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The effect of a 10-week physical fitness program on self-concept

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The University of Montana

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THE EFFECT OF A 10-WEEK PHYSICAL FITNESS PROGRAM
ON SELF-CONCEPT

BY

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B.A., Antioch College, 1974

A thesis submitted in partial fulfillment
of the requirements for the degree of

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The Effect of a 10-week Physical Fitness Program on Self-Concept

ABSTRACT

This study was designed to evaluate the effect of an increase in the level of physical fitness on self-concept. It was hypothesized that an increase in the level of physical fitness would result in an improved self-concept, and a positive correlation between the two variables would be demonstrated.

An experimental group consisting of nine volunteer subjects from the university community participated in a 10-week adult aerobic fitness course. The control group was composed of seven persons who showed an interest in the course, but were unable to attend.

Both groups were administered the Tennessee Self Concept Scale (TSCS), the Astrand Step Test, and the Physical Activity Index before and after the program.

An ANOVA with repeated measures was used to determine significant changes in the Total-P score of the TSCS and used to monitor significant changes in subscale scores of the TSCS as well. The Pearson Product Moment Correlation was utilized to determine correlation of physical fitness and/or physical activity with self-concept measures. The Total-P scores were also analyzed using a repeated measures design with proportioned cell frequencies.

It was concluded from this study that the program did not significantly affect level of physical fitness or self-concept scores. However, results did demonstrate a positive correlation between the identity subscale and the Step Test. In addition, the control group improved significantly on the moral-ethical-self subscale, and scored higher initially on the Step Test. The control also started at a higher level of activity, but the experimental group was significantly more active at the end of the program, demonstrating good experimental control.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>ii</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>The Problem</td>
<td>4</td>
</tr>
<tr>
<td>Hypothesis</td>
<td>5</td>
</tr>
<tr>
<td>Importance of the Study</td>
<td>5</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>6</td>
</tr>
<tr>
<td>2. REVIEW OF LITERATURE</td>
<td>8</td>
</tr>
<tr>
<td>Physical Fitness, Anxiety and Depression</td>
<td>8</td>
</tr>
<tr>
<td>Physical Fitness and Personality Factors</td>
<td>13</td>
</tr>
<tr>
<td>Physical Fitness in the Corporate World</td>
<td>21</td>
</tr>
<tr>
<td>Physical Fitness and Self-Concept</td>
<td>23</td>
</tr>
<tr>
<td>3. RESEARCH METHODOLOGY</td>
<td>34</td>
</tr>
<tr>
<td>Data About Subjects</td>
<td>34</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>35</td>
</tr>
<tr>
<td>4. DATA ANALYSIS, RESULTS AND DISCUSSION</td>
<td>41</td>
</tr>
<tr>
<td>5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS</td>
<td>48</td>
</tr>
</tbody>
</table>

APPENDIXES

| A. INSTRUMENTS | 52 |
| B. RAW DATA | 57 |
| BIBLIOGRAPHY | 60 |
Chapter 1

INTRODUCTION

Exercise enthusiasts, philosophers, physicians, and the military have claimed for centuries that physical activity can affect one's state of mind. Looking back in time we see that in the fifth century B.C., the Greek aristocrats went to the gymnasium an hour every day to train. They spoke of training the body and of the need for harmony between mind and body (48). According to modern philosophy, humans cannot be divided into two separate parts, mental and physical, but rather the psychological and physiological components are integrated into one complex configuration (28). Today such organizations as the YMCA and YWCA, Outward Bound, along with counselors, physical educators and coaches have maintained that a sound body contributes to a sound mind. Current research supports the theory that physical fitness is relevant to a healthier self attitude and sense of well-being (4, 10, 13, 15, 16, 17, 34, 36). In this era of increased tension, anxiety, depression and mental illness, a sound approach to improved mental health is of extreme value. More and more people are discovering the joys of running and other forms of aerobic exercise and testimonials regarding the resultant psychological benefits are readily available.
What happens when a person runs? Cooper's studies show that if a runner runs long enough and hard enough, he is getting enough exercise to produce certain beneficial physiological changes which he calls the "training effect" (11). These changes positively affect the heart, lungs, circulatory system, muscles, percentage of fat and more. These physiological changes are undoubtedly beneficial, helping the runner to increase his physical fitness; to reduce chronic fatigue, to sleep better; and generally feel more relaxed and refreshed (49).

Two testimonials of these benefits are recorded in Runner's World. The first article entitled "Running: A Road to Mental Health," by Andersen examined the effect running has on four areas of the human psyche: 1) anxiety, 2) depression, 3) self-esteem, and 4) creativity (2). Of particular interest were Andersen's comments on running and self-esteem. He contended that there are two aspects of gaining self-esteem from running; narcissistic and how one experiences one's body. He further noted that as the world grows more complex, one often feels powerless to control many of the issues to be faced in life, and this lowers self-esteem. In contrast, controlling the running aspect of life (time, place, pace of the run, etc.) is one way to regain our initiative and sense of power in an otherwise frustrating environment. The second aspect deals with the
growing complexities of the environment and particularly concerns the technological factors and changes that affect a person. One's body is no longer a major instrument used in dealing with the world; consequently, one becomes alienated from one's body. In the act of running, however, one can exalt again in physical nature and come to know and appreciate the physical being.

The other article on this topic in RW is a first-hand testimonial by Schanz (46). Schanz's own words describe his experience with running and self-esteem:

As I ran, a new element buoyed me. It was happiness unasked for, as totally spontaneous .... In my case, if it were not for lithium, I don't know if any amount of running could have brought me back to health. What I do know is that when I tied on my running shoes, I began to feel better. And with each step I took, I was farther down the road toward self-esteem (27). pg. 53.

Dr. George Sheehan, contemporary philosopher of running stated "Running is not a mere physical obsession: it is incorporating all the strengths of body, mind and spirit together." (48) Until recent years, there has been a noticeable lack of research in the specific area of self-concept and physical fitness. However, as already noted, more and more articles are appearing in professional journals and household magazines regarding the psychological values to be derived from participation in
physical activity. Thus, there appears to be evidence that physical fitness positively affects one's sense of well-being. In view of this popularly held belief that physical fitness can increase one's sense of well-being, the present study was designed to determine whether an individual's self-concept changes due to an alteration in level of physical fitness. If a positive correlation exists, this information would be extremely valuable to persons interested in increasing their level of fitness, to persons whose self-concept needs a boost, and to therapists, teachers, employers, counselors, coaches and persons interested in helping themselves or others attain a healthy harmony of body and mind. While the values of physical fitness may not be the "cure all" enabling all persons to live happy, healthy lives, they can be a positive self-help, preventive health means that can be practiced anywhere, at any time, for little or no cost.

The Problem

This investigation attempted to determine a relationship between self-concept and physical fitness via the Tennessee Self Concept Scale (TSCS) and the Astrand adaptation of the Harvard Step Test.
Hypothesis

The null hypothesis was assumed for the purpose of statistical analysis.

The research hypothesis posited an increase in level of fitness which would result in an improved self-concept and that a positive correlation between the two variables would be demonstrated.

Importance of the Study

Self-concept was selected as a measure of well-being because it has been demonstrated that an individual's self-concept is directly related to personality and mental health (10). The TSCS has been used effectively as a criterion of change as a result of significant experiences. If an increase in the level of physical fitness constitutes a successful growth experience which positively influences self-concept, this information would be a useful physical conditioning tool for normal people as well as in therapy for depressed persons, overweight individuals, alcoholics and others with self-concept problems.

One might also consider the benefits of physical conditioning as a resource to maintain the energy and
morale of employees. Many corporations are offering recreation and physical activity time, facilities, and programs on the job for employees and have found that these activities promote good attendance and improved work performance (1, 21, 32, 39, 42). In addition, this information could be shared in physical education courses, pointing out the lifetime importance of physical fitness.

The importance of adequate sleep and nutrition for the proper development of body and mind is well known. General acknowledgment is that if either ingredient is lacking, one becomes tired, irritable, and performs on a submaximal level. It may be equally as important to account for and provide adequate physical activity in order to achieve a harmonious balance between physiological and psychological health.

**Definition of Terms**

**Self-Concept**

Self-concept is how an individual perceives and chooses to describe himself and portray a picture of himself (10). Self-concept can also be defined as a person's total appraisal of his appearance, background and origins, abilities and resources, attitudes and feelings which culminate as a directing force in behavior (27).
Aerobic Physical Fitness

Aerobic physical fitness is the maximum ability to take in, transport and use oxygen. It consists primarily of a well-developed oxygen delivery system; strong heart and lungs that efficiently deliver oxygen to the working muscles (50).
Chapter 2

REVIEW OF LITERATURE

Research in the area of self-concept and physical fitness has come into being primarily in the last ten to fifteen years. The available literature covers many aspects including use of fitness programs as therapy and for rehabilitation. There is also some information available regarding physical fitness and its effects on employees and their work production. Other studies have researched the effect of physical fitness programs on psychological factors and personality and still others have examined the relationship between sport and mental health. All of these studies share similar concerns with the present study and are intended to help clarify its intentions, expectations and results.

Physical Fitness, Anxiety and Depression

An early study in this area incorporated 101 adult males in a six-week exercise program (34). The participants worked out in one of five programs including: circuit training, jogging, swimming, treadmill running, or bicycle ergometry. The researchers were primarily
interested in the relationship between depression and physical fitness. The study found that six weeks of exercise did not produce a significant reduction in depression for any of the various exercise groups. However, eleven of the 101 subjects were initially scored as clinically depressed and these subjects demonstrated a significant reduction in depression. This research appeared to be in agreement with the common belief that physical activity is capable of improving psychological states. Also of interest was the common report by many subjects that participation in the program resulted in their "feeling better." Approximately 85% of the subjects were reported to have spontaneously volunteered to participate in future similar studies. The last ten years have seen increasingly more studies and material identifying running and exercise as a treatment for anxiety and depression. Orwin successfully treated eight agoraphobic patients utilizing running as a means of reducing anxiety (38). In this particular treatment, running was not expected to alter personality characteristics or improve upon the subjects' sense of well-being, but rather to provoke a state of arousal similar to the feeling of anxiety experienced under certain circumstances. In discussion of this study, Muller and Armstrong suggested that it may be unnecessary to introduce relaxation or any other antagonistic behavior in the
treatment of fear and anxiety (35). Instead, it may be sufficient to alter one's interpretation of his autonomic arousal without attempting to control or alter it. They suggested that such a re-interpretation occurs upon the introduction of jogging in physical and temporal association with the fear-evoking stimuli.

Running as an adjunct to psychotherapy coupled with hypnosis and Transcendental Meditation (TM) was studied by Solomon and Bumpus (49). This treatment was labeled The Running Meditation Response, and in each of the 50 cases where this form of treatment was utilized the researchers reported it proved to be an important factor in the course of treatment. The purpose of the study was to demonstrate that both running and TM are methods for activating an altered state of consciousness (ASC) and that a combination of techniques would be beneficial as a psychotherapeutic adjunct. They further enhanced the effects of running through the use of hypnosis. They concluded that The Running Meditation Response should be seriously considered as a psychotherapeutic adjunct. They further agreed with Muller and Armstrong and Orwin that running can be helpful in the reduction of anxiety. They stated:

Running, by giving the patient a feeling of being in charge over functions such as heart rate, breathing and muscles, automatically gives him a sense of mastery. This is a therapeutic maneuver frequently employed in behavior therapy and in the course of biofeedback treatment. pg. 588
Solomon and Bumpus also suggested that running could be used in ego enhancement and supportive therapy. As a warm-up activity prior to group therapy, the study found that running reduced the disquietude of psychotic individuals and produced significant feedback.

Running in conjunction with behavioral therapy in the treatment of depression was evaluated by Buffone (6). Analyses of the five subjects who completed the entire twelve-week program revealed a significant reduction in depression. However, the subjects reported other variables affected the program as well. Reports also indicated that the combination treatment resulted in increased self-confidence, reduced anxiety and improved body image.

A more specific study of effects of exercise on depression was undertaken by Brown, Ramirez and Taub (5). The purpose of their investigation was to study the psychological correlates of exercise in normal and depressed subjects. The study was conducted in two phases. The first phase utilized 167 subjects who were high school and university students. All but the six control students participated in one of five exercise classes. The second phase involved 561 university students of which 101 were clinically depressed. Ninety two of the depressed persons participated in the exercise program and the other nine were controls. Four hundred and six normal controls exercised and 54 normal persons served as no exercise
controls. The results of phase one indicated that depression scores decreased for students participating in wrestling, mixed exercise, jogging and tennis. There was no change in depression for students in softball or the no exercise group. The results of the second phase found that jogging three or five times a week for ten weeks was associated with significant reduction in the depression scores of both the depressed and normal subjects, with those subjects jogging five days a week having the greatest reduction in depression scores. The subjects who did not exercise demonstrated unchanged scores. Discussion of this research pointed out that the apparent anti-depressant effect of exercise may depend at least to some degree upon intensity, duration and frequency of the physical activity. The researchers recommended that any safe, rational and effective treatment for depression should include a prescription for vigorous exercise.

Ledwidge, summed up the rationales for running as treatment for anxiety and depression quite well (29). His summations include the rationale that aerobic exercise as a means of alleviating anxiety and depression stems from the fact that endurance training lessens the biological response to physical stressors; and from viewing stress as the nonspecific response of the body to any demand. He further predicted that aerobic exercise would moderate that response. His psychological rationale refers to the
argument that therapeutic benefits of exercise arise from the fact that aerobic exercise enhances the exerciser's self-esteem and thereby increases self-confidence. These theories seem especially on target when he pointed out that unfitness is not the cause of anxiety and depression, but that we can learn how to moderate the intensity and duration of these states when they occur.

A recent study utilizing a practical application of the theory that running can affect depression was conducted by Rueter, as reported by Roth (44). Rueter studied 18 undergraduate college students suffering from depression as a result of being in school and away from home. The two groups of nine subjects each participated in running therapy and counseling therapy or in counseling only. Results of the study showed that the running group recovered from depression more quickly than the non-runners.

This literature provides facts, theories and information that secure a sound foundation for further use and study of running as an effective treatment for anxiety and depression.

**Physical Fitness and Personality Factors**

Folkins, Lynch and Gardner investigated the possibility that improvement in physical fitness would be
associated with positive changes in measures of psychological fitness (13). They assumed that the concept of fitness might be applied to both physical and psychological functioning to refer to a quality of health. Measures of physical fitness (a 1.75 mile run) and psychological fitness (Multiple Affect Adjective Check List and the Adjective Check List) were given to college students at the beginning and end of a semester-long jogging course. The same measures of psychological fitness were also administered to a control group composed of persons enrolled in archery or golf courses. The pre-training scores were significantly different between experimental and control groups on psychological measures of anxiety, depression, self-confidence, adjustment, work efficiency and sleep behavior. While those who took the jogging course were less psychologically fit at the pre-training stage, in a within-group analysis, the women in the jogging course experienced significant improvement in psychological fitness. Post-test scores also indicated a significant improvement on physical fitness in the experimental group as shown by heart rate and time taken to complete the run. In addition, changes in psychological fitness were correlated with changes in physical fitness. More specific results showed that the greater the physical fitness improvement, the more likely it was that a subject evidenced positive psychological changes.
The Cattell 16 Personality Factor Questionnaire has often been employed in similar studies. Sixty middle-aged men were administered this questionnaire before and after participation in a four-month physical fitness program (22). The subjects were divided into two groups according to their fitness scores, and were labeled either high-fit or low-fit. At the start, the high-fit group had significantly higher scores on only two factors: namely, emotional stability and imagination. By the end of the program, the low-fit group had increased its score on emotional stability so markedly that there was no longer a significant difference between groups. The low-fit group's score on imagination had increased, but they were still lower than the high-fit group. In addition, the low-fit men experienced large increases in self-sufficiency and, in fact, outscored the high-fit group. The researchers reported that their study had confirmed that physical activity could change the state of one's mind as well as body.

The personality of the middle-aged male runner was investigated also by Hartung and Farge, again using the Cattell 16 Personality Factor Questionnaire (18). Subjects were male runners of at least 40 years of age, but less than 60 who were in apparent good health and presently running at least two miles three days per week. Most had been running for more than five years and all had been
running for at least one year. The subjects' mileage ranged from 10 to more than 35 miles per week. A maximal treadmill test revealed the men to be well above the mean for their age in terms of cardiorespiratory fitness. The data indicated that the subjects were clearly more intelligent than average, had a high socio-economic status, were more imaginative and self-sufficient than average, but tended to be introverted. The researchers pointed out that the introversion tendency may have been a more important factor in motivating these men to run or jog rather than take up a team or dual sport. They speculated that the high levels of self-sufficiency and imaginativeness may have been a result of running rather than a cause since similar results were found with physical fitness improvements by Ishmail and Trachtman (22). The results of these two studies seem to indicate that involvement with physical activity is related to imagination and self-sufficiency. There were significant results in these areas for veteran runners as well as novices in a four-month fitness program, indicating that these factors are more a result of activity rather than a cause of long distance running. While it is not so clear how imagination may relate to self-concept, it stands to reason that persons who are self-sufficient are more likely to have a positive self-concept, thus further justifying the present study.
In a study of physical conditioning and psychological change data were collected from 16 students, 19 to 23 years old who had enrolled in a regular physical conditioning class (45). Of the sixteen subjects, thirteen were female and three were male. The students were asked to specify their current level of physical activity. A Conceptual Grid assessed the subjects' cognitive structure before the class. Three physiological tests were also employed: the Percentage Body Fat Test; the Heart Recovery Test; and the 1.5 Mile Run-Walk Test. The subjects then participated in a six-week conditioning class devoted primarily to jogging that met twice a week for one hour each session. At the end of the program, the subjects were readministered all tests. Three months after the program, each subject again specified the frequency and duration of their present jogging program and those subjects who indicated that they were still jogging were asked to take the 1.5 Mile Run-Walk Test. The data indicated that persons who demonstrated a change toward greater physical fitness and a concomitant positive self-concept, tended to continue the exercise program voluntarily after it had ended. Direct physical effects of conditioning did not seem to be directly related to psychological changes. The study concluded that the conditioning program alone does not change a subject's cognitive structure but the subject's interpretation of the exercise program is also required to establish a stable new
A comparison of 27 physically active females with 25 physically inactive females determined three significant differences on the Cattell 16 Personality Factor Questionnaire (4). The active subjects were more stable, less tense and less anxious. Comparisons of men with women revealed that the female subjects were slightly younger and the active males were in better aerobic condition. However, the active/inactive comparisons generally produced similar results on demographic and physiological variables. Whereas there were few differences on personality measures between the groups of women, the male comparisons of active/inactive subjects produced ten highly significant differences. The three differences found in the women's groups were three of the ten found in the men's results. These studies concluded that there appears to be a substantial divergence between males and females in the motivational factors that lead to the adoption of an aerobic program.

Heaps examined the issue of physical determination versus cognitive mediation of psychological functioning (19). He concluded that, although there is a definite psychological benefit following consistent exercise and physical change, this benefit results not from the physical improvement, but from the emotional or psychological perception of the physical and personal value of continued
exertion.

Research in fitness and personality factors has emerged in studies aimed at determining the effects of exercise on mood. One such study looked specifically at changes in mood before and after a 12.5 mile run. Nowles and Greenberg tested 18 subjects using the Mood Adjective Check List (MACL) and the State-Trait Anxiety Inventory before and after the run (37). The most outstanding change in mood was an increase in pleasantness after the run. Activation increased and relaxation decreased. Sadness, depression and anxiety began at low levels; after the run there was no evidence of these moods. Certainly an activity which induces decreases in both anxiety and relaxation arouses interest and poses many questions. The investigators suggested that relaxation may increase at some time after recovery from a run.

Jones also investigated mood, as well as self-actualization and motivation in relationship to a running program (25). The 19 subjects who completed an eight-week running program were tested before and after the program using the Personality Orientation Inventory (POI), the Motivational Analysis Test (MAT) and the Profile of Mood States (POMS). The results indicated that there was no significant overall effect due to the treatment of running although there were indications that the women became more inner directed and had an increased sense of

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vigor.

Research has demonstrated that cognitive processes are also affected by exercise. Van der Meer stated that the mental processes are heightened by strenuous physical activity (51). One theory she used to link improved cognitive skills with physical fitness is that exercise may help transport more blood and oxygen to the brain providing it with the energy and nutrients it needs to perform cognitive tasks well, pointing out once again the link between body and mind.

Zentner established that regular moderate running can precipitate a decrease in tension, depression, anger, fatigue, confusion and an increase in vigor (55). He also pointed out that running can manifest characteristics of extraversion.

While there is increasingly more research supporting the theories that exercise produces positive changes in both normal and clinical populations, the data does not clarify whether exercise functions in a similar manner in both populations. Chodzko-Zajko and Ishmail undertook to determine if the MMPI is a suitable measure of evaluation of the relationships between regular exercise and personality changes in normal and clinical populations (8). Their data suggested normal personality profiles appear to be related to profiles of clinically ill patients. They interpreted their data to be supportive of an essentially
flexible personality theory. They suggested further research that can directly compare relevant biochemical, physiological and psychological differences in response between clinical and normal populations who are receiving similar exercise treatment.

Physical Fitness in the Corporate World

Dr. Jerome Zuckerman, President of the Cardio-Fitness Center in New York's Rockefeller Center believes there is a definite relationship between physical fitness and employee productivity (21). To date, there is little empirical evidence that there is a positive relationship between fitness and employee productivity, but increased productivity seems to be a logical by-product of physical fitness and psychological well-being. Zuckerman contended that employees become more productive as their fitness level increases and that fit employees are also more alert in the afternoon.

Xerox is an example of a company that maintains it has experienced a marked increase in productivity among employees who participated in their "bus-fit" programs (21). Improved employee morale, reduced absenteeism and increased productivity are among the many benefits a company may receive from supporting a bus-fit program.

Tom Sattler, who runs a calisthenics program for
Gould, Inc., outside of Chicago, maintained that exercise adds certain intangible dividends, like the camaraderie that grows in a class like his, a bolstered ability to make friends and an increased ease at doing intellectual tasks (39). Van der Meer's theory would support this (51).

Standard Oil has incorporated a fitness program for their employees for the past several years and accountant William Hendry contended that participation in this program gave him a better outlook on life and he probably feels healthier and is happier for it (39).

The Kimberly-Clark Corporation in Neenah, Wisconsin has invested over two million dollars into their fitness facility and program for employees (32). The Health Management Program is aimed at changing people's habits that are detrimental to their mental health or physical well-being. The program offers a complete health examination and an exercise prescription.

Another Wisconsin agency with a fitness facility is the Sentry Insurance Company at Stevens Point (32). They have a comprehensive facility and health education program supervised by two physicians and support personnel.

Jerome Christina, director of the fitness program at Northern Natural Gas Company has discovered that employees participating in their fitness program lose significantly fewer days to illness than their employees not in the program (32).
Ranney conducted a 1981 study of 30 to 65 year old Caucasian males who held full-time managerial type jobs (42). Her study revealed that level of fitness acts in a main effect capacity on anxiety, exhaustion, and diastolic blood pressure in a multi-variate context.

A recent Purdue University study showed that people who exercise regularly may be better decision makers (1). The study found that persons involved in a regular fitness program made 60% fewer errors in forming strategies to arrive at complex decisions. The exercisers also reported an improved self-image and increased motivation. Investigator Salvendy noted:

A person's maximum decision-making potential is determined by heredity, not fitness. Environmental factors can help individuals achieve this potential, and physical fitness appears to be one such environmental factor. pg. 3

Physical Fitness and Self-Concept

Rehabilitation

One of the earlier studies to point out that physical development could positively affect self-concept and could be used as a rehabilitative tool, was undertaken in 1968 (24). The researchers studied the changes in self-concepts during a physical development program for 74 children with emotional disturbances, brain damage and mental retardation. Three measures of self-concept were
administered before and after a six-week physical development clinic and a comparison of these scores indicated the following significant changes: a.) an increase in willingness to be with larger groups of children, b.) an increase in willingness to be near the clinician, and c.) an increase in desire to be near the father. A simple interpretation of these results revealed the children were more aware of their actual size (height) after the clinic indicating a more realistic awareness of their physical relationship with their environment. The increase in willingness to be with larger groups of children is an obvious improvement for children who have emotional and developmental problems. The authors stressed that the newly formed relationships and self-confidence gained in the clinic most likely permitted the children to see themselves in more interpersonal relationships. The increase in desire to be near the father was important, especially since 63 of the subjects were male. The parents also reported significant developmental changes at home.

Collingwood conducted two related studies of the effects of physical training on self-concept for rehabilitative purposes.

He and Willett conducted one of the first studies to attempt a direct validation of the effectiveness of physical training having a facilitative impact on other dimensions of an individual's life, such as body attitude.
and self-concept (10). The subjects were five overweight boys ages 13-16 who participated in a three-week physical training program. The program included one hour a day in a gymnasium consisting of jogging activities and calisthenic exercises, and one hour each day in a pool doing bobbing and floating exercises along with sprints and endurance work. The program totalled 30 hours of participation over the three-week period. Physical fitness tests revealed that the subjects demonstrated a significant weight decrease, a nonsignificant waist decrease, a significant decrease in resting pulse rate, and a nonsignificant increase in lung capacity and significant increases of performance on the Kraus Weber series. Ratings on the Body Attitude Scale demonstrated a significant increase on the Evaluative and Potency dimensions. Subjects' ratings on the Index of Adjustment and Values showed a significant increase on the Self Concept dimension, significant increase on the Self Acceptance dimension and a nonsignificant increase on the Ideal Self Dimension. The authors believed the program provided a fairly concrete growth and success experience which gave the subjects positive feedback of themselves, thus affecting their self-attitudes. In turn, the data offer implications for the use of physical training within the therapeutic process for many clients.

Collingwood conducted a similar study with 50 young
male rehabilitation clients (9). Twenty-five of the clients constituted a control group and other twenty-five participated in a four week physical training program. The results demonstrated a significant weight decrease, a significant decrease in resting pulse rate and significant increases of performance on the Kraus Weber series. Subjects' rating on the Index of Adjustment and Values showed a significant improvement on the self-concept scale and the self-acceptance scale. These data support the contention that a healthy attitude and self-concept can progress through physical activity and development.

Another therapeutic use for physical fitness investigated the effect of jogging on physical fitness and self-concept in hospitalized alcoholics (15). The program consisted of ten male alcoholics who jogged one mile a day for twenty days and ten others who served as controls. The results showed that physical fitness improved from "poor" to "average" in the joggers and did not change in the controls. Self-concept as measured by the Gough Adjective Check List and Jourard Self-Cathexis Scale improved in the joggers, but not in the controls. Sleep disturbances were also reduced in the joggers. The conclusion was that alcoholics' health can improve significantly in twenty days of training and that self-concept improves with an increase in physical fitness. Physical fitness training would appear to have a place in alcoholism treatment programs.
The philosophy of sound body, sound mind offers many implications for rehabilitation, and these studies lend further empirical support for this theory and for the potential of physical activity as a therapeutic modality with disturbed children, alcoholics, overweight teenagers and young male rehabilitation clients.

**Perceived Physical Fitness**

After Collingwood documented that an increase in physical performance was related to an increase in self-attitude and self-acceptance, Leonardson designed an interesting study to determine whether perceived physical fitness was related to self-concept scores of high school and college students (30). A measure of perceived physical fitness was obtained from each group by means of a self-rating scale. Perceived physical fitness and self-concept scores were significantly correlated for both groups (college and high school). These results may indicate that perceived physical fitness and actual physical performance are related. Or, as Leonardson pointed out, they may suggest stability and validity of a self-report measure of physical health.

Leonardson and Gargiulo examined perceived fitness, actual physical fitness and self-concept (31). Data were collected from fifteen students who were tested before and after a ten week training session. Although a significant
difference in self-concept was not observed, and perceived physical fitness did not increase significantly, actual physical performance did increase significantly. Also perceived physical fitness and self-concept were significantly correlated on both pre and post-tests indicating that perceived physical fitness may well be an important aspect of self-concept.

Competitive Sports

Reports coming from the world of sports have shown definite differences between personalities of athletes and nonathletes. Athletes have tended to have more leadership qualities, more sense of personal worth, self-confidence and intellectual efficiency (22).

One study indicated that the world of sport is basically viewed by the general population as a beneficial institution (50). This survey summarized that the social control functions for society and the cathartic functions for the individuals appear to be the underlying themes in attitudes expressed toward the consequences of sport. From a conventional perspective, the study concluded that sports are generally seen as producing socially desirable results such as social order, restraint, discipline and relaxation; all of which can contribute to psychological well-being. A distribution of responses to 15 items focusing on various consequences of involvement in sport showed that the
subjects polled were basically very positive in their perception of the value of sport for both society and the individual. In fact, 75% of the 510 men and women surveyed affirmed that sports are part of being a well-rounded person. In addition, those questioned saw sports as particularly valuable as away of relaxing, a way to have a good time with friends, and as a way to get away from pressures and tensions.

**Fitness Programs and Self-Concept**

A unique comparative analysis of physical fitness, self-concept, and student teaching performance, found no apparent correlation between the measure of physical fitness and self-concepts for the subjects under study with the exception of the one fitness variable of grip strength, which correlated significantly with both physical self and the self-concept scores for the male group only (3). In comparing the mean scores of all the variables, very little difference was found between the male and female groups with the exception of the above-mentioned correlation. The subjects in this study included 23 males and 54 females enrolled as physical education majors at the University of South Florida. Self-concept was assessed with the Tennessee Self Concept Scale and physical fitness as assessed with a test battery consisting of: 1) the Astrand bicycle ergometer test, 2) a grip strength test, using hand
dynamometer, 3) a trunk-hip flexion test, 4) a one-minute sit-up test, 5) a pull-up test for males, and 6) a flexed-arm hang for the female subjects. Student teaching performance was evaluated by supervising teachers at the end of their third quarter practice teaching experience utilizing the Classroom Observation Record for rating teaching behavior. In terms of predicting student teaching performance, the self-concept measures were considered the best predictors, with the physical fitness variables adding only slightly to the total predictive value.

A study of the effect of group counseling and physical fitness programs on self-esteem was undertaken by Neal (36). The subjects who participated in this study were ninth grade boys divided into four groups: 1) the cardiovascular fitness group, 2) the counseling group, 3) the cardiovascular fitness and counseling group, and 4) the control group. The program lasted ten weeks, and the subjects were given the Coopersmith Self-Esteem Inventory to determine self-esteem, and the Cooper Twelve Minute Run-Walk Test to determine cardiovascular fitness before and after the program. The results indicated that an integrated program of counseling and physical education was the most effective program in improving cardiovascular fitness. The data also demonstrated that there were no changes in self-esteem as a result of the program.

Research similar to the present study was conducted by
Haberlack (16). He administered the TSCS to 286 selected male and female high school students before and after a six-week jogging program. The students were selected for their low self-concept and were divided into approximately three equal groups, each of which was assigned to one of three programs: 1) jogging with motivational techniques and positive reinforcement, 2) jogging and 3) a control group which consisted of participation in regular physical education programs. He found that all three groups improved significantly in total self-concept during the six-week period, but that the first group (jogging with motivational techniques and positive reinforcement) had the greatest mean improvement.

Wescott undertook to determine the effect of elective physical education classes at Southeastern Oklahoma State University on the self-concept (52). Three hundred and twelve students enrolled in fifteen different courses were the experimental group and thirty one students enrolled in three science courses were the control group. Each student was given the TSCS during the first week of school and the last week of the course. Using the t-test, there was no significant change within the self-concept of the control group. On the posttest, the experimental group was significantly improved on the subscales Family Self and Identity. Within the total experimental group, significant improvement was made on Total-P scores and selected
subscales.

The TSCS was also used by Rainey to research the effect of aerobic running on self-esteem (41). Subjects participated in one of three categories: non-running control, running alone, and running with a counselor. They ran three times a week for ten weeks one half hour per session. Twenty subjects completed pre- and posttesting on TSCS and the twelve minute run. Total-P scores and subscales remained unchanged for all groups.

McRory utilized the TSCS once again to determine the effects of an exercise program on self concept with 24 male Commissioned Peace Officers (33). The results were somewhat inconclusive. A significant decrease in Family Self was found among the exercise participants and they also displayed a decrease in distribution scores. There were no significant changes in the non-participant group.

Summary

Most of the research literature indicated that physical fitness can affect depression, anxiety, personality factors and self-concept. This knowledge has led to implementations of physical fitness programs in rehabilitation, therapy, and in the corporate world. Studies consistently showed that subjects reported "feeling better" when involved in physical activity; and that competitive sports are also perceived as having a positive
effect on personality and self-concept. The research still leaves many questions unanswered and craves more empirical evidence in substantiating the results and theories. The present study strives to contribute to the field.
Chapter 3

RESEARCH METHODOLOGY

The study proposed to assess the relationship between self-concept and physical fitness. Self-concept and physical fitness were measured before and after a ten-week fitness program. Changes in self-concept were measured by the TSCS and levels of physical fitness were measured by the Astrand Adaptation of the Harvard Step Test.

Data About Subjects

The subjects participating in the study were volunteers from the University of Montana population who responded to an advertisement for a noon-hour adult fitness course offered by the Department of Health and Physical Education. Twenty-nine individuals responded and completed testing by the second class meeting and the program was begun on the third session. This group was comprised of eighteen women and eleven men. By the fourth or fifth class session, thirteen persons dropped the course because of time conflicts but agreed to return for posttesting at the completion of the program and thus became the control group. The remaining sixteen persons comprised the experimental group and continued to participate in the program. Five members of the experimental group left the
program for various reasons, and two who completed the program were not available for posttesting. Of the five drop-outs, one left due to illness, one to injury, two withdrew from the university after an imposed lay-off from classes due to volcanic ash fallout from Mount St. Helens, and the other subject offered no explanation. This left nine subjects who completed the program and the pre and posttesting. Of the thirteen control subjects, only seven consented to return for posttesting. However, due to the nature of the time conflicts, drop-outs and withdrawals, the nine experimental subjects were all women, and the control group included five men and two women. Originally, for the purposes of statistical measurement and comparison with an ANOVA, two experimental subjects were randomly selected and their data dropped from the analyses in order to provide two groups of equal sample size. At a later date, this data was reinstated for further testing with a repeated measures design with proportioned cell frequencies.

Instrumentation

The volunteer subjects each signed an Informed Consent Form (Appendix A), completed the TSCS and Astrand Step Test and filled out a Physical Activity Index (PAI) (Appendix A). At the end of the ten-week program, all subjects
(control and experimental) took all tests again and completed another PAI.

The Tennessee Self Concept Scale

The TSCS is a pool of 100 self descriptive items which the subjects rate according to their degrees of truth as applied to themselves. The test measures the overall level of self-esteem in such a way that persons with high scores tend to like themselves, feel they are persons of value and worth, have confidence in themselves and act accordingly. Persons with low scores are doubtful about their own worth, see themselves as undesirable, often feel anxious, depressed, and unhappy and have little faith or confidence in themselves (12).

In terms of age and sex with regard to the TSCS, the manual states that the evidence so far suggests that there is no need to establish separate norms by age, sex, race or other variables (12). Wylie concluded that there is no clear evidence of any association between chronological age (6-50) years and scores on this scale (54). Neither does she find adequate evidence for concluding remarks regarding a relationship between sex and the TSCS scores.

Fitts reported in his manual of a study that sought to evaluate the effects of a tranquilizing drug on self-concept (12). The study showed symptomatic and behavioral improvements, but no significant change in
self-concept. He concluded that one cannot generalize much from such limited findings, but the implication is that one's self-concept is so basic that it does not readily change even though one begins to feel and act differently. He goes on to say, however, that there is considerable evidence that people's concepts of self do change as a result of significant experiences. Some light was shed on this area in a study that established that an inverse relationship existed between the amount of change in a student's life and his self-concept (23). This relationship indicated that high change was related to lower self-concept and low change was related to higher self-concept. But no significant relationship was found between the amount of change in a student's life and the total variability of one area of self perception to another.

Robinson and Shaver found that the TSCS is an instrument capable of providing a thorough clinical profile of a person's self-concept (43). They felt that the use of several subscores should be encouraged to give a full picture of the self-concept and that Fitts' own material on the scale in the form of a monograph series was useful. Conversely, in an empirical analyses of the TSCS, Pound, et al. concluded that as much information about self-concept can be obtained from the Total-P score as can be extracted from the combined subscales (40).
The Astrand Adaptation of the Harvard Step Test

This test entails stepping on and off a bench (13 inches high for women and 15 and 3/4 inches high for men) to the beat of a metronome set at 90 beats a minute. After five minutes, the subject's pulse is taken and fitness scores are computed with a formula using the subject's post-exercise pulse rate, sex, body weight and age. The Astrand Step Test predicts physical fitness in the form of maximum oxygen uptake, or the ability to take in, transport, and use oxygen. The most accurate measure of maximum \( O_2 \) uptake is taken during a treadmill stress test. However, this method is extremely time consuming and the step test is more time efficient and correlates well with the treadmill test (47).

Astrand found that this test is an indication of \( VO_2 \) uptake which correlates very well to the more accurate treadmill test, but that there is a tendency to underestimate at low values and to overestimate at high values (28). A bias toward underestimating the true \( VO_2 \) maximum uptake is greater in the very unfit individual.

The Physical Activity Index

The PAI rates the subject's level of physical activity based on three factors: intensity, duration, and frequency of activity. A score for each factor is assessed and the
three figures are multiplied to reveal an actual activity level score.

Fitness Program

The fitness program was a physical education course designed to focus primarily on aerobic conditioning (walking, jogging and running). Each workout session consisted of stretching, calisthenic warm-ups, a run-walk program tailored to each subject's level of fitness, and a cooling down period at the end of the class. The subjects exercised with a group leader for one hour a day on Monday, Wednesday, and Friday for ten weeks, increasing their running times and distances regularly. In addition, each participant kept a log of all other extracurricular activities. Since the program was offered as a university course, two class sessions were set aside to discuss implications of training, such as training zone heart rates, body fat and weight training.

Workouts were held in the University Field House on cold or rainy days, where subjects ran and/or walked laps or ran stairs. On nice days, the group went outside and worked out on the fitness trail adjacent to the Field House and ran laps and worked at some of the fitness stations. Some days the group was divided and people who were capable of running longer distances ran a 2 and 1/2 mile course with one group leader and the others did a shorter and more
varied workout with another leader. Three examples of subjects' progression of distance and workouts are listed below:

**Low-fit subject** - could run one indoor lap at first (1/10th mile). An early workout included running one lap, walking one lap, and running another half lap and walking for a cool down. By the end of the program, this subject could run 1/2 mile, walk 1/4 mile to recover and run another 1/2 mile.

**Medium-fit subject** - could only run 1/2 mile at the beginning of the program. A beginning workout included running 1/2 mile, walking until recovered, and running 1/2 mile more. By the end of the program, this subject could run 2 and 1/2 miles continuously.

**High-fit subject** - could run from one to three miles at the beginning of the program. This subject always tried to run three miles in class, constantly working on time. By the end of the program, she was running 65 to 110 minutes nonstop.
Chapter 4

DATA ANALYSIS, RESULTS AND DISCUSSION

The TSCS scores, the Astrand Step Test scores, and the PAI scores were pertinent data in this study. The study was primarily interested in differences between pretest and posttest scores. The researcher hypothesized that subjects in the experimental group would demonstrate an increase in their levels of self-concept and fitness and that there would be a significant positive correlation between these variables.

An ANOVA with repeated measures determined the significance of the several measures. This analysis method ascertained if significant improvement occurred in the Total-P score on the TSCS from pretest to posttest in the control or experimental group. The analysis also determined if any of the TSCS subscales improved significantly within the two groups. Too, the ANOVA ascertained significant changes in the Astrand Step Test scores or PAI scores. The ANOVA also determined significance in the mean difference between the experimental and control groups. All of the Total-P scores were analyzed at a later date using a repeated measures design with proportional cell frequencies. The ANOVA and Pearson Product Moment Correlation involved 22 variables:
pretest and posttest scores for the Total-P scores on the TSCS, three row and five column subscale scores on the TSCS, the Astrand Step Test scores, and the PAI scores. The .05 level of significance was employed in all analyses.

There was no significant improvement in the Total-P score on the TSCS with the ANOVA or repeated measures design; however, moral-ethical self subscale improved significantly from pretest to posttest (pretest $\bar{x} = 71$; posttest $\bar{x} = 74$; $p = .01$). It also improved significantly within the control group (pretest $\bar{x} = 68$; posttest, $\bar{x} = 73$; $p = .02$). (See Figure 1.) This significant improvement on the moral-ethical self subscale within the control group was unexpected and unexplainable. One could speculate that because control group subjects were initially interested in the course but could not attend, perhaps they felt virtuous when returning for the posttesting and thus helping out in some way.

No significant change in the Astrand Step Test scores was demonstrated; however, the ANOVA revealed that the control group scored significantly higher on the Step Test than the experimental group (experimental, $\bar{x} = 36$; control, $\bar{x} = 49$; $p = .01$). The higher pretest Step Test scores of the control group revealed that less-fit individuals chose to participate in the program.

The PAI scores demonstrated good experimental control with significant differences from pretests to posttests.
with the posttests significantly higher (pretests, \( \bar{X} = 34 \); posttests, \( \bar{X} = 50 \); \( p = .03 \)). This was the kind of result hoped for. A significant interaction between the experimental and control groups was found (see Figure 2). The control group started at a higher level of activity (\( \bar{X} = 47 \)), but went down slightly over the duration of the program (\( \bar{X} = 45 \)). The experimental group started at a lower level (\( \bar{X} = 22 \)), but it was significantly more active by the end of the program (\( \bar{X} = 55 \); \( p = .02 \)). Physical activity level improved most significantly for the experimental group. The control group was at a higher level of activity at the beginning of the program, but it was significantly lower than the experimental group by the end of ten weeks. This indicated that the program had a definite effect on activity level.

The Pearson Product Moment Correlation produced 15 significant correlations among the 22 variables. Three of these correlations were directly related to the hypothesis that there would be a significant positive correlation between self-concept and physical fitness. While the Total-P self-concept scores and the Astrand Step Test scores were not significantly correlated, the identity subscale and the Astrand Step Test scores were significantly correlated (\( r = .471 \) on pretest scores). Also, the Step Test scores and physical-self subscale were positively correlated for pretests (\( r = .717 \)) and posttests.
Figure 1

Moral-Ethical Subscale

Summary Table

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<th>df</th>
<th>F-ratio</th>
<th>P</th>
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<td>0.16</td>
</tr>
<tr>
<td>J</td>
<td>57.1429</td>
<td>1</td>
<td>11.374</td>
<td>0.01</td>
</tr>
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<td>7.280</td>
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<tr>
<td>Error I</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Error II</td>
<td>54.9762</td>
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<td>TOTAL</td>
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<td>27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A: Experimental/Control
J: Pre/Post
AJ: Interaction

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Figure 2

Physical Activity Index

Summary Table

<table>
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<tr>
<th></th>
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<th>Sum of Squares</th>
<th>df</th>
<th>F-ratio</th>
<th>P</th>
</tr>
</thead>
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<td>0.32</td>
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<td>5.815</td>
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</tr>
<tr>
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<td>7.675</td>
<td>0.02</td>
</tr>
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<td></td>
</tr>
<tr>
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<td>283.893</td>
<td>12</td>
<td></td>
<td></td>
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<td>27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(r = .512). These results indicated an improvement in subjects' identity and perception of physical-self with an increase in level of fitness.

Four significant negative correlations of posttest PAI scores with posttest TSCS scores were computed: PAI/Total-P (r = -.517), PAI/identify subscale (r = -.499), PAI/personal-self subscale (r = -.625), and PAI/social-self subscale (r = -.643). These correlations were unexpected and can probably be attributed to one experimental subject's severe drop in self-concept scores across all subscales.

Study Delimitations

Two aspects of this study seriously confounded the statistical results. This required cautious and conservative interpretations.

1. The subjects were volunteers. This presented three problems: (1) an all-female experimental group, (2) an uneven control group of five males and two females, and (3) no opportunity to pair experimental and control subjects for variables such as sex, activity level, age, weight, etc.

2. The ten-week fitness program was severely
interrupted for four consecutive work-outs during the seventh week due to the eruption of Mount St. Helens and resultant volcanic ash fallout.
Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This ten-week aerobic conditioning program did not significantly affect self-concept or levels of physical fitness. The study did, however, find positive correlations between level of fitness and two self-concept factors on the TSCS subscales: identity and physical-self. The study was effective in increasing the activity level of the participants in the experimental group who seemed to be positively affected by the program.

There was no change in total self-concept as a result of the physical fitness program and there was no direct correlation between self-concept and level of fitness. This supported data reported by Leonardson and Garguilo (31), Rainey (41), Jones (25), and Saipe (45). Neal also reported no change in self-esteem due to a physical fitness program (36). Perhaps further study is required as per Saipe's suggestion that cognitive structure is changed by subject interpretation of a program as much as or more than the conditioning factor. Also as noted by Brown, Ramirez and Taub (5), frequency and duration of fitness programs play a significant role in affecting personality changes in persons involved in fitness programs. Perhaps this program was geared at a frequency and duration incapable of
providing a significant growth experience.

The positive correlation of the identity subscale with Step Test scores supported Wescott's (52) research which also found increases in identity scores with participation in a fitness program. The subjects' increases in physical-self scores with an increase in level of fitness supported Heaps (19), who believed benefits arise from emotional perception of the physical and personal value of continued exertion.

No explanation as to why more men dropped out of the experimental group than women can be ascertained at this time. This may be related to Bolton and Renfrow's conclusion that there is a substantial divergence between motivational factors for men and women in the adoption of an aerobic conditioning program (4).

In keeping with the reports of other studies and testimonies, subjects in this study said they felt better. One subject reported that the workout left her feeling high all day and that the program improved her self-confidence. Another female subject felt better and reported waking earlier and enjoying it.

One participant, the most physically fit, had the greatest increase in physical activity level, yet her self-concept score fell drastically. While this was contradictory to the literature, the subject later revealed that her family was not doing well financially and that
running kept her from plunging to even lower emotional depths.

Another subject, one of two low-fit individuals at the beginning of the program, registered one of the three lowest scores on the TSCS. By the end of the program, her fitness level had improved two complete levels and her self-concept improved 47 points. She said she felt better, the program was something to look forward to and it gave her more energy. The college students she worked with offered spontaneous comments on the positive changes in her behavior and personality.

Although the data did not demonstrate a direct positive effect of a physical fitness program on self-concept, they did demonstrate a positive correlation between level of fitness and perceptions of identity and physical-self, and appears to have positively affected the quality of some subjects' lives. The data might have reached or approached significance with a larger sample size and a continuous, uninterrupted program.

A similar study could be conducted employing a larger sample with equal numbers of males and females in both control and experimental groups with an effort made to pair subjects for age to obtain more suitable data. It might also prove beneficial to incorporate more than one level of fitness program to test for effects of frequency, duration and intensity of training as well. Implementing more than
one test for fitness and measuring self-concept would lend
greater validity as well. Polkins and Sime found these
kinds of studies often have problems with internal validity
and suggest that once a group of motivated subjects has
been identified, a random assignment procedure is
imperative (14). They, too, suggest variations in duration
and intensity of exercise programs and suggest that
documentation of cardiovascular functioning is one approach
to greater standardization of exercising effects.

The experimenter also found that students in a women's
weight training class evidenced significantly higher
Total-P scores on the TSCS (\< .05) after a ten-week course
than did women in the aerobic course. This suggests
another relatively unexplored area of fitness and
self-concept.
APPENDIX A

Instruments
A 10 week program comparing fitness, depression and self-concept.

You will be engaged in an exercise program three days a week for one hour per day lasting ten weeks. Exercising will consist of running, weight training, games, and other activities concentrating on aerobic fitness at the sub-maximal level. Certain tests of physical condition will be administered before and after the 10 week exercise program. Blood pressure, resting heart rate, body fat, weight and an estimation of the body's ability to use oxygen (step test), will be among the tests administered. Also, before and after the exercise program, two depression scales (Zung and Beck) and one self-concept scale (Tennessee) will be administered. The changes in all these measurements will be correlated after the program to see if any relationship exists.

The only discomforts that are anticipated are the same as those associated with any fitness or exercise program. You will be allowed to advance at your own rate and are able to withdraw from the program at any time without any fear of adverse reactions or from the program staff.

A gain in aerobic fitness and strength may be expected if you work at and participate in the program. These gains have been associated with a lower risk of coronary heart disease, lowering of blood pressure, lowering of body fat, gain in aerobic endurance, an improved self concept and a lowering of total anxiety. While associated, these relationships are not proven to be cause and effect.

If further explanation of the program is wanted, please feel free to ask the instructor at any time. If you have any problems in types of exercises selected, suitable alternatives will be added, for example, the substitution of bicycling for running. All information given in the program will be kept confidential and if you desire, you may have the information destroyed at the completion of the program. Thank you for your voluntary participation in this program.

Program Coordinators

Craig Montagne
Cathy Prinslow
Tom Cotner
I have read and understood the above and agree to participate in this program.

____________________  __________
Signature             Date
Physical Activity Index

Name __________________________ Date _____________

Circle your score for each category

<table>
<thead>
<tr>
<th>Score</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Sustained heavy breathing and perspiration</td>
</tr>
<tr>
<td></td>
<td>Intermittent heavy breathing and perspiration-</td>
</tr>
<tr>
<td></td>
<td>as in tennis.</td>
</tr>
<tr>
<td>4</td>
<td>Moderately heavy - as in recreational</td>
</tr>
<tr>
<td></td>
<td>sports and cycling.</td>
</tr>
<tr>
<td>3</td>
<td>Moderate - as in volleyball, softball.</td>
</tr>
<tr>
<td>2</td>
<td>Light - as in fishing, walking.</td>
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<tr>
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<table>
<thead>
<tr>
<th>Duration</th>
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<td></td>
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<td></td>
<td>3</td>
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<td></td>
<td>2</td>
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<td>Under 10 minutes</td>
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<table>
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<th>Score</th>
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<tr>
<td></td>
<td>5</td>
<td>Daily or almost daily</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>3 to 5 times a week</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1 to 2 times a week</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Few times a month</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Less than once a month</td>
</tr>
</tbody>
</table>

Score = Intensity x Duration x Frequency

Score = _______ x _______ x _______ = _______

Adapted from Sharkey, 1977
ADULT FITNESS - ACTIVITY LOG

<table>
<thead>
<tr>
<th>Date</th>
<th>Exercise</th>
<th>Duration</th>
<th>Intensity</th>
<th>Date</th>
<th>Exercise</th>
<th>Duration</th>
<th>Intensity</th>
</tr>
</thead>
</table>

(1) Duration - When figuring the time spent engaging in an activity, don't include the time when you are doing nothing or just standing around.

(2) Intensity - 5 - Sustained heavy breathing and perspiration - fast running.
4 - Intermittant heavy breathing and perspiration - tennis, raquet sports.
3 - Moderately heavy - cycling, soccer.
2 - Moderate - volleyball, softball.
1 - Light - fishing, walking.
APPENDIX B

Raw Data
RAW DATA #1: Experimental Group

-------- TSCS Scores --------

<table>
<thead>
<tr>
<th>Subject #</th>
<th>P</th>
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<th>2</th>
<th>3</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Step Test</th>
<th>PAI</th>
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<tr>
<td>01</td>
<td>323</td>
<td>116</td>
<td>104</td>
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<td>75</td>
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<td>70</td>
<td>40</td>
<td>48</td>
</tr>
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Key:  
P = Total Positive Score  
1, 2, and 3 = Row Scores (Identity, self-acceptance and behavior)  
A, B, C, D, E = Column Scores (Physical, moral-ethical, personal, family and social)
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