The Effect of Aerobic Training and Weight Training on the Cardiorespiratory Fitness, Body Cathexis, and Self-Concept of College Females

John Stuart Irvine
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THE EFFECT OF AEROBIC TRAINING AND WEIGHT TRAINING
ON THE CARDIORESPIRATORY FITNESS,
BODY CATHEXIS, AND SELF-CONCEPT OF
COLLEGE FEMALES

by

John Stuart Irvine

A Dissertation
Submitted to the
Faculty of The Graduate College
In partial fulfillment of the
requirements for the
Degree of Doctor of Education
Department of Counseling and Personnel

Western Michigan University
Kalamazoo, Michigan
December 1984

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The Effect of Aerobic Training and Weight Training on the Cardiorespiratory Fitness, Body Cathexis, and Self-Concept of College Females

John S. Irvine, Ed.D.
Western Michigan University, 1984

The present study investigated the effects of two differing exercise programs, aerobic training and weight training, upon the body cathexis, global self-concept, and cardiorespiratory fitness of college females. The subjects were undergraduate non-intercollegiate athletes who self-selected into four different physical education classes that served as the two experimental and one control group. The subjects in the aerobics exercise group engaged in rope jumping, aerobic dance, and jogging for 50 minutes, twice per week, for 14 weeks. The weight training experimental group utilized free weights and variable resistance strength training equipment during the 14-week, twice weekly, 50-minute sessions. The control group consisted of students enrolled in archery and golf classes that met for the same frequency and duration as the two experimental groups. All subjects were tested before and after the training programs with the Tennessee Self-Concept Scale and the Secord Jourard...
Body Cathexis Scale. In addition, the cardiorespiratory fitness level of the subjects in the two experimental groups was assessed with the Cooper 12-minute run.

The following hypotheses were stated: 1) both experimental groups (weight training and aerobic training) would demonstrate significant (.05) increases in global self-concept and body cathexis, 2) the control group would not demonstrate any changes on these two psychological measures, 3) only the aerobic group would demonstrate increased cardiorespiratory fitness, and 4) that a significant (.05) relationship would exist between subjects' scores on the Tennessee Self-Concept Scale and the Secord Jourard Body Cathexis Scale.

The research design employed was a non-equivalent control group design with self-selected groups. The pre-test data and pre-post differences on all variables were analyzed with the t-test for mean differences. The Pearson product moment correlation was utilized to assess the self-concept/body cathexis relationship.

As hypothesized, significant improvements in cardiorespiratory fitness levels were found for the aerobic training group, however, no significant improvements in self-concept or body cathexis were found for any of the groups. A significant (.05)
relationship was found between subjects' scores on the Secord Jourard Body Cathexis Scale and the Tennessee Self-Concept Scale. It was suggested that mere participation in physical training programs is inadequate to produce significant psychological benefits. Further research was called for before definitive conclusions about the psychological effects of differing forms of exercise can be made.
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Western Michigan University

University Microfilms International

300 N. Zeeb Road, Ann Arbor, MI 48106
ACKNOWLEDGEMENTS

I would like to express my gratitude to those who have assisted and supported me with this dissertation and throughout my doctoral program. I am especially grateful to Dr. Robert Hopkins who has guided me through the entire program, to Dr. Beverly Belson for her support and expert editing and Dr. Norman Peterson for his advise and comments. My thanks also extend to Dr. Robert Brashear for his friendly consultations, to the staff of the Physical Education department and Counseling and Testing Center at Tulane University. Karen Schreifels, who also struggled with me in assembling the manuscript also deserves my sincerest thanks.

My family and friends also receive my gratitude for their continual support and encouragement and my wife, Jill, deserves the greatest thanks of all. Her understanding, tolerance, and love have enabled me to start, persist, and complete this project.

John Stuart Irvine
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CHAPTER I

THE PROBLEM

Introduction

The relationship between the mind and the body has been a topic of controversy for thousands of years. Hippocrates, the Greek physician of the 4th century B.C., taught that the individual should be treated as a whole, that the mind and body need to work cooperatively. The Romans held similar beliefs "Mens sana in corpore sano" or "a healthy mind goes with a healthy body" (Kostrubala, 1976). Descarte, a philosopher in the 17th century, has been a powerful influence on the modern western practice of medicine. His philosophy, Cartesian Dualism, separates the mind from the body and diagnoses problems as either medical or psychological, distinctly separating the two. This philosophy views individuals' bodies as biological machines separate from any experience of the mind and ignores the complex interactions and interworkings. William James, in 1899, countered the Dualistic stance by advocating that well-conditioned bodies and well-conditioned minds are coequals. In spite of advocates
such as James, the separation of the mind from the body has continued in many facets of psychology and medicine.

In the last several decades, the importance of the mind-body interaction has been underlined by a number of events. In the 1950's, Hans Selye's (1976) conceptualized stress as a non-specific physiological response to any event, whether the event is physical trauma or emotional frustration, tightly associated mental perceptions and physiological states. Biofeedback technology has also provided graphic illustrations of the bonds between mind and body. Elmer Green of the Menninger Clinic and a leader in biofeedback research wrote, "Every change in the physiological state is accompanied by an appropriate change in the mental-emotional state, conscious or unconscious, and conversely, every change in the mental-emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state" (Green, 1976, p. 6). Eastern philosophy and meditation practices have also come under increased study and interest. In the 1930's investigators studied Indian yogis' voluntary control processes that had been previously thought to be involuntary, such as brain waves and cardiac rate and
rhythm.

The mind-body interaction has also been demonstrated by epidemiologists who have linked a number of modern illnesses with our lifestyles and behaviors. Friedman and Rosenman (1974) have identified a complex of emotional reactions which they designated the Type A behavior pattern which they believe is a major cause of premature coronary heart disease. Changes in society have led to increased sedentary behavior and this lack of physical activity has been identified as a risk factor in coronary heart disease, the number one cause of death in this country (Paffenberger, Hale, Brand, and Hyde, 1977). The prescriptive use of exercise has become a standard component in cardiac rehabilitation, and it is not unusual to see groups of former cardiac disease patients participating in aerobic exercise events including the 26.2 mile marathon.

This recognition of the mind-body connection and the importance of exercise to a person's well-being have not gone unnoticed by the general public. In 1961, a Gallup poll revealed that 24 percent of adults over the age of 18 were exercising, but by 1977 that number had doubled. A Harris poll in 1978 found that of the 37 percent of adults who reported exercising

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regularly 65 percent had initiated their program in the last two years. This increased interest in physical activity and fitness is also indicated by the sales figures of a company that manufactures and sells women's running shorts. Six years ago the company sold 5800 pairs in a year, but recently sold 225,000 pairs in the same length of time. Another demonstration of the fitness boom is that Dr. Kenneth Cooper's book on aerobic conditioning, Aerobics, first printed in 1968, is now well beyond its thirtieth printing. The popularity of running and jogging, as measured by the number of participants in the thousands of local races and fun runs, seems to have reached a high point by 1980 and has maintained the same high levels of participation since then (Fixx, 1983).

Part of this increase of interest may be attributable to the well studied and publicized health benefits of exercise. These benefits include the reduction of triglyceride levels, improved heart and circulatory efficiency, reduced blood pressure in hypertensives, lowered body fat, improved lung capacity, and enhanced digestive functioning (Ardell, 1980).

In addition to the physiological benefits of exercise there have been many claims of enhanced
psychological well-being. Even in *Aerobics*, first edition, Senator William Proxmire is quoted as saying that "such a fitness program makes lives more vital, alert, efficient, and yes, happy" (p. viii). This opinion is shared by millions of committed exercisers who state that they feel better because they exercise. During the past decade there has been considerable research investigating such claims and a vast majority of this research exploring the exercise/psychological well-being relationship has focused solely on aerobic exercise. Aerobic exercise (such as running, cycling, and swimming) is that exercise which involves repetitive movements of large muscle groups which stresses, but does not exceed, the oxygen processing capabilities of the cardiovascular system (Cooper, 1968a). Aerobic means "with oxygen". This study will investigate the relationship between aerobic exercise and psychological variables, as well as the relationship between another form of exercise, weight training, and the same psychological measures.

Researchers have found a significant relationship between vigorous physical training programs such as running and jogging and enhanced psychological well-being as measured by mood or self-esteem scores (Brown, Ramirez, & Taub, 1978) (Morgan, 1968) (Tillman, 1965)
Physiological and psychological hypotheses have been presented to account for the observed changes in psychological functioning. Physiological explanations include: altered neurotransmitter levels (Stein & Belliza, 1981), increased oxygenation of brain tissues (Powell, 1975), reduced musculature feedback to the central nervous system (Folkins, Lynch, & Gardner, 1972) alterations of muscular neuronal activity (Brown, 1976), and increased adrenal activity (Michael, 1957). Psychological explanations include: a greater sense of mastery (Griest, Klein, Eischens, Faris, Gurman, & Morgan, 1976), distraction from anxiety producing cognitions (Bahrke & Morgan, 1978), greater resistance to stress (Dill, 1960), increases in perceived fitness (Heaps, 1978), and enhanced body image (Winnick, 1979).

While these reports have provided new information about exercise and psychological interactions, little light has been shed on what aspects of these exercise programs are responsible for any observed changes. It is not known which of the many hypotheses presented is an actual cause of psychological changes. Which hypothesis is most appropriate may be dependent upon the type of exercise program employed. Differing
exercise routines have different effects upon physiological variables. Aerobic exercise, such as running, results in increased aerobic capacity of the cardiovascular system while weight training results in improvements in muscle tone and strength. These different exercise programs may affect the psychological variables differently as well. Nearly 90 percent of the reviewed research in the exercise/well-being area has focused on aerobic exercise, but exercise is multifaceted and aerobic exercise is only one part of a larger whole. Much of the research on aerobic exercise has failed to actually ascertain if a true physical conditioning effect has occurred thereby making it difficult to conclude that changes in aerobic conditioning are responsible for altered psychological well-being.

Differing classification schemes of exercise have been proposed (Golding & Bos, 1967) (Nixon & Jewett, 1980) (McNamara, 1978), usually differentiating between flexibility, muscular strength, muscular endurance, and cardiovascular of aerobic fitness. Tucker (1982a) has studied strength training in college males and found significant improvements in self-concept. Trujillo (1983) found similar improvements with female weight trainers. Hypotheses explaining
these changes included: 1) weight training significantly alters body composition, and 2) provides rapid feedback of gains in muscular strength and functioning (Tucker, 1982b).

While research in the area of exercise and psychological functioning has grown tremendously in the past decade much remains to be done. Blumenthal (1982) has called for additional research to clarify what processes are responsible for beneficial effects reported from aerobic exercise. Karper (1981) has called for research delineating how differing fitness programs affect psychological well-being and Weinstein and Meyers (1983) recognize a need for more investigation of what processes of physical training lead to changes.

In this study an examination will be made of both aerobic and weight training exercise programs and their impact on measures of self-concept and body cathexis and a measure of aerobic conditioning. Such research should increase the understanding of the processes responsible for such changes.

Limitations

The study will have certain limitations:

1. The university students utilized as
subjects are required to enroll in physical education courses. The particular type of physical education classes that students enroll in and their scheduling is left to personal choice. Therefore, group members self-select into the two treatment and one control group.

2. There is no control over the subjects' exercise or other behaviors outside of the actual fitness classes. It may be assumed that similar variables would be affecting both the experimental and control groups since all groups are in similar environments.

3. Each subject within their group was taught the same information and led through similar activities, yet intensity of performance could not be strictly controlled, due to individual differences.

4. Cardiovascular fitness levels for the control group are not obtainable.

5. The number of subjects in each group is limited due to low female enrollments in weight training programs.
6. The measure of self-concept, the Tennessee Self-Concept Scale, may not be sufficiently sensitive to detect psychological changes that result from the exercise programs.

7. Results will be directly applicable to college females only.

Significance of the Study

The history of conflict and the recent resurgence of interest in the mind-body relationship points to the need for further study in this area. Numerous significant but unsubstantiated claims have been made about the positive side effects and how certain forms of exercise influence psychological functioning. One psychological problem, where exercise has been advocated as an appropriate treatment, is depression. Depression is the most commonly seen psychiatric disorder in large scale populations and any intervention that can reduce this difficult problem demands examination. Anxiety and stress reduction through exercise has also been studied and the results suggest exercise to be an effective tool without the undesirable side effects of other interventions such as tranquilizers. According to Pitts (1969) "30 to 70
percent of all patients currently being treated by physicians in general practice are suffering from conditions which have their origins in unrelieved stress" (p. 148). Insomnia currently affects an estimated 30 million Americans (Pelletier, 1977) and some initial evidence suggests that exercise may assist in effectively reducing this problem.

Any behavior or activity that may influence self-concept can hardly be overestimated in importance to the individual and their society. Fitts (1972) states "I have visualized the issue of self-concept change as so central to all of our society. To me, this is the real issue underlying many others that plague us, crime and delinquency, mental illness, social conflict, alcoholism, drug abuse, marital misery, and many other people related problems" (p. 28) Each of these issues that Fitts refers to is a national priority and the prospect that such a simple intervention such as exercise could effect self-concept is tremendous. This possible impact demands that considerable research into this relationship of exercise and self-concept be conducted. Even a small change in self-concept, when multiplied by the vast numbers of individuals such programs could reach, might produce major gains in well-being for the society as a whole.
The physiological benefits of exercise have been well documented and on that basis alone it would appear to be in society's interest to encourage, reward, and facilitate such health enhancing behavior. To effectively maximize both these physiological and psychological benefits requires a knowledge of exactly what the effects are and what elements of the exercise processes and programs are responsible for any alterations.

Americans, as individuals and corporations alike, are investing large sums of time, money, and energy into exercise programs and are finding these programs valuable in reducing health problems and related costs. Any intervention that may enhance and expand these known benefits merits further evaluation.

Purpose of the Study

This study is intended to increase the knowledge of the exercise processes and benefits by comparing the effects of two different exercise programs on the same psychological dependent variables. Aerobic programs have been known to produce significant alterations in aerobic conditioning while weight training programs have minimal impact on this same physiological measure (Gettman & Pollack, 1981). Weight training programs
may, however, provide greater feedback concerning body image and greater changes in body composition (Tucker, 1983a), resulting in a significant and positive change in body cathexis and self-concept. A comparison of these programs that have different effects on physiological characteristics will provide new information concerning what aspects of exercise may or may not be responsible for psychological alterations.

The purpose of this study is to examine 1) aerobic fitness programs, 2) weight training programs, 3) the relationship between these programs and aerobic capacity, body cathexis, and global self-concept. The population to be studied will consist of college females who are not active in intercollegiate athletics. The study will examine three parallel questions:

1. What is the effect of a 14-week aerobic conditioning program on the aerobic capacity, body cathexis, and global self-concept of college females.

2. What is the effect of a 14-week weight training program on the aerobic capacity, body cathexis, and global self-concept of college females.

3. What is the effect of a 14-week non-
aerobic, non-strength training physical education class on the aerobic capacity, body cathexis, and global self-concept of college females.

Summary

The area of mind-body interaction has always generated controversy but lacks an adequate research base. One area where the mind-body interaction is central is the relationship between exercise and psychological well-being. This interaction has gained considerable attention in the past decade, but there remains little that is known about the processes of exercise that leads to enhanced psychological functioning that occurs for some individuals under certain circumstances. This study will examine two different forms of exercise and assess the outcome on one physiological and two psychological measures.
CHAPTER II

REVIEW OF THE LITERATURE

Fitness and Psychological Differences

Much of the research in the 1960's and 1970's in the area of exercise and psychological well-being was survey or correlational. These studies frequently compared groups of fit or athletic individuals with unfit and sedentary populations. The findings were that fit groups were lower in neuroticism, lower in anxiety, and higher in self-concept (Albinson, 1974) (Behrman, 1967) (Jette, 1971).

Another area of research interest was the relationship between physical fitness and personality traits. Ismail and Trachtman (1973) found alterations in self-sufficiency, stability, and imagination when middle aged men initiated a regular exercise program. Young and Ismail (1973) found that high fit individuals were more intellectually inclined, emotionally stable, composed, self-confident, easy going, relaxed, less ambitious, and unconventional, than low fit individuals. Buccola and Stone (1973) found that aged men (60-79) who voluntarily participated in a 14-week...
walking-jogging program showed greater self-sufficiency as measured by the 16 Personality Factors tests at the conclusion of the program. Also using the 16 PF, Ismail and Young (1973) found that physical fitness was associated with emotional stability and composure, extraversion, group dependency, and unpretentiousness and with relative youthfulness and unconventionality.

While these studies provided a link between fitness training and psychological well-being, no support of cause and effect relationships were provided nor was direction of effect investigated. In the past decade research in this exercise-psychology arena has become more experimental and more sophisticated, yet has come under criticism for its shortcomings. A comprehensive review of the literature by Folkins and Sime (1981) concluded that most research conducted in this area has been 1) poor in design, mostly being one group pre-post; 2) that the research has focused on clinical populations or children; and 3) that the few studies have included measures of aerobic fitness to verify the actual physiological alterations.

Aerobic Exercise and Psychological Well-Being

A vast majority of studies in the area of exercise and psychological health have focused on aerobic
exercise. Materials reviewed within this research reveal a 7 to 1 ratio of studies dealing with aerobic exercise compared to other forms of exercise. The term "aerobic" has become almost synonymous with fitness, and Folkins and Simé (1981) labeled aerobic as the best indicator of fitness. Additionally, there is agreement that aerobic exercise has the greatest beneficial impact on psychological well-being (Cooper, 1968). Aerobic exercise is that which results in increased oxygen processing capability of the cardiovascular system through a more powerful heart, more efficient lungs, and a good vascular system (Thomas, 1981).

To produce such physiological adaptations one must exercise at an intensity of 75 percent of maximal heart rate for a period of 20-30 minutes three times per week. An approximation of one's maximum heart rate can be obtained by subtracting years of age from 220. Pulse monitoring is frequently employed in exercise groups to ensure that this target heart rate is met but not exceeded. Running, swimming, cycling, cross country skiing, vigorous dancing and walking are often cited as means of attaining the necessary work load to result in the aerobic conditioning effect. The form of exercise or activity one participates in does not determine whether an activity is truly aerobic; for a
conditioning effect to take place what is important is that the cardiovascular system be stressed as described above.

Folkins and Sime (1981) believe that the research to date shows that sedentary (inactive) groups exposed to aerobic fitness training programs derive cognitive benefits of increased intellectual functioning and enhanced body image. In another review of the literature, Karper (1981) states that "aerobic exercise appears to have a positive effect on numerous elements of psychological makeup" (p. 68).

Aerobic Training and Depression

One aspect of psychological functioning where some of the most productive research has focused has been in the area of mood states. Individuals who regularly participate in exercise routines report that such activities make them feel better (Morgan, 1968) (Brunner, 1969) (Morgan, 1970). Sharp and Reilley (1976) studied 65 college males who participated in a twice weekly aerobic conditioning class and found that changes in aerobic conditioning as measured by Cooper's 12-minute run were significantly negatively related to the depression scale of the MMPI. Lobstein (1983) and Kavanaugh (1977) have also found lower depression
scales on the MMPI in joggers when compared to sedentary individuals. Brown, Ramirez, and Taub (1978) investigated the effects of running, an aerobic activity, on the Zung depression scale scores of depressed and non-depressed students. The results showed significant reductions in depression scores for both the depressed exercisers and non-depressed exercise group when compared to the no exercise controls. These reductions in Zung scale scores were evident for the subjects who jogged five days per week as well as those who jogged only three days per week.

Kavanaugh (1977), in a study of ex-myocardial infarction patients who were extremely depressed, found significant improvement on the MMPI depression scale following a regular running program.

Greist, Klein, Eischens, Faris, Gurman, and Morgan (1979) conducted a pilot study of running as a treatment for depression in which they compared the effects of time limited psychotherapy, time unlimited psychotherapy, and running treatment, on depression. They stated "the running treatment was as effective in alleviating depressive symptoms and target complaints as either the time limited or time unlimited psychotherapy treatments." A related study (Margolis, 1982) which compared group cognitive therapy and group
cognitive therapy plus exercise as a treatment for mild to severe levels of depression found both methods equally effective.

While a considerable amount of research is highly supportive of aerobic activity impacting moods, specifically depression, a number of questions and reservations remain. How much running or other aerobic activity is necessary to effect changes, what frequency, duration, and intensity is required to maintain changes, does a cessation of running result in a reoccurrence of depressive symptoms, and is it fitness or perceived fitness that facilitates improvements? Weinstein and Meyers (1983), in a review of the running/depression literature, state that "definitive conclusions regarding the antidepressant properties of running are currently unwarranted" (p. 288).

Aerobic Training and Anxiety

Change in anxiety levels in college students was one factor studied by Folkins, Lynch, and Gardner (1972). Following a semester long jogging course, significant improvements in anxiety and depression, as measured by the Multiple Affective Adjective Checklist, were found in the female students but not the males. Blumenthal, Williams, Needels, and Wallace (1982)
assessed the effect of a 10-week aerobic fitness program on adults and their moods, including anxiety levels. Levels of both state and trait anxiety decreased for the exercise group, whereas the control group's scores actually increased.

Bahrke and Morgan (1978) investigated the effects of aerobic exercise (walking on a treadmill at 70 percent of maximal heart rate), relaxation training, and quiet rest, on the Spielberger Scale of State Anxiety. In each of these three conditions significant reductions in anxiety occurred.

The effect of induced stress on conditioned versus non-conditioned subjects was investigated by McGlynn, Franklin, Lauro, and McGlynn (1983) who found that the conditioned group responded with much lower levels of arousal. The conditioning program was a 14-week aerobic training program that resulted in decreased blood pressure, muscle tension, and levels of state and trait anxiety.

Jones and Weinhouse (1979) utilized a pre-post study to assess the effect of a structured running program consisting of running 45 minutes, three times per week at 75 percent of maximum cardiac output. After the year-long program subjects demonstrated improved cardiovascular efficiency and were more
relaxed and feeling-oriented as measured by the 16 PF. These results led to their conclusion that running should be utilized as a significant psychological therapeutic modality. Among the investigators who have found vigorous exercise to reduce anxiety have been Popejoy (1967), Young (1979), Karbe (1966), Hanson & Neede (1974), and Morgan and Roberts (1970).

Exercise and Self-Concept

The effect of exercise, particularly aerobic exercise, on global self-concept has also received considerable literature attention. Positive self-concept has been considered by many to be an essential component of psychological well-being and adjustment (Rosenberg, 1979) (Coopersmith, 1967). Rosenberg defines self-concept as the "totality of the individual's thoughts and feelings with reference to himself as an object" (p. 57), and Wylie (1961) considers self-concept a term denoting the set of cognitions one has towards the self.

The self-concept includes all that individuals know about themselves including the physical self, abilities, interests, social traits and behaviors, material possessions, family, vocational, and avocational pursuits, among others. Fitts (1965)
agrees with Wylie and other theorists and states self-concept to be "the individual's concept of himself", "how an individual perceives himself" and "his own picture of himself" (p. 1).

It must be remembered that the self-concept is an abstraction and is only a perception of one's self and may or may not match a more objective standard of reality. These perceptions or views of one's self are important because of their significant impact upon behavior. Benjamin (1950) stated that the individual tends to behave in a manner subjectively consistent with their concept of self. Combs and Snygg (1959) agreed and believe that an individual's thinking and behavior are largely determined by their self-concept and therefore "the self-perceptions we possess have a tremendous role in determining every behavior" (p. 122). Rogers (1959) further states that "behavior is consistent with the self-structure" (p. 198). Jourard (1964) also believed that individuals limit their behavior according to the definitions of the self-concept.

The importance of the self-concept is thus difficult to overestimate. Rosenberg (1963) states that "some clinicians go so far as to characterize low self-esteem as one of the basic elements of neurosis"
Gregory (1966) stated "modern psychologists are agreed that the self-concept is the foundation for the entire personality" (p. 53) and believes self-concept to be at the core of what a person does and does not do. Because of the centrality of the self-concept to human behavior any activity or intervention that enhances self-concept is of great significance and merits investigation.

Folkins and Sime (1981) in their review of physical fitness training and mental health concluded that "in contrast to other personality dimensions that have been studied, self-concept appears to be affected by physical fitness changes" (p. 381).

Rothfarb (1970) studied the relationship between self-concept as measured by the Tennessee Self-Concept Scale and exercise behavior of college males and found that exercisers had significantly higher (positive) scores than non-exercisers. Smith (1982) also studied whether individuals who engage in regular exercise differ from non-exercisers in terms of level of self-concept. No differences were found. Collingwood (1971), in a study of obese teenagers enrolled in a three-week primarily aerobic fitness program, found significant increases in self-concept and self-acceptance. The fitness program included jogging,
callisthenics, and swimming and subjects were required to increase repetitions and distances covered each week. The teenagers were coached and exhorted each day to exceed the previous day's record. McNamara (1978) employed three different methods of physical activity and assessed subjects' self-image before and after a 10-week training program. All three groups showed the subjects' self-image had improved by the time the program was completed. White (1973), in another study, investigated the effect of a 10-week fitness training program on self-concept and concluded that Tennessee Self-Concept scores could be significantly enhanced. Similarly, Jones (1983) found self-concept scores increased following a 12-week aerobic program for adults. Jones also found significant positive changes in the oxygen processing capabilities and decreases in percentage of body fat in these subjects. Aerobic dance and self-concept relationships were investigated by Eickhoff, Thorland, and Angorge (1983) who found that improvements in self-concept appeared to be limited to those who are at low fitness levels prior to engaging in a regular program of aerobic dance at a moderate intensity.

Teng (1982) also studied the effect of participation in a seven-week aerobic dance program on
low self-esteem women, low physical-self women, high self-esteem women, and women with a history of regular exercise. Only the low physical-self women demonstrated increased self-esteem following completion of the program.

Two different studies have investigated the effects of combining fitness training with counseling to enhance self-esteem. Neal (1977) studied ninth grade boys in four treatment groups: (1) cardiovascular fitness, (2) counseling, (3) cardiovascular fitness and counseling, and (4) the control group. Following the ten-week program the fitness and counseling group showed the greatest improvement in cardiovascular fitness but none of the programs resulted in measured changes in self-esteem using the Coopersmith Self-Esteem Inventory.

Hilger and Mitchell (1979) randomly assigned students to one of three groups: (1) control, (2) running, and (3) running with counseling. The Tennessee Self-Concept Scale and Cooper's 12-minute walk/run were administered before and after the 10-week program. Both running groups received the same treatment, met three times per week for one hour per session, and were encouraged to increase their performances each day. The running plus counseling
group met for one additional hour per week and was designed to give each subject individual attention regarding any difficulties they might experience, to disseminate factual information about short and long term benefits of running, to set and reinforce goals, and to provide support and encouragement in an accepting environment. Subject data was separated into high and low self-concept groups and one-way analysis of variance was used to test differences in means of gain scores on the pre and post test administrations of the Tennessee Self-Concept Scale for the different groups.

Analysis of the data revealed that both running and running plus counseling groups, high self-concept and low self-concept demonstrated significant improvements in levels of fitness. The low self-concept subjects in both experimental groups also showed considerable gains in self-concept, with the running plus counseling groups exhibiting the greatest changes. As with Eickhoff, Thorland, and Ansorge's research, low self-concept individuals appear to demonstrate the greatest self-concept gains. The support, information, reinforcement, and feedback of the counseling group may have contributed to the greater self-concept score increases by the counseling plus
running group. The authors felt that any increases in self-concept scores for the high self-concept groups may have been obscured by possible ceiling effects of the Tennessee Self-Concept Scale.

Trujillo (1983) found that a 16-week running program resulted in significant increases in self-concept as measured by the total positive score of the Tennessee Self-Concept Scale using a matched pair t test on gain scores. An analysis of covariance found gain scores between runners and controls to be non-significant. Other research that has shown positive alterations in self-concept from aerobic programs include studies by Folkins (1972), McGowan (1974), Martineck (1978), and Kowal (1978). Bruya (1977) and Mauser and Reynolds (1977) found no significant alterations of self-concept in their studies.

While a majority of studies dealing with physical fitness training and measures of global self-concept disclose results that are positive, there are indeed many exceptions which limit statements about this relationship and raise questions that require further examination.

Aerobic Exercise and Body Image

In the literature on self-concept theory there has
been an ongoing controversy as to whether self-concept should be viewed globally or broken into component parts for further study. Gergen (1971) believes that the assumption of a global concept of self is misleading, and recent research in the self-concept and exercise area has begun to focus on more specific aspects of the self-concept. The use of specific scales of self-concept has been strongly recommended as a means of examining the exercise-self-concept interaction (Sonstroem, 1982). One aspect of the self-concept that would logically be expected to be modified through exercise is body image; how one perceives one's own body. Wylie (1961) believes that "a person's body characteristics as he perceives them might exert a central influence on the development of his self-concept" and that "self-concept theorists agree on the general idea that body characteristics that are lowly valued by S may be expected to undermine his general self-regard, while highly valued body characteristics should enhance self-regard" (p. 159). Even Freud stated that "ego is first and foremost, a body ego" (Schwab and Harling, 1968).

This relationship between self-concept and body image has been documented by Zion (1965) who, in a study of 200 women, found a significant degree of
correlation between five body scales and the Index of Adjustment and Values. Zion believed "that the
suitability one has in one's body is related to the
suitability with which one faces the world" (p. 494).

Secord and Jourard (1953) developed a self
cathexis scale and a body cathexis scale which measures
these two attitudes towards the self and found a .58
correlation between them for males and a .66
correlation for females, demonstrating that feelings
about the body are commensurate with feelings about the
self. Rosen and Ross (1968) confirmed these results
and further refined the use of the scale. They
presented evidence that Secord and Jourard's
correlations between self and body cathexis were indeed
real and not simply due to response set.

Genskow (1967) found self-esteem to be positively
related to body concepts for both disabled and non-
disabled groups while Fisher and Cleveland (1958) noted
that a person's perceptions of his body exert a strong
influence on his behavior. Mendelson (1982) examined
this same relationship in normal weight and overweight
males and females between the ages of 8 and 17 and
found significant self-concept/body concept
correlations at all ages. She also found relative
weight to be the best predictor of body concept. The
importance of body image to self-concept may be emphasized by today's society which presents the slim and fit body as an important ingredient in social success. Goldberg and Folkins (1974) found significant correlations between body image and anxiety (-.48), depression (-.51), and hostility (-.39).

Tucker (1983a) believes that 25 percent of one's self-concept is due to one's body concept; therefore, changes in body cathexis should have a significant impact on self cathexis.

Various investigators have studied the effects of exercise programs on body image and body cathexis. Frye (1982) found body image significantly enhanced by a running-aerobic and hydro-aerobic program. Collingwood and Willett (1971), in their study of obese teenagers, found subjects' ratings on the Body Attitude Scale significantly increased. Collingwood (1972) expanded this study and investigated the effects of a daily, one-hour, four-week physical fitness program on a group of male rehabilitation clients with behavioral and/or emotional difficulties. The fitness program included aerobics, calisthenics, and agility drills, and subjects were encouraged to increase their performance each day. At the conclusion of the program, subjects showed improvements on the Body...
Attitude Scale as well as enhanced physiological, emotional, and intellectual functioning. Jeffers (1977) also utilized the Body Attitude Scale in investigating the effects of two different physical training programs on university males and females. The male experimental group was involved in a 12-week running and weight training program and the female group was involved in a conditioning program which combined physical, figure control, and nutritional information. Control groups attended instructional class without physical activity. Results of the study revealed that both male and female experimental groups demonstrated significant improvements in body attitude scores.

In 1983 Jones studied the effect of a 12-week aerobic fitness program for adults and employed the Tennessee Self-Concept Scale, which includes a body satisfaction subscale. By the end of the program subjects demonstrated improved aerobic condition, increased total self-concept score and significant changes in the body concept scale scores. White (1973) had found similar results in his investigation of fitness training classes for students in a university.

Using the Secord Jourard Body Cathxis Scale, Epstein (1983) found no significant changes from pre to
post test. Subjects were participants in a 16-week aerobic exercise group.

The preponderance of evidence points to body concepts being modified through fitness training, but what elements of fitness training are responsible for such changes remain obscure. Tucker (1982a) found physical self-concept scale scores of the Tennessee Self-Concept Scale to increase following a weight training program and, in another study, Tucker (1982b) found that as weight training experience increased, body satisfaction, as measured by the Secord Jourard Body Cathexis Scale, increased commensurately. A large majority of studies have investigated aerobic conditioning and psychological well-being, yet fitness is generally defined as being composed of several different components including aerobics, muscle strength, muscular endurance, and flexibility (Golding & Bos, 1967). Weight training has been neglected as a possible factor in enhancing psychological variables and may yield valuable data.

Weight Training

In one study, McNamara (1978) compared the effects of three different fitness training programs (army fitness, calisthenics, and weight training) on college
students and found positive changes in psychological variables, including self-concept, from all three programs. It is interesting to note that while the weight training group exhibited the smallest change in aerobic conditioning, this same group demonstrated the greatest degree of change on the Tennessee Self-Concept Scale total positive score. This suggests that aerobic fitness may not be the variable that is responsible for alterations in self-concept.

Tucker (1982a) utilized a pre-test/post-test control group design to study the effect of a 16-week, two-workout per week weight training program on the Tennessee Self-Concept Scale scores of college males. While at pre-test there were no significant differences between experimental and control groups, at post-test the weight trainers showed significantly higher scores on the total positive scale and four subscales. In a retrospective study Tucker (1982b) found that as subjects reported increasing experience with weight training the more their global self-concept, body image, and extraversion scores increased.

In a later study Tucker (1983b) demonstrated muscular strength to be a significant predictor of global self-esteem, body cathexis, extraversion, and neuroticism in college males.
Trujillo (1983) studied college females engaged in 16-week running and weight training classes and found increases in the total p scale of the Tennessee Self-Concept Scale in both groups compared to controls, but the changes were of statistical significance only for the weight training group. In this study 35 percent (4) of the runners reported feeling better physically and psychologically while 83 percent (11) of the weight training students felt the same way.

Trujillo's research is the only one reviewed that investigated weight training/strength building programs with women. This may be due to the fact that only in the last several years have women perceived such a program as socially appropriate, potentially rewarding, and an available option. Its benefits for women have been stated by Wilmore (1975) who demonstrated 20 to 50 percent increases in strength as a result of a 10-week, three times per week program. There have been many myths and misconceptions about the de-feminizing effects of weight training for females, that weight training builds large masculine looking muscles, that is causes inflexibility and being muscle bound, and muscle turns to flab or fat if you quit weight training; yet Wilmore's study rejected all such ideas. He found that in spite of the large strength increases
noted the size of waist, hips, and buttocks decreased, arm size remained constant, and only chest size increased. All of these alterations in body composition are deemed positive in our prevailing American culture. Unused muscle will lose strength, and eventually atrophy, but cannot turn to fat, and weight training actually increases flexibility (Palmer, 1978).

The reviewed research thus suggests that weight training significantly enhances self-concept. This suggests that the changes in self-concept that are frequently seen in programs of aerobic conditioning may not be due to any alterations of aerobic fitness as is often suggested, since weight training has a minimal effect on the aerobic variable. Gettman and Pollock (1981) reviewed the research on the physiological benefits of weight training and concluded that traditional weight training does not increase cardiovascular fitness, that circuit weight training produces only moderate increases, and that "circuit weight training should not be considered an adequate aerobic program" (p. 49). Circuit weight training refers to a series of weight training exercises of approximately 12 to 15 repetitions each using a moderate amount of weight (40-60 percent of one
repetition maximum) and the individual moves from one station to another with minimal rest (15-20 seconds) between stations. Conventional weight training consists of the application of muscular force to a resistance, constant or variable, through the muscles' range of motion at a very high intensity for few repetitions (6-8). Traditional weight training is anaerobic, of such immediate intensity that the individual goes into oxygen debt, and oxygen demand outstrips supply capability. As indicated previously, a number of researchers have found that alteration of body image does affect self-concept (Secord and Jourard, 1953) (Genskow, 1967) (Rosen and Ross, 1968) (Zion, 1965). While significantly vigorous fitness programs, whether aerobic or strength training, modify body composition and function, weight training yields more easily observable effects (Mathews and Fox, 1976). Aerobic conditioning and weight training both result in a reduction in percent of body fat and weight training results in increases in lean body weight (muscle and bone weight). Gettman and Pollock (1981) state that circuit weight training can be used as a method of body composition control due to these effects. Weight training moves the individual towards a more mesomorphic body type while running, which lacks the
Increases in lean body weight and strength, moves an individual towards a more ectomorphic profile. The mesomorphic body type (lean and muscular) is viewed by our culture more favorably than the thin ectomorph or round endomorph (Tucker, 1983a). Based upon this the individual who engages in weight training as opposed to aerobic exercise may receive more positive environmental feedback and higher self-appraisals, possibly resulting in enhanced self-concept.

Perceived Fitness

The importance of feedback on performance was underlined by Heaps (1978) in a study of 56 male volunteers. Heaps investigated the relationship of perceived and actual levels of fitness to body cathexis and other psychological variables. The student volunteer participants were told that they would receive an objective estimate of their level of physical fitness. The Cooper 12-minute test was utilized due to its ability to provide an accurate estimate of actual aerobic condition. The students estimated their level of fitness and completed a battery of psychological measures including the Bills, Vance, and McLeans Index of Adjustment and Values, the Dominance Scale of the California Psychological
Inventory, the Secord Jourard Body Cathexis Scale, the Taylor Manifest Anxiety Scale, and the Marlowe Crown Social Desirability Scale.

Participants received two types of feedback about their level of fitness; social (from another person), and physical (from physiological data). The social feedback was delivered by a research assistant who completed the running test with each participant and who performed at a much higher or lower level of performance than the subject, depending upon the feedback condition. In the high social feedback condition the researchers "confederate" would act exhausted, run for a shorter distance and tell the subject that he must certainly be in good shape to perform so well. In the low social feedback group the confederate acted tired but not exhausted, ran considerably farther than the subject, and communicated to the subject how out of shape the subject must be.

These two levels of social feedback were combined with two levels of physiological feedback. During the runs each participant was wired to a remote electrocardiograph. In the high physical feedback condition the subject was shown his recorded data following the run and was told that it meant that they were in good shape and that their heart rate and oxygen
consumption were steady and at a good level. In the low physical feedback condition the subjects' data were interpreted in the opposite direction, that the subject was out of shape, and that heart rate and oxygen consumption were unsteady and at a poor level. Participants were randomly assigned to one of four feedback conditions: (a) high social-high physical, (b) high social-low physical, (c) low social-high physical feedback, and (d) low social-low physical feedback.

Each subject was connected to the radio telemetry units, completed the 12-minute run, was given the appropriate levels of feedback, and completed the attitude questionnaires.

The results indicated that subjects' perceptions of their own levels of fitness were predictably influenced by the social and physical feedback provided and that these perceptions of fitness were positively related to feelings of self-acceptance and negatively related to anxiety about one's body. Actual levels of fitness were not related to any of the self-attitudes and feelings. This data suggests that real physical improvement is effective in creating psychological changes only if the information about the actual physical change is effectively communicated and
perceived by the subject. Heaps (1978) concludes that it is not physical improvement that results in improved psychological functioning, rather it is one's perception or interpretations of the improvement that is of importance. Also, people who do maintain psychological benefits from physical exercise do so because of continual feedback about their performance.

According to Lazarus (1975) feedback provides the rewards and punishments that modify our behavior and are partially responsible for our learning. As noted, weight training may be a physical activity that provides greater performance and bodily feedback.

Leonardson (1977), in a study of high school and college students, found that perceived fitness was significantly correlated with self-concept scores. Leonardson and Garguilo (1978) also found a significant correlation between perceived physical fitness and self-concept, while actual physical performance and self-concept were not significantly correlated. This work substantiates Heaps' belief that one's perceptions of physical fitness are more important than actual levels of physical performance in influencing psychological outcomes.

Further support as to the importance of feedback in physical training and the enhancement of
psychological gain come from Hilyer and Mitchell (1979). This study, described under the heading of self-concept, utilized a one-hour counseling group in addition to running as a treatment. One aspect of the counseling hour was the provision of rewards and feedback for exercise behaviors. Results showed that those subjects who received running plus counseling treatment experienced greater gain in self-concept when compared to the running only group, suggesting the effect of feedback in enhancing psychological gain in exercise programs.

Neal (1977) conducted a similar program combining fitness training with counseling. The 10-week program, which utilized the Coopersmith Self-Esteem Inventory and Cooper's 12-minute run as dependent variables, showed that the integrated program was most effective in improving cardiovascular fitness but demonstrated no significant changes in self-esteem from any of the programs.

Summary

Physical fitness has often been found to be beneficial to psychological well-being, yet the mechanism for such effects remains obscure. One area of study which has yielded suggestive data is the
effect of physical training on body image and in turn on self-concept. Weight training, a primarily nonaerobic fitness intervention, has been shown to have positive effects upon males' perceptions of their bodies and upon their self-concept; and one's perception of fitness has been demonstrated to be of critical importance. There has been little research reported in the literature that is concerned with women, weight training, body image, and self-concept. This study is designed to examine this area and to contrast weight training and aerobic training for women on measures of cardiovascular fitness, body image, and self-concept.
CHAPTER III

METHOD

The purpose of this study was to investigate two different forms of fitness training: weight training and aerobic training, and to assess their effect upon the aerobic condition, body concept, and self-concept of college females.

The chapter related to methodology includes a description of the sample, instruments employed, procedures with which the data was collected, the experimental design, and the statistical analyses employed.

Subjects

Subjects for this study will be obtained from physical education classes at Tulane University, where the sample population will be limited to undergraduate female students who are not participants in a university intercollegiate athletic program. Involvement in other physical activities, such as intramurals, will not negate subject participation in the research study. Enrollment in two physical education classes is a core requirement for
undergraduate Tulane students. The particular type of physical education classes that students enroll in and their scheduling is left to personal choice.

The first experimental group will consist of all undergraduate women who enroll in a 14-week aerobic conditioning class. The second experimental population, the weight training group, will consist of all undergraduate women who enroll in a 14-week weight training class.

The control group will consist of all undergraduate women enrolled in 14-week archery or golf class.

Instrumentation

The experimental and the control group subjects will be asked to complete the Counseling Form of the Tennessee Self-Concept Scale (TSCS) (Fitts, 1965) the Second Jourard Body Cathexis Scale (SJBCS) (Secord & Jourard, 1953) during the first week of class. Testing will be done in the classroom by the experimenter, and subjects will be told that the data will be used for research, is confidential, and that the results of testing and of the research would be disclosed to them at the conclusion of the program if they so desire. The subjects will also be required to sign a consent form approved by the Human Subjects
The Cooper 12-minute run will be employed to assess cardiovascular efficiency. This assessment will be conducted on a quarter-mile outdoor track during the first and last weeks of training. Subjects in the two experimental groups will run and/or walk as much distance as they possibly can during a 12-minute time period and the distance recorded. The control group will not be tested on this measure, as course requirements do not demand strenuous physical activity. Folkins, Lynch, and Gardner (1972) also employed archery and golf students as control group members and stated "it would seem unreasonable to request a 1.75-mile run for those persons contracting for archery and golf." (p. 504).

In the Cooper 12-minute run, subjects are instructed to run/walk for a timed 12-minute period covering as much distance as possible. This procedure was devised to test groups of subjects, has been employed frequently in aerobic research, and has a .91 correlation with more sophisticated measures of assessing maximal oxygen uptake (Cooper, 1968). Maximal oxygen uptake is the amount of oxygen a person consumes and is the primary measure of cardiovascular system efficiency. One benefit of this procedure in testing groups of subjects is that it results in
Individuals becoming exhausted in a brief period of time regardless of their level of fitness (Heaps, 1978).

The TSCS, Form C (Fitts, 1965), a 100-item, 5-point Likert-scaled device, will be utilized as a measure of global self concept. This measure has been widely used in the physical fitness/self-concept area (Trujillo, 1983) (Hanson & Nedde, 1974) (Hilyer & Mitchell, 1979).

Fitts (1965) reports test-retest reliability of the TSCS as .92 and established the tests validity by only using those items which seven clinical psychologists agreed were relevant positive or negative measures of self-concept. Construct validity has been demonstrated by finding significant positive correlations between the TSCS and the Minnesota Teacher Attitude Survey, the Minnesota Multiphasic Personality Inventory, the Edwards Personal Preference Schedule, and the 16 Personality Factor Questionaire (Vincent, 1966). Predictive validity has also been demonstrated by the instrument's ability to distinguish types and degrees of psychological disorder (Fitts, 1965). Crites (1972) considers the scale as a valid measure and Suinn (1972) considers the TSCS to rank "among the better measures combining group discrimination with self concept information" (p. 151).
The normative samples for the TSCS are based upon a large cross section of the population and includes individuals from various regions of the country and ages ranging from 12 to 68. It has been found that demographic variables such as sex, age, race, education, and intelligence have a negligible effect on scale scores (Fitts, 1965).

The SJBCS is a 46-item, 5-point Likert-scaled subjective measurement that asks respondents to indicate the degree of satisfaction and dissatisfaction with various bodily parts and processes. The possible responses are:

1. Have strong feelings and wish change could somehow be made.
2. Don't like, but can put up with.
3. Have no particular feelings one way or the other.
5. Consider myself fortunate.

This scale is widely used in body concept research and is considered by Tucker (1982b) "as a stable and consistent instrument" (p. 40). The test-retest reliability is .87 (Tucker, 1982b) and split half reliabilities are reported as .84 (Weinberg, 1960) and as .91 (Jourard & Remy, 1959).
Procedures

Aerobic Training Group

The aerobics experimental group will consist of all female non-intercollegiate athlete students enrolled in a 14-week aerobics physical education class. The class will meet twice per week for 50 minutes per session during which time they will be taught basic principles of aerobic conditioning and cardiovascular functioning. The class will be taught by a masters level physical education instructor who has several years experience teaching this course. The instructor will be assisted by two undergraduate teaching assistants. Participants will engage in a variety of aerobic activities designed to raise the heart rate to target levels (75 percent of maximum) and to maintain that level of intensity for at least 25 minutes per session. Class activities will be preceded by a warm-up period that will involve non-strenuous movements of large muscle groups as well as static stretches. Following the aerobic activities, walking will be used for a gradual cool down. Fifty percent of class time will be spent in aerobic dance and rope jumping to be followed by a minimum of a 3/4-mile jog. Once during the course of the 14-week program, the class will also utilize a two-mile par course that
entails jogging to 14 different exercise stations. In order for a passing grade to be obtained in the course, students cannot be absent from class more than three times. Class grades become a part of the students' cumulative grade point average.

Weight Training Group

The weight training experimental group will consist of all female students (non-intercollegiate athletes) enrolled in a weight training physical education class. Due to the small number of women who sign up for weight training, the women in all three offered sections will be collapsed into one course for experimental purposes. In this way all possible subjects will be utilized. The class will meet twice per week for 50 minutes per session and will be taught by a member of the physical education staff whose expertise is in the area of weight training and strength building and who is also the strength coach for the male and female athletic teams. This individual has taught this class previously but this is the first time the class will have a high proportion of female non-athletes participating. This increase in female participation is due to two reasons. One, the increasing interest in weight training by women, and secondly, by the experimenter collapsing all female
subjects into one section. The 14-week program is designed to provide information about the safe and effective methods of weight training. Subjects will be instructed in the use of free weights, Nautilus variable resistance equipment, and Cam II pneumatic resistance machines. These machines employ mechanical devices such as cams to work the muscle evenly throughout the joints' range of movement. The strength demand is thus constant, whereas with free weights the muscle is exercised at its maximum at only one point within the exercise movement. Subjects who are absent for more than three classes during the 14-week training period will receive a failing grade that becomes a part of their academic record.

During the first two weeks of training the proper use of the equipment will be demonstrated and subjects will receive information regarding muscle groups and functions, principles of muscle and strength training, and the design of a strength program to meet individual needs. The subject will then design and implement their plan pending the approval of the instructor. During the remaining 12 weeks of the course, students will engage in supervised weight training for 45 minutes twice per week. The weight lifted will be that amount that will result in exhaustion after approximately 12 repetitions at each exercise position.
The exact number of repetitions and exercises completed during each session will be ultimately dependent upon the individualized goals developed by the student under supervision of the instructor.

Control Group

The control group will consist of all female non-intercollegiate athletes enrolled in either an archery or a golf physical education class. These two classes have been chosen because they do not enhance aerobic fitness or strength development. These classes, like the two experimental groups, will meet twice per week for 50 minutes and will continue for 14 weeks. Grading will be based upon attendance, skill acquisition, and a final examination, and will be computed in the students' cumulative grade point average.

Experimental Design

The research design to be employed is a non-equivalent control group design with self-selected groups. The student subjects are required to participate in two physical education courses but have control over what type of course they select. Once the groups are formed the experimental group participants are administered both of the psychological dependent
variables and the measure of aerobic condition. The control group also is administered the psychological measures but not the aerobic measure. Subjects then complete the 14-week courses at the conclusion of which they are retested using the same instrument and procedures.

Statistical Analysis

A Pearson product moment correlation will be utilized to identify and assess the relationship between the variable of body concept as measured by the SCBCS, and self-concept as measured by the TSCS, across all subjects.

The t-test for mean differences will be employed to assess any pre-test mean differences between the aerobic experimental group and the control group, between the weight training experimental group and the control group, and between the aerobic experimental and weight training experimental groups. The t-test for mean differences will also be employed to assess the effects of the different physical training programs from pre-test to post-test.

Operational Definitions

Aerobic exercise: Exercise involving prolonged and rhythmic movement of large muscle groups that results
in increased oxygen processing capability of the cardiovascular system.

Cardiovascular fitness: The relative efficiency of the heart, lungs, and blood vessels. The more fit an individual is, the more efficiently that individual can process oxygen. This will be measured with Cooper's (1968) 12-minute run.

Body image: One's view of one's own physical being. To be measured with the Secord Jourard Body Cathexis Scale.

Body cathexis: A subjective measure of the degree of feeling of satisfaction or dissatisfaction with various parts of the body.

Self-concept: One's perception of one's self as measured by the total positive score on the Tennessee Self-Concept Scale.

Weight training: The repeated application of force by muscle groups against a resistance to build strength and muscle tissue.

Operational Hypothesis

1. Aerobic conditioning will result in a significant (.05) alteration of cardiovascular
condition as measured by the Cooper 12-minute run.

II. Weight training will result in no significant
 (.05) improvements in cardiovascular conditioning as
 measured by Cooper's 12-minute run.

III. Aerobic conditioning will result in
 significantly (.05) increased scores of the total
 positive scale of the TSCS.

IV. Weight training will result in significantly
 (.05) increased scores on the total positive scale of
 the TSCS.

V. Aerobic conditioning will result in
 significant (.05) increases on the mean score of the
 SJBCS.

VI. Weight training will result in significant
 (.05) increases on the mean score of the SJBCS.

VII. The control group will show no significant
 (.05) effects on the total positive score of the
 TSCS.

VIII. The control group will show no significant
 (.05) effects on the mean score of the SJBCS.

IX. There will be a significant (.05) positive
 correlation between subjects' scores on the SJBCS
 and the total P score of the TSCS, both pre- and post-
test for all groups.
Summary

Experimental subjects in this study were self-selecting female students enrolled in 14-week aerobic and weight training classes at Tulane University. Control subjects come from female students in golf and archery classes. All subjects were administered the SJBCS and TSCS at pre and post-test and the experimental subjects also completed the Cooper 12-minute run as a measure of cardiovascular fitness. The data collected is to be analyzed with a Pearson product moment correlation to assess the relationship between the variables of body cathexis and global self-concept. Analysis of treatment affects will be accomplished with the $t$-test for mean differences and pre-test group differences will be measured with the analyses of variance.
CHAPTER IV

ANALYSIS AND RESULTS

Analyses

This chapter will examine the statistical analysis of the collected data and will evaluate the validity of this study's hypotheses. Included are analyses of 1) pre-test group differences, 2) treatment effects, and 3) the relationship between subjects' scores on the Tennessee Self-Concept Scale (TSCS) and the Second Jourard Body Cathexis Scale (SJBCS).

Pre-Test Data

The analysis of pre-test data is important for several reasons. Pre-test data provide a baseline with which later data can be compared in order to evaluate treatment effect. Existing pre-test group differences must be known to assess any selection factors affecting post-test scores. This is especially germane in this study as subjects self-selected into treatment groups. Finally the pre-test data will partially determine the representativeness of the sample which will determine the extent to which the results can be generalized.
The control group was not measured on this variable. The mean distance in miles covered during the 12 minutes was 1.07 miles for the weight training experimental group and 1.16 miles for the aerobic experimental group. The .09 mile difference between the two experimental groups was found not to be significant at the .05 level when analyzed with the t-test of mean differences. These results are shown in Table 1.

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<tr>
<td>Aerobic</td>
<td>17</td>
<td>1.16</td>
<td>.12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to Cooper & Cooper (1972) any distance between .95 and 1.14 miles covered is considered poor and distances between 1.15 and 1.34 miles are considered as a fair aerobic condition for females under the age of 30. Individual subject performance ranged from very poor (1.87) to good (1.56).
Secord Jourard Body Cathexis Scale

Pre-test means and standard deviations for the control and experimental groups on the SJBCS are presented in Table 2.

Table 2

Pre-test Means and Standard Deviations for Control and Experimental Groups on the Secord Jourard Body Cathexis Scale

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight Training</td>
<td>12</td>
<td>149.58</td>
<td>23.83</td>
</tr>
<tr>
<td>Aerobic Training</td>
<td>17</td>
<td>154.94</td>
<td>19.17</td>
</tr>
<tr>
<td>Control</td>
<td>15</td>
<td>156.13</td>
<td>15.13</td>
</tr>
</tbody>
</table>

The t-test for mean differences was employed to assess pre-test differences between the experimental and the control groups, and between the two experimental groups. The t-test for these groups on the SJBCS found no significant differences at the .05 level. These results are presented in Table 3.
### Table 3

**t-Test on Pre-Test Scores on the Second Jourard Body Cathexis Scale**

<table>
<thead>
<tr>
<th>Groups</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control vs. Weight Training</td>
<td>.1934</td>
<td>.848</td>
</tr>
<tr>
<td>Control vs. Aerobic Training</td>
<td>1.702</td>
<td>.101</td>
</tr>
<tr>
<td>Weight Training vs. Aerobic Training</td>
<td>1.472</td>
<td>.153</td>
</tr>
</tbody>
</table>

### Tennessee Self-Concept Scale

Pre-test means and measured standard deviations for all experimental and control groups on the TSCS Total Positive score (P) are presented in Table 4.

### Table 4

**Pre-Test Means and Standard Deviations for Control and Experimental Groups on the Tennessee Self Concept Total Positive Scale**

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight Training</td>
<td>12</td>
<td>353.92</td>
<td>34.30</td>
</tr>
<tr>
<td>Aerobic Training</td>
<td>17</td>
<td>346.41</td>
<td>33.77</td>
</tr>
<tr>
<td>Control</td>
<td>15</td>
<td>360.00</td>
<td>36.84</td>
</tr>
</tbody>
</table>

The t-test for mean differences was employed to assess pre-test differences between the experimental and the control groups, and between the two experimental groups. The t-test for these groups on
the TSCS found no significant differences at the .05 level. These results are presented in Table 5.

Table 5

<table>
<thead>
<tr>
<th>Groups</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control vs. Weight Training</td>
<td>1.089</td>
<td>.285</td>
</tr>
<tr>
<td>Control vs. Aerobic Training</td>
<td>.4394</td>
<td>.664</td>
</tr>
<tr>
<td>Weight Training vs. Aerobic Training</td>
<td>.5857</td>
<td>.563</td>
</tr>
</tbody>
</table>

Results

In this section, each of the nine hypotheses are evaluated according to the results of the statistical analyses.

Analysis of Hypotheses

The first hypothesis predicted that the 14-week aerobic conditioning program would result in improvements in subjects’ cardiovascular fitness levels, as measured by Coopers (1968) 12-minute run, that would exceed the .05 level of significance.

Pre-test to post-test differences on the 12-minute run for the aerobic training group were evaluated with the t-test for mean differences. As shown in Table 6,
the observed improvements in cardiovascular function exceed the .05 level of significance.

Table 6

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>17</td>
<td>1.16</td>
<td>.13</td>
<td>2.50</td>
<td>.018</td>
</tr>
<tr>
<td>POST</td>
<td>17</td>
<td>1.29</td>
<td>.18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis I is supported by subjects observed improvements in cardiovascular function over the 14-week training period.

Hypothesis II stated that no changes in aerobic condition would result from a 14-week weight training program. The t-test for mean differences was employed to assess group differences between pre- and post-test scores on the 12-minute run. The results are presented in Table 7, and show no effects significant at the .05 level.
Table 7
† Test Between Pre- and Post-Test
12-Mile Run Times for the Weight Training Group

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>12</td>
<td>1.075</td>
<td>.198</td>
<td>.7765</td>
<td>.446</td>
</tr>
<tr>
<td>POST</td>
<td>12</td>
<td>1.143</td>
<td>.2269</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis II was supported by subjects demonstrating no changes in aerobic condition that were significant at the .05 level as measured by the 12-minute run, following the 14-week weight training program.

Hypothesis III stated that the aerobic training group would demonstrate increases in the total P score of the TSCS. The results of the t-test for mean differences showed no differences at the .05 level of significance, and are presented in Table 8.

Table 8
†-Test Between Pre- and Post-Test Total Positive Scores on the Tennessee Self-Concept Scale for the Aerobic Group

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>17</td>
<td>346.4</td>
<td>33.77</td>
<td>-.2828</td>
<td>.779</td>
</tr>
<tr>
<td>POST</td>
<td>17</td>
<td>343.2</td>
<td>31.70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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The results indicate that Hypothesis III is not supported, there were no changes from pre- to post-test significant at the .05 level on the total P score of the TSCS.

Hypothesis IV stated that the total P scores on the TSCS would be increased at the .05 level of significance following the participation in a 14-week weight training course. The results of the t-test for mean differences showed no changes that were significant at the .05 level. These results are presented in Table 9.

<table>
<thead>
<tr>
<th>Table 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>t-Test Between Pre- and Post-Test Total Positive Scores of the Tennessee Self-Concept Scale for the Weight Training Group</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>PRE</td>
</tr>
<tr>
<td>POST</td>
</tr>
</tbody>
</table>

Hypothesis IV is not supported, as there were no changes between pre- and post-test scores on the total P score of the TSCS for the weight training group at the .05 level of significance.

Hypothesis V stated that participants in a 14-week aerobic training program would show increases on the SJBCS, significant at the .05 level. The t-test for
mean differences revealed no significant improvements. These results are in Table 10.

Table 10
t-Test Between Pre- and Post-Test Scores on the Second Jourard Body Cathexis Scale for the Aerobic Group

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SC</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>17</td>
<td>154.9</td>
<td>19.17</td>
<td>1.937</td>
<td>.062</td>
</tr>
<tr>
<td>POST</td>
<td>17</td>
<td>168.6</td>
<td>22.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The aerobic training group did not demonstrate any changes in body cathexis as measured by the SJBCS that were significant at the .05 level, thus rejecting Hypothesis V.

Hypothesis VI stated that the subjects in the 14-week weight training program would demonstrate increases on the SJBCS significant at the .05 level. Mean scores increased from 142.8 on the pre-test to 150.3 on the post-test, however, these differences, when analyzed with the t-test for mean differences, reveals no effects at the .05 level of significance. These results are presented in Table 11.
Hypothesis VI is not supportable. No alterations in body cathexis were found at the .05 level of significance following the 14-week weight training program.

Hypothesis VII stated that the total P scores on the TSCS would not be significantly affected by participation in the control group. This hypothesis was supported. There were no differences at the .05 level of significance. The results of the t-test for mean differences are presented in Table 12.

Table 11

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>12</td>
<td>142.8</td>
<td>25.16</td>
<td>0.7038</td>
<td>0.489</td>
</tr>
<tr>
<td>POST</td>
<td>12</td>
<td>150.3</td>
<td>26.44</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 12

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>15</td>
<td>360.0</td>
<td>36.85</td>
<td>1.652</td>
<td>0.170</td>
</tr>
<tr>
<td>POST</td>
<td>15</td>
<td>357.7</td>
<td>38.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Hypothesis VIII stated that the mean scores on the SJBCS would not be significantly affected by participation in the control group. This hypothesis was also supported. There were no differences between pre- and post-test means at the .05 level of significance. The results of the \( t \)-test for mean difference are presented in Table 13.

Table 13
\( t \)-Test Between Pre- and Post-Test Mean Scores on the Second Jourard Body Cathexis Scale for the Control Group

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>( t )</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>15</td>
<td>156.1</td>
<td>15.13</td>
<td>1.038</td>
<td>.308</td>
</tr>
<tr>
<td>POST</td>
<td>15</td>
<td>162.3</td>
<td>17.17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis IX stated that the mean scores on the SJBCS for all groups pre and post, would demonstrate a positive correlation with the total P scores on the TSCS for all groups, pre and post. This hypothesis was supported. The Pearson's Product Moment \( r \) correlation coefficients are shown in Table 14.
Table 14

Pearson Product Moment Correlations
Between Second Jourard Body Cathexis Scores and
Tennessee Self-Concept Total P Scores for All Groups,
Pre- and Post-Test

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight Training</td>
<td>12</td>
<td>.5464*</td>
<td>.7075**</td>
</tr>
<tr>
<td>Aerobic Training</td>
<td>17</td>
<td>.4569*</td>
<td>.4246*</td>
</tr>
<tr>
<td>Control</td>
<td>15</td>
<td>.7313*</td>
<td>.3949n.s.</td>
</tr>
</tbody>
</table>

*.05 **.01 (1-tail)

Summary

There were six hypotheses which examined the effect of aerobic training, weight training, and non-aerobic, non-strength training activity on self-concept and body cathexis. Two additional hypotheses examined how aerobic training and weight training affected aerobic conditioning. And finally one hypothesis concerned the relationship between scores on the SJBCS and the TSCS total P score for all groups. The analyses employed were the t-test for mean differences and the Pearson Product Moment Correlation.

The following summarizes the nine hypotheses tested:

1. Hypothesis I predicted an increase in cardiovascular function as measured by the 12-mile run following a 14-week course in aerobic

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conditioning. The t-test for mean differences was significant at the .05 level, thereby supporting this hypothesis.

2. Hypothesis II predicted no changes in aerobic conditioning would result following a 14-week weight training program. A lack of significance at the .05 level was found when the data were analyzed by the t-test for mean differences, thereby supporting hypothesis II.

3. Hypothesis III predicted an increase on subjects total P scores on the TSCS at the .05 level of significance following a 14-week aerobic conditioning course. This hypothesis was rejected as no changes were at the .05 level.

4. Hypothesis IV predicted an increase on subjects' total P scores at the .05 level of significance on the TSCS following a 14-week weight training course. This hypothesis was rejected as changes were not found at the .05 level of significance.

5. Hypothesis V predicted an increase on subjects' scores at the .05 level of significance on the SJBCS following a 14-week
aerobic conditioning course. This hypothesis was rejected as changes found were not significant at the .05 level.

6. Hypothesis VI predicted increases on subjects' scores on the SJBCS following a 14-week weight training course. This hypothesis was rejected as changes found were not at the .05 level of significance.

7. Hypothesis VII predicted changes on subjects' total P scores at the .05 level of significance on the TSCS following a 14-week non-aerobic/non-weight training course (archery and golf). This hypothesis was supported as the t-test for mean differences was not significant.

8. Hypothesis VIII predicted changes on subjects' scores on the SJBCS at the .05 level of significance following a 14-week non-aerobic/non-weight training course (archery and golf). This hypothesis was supported as the t-test for mean differences was not significant.

9. Hypothesis IX predicted a positive relationship at the .05 level of significance
between subjects' scores on the TSCS total P scores and the subjects' scores on the SJBCS for all groups pre- and post-test. Analyses with the Pearson Product Moment correlation demonstrated such relationships, except for the control group at post-test, therefore supporting Hypothesis IX.

As hypothesized, significant positive changes in cardiovascular fitness were found for the aerobic experimental group, while no significant changes were found in the weight training experimental group or in the control group. No significant changes on the SJBCS or the TSCS were found as a result of either of the experimental groups or the control group. Finally, as hypothesized, a significant positive relationship was found between subjects' scores on the TSCS and the SJBCS.
SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to examine the effects of two different and popular forms of exercise, weight training and aerobics, on the related psychological variables of body cathexis and self-concept. Research results and conclusions are presented to enhance understanding of the means by which such changes are mediated.

During the past decade there has been a significant increase in the number of persons who participate in physical activity and increased research interest in the psychological and emotional benefits that may stem from such behaviors. Numerous claims of benefit have been made and these psychological alterations have been attributed to a variety of causal relationships. These benefit explanations are primarily physiological or psychological in nature. This study examined the effect of two exercise programs, each having different physiological effects on the body, on global self-concept and body cathexis.
These two constructs are of central importance to psychological well-being.

The review of the literature examined the areas of aerobic exercise and psychological well-being. Specifically, the effects of exercise on depression, anxiety, self-concept, and body cathexis were examined. The literature contained inconsistent reports as to the effects of exercise on psychological well-being. Frequently positive psychological effects were found, but many of these studies contained psychological contaminants (expectancy effects, reinforcement, goal setting) that limit one's ability to ascertain what aspect or aspects of involvement in exercise programs facilitate enhanced psychological well-being.

One variable that the review of the literature suggests may be responsible for improvements in psychological well-being is that of body image, improvements in which are consistently related to improved self-concept. Another variable that has been researched is that of perceived fitness. Heaps (1978) and others have concluded that fitness, per se, is not responsible for improved psychological functioning but rather it is one's perceptions of one's level of fitness that is responsible for any observed changes. Additionally, fitness training research that has compared fitness versus fitness plus counseling have
consistently shown the fitness plus counseling subjects to realize greater psychological benefit. This again suggests that factors other than physiological training by itself may be operating to increase psychological well-being.

The literature review found results that point to some aspect or aspects of exercise programs resulting in increased psychological well-being but with little definitive understanding as to how such programs may be of benefit. Finally, the literature examining weight training and psychological effects is limited, and due to the selected research sample only one study focusing on women and weight training was extensively reviewed.

The subjects in this study consisted of female non-athletes at Tulane University in New Orleans, Louisiana. These students were required to take a physical education class but were free to select a class of their own choosing. The aerobics experimental group consisted of those subjects enrolled in a 14-week aerobics conditioning class. The weight training experimental group consisted of those subjects enrolled in a 14-week weight training course and the control group consisted of subjects enrolled in golf and archery classes. The golf and archery classes were judged to be non-aerobic and non-strength developing in
nature, and therefore were used as a control group.

All subjects completed the Tennessee Self-Concept Scale (TSCS) Form C and the Secord Jourard Body Cathexis Scale (SJBCS) during the first and fourteenth weeks of the course. The TSCS was chosen as it is a tested, reliable, and valid measure of one's self-concept. The SJBCS was utilized to assess subjects' evaluations of their physical selves. Additionally, the subjects in the two experimental groups completed the Cooper (1968) 12-minute run to assess their aerobic condition at the beginning and end of the semester.

The results of the study revealed the following:

1. The aerobic conditioning class resulted in a significant increase at the .05 level in aerobic condition, whereas the weight training program did not meet this level of significance.

2. Neither the experimental or control groups demonstrated significant increases at the .05 level in global self-concept or body cathexis from pre- to post-test.

3. Scores on the SJBCS and the TSCS total P score are consistently and significantly related.
Conclusions

Hypothesis I, which stated that the aerobic training groups' cardiovascular condition would be improved following the 14-week conditioning program, was supported. While some programs of aerobic dance have not demonstrated significant cardiovascular changes it can be concluded that this program of dance, rope jumping, and jogging was of sufficient intensity and duration to demonstrate physiological improvements.

Unlike the aerobic group, the weight training groups' change in cardiovascular functioning did not demonstrate significance at the .05 level. It can be concluded that the two hours per week of weight training was of insufficient aerobic intensity and/or duration to produce cardiovascular changes as measured by the 12-minute run. This is consistent with Gettman and Pollacks (1981) review that stated weight training has little effect on cardiorespiratory fitness.

A primary claim for exercise is that it enhances how people feel about themselves and their bodies, yet this study does not support such conclusions. The global self-concept as measured by the total P scores of the TSCS, and body cathexis as measured by the SJBCS, were not improved following either the aerobic or weight training programs.
One reason why such increases were not found may have been due to the psychological health of the subjects at pre-test. Normative scores on the TSCS for the general population are 345 (Fitts, 1965) and in this study the pre-test scores for the weight and aerobics group were 354 and 346, respectively, demonstrating normal or above normal levels of self-concept. Teng (1982), Hilyer and Mitchell (1979), and others have found that only low self-concept subjects demonstrate significant positive changes following exercise programs. While this study did not show significance at the .05 level, an examination of the raw data appear to support the hypothesis that only low self-concept subjects will benefit while normal or high self-concept subjects may not increase levels of self-concept. The four aerobic subjects in this study who scored lowest at pre-test on the TSCS gained an average of 20 points while those scoring highest lost an average of 12 points. On the SJBCS the subjects scoring lowest gained an average 24 points while the higher scoring subjects gained 4 points at post-test. Such results were found only in the aerobic group and may be a regression artifact. In conclusion, it may simply be that higher self-concept subjects do not have as much change to make as do the low self-concept subjects.
A second reason why significant psychological changes were not observed in this study may be grounded in cognitive theory, where it is the meaning ascribed to an event, rather than the event itself, that determines feelings and outcomes. If a behavior or activity is to have a positive benefit for the individual, then that activity must first be perceived of in a positive manner. For an exercise program to demonstrate positive psychological benefits, the subjects must be aware of and appreciative of any changes that are occurring. Heaps (1978) has stated that physiological changes are beneficial only when such changes are assimilated. This position is further supported by Hilyer and Mitchell's (1979) study that compared a running group with a running plus counseling group and found that the running plus counseling intervention was most effective in enhancing the self-concept. It appears that the supportive and reinforcing aspects of the counseling group assist in the positive valuing of the exercise program that appears necessary to produce psychological benefit.

The processes of assimilation and reinforcement may have been inadequate for the two experimental groups of this study. In the aerobic exercise class a benefit stressed was weight loss and this was
underscored by frequent weigh-ins. This emphasis may have led subjects to view exercise as a means of developing or maintaining a physical appearance that would be attractive to others rather than to feel more positive about oneself and one's physical being. This would seem to be in opposition to developing a positive and intrinsically rewarding attitude about the self.

There are several possible explanations concerning the lack of psychological change in the weight training subjects. First, the training program may have been of insufficient intensity and duration and perhaps a more vigorous routine would have demonstrated significant results. Secondly, what may be perceived as positive feedback or changes by males may have been viewed quite differently by the females in this study. Second and Remy (1956), and others, have shown that males and females differ on what body characteristics are highly valued. Alterations of muscle size and strength that may be viewed positively by males may in fact be perceived in a negative manner by college females. Additionally, a number of myths persist about the defeminizing effects of weight training, and while these were repudiated in the class they may still have had an impact on the subjects.

Finally, a further reason why no psychological benefits may have accrued may have been due in part to
the relationship and interactions between the weight training instructor and the subjects. The instructor typically worked with highly motivated male athletes who required little external reinforcement. At the same time the instructor reflected a "no pain-no gain" training philosophy that may have been effective with the male athletes but may have been perceived as punitive by the female subjects. This lack of reinforcement and support by the male instructor may have been counter-productive to the subjects perceiving themselves as gaining in fitness. This would explain a lack of increased psychological well-being since, as Heaps (1978) has demonstrated, it is not fitness, per se, but rather it is perceived fitness that effects psychological well-being.

This study along with others that have found non-significant effects (Bruya, 1977) (Mauser & Reynolds, 1977) suggests that exercise and self-concept change is a complex interaction that cannot be understood with simplistic formulas. While exercise may affect physiological factors in a direct manner, a specific amount of exercise resulting in a specific amount of physiological change, that does not appear to be the case when psychological outcomes are being measured.
Limitations of the Study

Limitations of this study fall into three categories; subjects, variable measurement, and generalizability. Three distinct limitations are related to the research study subjects. The total number of subjects in the study (N=44) is less than ideal. The weight training experimental group contained only 12 subjects. The size of this experimental group was limited by the total number of female non-intercollegiate athletes who elected weight training during the time of the study. A second subject limitation was the factor of self-selection into the experimental or control group.

This selection bias and subsequent threat to internal validity is a difficult issue for the field researcher to circumvent. Finally, there were no controls over the outside activities of the subjects and other factors could have been affecting the dependent variables. However, one may assume that similar variables would be affecting both groups as they were in the same environment and had the potential opportunity to engage in similar activities.

The variables under study and their measurement constitute the second area of limitation. Only one measure of physiological condition was utilized, that
being the 12-minute run to assess cardiovascular fitness. While this measure is highly correlated with more sophisticated measures of maximum oxygen consumption, these more expensive and accurate treadmill tests would yield somewhat more precise data. Because of the high costs, approximately $100 per subject, and the amount of time that treadmill testing takes, the Cooper measure was chosen. Measurements of the aerobic variable for the control subjects would have also been meaningful to this study. Another physiological variable, muscular strength, could also have been assessed to evaluate whether the weight training experimental group increased on this variable during the 14-week training period.

The psychological variables of self-concept and body cathexis were both assessed with proven and reliable instruments, yet, as with most psychological devices, their sensitivity may have been insufficient to detect changes. A more extensive battery of psychological tests might have been able to reveal changes that occurred in areas other than global self-concept and body cathexis. While this would not solve the problem of lack of instrument sensitivity it could reveal other areas of psychological benefit that were the result of the experimental interventions. Solving the problem of sensitivity is dependent upon the
development of more sophisticated assessment devices.

Generalizability most adequately describes the third limitation area. More research is needed to be able to generalize the findings of this study to groups other than college females attending a selective private university. This broader selection factor, choice of university, is another possible selection bias, as a given institution may attract a student population with a particular set of psychological characteristics. In addition, college students may be a poor sample to study due to their ongoing development and constant changes, which again may limit generalizability of results.

Implications

This study suggests that physical training programs designed to enhance psychological well-being must involve more than physical participation by subjects. Awareness of changes and positive perceptions toward such changes may be necessary to produce psychological benefit. Such awareness may be facilitated by frequent monitoring and feedback of subjects' performances and their progression towards defined goals. The efforts and behaviors of exercise participants need to be frequently rewarded and the
positive aspects of exercise need to be underscored to fully realize possible psychological benefits.

In utilizing exercise as a means of improving psychological well-being, or when one simply wants to obtain maximum benefits from a physical fitness program, these psychological factors must be taken into consideration. In addition, compliance and continued participation in a healthy routine of physical activity could also be enhanced as the subjects' perceptions of benefits were maximized.

A final implication is that persons who are prescribing and recommending exercise as a means of psychological enhancement need not be overly concerned with a given form or method of physical training. Of greater importance is that the client selects a program that they perceive as valuable. This decision to engage in an exercise program needs to be reinforced and the client's perception of benefit should be enhanced.

Recommendations for Future Research

The results of this study underscore the numerous interacting factors involved in the exercise/psychological well-being area. An understanding of these issues will require further well designed research in several directions:
1. The effects of feedback and reinforcement on psychological changes resulting from both aerobic and strength training.

2. The effects of weight training programs on specific aspects of body image and self-perception in females.

3. The effects of weight training programs on different psychological variables, such as anxiety and depression, in females.

4. The effects of a longer duration training program on self-concept and body cathexis in different female populations.

5. A study of existing "fitness spas" for women that are, in general, short on actual physical changes but appear long on reinforcement and expectancy.

6. Continuing investigation of how different psychological profiles are differentially affected by exercise programs.

In summary, there has been considerable research pointing to positive psychological benefits that accrue from exercise, yet this study failed to demonstrate such effects. An investigation of possible reasons for this lack of supportive data raises a number of
questions that need further exploration before definitive statements can be made concerning this relationship.
SUBJECT CONSENT FORM

I understand the basic procedures of this study and am aware that I may discontinue participation at any time. I hereby give my consent to participate as a subject.

Signed

I have personally discussed the research procedure, and any possible risks, with the above. I am satisfied that the subject understands these areas.

Signed

Date
SECORD JOURARD BODY CATHEXIS SCALE

Below are a number of body items or characteristics of yourself. Please indicate on the scale provided which things you are satisfied with exactly as they are, what you worry about and would like to change, and which things you have no feelings about one way or the other.

Consider each item listed and circle the number which best represents your feelings according to the following scale.

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<td>Consider myself fortunate</td>
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<td>4</td>
<td>Am satisfied</td>
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<td>3</td>
<td>Have no particular feelings one way or the other</td>
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<td>Don't like, but can put up with</td>
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<td>I have strong feelings and wish change could somehow be made</td>
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INSTRUCTIONS

On the top line of the separate answer sheet, fill in your name and the other information except for the time information in the last three boxes. You will fill in these boxes later. Write only on the answer sheet. Do not put any marks in this booklet.

The statements in this booklet are to help you describe yourself as you see yourself. Please respond to them as if you were describing yourself to yourself. Do not omit any item. Read each statement carefully, then select one of the five responses listed below. On your answer sheet, put a circle around the response you chose. If you want to change an answer after you have circled it, do not erase it but put an X mark through the response and then circle the response you want.

When you are ready to start, find the box on your answer sheet marked time started and record the time. When you are finished, record the time finished in the box on your answer sheet marked time finished.

As you start, be sure that your answer sheet and this booklet are lined up evenly so that the item numbers match each other.

Remember, put a circle around the response number you have chosen for each statement.

<table>
<thead>
<tr>
<th>Completely False</th>
<th>Mostly False</th>
<th>Partly False and Partly True</th>
<th>Mostly True</th>
<th>Completely True</th>
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You will find these response numbers repeated at the top of each page to help you remember them.
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These consist of pages:

Pages 91-97

__________________________________________
BIBLIOGRAPHY


McNamara, M. J. (1978). The effects of three conditioning programs on selected physical and psychological parameters of college students. Dissertation Abstracts International, 38, 7212A. (University Microfilms No. 78-08, 165)


