involve interpersonal relationships which pose some threat to self-esteem. But whether or not people who differ in A-Trait will show corresponding differences in A-State

depends upon the extent to which a specific situation is perceived by a particular individual as dangerous or threatening, and this is greatly influenced by an individual's past experience (Spielberger et al., 1970).

Although the STAI test has been available for only a relatively short time, it has been used in a number of studies as a measure of both state and trait anxiety. Current research with the STAI test indicates that the A-Trait scale is highly correlated with other measures of trait anxiety, and that the A-State scale is particularly useful in situations that require measurements of state anxiety (Spielberger et al., 1970).

In the development of Form A and other early versions of the inventory, more than 3,000 college students were tested. In the development and standardization of the STAI (Form X), which was used in this study, a total of over 3,300 high school and college students were tested (Spielberger et al., 1970).

Undergraduate students from Florida State University were tested with the STAI and then again one hour, 20 days, and 104 days later. During the test-retest interval, they were exposed to the following experimental conditions: (1) a brief period of relaxation training, (2) a difficult IQ test, and (3) a film that depicted accidents resulting in serious injury or death. The test-retest correlations for the A-Trait scale were reasonably high, ranging from .73 to .86 while those for the A-State scale were relatively low,

ranging from .16 to .54, with a median r of only .32 for the six subgroups. The low r 's for the A-State scale were anticipated because a valid measure of A-State should reflect the influence of unique situational factors existing at the time of testing (Spielberger et al., 1970).

Given the transitory nature of anxiety scales, measures of internal consistency such as the alpha coefficient would seem to provide a more meaningful index of the reliability of A-State scales than test-retest correlations. Alpha coefficients for the STAI scales were computed by formula K-R 20 for the normative sample of high school and college students. These reliability coefficients ranged from .83 to .92 for A-State and .86 to .92 for A-Trait. Thus, the internal consistency of both STAI subscales is reasonably good (Spielberger et al., 1970).

In the construction of the STAI, individual items were required to meet prescribed A-State and A-Trait validity criteria at each stage of the test development process in order to be retained for further evaluation and validation. Evidence bearing on the construct validity of the A-State scale was obtained in a study in which the scale was given in a single testing session to 197 undergraduate students at Florida State University under four different experimental conditions. The first administration occurred at the beginning of the testing session (NORMAL condition); the second followed a 10-minute period of relaxation training (RELAX condition). The students were then asked to work on

the Terman Concept Mastery Test and they were interrupted after ten minutes for the third administration of the scale (EXAM condition). The final administration followed immediately after the students viewed a stressful movie (MOVIE condition) depicting several accidents in a woodworking shop (Lazarus & Opton, 1966).

The mean scores for the A-State scale, as well as the scores for individual A-State items, were lowest in the RELAX condition and highest after the students viewed the stressful film. In the NORMAL and EXAM conditions, the A-State scale scores and item scores were approximately the same for males and females, indicating that these conditions had similar impact on both sexes (Lazarus & Opton, 1966).

The correlation between the STAI A-State and A-Trait scales depend upon the type and the amount of stress that characterize the conditions under which the A-State scale is given. Correlations between the scales varied between .44 and .55 when the STAI was given with standard instructions to four different samples of female undergraduate students; the correlations between the scales for males in these samples varied between .51 and .67. State-trait anxiety correlations tend to be slightly higher when the STAI scales are given, one immediately after the other, in the same testing session, but such correlations are markedly lower if the subjects are exposed to or threatened with some form of physical danger (Spielberger et al., 1970).

The results of the following studies give further evidence of construct validity of the STAI. Sachs and Diesenhau (1969) investigated the effects of examination stress on scores on the STAI scales of undergraduate students at the University of Illinois (Chicago). The STAI test was administered during a regular class period at the beginning of the summer term (nonstress condition) and subsequently readministered immediately prior to the final examination (stress condition). The mean A-State score in the stress condition (40.87) was significantly higher than in the nonstress condition (38.98). There was also a small, but significant decrease in A-Trait scores which the authors interpreted as a general tendency for subjects to obtain lower scores on repeated administrations of personality tests (Windle, 1954). In more recent studies, it has been found that repeated administrations of a personality test lead either to greater reliability in differentiating among subjects (Howard & Diesenhau, 1965) or have no significant influence on test scores (Bendig & Bruder, 1962).

To examine the effects of the order of administration on STAI scores, Sachs and Diesenhau (1969) gave the A-State and A-Trait scales twice, in a counter-balanced order, during two regular class periods near the beginning of the term. For both the A-Trait and A-State scales, the mean scores obtained in each administration of the STAI were approximately the same, irrespective of whether the A-State scale was given first or second.

Gorsuch (1969) gave the STAI A-Trait scale to Vanderbilt University undergraduates enrolled in a personality course during a regular class period near the beginning of the term, and then readministered the scale to most of these same students one month later. During this month, the STAI A-State scale was given three times each week at the beginning of a class period. Gorsuch found that students who showed an increase in A-Trait during the month had significantly higher average state anxiety levels during the fourth week than they reported during the first week of the study.

While increases in trait anxiety were preceded by a period of time in which there were substantial increases in A-State, higher levels of A-State did not necessarily lead to increases in A-Trait. Increases in A-Trait scores seemed to depend upon whether elevations in A-State were determined primarily by external factors or resulted from psychodynamic conflicts or interpersonal stresses (Gorsuch, 1969).

In summary, the STAI test provides a useful and versatile instrument for the measurement of state and trait anxiety, and its content, concurrent and construct validity compare favorably with other published tests of anxiety, i.e., IPAT Anxiety Scale, Taylor Manifest Anxiety Scale. The test-retest reliability of the STAI A-Trait scale is relatively high, but stability coefficients for the STAI A-State scale tend to be low, as would be expected for a measure designed to be influenced by situational factors.

Both the A-Trait and A-State scales have a high degree of internal consistency (Spielberger et al., 1970).

Coopersmith Self-Esteem Inventory

Self-esteem is a set of attitudes and beliefs that persons bring with themselves when facing the world. In psychological terms, it provides a mental set that prepares the individual to respond according to expectations of success, acceptance, and personal strength. Self-esteem is a personal judgment of worthiness expressed in the attitudes a person holds toward the self (Coopersmith, 1984).

Attitudes toward the self, like other orientations and dispositions, may be either conscious or unconscious. It is presumed that they are like other attitudes in that they carry positive and negative affective connotations and are intertwined with intellectual and motivational processes. Thus a person need not be aware of one's attitudes toward the self, but they will nonetheless be expressed in the person's voice, posture, gestures, and performance (Coopersmith, 1984).

The SEI (Adult Form) is used with people sixteen years and older. It consists of 25 items adapted from the School Short Form so the language and situations are appropriate for adults. The correlation of total scores on the School Short Form and the Adult Form exceeds .80 for three samples of high school and college students (N=647) (Coopersmith, 1984). The School Short Form was developed to provide an alternative to the fifty-item School Form when time

limitations make it impractical to administer that form. The School Short Form was developed based on an item analysis of the School Form and includes the twenty-five School Form items that showed the highest item-total score correlations. The total score correlation of the School Form with the School Short Form is .86 (Coopersmith, 1967). The SEI may be administered to groups or individuals and takes approximately ten minutes to complete.

The original School Form was administered to 1,748 children attending the public schools of central Connecticut. The distribution of scores obtained from this sample was skewed in the direction of high self-esteem. Test-retest reliability after a three-year interval with a sample of 56 children from this population was .70 (Coopersmith, 1984).

Spatz and Johnston (1973) administered the School Form to over 600 students in grades 5, 9, and 12 in a rural school district. From each grade, 100 inventories were selected, and Kuder-Richardson reliability estimates (K-R 20s) were calculated. Obtained coefficients were .81 for grade 5, .86 for grade 9, and .80 for grade 12. The coefficients indicate adequate internal consistency for students in all three grades.

In a pretest-posttest comparison, Drummond, McIntire, and Ryan (1977) administered the SEI School Form to 591 children in grades 2 through 12 (six-month interval). Significant correlations were found for all grade levels and

both sexes for the General Self subscale and Total Self scores, confirming temporal stability of the SEI.

In other studies, Fullerton (1972) reported a coefficient of .64 for 104 children in grades 5 and 6 who were tested twelve months apart. Test-retest reliability for the SEI was originally reported by Coopersmith (1967) to be .88 for a sample of 50 fifth grade children (five-week interval) and .70 for a sample of 56 children (three-year interval).

Data are insufficient for the Short Form, but reliability coefficients would probably be somewhat lower because of the shorter length. In one study of 103 college students, Bedeian, Geagud, and Zmud (1977) reported K-R 20s of .74 for males and .71 for females. In the same study, the test-retest reliability coefficients obtained were .80 for males and .82 for females.

In summary, the SEI provides a useful and versatile instrument for the measurement of self-esteem. The correlation of total scores on the School Short Form and the Adult Form exceeds .80 for three samples of high school and college students (N=647) (Coopersmith, 1984). The test has a high degree of internal consistency and temporal stability. The test-retest reliability is also quite high.

Procedures

Two investigators conducted a research study involving the Women's Cross-Country Team from the University of Wisconsin-La Crosse during a six-week period. Both

investigators examined changes in the anxiety, self-esteem, and performance levels of the subjects over time. This investigator assessed the effects of relaxation techniques and her colleague assessed the effects of mental imagery techniques on these parameters.

During the first three weeks, all of the subjects remained as one large group to establish standardization so they could serve as their own control group. During this time, an educational lecture was presented each week which covered the topics of nutrition, injury prevention, and conditioning philosophy. The STAI and SEI tests were administered before and after the three-week series of lectures to all of the subjects and the results were compiled.

Two days later, a one-and-a-half hour seminar was given to the subjects by both investigators to introduce them to what was going to be happening over the next three weeks. During this time, the subjects were familiarized with stress, how it relates to running, and how to cope with or decrease it.

Each individual was randomly assigned to either the relaxation or the mental imagery group. An exception to this was made for three of the subjects who had had previous professional exposure to relaxation and mental imagery. These subjects were put in the mental imagery group so their individual capabilities would not be hindered. During the next three weeks, the individuals in each group were

taught the specific techniques by the respective investigator.

The following components of the relaxation process were covered by this investigator:

1. The individual must set aside a specific time and place to facilitate the relaxation process. She must let it happen naturally and follow the specific structured technique without goal orientation.
2. One must assume a comfortable position with as much support as possible and not cross the arms or legs. The eyes should be allowed to close at this time.
3. The individual should breathe normally and observe the breathing cycle passively.
4. The individual should disregard the inhalations and not think about them at all.
5. The individual should focus attention on the exhalation phase of the breathing cycle.
6. The individual should feel and experience key sensations as exhalation occurs. The sensations one may notice are sinking down, slowing down, heaviness, and an overall letting go or feeling of relaxation. To enhance the relaxation effect, one must synchronize the key feelings with the exhalation phase.
7. The individual should remain in the relaxed state for several minutes and when one is ready to end

the relaxation a deep breath should be taken as one flexes, stretches, and opens the eyes (Curtis & Detert, 1985).

Four relaxation techniques were introduced to the group by this investigator during the three-week period. They were: (1) the exhalation exercise, (2) the sequential relaxation exercise, (3) the sensory awareness exercise, and (4) the body scan technique.

Exhalation Exercise

The exhalation exercise focuses on the exhalation phase of the breathing cycle. The exhalation phase is the built-in mechanism that everyone has for relaxation. The exhalation phase is the foundation for many other relaxation exercises besides this one. Key sensations should be felt and experienced as the individual exhales. The sensations are sinking down, slowing down, and an overall letting go or feeling of relaxation (Curtis & Detert, 1981).

Sequential Relaxation Exercise

The sequential relaxation exercise uses the exhalation phase of the breathing cycle to allow specific body parts to relax. When the sensation of relaxation develops in a body part, attention will be moved to another body part until that one is relaxed. This is continued until total body relaxation is achieved (Curtis & Detert, 1985).

Sensory Awareness Exercise

The sensory awareness exercise is designed to help one become more consciously aware of sensory perceptions and

sensations that exist within the body. As an individual tunes in to and develops a more heightened awareness of the body and permits it to set its own pace, a feeling of relaxation and slowing down will occur. Again the individual should focus on the exhalation phase of the breathing cycle (Curtis & Detert, 1985).

Body Scan Technique

The body scan technique uses the exhalation phase as the individual's cue to allow the body to relax. A body search for tension or movement is performed beginning at the head and moving downward. Then while focusing on a body segment or muscle group, the individual exhales and allows any tension to flow outward. This procedure is carried out until the whole body is in a relaxed state (Curtis & Detert, 1981).

The subjects were required to practice their relaxation techniques three times per day; namely, (1) in the morning after rising, (2) in the afternoon with the investigator, and (3) before retiring at night. If the subjects were unable to meet this requirement, they were to practice the techniques at least once daily and preferably this was to be with the investigator. This investigator met with the subjects five days per week for 20 minutes prior to the cross-country practice sessions. Twice during the experimental period meets interfered with these practice sessions. Thus, the subjects were instructed to practice the techniques on their own. A short discussion period, led by the

investigator was conducted after each relaxation session. This was done to process each technique and get feedback from the subjects so changes could be made if necessary. This investigator had an assistant to cover any relaxation practice sessions she could not attend. This investigator worked with the assistant so that the individual understood what was to be covered and how to correctly lead the techniques in her absence.

The cross-country team ran 1000 and 2000 meter experimental trials which were timed by the coach during a practice session in mid-September and late October. This was done to establish physical performance changes during the season. However, the subjects in the relaxation group failed to complete all of the trials. Thus, physical performance changes in this group were based on their running times in the various meets throughout the season and the coach's subjective assessment.

After completion of the three-week training session, post-experimental STAI and SEI tests were given to the relaxation and mental imagery groups. Some of the subjects took the tests within a few days after completion of the training session and others took them up to approximately three to four weeks later. This discrepancy was due to the fact that the cross-country season was over for some of the subjects who had not qualified for post-season competition and it was difficult to locate them to take the tests as our daily meetings with them were over. The results were then

compared between the two experimental groups and within the relaxation group itself.

Statistical Treatment of Data

A two-way analysis of variance (ANOVA) with repeated measures was utilized to analyze the data of this study. The Scheffe post-hoc test was used to determine significant differences in the relaxation group over time when a significant F ratio was obtained. The entire female cross-country team served as their own control. The level of significance was set at the .05 level.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to determine the effects of relaxation techniques on the reduction of anxiety levels and the improvement of self-esteem and performance levels of female intercollegiate cross-country runners over a six-week period. A colleague of this investigator conducted a similar study assessing the effects of mental imagery techniques on the same three parameters. During the first three weeks, the entire team remained as one large group to establish standardization so they could serve as their own control group. The team was then randomly divided into a relaxation group and a mental imagery group. The State-Trait Anxiety Inventory (STAI) and the Coopersmith Self-Esteem Inventory (SEI) were administered before and after the three-week standardization series of lectures and then again after the three-week experimental period. The original sample size for this investigator's part of the study was 20, but 7 subjects had to be dropped from the final statistical analysis because these individuals had not completed all of the testing requirements. The statistical treatment utilized in this study was a two-way analysis of variance (ANOVA) with repeated measures. Comparisons were made between the relaxation and mental imagery groups. The

relaxation group was also compared with itself. The significance of the change over time within the relaxation group was analyzed using the Scheffe post-hoc test. The .05 level of significance was chosen to accept or reject the null hypothesis.

This chapter presents and analyzes the data collected during this study. These findings are then discussed relative to their statistical significance and importance to the outcome of the study.

Group and Within Group Comparisons

Individual cell means and standard deviations for both the mental imagery and relaxation groups on the State T-test are given in Table 1. As can be seen from the table, the means of the mental imagery group are higher than those of the relaxation group except in the case of test three. The means of the mental imagery group decrease over time which indicates a reduction in state anxiety.

Table 1

Means and Standard Deviations for Mental Imagery
and Relaxation Groups on State T-Test

	Mental Imagery		Relaxation	
	Mean	S. D.	Mean	S. D.
Test 1	60.54	8.87	54.46	8.67
Test 2	54.15	8.63	48.92	12.35
Test 3	53.31	10.44	54.46	8.87

The data in Table 2 indicates that there was a significant difference over time within the relaxation group on the State T-test where $F=3.86$ and $p<0.03$. No significance was found between the two research groups ($F=1.37$ and $p<0.25$). When scores from the relaxation group were subjected to a post-hoc Scheffe test, no significant differences were found between any of the three tests.

Individual cell means and standard deviations for both the mental imagery and relaxation groups on the Trait T-test are given in Table 3. The data indicates that the means of the mental imagery group are higher than those of the relaxation group. The means of both groups decrease over time which indicates a reduction in trait anxiety.

Table 2
Analysis of Variance of State T-Test by Group
and by Test

Source	Sum of Squares	d. f.	Mean Squares	F	Tail Probability
Mean	230047.38	1	230047.38	1415.47	0.00
Group	223.38	1	223.38	1.37	0.25
Error	3900.56	24	162.52		
R	469.00	2	234.50	3.86	0.03*
RG	203.15	2	101.58	1.67	0.20
Error	2918.51	48	60.80		

* Significant at .05 level
F_{.05} for 2 and 48 d. f.=3.23

Table 3

Means and Standard Deviations for Mental Imagery
and Relaxation Groups on Trait T-Test

	Mental Imagery		Relaxation	
	Mean	S. D.	Mean	S. D.
Test 1	58.00	5.69	55.54	8.09
Test 2	57.85	6.68	54.15	8.14
Test 3	53.15	7.63	51.15	9.63

The data on Table 4 shows that there was a significant difference over time in the relaxation group on the Trait T-test as represented by $F=11.04$ and $p<0.00$, but not between the two groups with $F=.95$ and $p<0.34$. The Scheffe post-hoc test showed significance between test 1 and test 3 in the relaxation group which gives further verification of a reduction in trait anxiety over time.

Table 4

Analysis of Variance of Trait T-Test by
Group and by Test

Source	Sum of Squares	d. f.	Mean Squares	F	Tail Probability
Mean	235730.05	1	235730.05	1560.88	0.00
Group	144.05	1	144.05	0.95	0.34
Error	3624.56	24	151.02		
R	317.95	2	158.97	11.04	0.00*
RG	9.95	2	4.97	0.35	0.71
Error	691.44	48	14.40		

* Significant at .05 level
 $F_{.05}$ for 2 and 48 d. f.=3.23

Table 5 indicates the means and standard deviations for both the mental imagery and relaxation groups on the State percent rankings. As can be seen from the table, the means of the mental imagery group are higher than those of the relaxation group except in the case of test three which was also seen on the State T-test results in Table 1. The means of the mental imagery group decrease over time which indicates a reduction in state anxiety.

Table 6 indicates that there was a significant change over time in the relaxation group on the State percentile ranks shown by $F=3.71$ and $p<0.03$. There was no significant difference between the groups ($F=1.32$; $p<0.26$). When the scores were subjected to a post-hoc Scheffe test no significant differences were found between any of the three tests.

Table 5

Means and Standard Deviations for Mental Imagery
and Relaxation Groups on State Percentile Ranks

	Mental Imagery		Relaxation	
	Mean	S. D.	Mean	S. D.
Test 1	77.77	21.36	62.69	24.32
Test 2	60.85	23.01	44.85	34.93
Test 3	60.31	32.36	64.38	25.77

Individual cell means and standard deviations for both the mental imagery and relaxation groups on the Trait percentile ranks are given in Table 7. The table indicates

that the means of the mental imagery group are higher than those of the relaxation group. There is a reduction in trait anxiety in both groups as evidenced by the decrease in means over time.

Table 6

Analysis of Variance of State Percentile Ranks
by Group and by Test

Source	Sum of Squares	d. f.	Mean Squares	F	Tail Probability
Mean	297974.88	1	297974.88	249.94	0.00
Group	1579.50	1	1579.50	1.32	0.26
Error	28612.62	24	1192.19		
R	3940.23	2	1970.12	3.71	0.03*
RG	1670.08	2	835.04	1.57	0.22
Error	25493.69	48	531.12		

* Significant at .05 level
F_{.05} for 2 and 48 d. f.=3.23

Table 7

Means and Standard Deviations for Mental Imagery
and Relaxation Groups on Trait Percentile Ranks

	Mental Imagery		Relaxation	
	Mean	S. D.	Mean	S. D.
Test 1	75.77	15.08	67.31	24.75
Test 2	74.69	15.40	63.85	24.69
Test 3	60.38	23.94	53.85	31.03

There was a significant difference over time in the relaxation group in the Trait percentile ranks as indicated

on Table 8 ($F=9.26$; $p<0.00$). However, no significant differences were found between the groups ($F=1.14$; $p<0.30$). A post-hoc Scheffe test showed a significant difference between test 1 and test 3 which gives further verification of a reduction in trait anxiety over time.

Table 8
Analysis of Variance of Trait Percentile Ranks
by Group and by Test

Source	Sum of Squares	d. f.	Mean Squares	F	Tail Probability
Mean	339504.05	1	339504.05	266.60	0.00
Group	1447.38	1	1447.38	1.14	0.30
Error	30562.56	24	1273.44		
R	3127.72	2	1563.86	9.26	0.00*
RG	60.54	2	30.27	0.18	0.84
Error	8103.74	48	168.83		

* Significant at .05 level
F_{.05} for 2 and 48 d. f.=3.23

Table 9 indicates the individual means and standard deviations for both the mental imagery and relaxation groups on the State raw score. The means of the mental imagery group are higher than those of the relaxation group except in the case of test 3 which was also seen on Tables 1 and 4. The means of the mental imagery group decrease over time which indicates a reduction in state anxiety.

The data on Table 10 indicates that there was no significant change over time on the State raw scores of the

relaxation group ($F=2.55$; $p<0.09$). There was also no significant difference between the two research groups ($F=0.93$; $p<0.34$).

Table 9

Means and Standard Deviations for Mental Imagery and Relaxation Groups on State Raw Score

	Mental Imagery		Relaxation	
	Mean	S. D.	Mean	S. D.
Test 1	45.85	11.33	38.92	10.26
Test 2	38.54	10.93	35.62	14.22
Test 3	38.46	10.79	38.62	8.42

Table 10

Analysis of Variance of State Raw Score by Group and by Test

Source	Sum of Squares	d. f.	Mean Squares	F	Tail Probability
Mean	120674.67	1	120674.67	554.21	0.00
Group	203.54	1	203.54	0.93	0.34
Error	5225.79	24	217.74		
R	390.87	2	195.44	2.55	0.09
RG	163.69	2	81.85	1.07	0.35
Error	3683.44	48	76.74		

$F_{.05}$ for 2 and 48 d. f.=3.23

Individual cell means and standard deviations for both the mental imagery and relaxation groups on the Trait raw score are given in Table 11. As can be seen from the table, the means of the mental imagery group are higher than those

of the relaxation group. The data indicates a reduction in Trait anxiety in both groups as evidenced by the decrease in the means over time.

There was a significant change over time in the relaxation group in the Trait raw scores as indicated on Table 12 where $F=11.89$ and $p<0.00$. When the scores were subjected to a post-hoc Scheffe test a significant difference was shown between test 1 and test 3 which gives further verification of a reduction in trait anxiety over time. The data also shows that there was no significant difference between the two research groups ($F=0.55$; $p<0.47$).

Table 11

Means and Standard Deviations for Mental Imagery and Relaxation Groups on Trait Raw Scores

	Mental Imagery		Relaxation	
	Mean	S. D.	Mean	S. D.
Test 1	44.85	6.67	42.92	8.19
Test 2	45.08	8.26	41.85	8.77
Test 3	40.46	7.50	39.08	8.36

Table 13 indicates the means and standard deviations for both the mental imagery and relaxation groups on the SEI raw scores. As can be seen from the table, the scores increase over time in both groups which indicates an increase in self-esteem. The greatest increase in the SEI score from test 1 to test 3 was exhibited by the mental imagery group (8.31) compared to 3.69 for the relaxation

group. The relaxation group showed the largest increase from test 2 to test 3 (3.08) compared to 1.23 for the mental imagery group.

Table 12
Analysis of Variance of Trait Raw Scores by
Group and by Test

Source	Sum of Squares	d. f.	Mean Squares	F	Tail Proba- bility
Mean	140038.78	1	140038.78	828.31	0.00
Group	92.63	1	92.63	0.55	0.47
Error	4057.59	24	169.07		
R	266.49	2	133.24	11.89	0.00*
RG	11.72	2	5.86	0.52	0.60
Error	537.79	48	11.20		

* Significant at .05 level
F._{.05} for 2 and 48 d. f.=3.23

Table 13
Means and Standard Deviations for Mental Imagery
and Relaxation Groups on SEI Raw Scores

	Mental Imagery		Relaxation	
	Mean	S. D.	Mean	S. D.
Test 1	69.23	26.15	72.62	10.94
Test 2	76.31	19.76	73.23	14.73
Test 3	77.54	17.78	76.31	10.89

The data on Table 14 indicates that there was no significant change over time on the SEI raw scores of the relaxation group ($F=1.82$; $p<0.17$). The scores increased

over time from test 1 to test 3, but the change was not significant. There was also no significant difference between the two experimental groups ($F=0.00$; $p<0.96$).

Table 14

Analysis of Variance of SEI Raw Scores
by Group and by Test

Source	Sum of Squares	d. f.	Mean Squares	F	Tail Probability
Mean	429499.28	1	429499.28	651.74	0.00
Group	1.85	1	1.85	0.00	0.96
Error	15816.21	24	659.01		
R	480.41	2	240.21	1.82	0.17
RG	144.00	2	72.00	0.55	0.58
Error	6330.26	48	131.88		

$F_{.05}$ for 2 and 48 d. f.=3.23

Discussion

The purpose of this study was to determine the effects of relaxation techniques on the reduction of anxiety levels and the improvement of self-esteem and performance levels of female intercollegiate cross-country runners. A colleague of this investigator conducted a similar study assessing the effects of mental imagery techniques on the same three parameters. The null hypothesis was rejected in regard to the state and trait anxiety levels of the subjects in the relaxation group, but not the self-esteem levels ($p<.05$).

The data on Tables 3, 7, and 11 show a decrease in the means of the relaxation group over time which indicates a decrease in trait anxiety. Tables 4, 8, and 12 also indicate a significant change in trait anxiety over time. When the scores in the latter three previously mentioned tables were subjected to a post-hoc Scheffe test a significant difference ($F > 6.46$) was consistently found between test 1 and test 3. This clearly indicates that the relaxation techniques decreased trait anxiety over the course of the study period.

The relaxation group showed a significant change over time in state anxiety as indicated by the data in Tables 2 and 6. However, when a post-hoc Scheffe test was run on these scores no significant differences ($F < 6.46$) were found between any of the three tests. This resulted because the test score range from test 1 to test 2, test 2 to test 3, and test 1 to test 3 was not great enough to indicate significance. One possible explanation for this may be the conservative nature of the post-hoc Scheffe test in indicating significant differences. A second possible explanation for why this occurred is that the subjects in the relaxation group took the STAI tests three different times under nonstressful conditions. This latter explanation is supported by Sachs and Diesenhau (1969) who showed that mean A-State scores obtained in a stress condition were significantly higher than those in a nonstress condition. There was also no significant change in the

State raw scores in the relaxation group as shown in Table 10.

The fact that the relaxation techniques were more effective in reducing trait anxiety than state anxiety has certain implications for long term effects in stress control. By decreasing an individual's general level of anxiety which is a personality trait, one's reaction to some perceived threat will most likely be more appropriate (Curtis & Detert, 1981; Cratty, 1984). Therefore, it is important for individuals to learn how to cope with stress in a positive manner because stress is a normal occurrence in everyday life (Jencks, 1977; Curtis & Detert, 1981).

The means of the mental imagery group decreased over time in regard to state anxiety as shown by the data in Tables 1, 5, and 9 which indicates a reduction in state anxiety. However, the corresponding means did not decrease accordingly in the same pattern in the relaxation group.

The means of the mental imagery group were generally higher than those of the relaxation group which indicates that the mental imagery group had higher self-esteem and anxiety levels when compared with the relaxation group. Exceptions to this were with test 3 of the State T-test, test 3 of the State percentile ranking, test 3 of the State raw score, and test 1 of the SEI raw score.

There was statistically no significant difference ($p > .05$) between the two experimental groups in the anxiety levels of the subjects as a result of the treatment which is

shown by the data in Tables 2, 4, 6, 8, 10, and 12. As mentioned previously, the relaxation group had a significant change ($p < .05$) over time in both state and trait anxiety. Therefore, one can conclude that both the relaxation and mental imagery techniques were equally effective in reducing the state and trait anxiety levels of the subjects.

The relaxation group showed no significant change over time in self-esteem levels as shown by the data on Table 14. There was also no significant difference ($p > .05$) between the two experimental groups. Table 13 shows an increase in the self-esteem scores of both groups from test 1 to test 3. This indicates that both relaxation and mental imagery techniques are equally effective in having a nonsignificant positive correlation with the self-esteem levels of this female intercollegiate cross-country team. Further discussion of this information can be found in the inferences section of Chapter 5.

Summary

The purpose of this study was to determine the effects of relaxation techniques on the reduction of anxiety levels and the improvement of self-esteem and performance levels of female intercollegiate cross-country runners. A colleague of this investigator conducted a similar study assessing the effects of mental imagery techniques on the same three parameters. During the first three weeks, the entire team

remained as one large group to establish standardization so they could serve as their own control group. The team was then randomly divided into a relaxation group and a mental imagery group. The STAI and SEI tests were administered before and after the three-week standardization series of lectures and then again after the three-week experimental period. The sample size used in the statistical analysis of each group was thirteen. The statistical treatment utilized to determine if there was a significant difference between the two experimental groups and with the relaxation group itself was a two-way analysis of variance (ANOVA) with repeated measures. The significance of the change over time within the relaxation group was analyzed using the Scheffe post-hoc test.

The results of this study rejected the null hypothesis in regard to the anxiety levels of the subjects in the relaxation group. Both the state and trait anxiety levels decreased significantly ($p < .05$) over time. When a post-hoc Scheffe test was run on the data a significant difference ($F > 6.46$) was consistently found between test 1 and test 3 in regard to trait anxiety. On the other hand, when the post-hoc Scheffe test was run on the state anxiety scores no significant differences ($F < 6.46$) were found between any of the three tests. This resulted because the test score range from test 1 to test 2, test 2 to test 3, and test 1 to test 3 was not great enough to indicate significance. This could be due to the conservative nature of the post-hoc

Scheffe test or the fact that the three STAI tests were administered under nonstressful conditions. The fact that the relaxation techniques were more effective in reducing trait anxiety than state anxiety has certain implications for long term effects in stress control.

There was statistically no significant difference ($p > .05$) between the two experimental groups in the anxiety levels of the subjects as a result of the treatment which is shown by the data in Tables 2, 4, 6, 8, 10, and 12. As mentioned previously, the relaxation group had a significant change ($p < .05$) over time in both state and trait anxiety. Therefore, one can conclude that both relaxation and mental imagery techniques were equally effective in reducing the state and trait anxiety levels of the subjects.

The null hypothesis was not rejected in regard to the self-esteem levels of the subjects. Even though the SEI raw scores increased over time from test 1 to test 3 the change was not significant ($p > .05$). In addition, statistically there was no significant difference between the two experimental groups as a result of the treatment. This indicates that both relaxation and mental imagery techniques are equally effective in having a nonsignificant positive correlation with the self-esteem levels of this sample of female intercollegiate cross-country runners.

A statistical assessment of the effects of relaxation techniques on physical performance was not made due to the low compliance rate. Therefore, the null hypothesis was

not rejected in regard to this parameter. Based on their running times in competition, 8 of the 13 subjects used in the statistical analysis improved in physical performance throughout the season. On the other hand, 10 of the 13 subjects in the mental imagery group performed the 1000 and 2000 meter experimental trials during practice in mid-September and late October to establish physical performance changes during the season. A significant change ($p < .05$) was found in regard to the physical performance of these individuals. A direct comparison was not made between the two experimental groups in regard to physical performance changes because of the low compliance rate of the relaxation group. Further discussion of this information can be found in the inferences section of Chapter 5.

Compliance in the relaxation and mental imagery groups was based on 195 contact sessions with the investigators during the three-week experimental period. Five of the 13 subjects used in the statistical analysis in the relaxation group had 75 contact sessions with the investigator. Therefore, the total compliance rate for the investigator administered sessions was 39%. The remaining eight subjects had a total of 58 documented self-administered contact sessions.

The reduced compliance rate of the relaxation group was due to a number of conflicting circumstances (i.e., coaching needs, team unity needs, class schedules, injury problems). There was a direct relationship between the low compliance rate of the relaxation group and the lower average means of

the test scores throughout the study compared with the mental imagery group. This is indicated by the data in Tables 1, 3, 5, 7, 9, and 11. After randomly dividing the subjects into the two experimental groups, the relaxation group was composed primarily of freshmen and sophomores. In contrast, the mental imagery group was composed primarily of upper classmen and had a total compliance rate for the investigator administered sessions of 84%. The relaxation and mental imagery groups were compared with each other in the statistical analysis. There were no significant differences ($p > .05$) between the two groups in the anxiety and self-esteem levels of the subjects as a result of the treatment. Therefore, even though the compliance rate of the relaxation group was lower, the relaxation techniques were just as valid as the mental imagery techniques in having positive effects on the anxiety and self-esteem levels of the subjects.

This study has shown that anxiety levels can be decreased through relaxation techniques. This finding reinforces previous research conducted in this area (Ziegler, 1980; Garfield, 1984). However, further studies need to be conducted which look more closely at the exact role relaxation techniques play in enhancing the physical performance of athletes through the control of negative emotions such as fear and anxiety. This information can then be applied in other aspects of the athletes' lives to control stressors they are faced with daily.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

The purpose of this study was to determine the effects of relaxation techniques on the reduction of anxiety levels and the improvement of self-esteem and performance levels of female intercollegiate cross-country runners. A colleague of this investigator conducted a similar study assessing the effects of mental imagery techniques on the same three parameters. During the first three weeks, the team remained as one large group with the subjects serving as their own control group. The team was then randomly divided into a relaxation group and a mental imagery group for separate group comparisons and group within group analysis. This investigator dealt only with the relaxation group. The STAI and SEI tests were administered before and after the three-week series of lectures to establish standardization and then again after the three-week experimental period to assess change over time. The original sample size for this investigator's part of the study was 20, but only 13 completed all of the testing requirements. The statistical treatment utilized to determine if there was a significant difference between the two groups and with the

relaxation group itself was a two-way analysis of variance (ANOVA) with repeated measures. The significance of the change over time within the relaxation group was analyzed using the Scheffe post-hoc test. The level of significance was set at $p=.05$. The null hypothesis was rejected in regard to the anxiety levels of the subjects, but not the self-esteem or physical performance levels. In addition, statistically there was no significant difference between the relaxation and mental imagery groups as a result of the treatment.

Conclusions

Based on the limitations of this study and the statistical interpretation, the following conclusions were drawn:

1. There was a significant difference ($p<.05$) in the state and trait anxiety levels of the female cross-country team at the University of Wisconsin-La Crosse as a result of the relaxation techniques.
2. The relaxation techniques were more effective in reducing trait than state anxiety which was based on the results of the post-hoc Scheffe test.
3. There was no significant difference ($p>.05$) between the two experimental groups in reducing the state and trait anxiety levels or increasing the self-esteem levels of the subjects.
4. The use of relaxation techniques caused no significant change ($p>.05$) in the self-esteem levels of

this sample of female intercollegiate cross-country runners.

Inferences

On the basis of the data obtained from this study, the following inferences were made:

1. The self-esteem scores increased over time in the relaxation group from test 1 to test 3. However, this change was not significant ($p=.17$). This would seem to indicate that the relaxation techniques had a nonsignificant positive effect on the self-esteem levels of the subjects.
2. Eight of the 13 subjects used in the statistical analysis improved in physical performance based on their running times in competition. However, no statistical assessment was made in regard to this parameter in the relaxation group due to the low compliance rate. It was shown that the mental imagery group had a significant change ($p<.05$) in regard to the physical performance levels of the subjects. Therefore, since there was statistically no significant difference between the two experimental groups in regard to the treatment, it would seem to indicate that there was a strong positive correlation between the relaxation techniques and the performance levels of the subjects.

Recommendations

The following recommendations are made for future studies:

1. It is recommended that a similar study be conducted using a men's cross-country team to assess differences between sexes in regard to anxiety, self-esteem, and performance levels using relaxation techniques.
2. It is recommended that the psychological tests be given immediately prior to and after the athletic event to assess changes in anxiety and self-esteem levels associated with competition.
3. It is recommended that additional tools be utilized to assess the self-esteem and state-trait anxiety levels of the subjects.
4. It is recommended that a study be conducted using a combination of relaxation and mental imagery techniques in acquiring and retaining certain athletic motor skills, i.e., kicking field goals, shooting free throws.
5. It is recommended that a similar study be done with the head coach of the cross-country team leading the relaxation techniques to assess changes in compliance, anxiety, self-esteem, and performance levels rather than using investigators outside the coaching staff.

6. It is recommended that a similar study be conducted using larger sample sizes and having only one-third of the subjects take the STAI and SEI tests at the three different times.

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APPENDIX A

SUBJECT CONSENT FORM

...will serve as their own
...will have a minimum
...of 100% efficiency...

...the team will be...
...will be...
...will be...

...the team will be...
...will be...

...this experiment
...which consists of
...of the relaxation and/or

...of the nature of
...of the nature of
...of the nature of

INFORMED CONSENT

EFFECTS OF MENTAL IMAGERY AND RELAXATION
ON ANXIETY, SELF-ESTEEM, AND PERFORMANCE LEVELS
OF FEMALE CROSS-COUNTRY RUNNERS

I, _____ volunteer to participate in the training enhancement, relaxation, and mental imagery series of lectures.

The entire cross country team will serve as their own control group. This will consist of a three-week educational lecture series so that everyone will have a baseline reference for physiological training principles.

For the following three weeks, the team will be randomly assigned to one of two groups and will learn the relaxation/mental imagery techniques. There are no risks involved with learning these techniques. However, anyone taking psychologically altering drugs are recommended not to do so during the length of this study.

The study will involve the administration of two pre- and post-psychological inventories. The two tests are the State-Trait Anxiety Inventory (STAI) and the Coopersmith Self-Esteem Inventory (SEI).

I understand that my participation in this experiment requires a very active involvement. This includes self-responsibility for keeping a daily journal which consists of recording the frequency and effects of the relaxation and/or mental imagery practice.

I have read the above statements and any questions which may have occurred to me have been fully answered to my satisfaction. I have been fully advised of the nature of the procedure and possible risks which I hereby assume voluntarily.

I hereby acknowledge that no representations, warranties, guarantees, or assurances of any kind pertaining to the procedures have been made to me by the University of Wisconsin-La Crosse, the officers, administrators, employees, or by anyone acting on behalf of any of them.

Signed: _____ Date: _____

Witness: _____ Date: _____

APPENDIX B

STATE-TRAIT ANXIETY INVENTORY (STAI)

SELF-EVALUATION QUESTIONNAIRE

Developed by C. D. Spielberger, R. L. Gorsuch and R. Lushene

STAI FORM X-1

NAME: _____ DATE: _____

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 am regretful | 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 rested | ① | ② | ③ | ④ |
| 9. I feel anxious | 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 "high strung" | 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 over-excited and "rattled" | ① | ② | ③ | ④ |
| 19. I feel joyful | ① | ② | ③ | ④ |
| 20. I feel pleasant | ① | ② | ③ | ④ |

SELF-EVALUATION QUESTIONNAIRE

STAI FORM X-2

NAME _____

DATE _____

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 *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.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	①	②	③	④
22. I tire quickly	①	②	③	④
23. I feel like crying	①	②	③	④
24. I wish I could be as happy as others seem to be	①	②	③	④
25. I am losing out on things because I can't make up my mind soon enough	①	②	③	④
26. I feel rested	①	②	③	④
27. I am "calm, cool, and collected"	①	②	③	④
28. I feel that difficulties are piling up so that I cannot overcome them	①	②	③	④
29. I worry too much over something that really doesn't matter	①	②	③	④
30. I am happy	①	②	③	④
31. I am inclined to take things hard	①	②	③	④
32. I lack self-confidence	①	②	③	④
33. I feel secure	①	②	③	④
34. I try to avoid facing a crisis or difficulty	①	②	③	④
35. I feel blue	①	②	③	④
36. I am content	①	②	③	④
37. Some unimportant thought runs through my mind and bothers me	①	②	③	④
38. I take disappointments so keenly that I can't put them out of my mind	①	②	③	④
39. I am a steady person	①	②	③	④
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	①	②	③	④

APPENDIX C

COOPERSMITH SELF-ESTEEM INVENTORY (SEI)

ADULT FORM

SEI

Coopersmith Inventory

Stanley Coopersmith, Ph.D.
University of California at Davis

Please Print

Name _____ Age _____

Institution _____ Sex: M _____ F _____

Occupation _____ Date _____

Directions

On the other side of this form, you will find a list of statements about feelings. If a statement describes how you usually feel, put an X in the column "Like Me." If a statement does not describe how you usually feel, put an X in the column "Unlike Me." There are no right or wrong answers. Begin at the top of the page and mark all 25 statements.

	x4=	
--	-----	--

 Consulting Psychologists Press, Inc.
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Like
Me

Unlike
Me

- | | | |
|--------------------------|--------------------------|---|
| ☐ | ☐ | 1. Things usually don't bother me. |
| ☐ | ☐ | 2. I find it very hard to talk in front of a group. |
| ☐ | ☐ | 3. There are lots of things about myself I'd change if I could. |
| ☐ | ☐ | 4. I can make up my mind without too much trouble. |
| ☐ | ☐ | 5. I'm a lot of fun to be with. |
| ☐ | ☐ | 6. I get upset easily at home. |
| ☐ | ☐ | 7. It takes me a long time to get used to anything new. |
| ☐ | ☐ | 8. I'm popular with persons my own age. |
| ☐ | ☐ | 9. My family usually considers my feelings. |
| ☐ | ☐ | 10. I give in very easily. |
| ☐ | ☐ | 11. My family expects too much of me. |
| ☐ | ☐ | 12. It's pretty tough to be me. |
| ☐ | ☐ | 13. Things are all mixed up in my life. |
| ☐ | ☐ | 14. People usually follow my ideas. |
| ☐ | ☐ | 15. I have a low opinion of myself. |
| ☐ | ☐ | 16. There are many times when I would like to leave home. |
| ☐ | ☐ | 17. I often feel upset with my work. |
| ☐ | ☐ | 18. I'm not as nice looking as most people. |
| ☐ | ☐ | 19. If I have something to say, I usually say it. |
| ☐ | ☐ | 20. My family understands me. |
| ☐ | ☐ | 21. Most people are better liked than I am. |
| ☐ | ☐ | 22. I usually feel as if my family is pushing me. |
| ☐ | ☐ | 23. I often get discouraged with what I am doing. |
| ☐ | ☐ | 24. I often wish I were someone else. |
| ☐ | ☐ | 25. I can't be depended on. |