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A Case Study Report of 29 South Dakota State College Freshman Men with Low Physical Fitness Indices

Jack K. Richardson

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A CASE STUDY REPORT OF 29 SOUTH DAKOTA STATE COLLEGE
FRESHMAN MEN WITH LOW PHYSICAL FITNESS INDICES

By

Jack K. Richardson

A thesis submitted in partial fulfillment of the requirements for the degree Master of Science at South Dakota State College of Agriculture and Mechanic Arts

July, 1957
A CASE STUDY REPORT OF 29 SOUTH DAKOTA STATE COLLEGE

FRESHMAN MEN WITH LOW PHYSICAL FITNESS INDICES

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Adviser

Head of the Major Department
ACKNOWLEDGEMENTS

The writer wishes to express appreciation to Doctor Campbell Snowberger, director of graduate study in the Department of Physical Education and Recreation at South Dakota State College, for the many helpful suggestions and the interest shown in this study.

The author is particularly indebted to his wife, Darlene, whose constant cooperation, assistance, and encouragement made this study possible.

Appreciation is also given to the 29 subjects who participated in the case studies, to the graduate students who assisted with the testing, and to the Department of Physical Education, South Dakota State College, for the use of the necessary testing equipment.

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CHAPTER I

THE PROBLEM

Introduction

The subject of physical fitness has been the concern of many people, especially since World War II. This has also been a controversial problem when physical education leaders get together to discuss the objectives of this field of physical education in the school program. We do know that the curriculum in physical education should be so developed to provide for the present and future needs of the child as far as biological development and maintenance is concerned. This knowledge leads us to what man considers to be the most basic objective of our program, physical fitness. At this point much controversy can develop from a discussion of a definition of physical fitness.

Physical fitness has been defined in many ways by different leaders in physical education. Clarke defines physical fitness as:

The development and maintenance of a sound physique and of soundly functioning organs, to the end that the individual realizes in an optimum measure his capacity for physical activity as well as for mental accomplishments, unhampered by physical drains or by a body lacking in physical strength and vitality.¹

McCloy² in his definition lists six aspects of good physical fitness—


heredity of vital organs, good health, good hygienic habits, physical conditioning, endurance, and body flexibility.

Cureton states that "...physical fitness means ability to handle the body well and the capacity to work hard over a long period of time without diminished efficiency."³ Forsythe and Duncan sum up their definition as: "The development of the physical characteristics of endurance, strength, power, balance, flexibility, and coordination."⁴

These definitions of physical fitness tend to agree with the definition by the Joint Committee of the American Medical Association and the American Association for Health, Physical Education, and Recreation, which says: "A person physically fit will have enough strength, speed, agility, endurance, and skill to accomplish the maximum tasks that the day may bring."⁵

Another indication of the importance of physical fitness in the United States can be attributed to the fact that President Eisenhower, in June, 1956, called a conference to discuss the fitness of American youth. At this conference the total fitness of all America's children and youth was discussed by 150 leaders in the field of sports, education, youth programs, recreation, health, and related areas. It was the feeling of this group that more should be done to help youth become more

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physically fit and better qualified to face the requirements of modern life.

Recently, the Nation's attention was focused on the problem of physical fitness as the result of a study made by Kraus and Hirschland in which they compared the physical fitness of American children with that of European children. In this study it was indicated that American children are much inferior to the European children.

In the keynote, opening address, of a recent physical fitness conference on American youth, Vice-President Nixon expressed the objectives of an adequate physical fitness program when he said:

 We are not a nation of softies but we could become one, if proper attention is not given to the trend of our time, which is toward the invention of all sorts of gadgetry to make life easy and in so doing to reduce the opportunity for normal physical health-giving exercise.

The objective of an adequate physical fitness program can be summed up in one word—participation—participation on the part of every boy and girl in America in some form of healthy recreational and physical activity.

The super athlete is not our primary concern. He will take care of himself. It is the boy or girl with ordinary physical abilities who should receive the major share of our attention.

Neither is our primary concern the development of physical fitness in itself. Everyone agrees that the person who has physical fitness enjoys a healthy mental outlook and a general feeling of bodily well-being. Physical activity relieves emotional strain under which we live and relieves the pressure of our highly productive lives.

All studies of this problem indicate that an obvious by-product of an adequate physical fitness and recreational

program for America's youth will be a reduction in the rate of juvenile delinquency.

The need for the conference is shown by such facts as these:

Less than 50 per cent of our boys and girls in high school have physical education.

Ninety-one per cent of the nation's 150,000 elementary schools have no gymnasium.

Only 1,200 of our 17,000 communities in the United States have full time recreation leadership.

Forty per cent of those persons entering the Armed Forces in World War II were unable to swim as far as 50 feet.

Drownings between the ages of 5-14 are second only to motor vehicles in accidental deaths.

Most drownings occur within 15-20 yards of some point of safety.

Less than five per cent of our youth have had the opportunity to enjoy the experience of camping and outdoor living.

Ninety per cent of the nation's elementary schools have less than the recommended five acres of land necessary for essential play areas.

There is also a recent increase in the emphasis of physical fitness testing. Several important factors have stimulated the growth. The first of these is one of prime importance. America was startled to find a high percentage of men examined for military service during the First and Second World Wars were physically unfit. The Korean War brought stories of lives being lost because troops were poorly conditioned to carry out their duties. It is realized that if anything is to be done about this problem we must test our children in their growing years and

---


8 The author realizes that physical education could do very little to eliminate many of the causes of rejection from military service, as; eyesight, hearing defects, etc.
make curricular changes as are indicated by the results of the testing.

Research has shown that physical fitness is related to adequate social and personality adjustments and to mental accomplishments. Sperling stated in his study that "... a more socially desirable degree of personality development accompanies a greater degree of experience in physical education activities." In a study at Syracuse University, Page found that college men of low fitness were "... definitely below the average in social adjustment." He also concluded that improvement in physical ability does favorably influence personality.

The building of muscles does not mean a person is physically fit. Even though strengthening exercises are important in a developmental program, the results obtained go beyond this apparent phase of the process. Along with increasing strength there is an increase in organic vigor, stamina, poise, and an improved mental outlook. "Necessarily, then, bodily strength must always be of primary concern to the physical educator, as upon it depends the individuals ability to learn physical skills, to maintain body vigor, and to resist fatigue."11

The great educator John Locke once said in his book, Some Thoughts Concerning Education, "A sound mind in a sound body is a short but full description of a happy state in this world. He that has these has little


more to wish for, and he that wants either of them will be but little the better for anything else. " Plato, also maintained "... the necessity of a sound interaction between body and mind as the basis of all education."^{12}

When one considers the type of physical education programs offered in many parts of the country, he wonders what the physical fitness status is of our own South Dakota children. It was with this thought in mind that the physical fitness testing program was launched at South Dakota State College.

**Statement of the Problem**

In the last quarter century the life of the agrarian people of South Dakota has changed from one of heavy physical activity to one which could be described, in comparison, as sedentary. The children have quickly become attracted to this easier life and have progressively made life even less active, physically. It is common knowledge that a growing child must have strenuous activity for complete biological development. It is the responsibility of the school to provide the child with a complete education which takes care of his physical, social, emotional, as well as his mental needs. As one looks in on the public schools of South Dakota, he would suspect that physical education is not carrying its load. This defect of South Dakota public schools was one of the reasons which caused the author to attempt this study.

The purposes of the study are:

1. To determine the change in the physical fitness indices of 29

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low physical fitness individuals after a nine week program of
developmental physical education.

2. To determine any change in grade point average for these 29
low physical fitness individuals after completing this develop-
mental program of physical education.

3. To make a comparison, by percentile rank, for the American
Council on Education scores and the physical fitness indices.

4. To determine the relationship between the basal metabolism
rate and the physical fitness index.

5. To determine the home, health, social, and emotional adjust-
ment of men students with low physical fitness indices.

6. To determine by use of the interview method what personal in-
formation might be elucidated from these low physical fitness
students.

7. To attempt to find some of the probable causes of low physical
fitness.

8. To make suggestions for revision and improvement of the re-
quired physical education program as the findings might indi-
cate.
CHAPTER II

RELATED LITERATURE

The idea of using strength tests as a measure of physical condition is not new, nor is it new to combine strength tests into a formal battery for the purpose of measuring athletic ability. Sargent, in 1880, proposed such a battery in which the individual elements making up athletic ability were measured by calibrated mechanical instruments. It was not until 1925, at which time, Dr. Frederick Rand Rogers standardized testing procedures and developed norm tables for their interpretation, that the relationship between physical condition, athletic performance, and muscular strength was demonstrated. His study was expanded so that the final score, the strength index (predicting potential athletic ability) was divided by a norm based upon the individual's sex, weight, and age. The resulting quotient, the physical fitness index (PFI), became a measurement of general physical fitness.

The physical fitness index battery as Rogers developed it consisted of four muscular strength tests: right grip, left grip, back lift, leg lift; two muscular endurance tests: push-ups, pull-ups; and lung capacity; seven in all. A physical fitness index of 100, according to Rogers, is considered average for the national population.

13 Dudley A. Sargent, "Relation of Height, Weight, and Strength to the Cephalic Index," Scientific American Supplement, XLIX, June, 1900, pp. 20463, 20464.

Probably the biggest single improvement in the physical fitness index testing technique was produced by Everts and Hathaway\(^1\) when they designed a four inch wide web belt for use in measuring leg strength. It necessitated the establishment of new national norms. Rogers estimates that the belt technique "... increased the validity of the strength index as a measure of general athletic ability by ten to fifteen per cent and of the physical fitness index as a measure of general health and endurance by possibly fifteen per cent."\(^2\)

In supporting the physical fitness index as a measure of fitness Rogers claims, "A logical deduction will serve to indicate the significance of strength tests as measures of general physical fitness:

1. Since large muscle activity improves general fitness, and

2. Since large muscle activity affects the strength of the active muscles, therefore

3. A measure of the strength status of muscle fibers is also a measure of the fitness status of the vital organs which determine the health of the body."\(^3\)

In validating the physical fitness index as a measure of physical fitness, Chamberlain and Smiley\(^4\) selected at random a group of 65

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\(^{2}\)Frederick Rand Rogers, "The Evaluation of Physical Fitness Index Tests and Programs," *Education*, VI, April, 1940, p. 538.


Cornell University students. The Rogers' Physical Fitness Test was administered to these students. The staff of university physicians gave the students a careful physical examination upon which estimates of their health status were based. In this group, 52 of the 65 students were given the same classification in both the physicians' estimates and the Rogers' Physical Fitness Test, an 80 per cent agreement.

The correlation between the two ratings was $0.60 \pm 0.05$, although the true correlation is probably $0.65$ or above, owing to the fact that it was possible to use only three class intervals in making the computation. This correlation is highly satisfactory when it is remembered that it compares well with physicians' estimates of other health factors.

Moreover, the correlation coefficient between medical ratings and physical fitness indices is twice as significant as between teachers' judgments of intelligence and intelligence quotients as derived from tests.\(^1\) Scores on the Stanford Revision and Extension of the Binet-Simon Intelligence Scale correlate $0.48$ with teachers' judgment of intelligence. Clarke reduces this comparison to "predictive indices" as follows:

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Thus a judgment of medical ratings and physical fitness index regarding physical fitness will be correct 24 per cent of the time while judgment of teachers' ratings and the best intelligence test will be right 12 per cent.


percent of the time.

Additional evidence to support the validity of the physical fitness index in revealing physical condition is as follows:

1. **Significance of a change in strength:**
   There are many cases on record showing the significance of a change in strength to a change in physical fitness. In these studies the hand dynamometer was used to make a daily record of grip strength, and any definite changes that occurred were investigated. The causes found included intestinal parasitism illness, under nourished conditions, and physical drains.

2. **Case studies of low physical fitness index:**
   A mass of material contained in case studies of pupils with low Physical Fitness Indices gives considerable evidence of the significance of the physical fitness index in revealing physical condition. There are many cases on record in which low or declining physical fitness indices have indicated the presence of organic drains within the individual. Such conditions as the following have been discovered: thyroid deficiency, ulcer, emotional disturbance, syringomyelia, cancer, tuberculosis, and worry. Subsequent improvement in strength scores following effective treatment was a typical experience. These case studies give evidence of the importance of the physical fitness index in determining physical condition.  

There are a number of studies that support the contention that physical fitness is related to mental achievements. In 1922 Rogers at Stanford University studied two groups of students with nearly equal intelligence quotient averages, but differing greatly in average muscular strength. The scholarship of the high strength group which had an average intelligence quotient of 107 was considerably superior to the low strength group which had an average intelligence quotient of 111.  

The Brookline, Massachusetts, public schools in its annual report }

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21 Ibid., pp. 158-164.

for 1941 reported the average physical fitness indices by classes for the 126 boys whose names appeared on the high school scholarship roll were as follows: sophomores, 116; juniors, 116; and seniors, 117.  

Page 24 at Syracuse University found, for the year 1939-40, that 83 per cent of the freshman male students dismissed from the university because of low grades had physical fitness indices below 100; 39 per cent had physical fitness indices below 85. These same students had scholastic aptitude scores on standard tests well above the average score.

Rogers has contended that physically unfit boys and girls at all levels of intelligence have greater difficulty in maintaining mental efforts and alertness; and he has proposed the following law of General Learning Capacity: "The capacity to learn anything depends on both intelligence and physical fitness; generally physical fitness is twice as conducive to learning as is intelligence."  

This law is interpreted to mean that an individual's general learning capacity for a given level of intelligence is increased or decreased in accordance with his degree of physical fitness (physical fitness index).

Goefield and McCollum in a case study report of 78 University
of Oregon Freshman men with low physical fitness concluded there was an apparent relationship between scholastic achievement and improvement in physical fitness index. For this group the initial physical fitness index median of 80.6 rose to 93 after a seven week conditioning program. At the same time the grade point average of 1.84 for the low physical fitness index group improved 14.1 per cent as compared to the initial grade point average of 2.45 for university men as a group which rose 3.5 per cent.

The relationship between athletic participation and desirable social adjustment has been established by past investigations, but the assumption that there is a relationship between physical fitness index and social adjustment has not yet been proved. Coefield and McCollum,27 using the Washburne Social Adjustment Inventory, concluded that students of the low physical fitness category were below average in social adjustment. Page28 using the same inventory drew similar conclusions. Conversely, Weber,29 using the Minnesota Multiphasic Personality Inventory, reports that there is no relationship between physical fitness ratings and adjustment scores.

27 Ibid.
28 Page, loc. cit.
CHAPTER III

COLLECTION OF THE DATA

The Sample

All undergraduate men enrolled in the required general physical education course at South Dakota State College in the fall quarter of 1956 were given the Rogers' Physical Fitness Index Test. From these results it was noted there was a large per cent of students with low physical fitness indices. During the winter quarter, 75 students enrolled in two sections of physical education offered at the same hour. These 75 students were re-tested with the Rogers' Physical Fitness Index Test and those who had a physical fitness index below 90 were selected as the sample for this investigation. The 29 subjects used for these case studies were placed in a special developmental program. This class met for a one hour period twice a week during the winter quarter. At the end of the developmental program their physical fitness index was again ascertained.

The core of the conditioning program consisted of the following:

Twelve exercises and the order in which they were given:
1. High jumper
2. Bend and reach
3. Squat thrust
4. Rowing exercise
5. Squat bender
6. Push-up
7. Side bender
8. Body twist
9. Squat jumper
10. Truck twister
11. Stationary running
12. Eight count push-up

In applying these exercises, the beginning dosage was five repeti-
tions of each exercise; one repetition was added each week until a maximum of 15 had been reached. Every class period was preceded by a warm-up of running three laps around the perimeter of the gymnasium floor.

Weight lifting was also included in the program. A weight totaling one-fourth of the subject's body weight constituted the starting dosage. At least ten pounds were added each two weeks. The following three bar-bell exercises, designed to strengthen the shoulder girdle were given in the order listed:

1. Four repetitions of the two arm curl repeated four times with brief rest after each series of four repetitions.

2. Four repetitions of the military press repeated as in number one.

3. Four repetitions of the rowing motion repeated as in number one.

In a day's program were also included games of low organization and endurance, work on apparatus and rope climbing, and game activities such as basketball.

The Testers

The investigator did all of the testing and interviewing except for the physical fitness test. The administration of the Rogers' Physical Fitness Test was performed by the graduate students enrolled in the department of physical education at South Dakota State College. All the testers had previously assisted with the fall physical fitness testing of 540 undergraduate men. This work involved an entire week at the beginning of the fall quarter. All physical fitness testing was done under the direct supervision of Dr. Campbell Snowberger, director of graduate study in the
The Method of Research

The case study method used in this investigation was patterned after the procedure outlined by Clarke. The gathering of data involved two phases, the testing and the personal interview phase. The personal interviews were based on the information obtained through the tests, and an attempt was made through interrogation to determine the prime cause or causes of the students' low physical fitness. This procedure is described below.

The Data

Physical Fitness Index Scores: The following test items composed the physical fitness index test battery:

1. Lung capacity: measured in cubic inches with a wet spirometer.

2-3. Right and left grips: pounds of strength applied to a manometer.

4-5. Back and leg lifts: pounds of strength applied to a dynamometer.

6-7. Pull-ups and push-ups: number of chins on a high bar and number of dips on the parallel bars, combined by a formula based on body weight and height to obtain arm strength.

The testing techniques and physical fitness index scoring followed in accordance with those described by Clarke.

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31 Ibid., Chapter 8.
The Bell Adjustment Inventory: The second week following the initial physical fitness index testing, each man was given the Bell Adjustment Inventory. Complete with national norms, it provides four separate measures of personal and social adjustment: (1) Home Adjustment, (2) Health Adjustment, (3) Social Adjustment, (4) Emotional Adjustment.

The measurement of four types of adjustment permits location of specific adjustment difficulties. A total score is provided to indicate the general adjustment status. The individual is rated by the following description:

- Excellent
- Good
- Average
- Un satisfactory
- Very Un satisfactory
- Very Aggressive
- Aggressive
- Average
- Retiring
- Very Retiring

The coefficients of reliability for each of the four sections of the inventory and for its total score are as follows: (N = 258)

- Home adjustment: .89
- Social adjustment: .93
- Health adjustment: .89
- Emotional adjustment: .85
- Total Score: .89

American Council on Education Psychological Examination: The purpose of the American Council on Education Psychological Examination


is to appraise what has been called scholastic aptitude or general intelligence, with special reference to the requirements of most college curriculum.

The test results are useful in handling those problems in which it is advisable to distinguish a student's mental abilities from his high school preparation and his industry. The advisor's action in the case of a student who is failing can be intelligently guided if he has some means of knowing how his mental abilities rate.

The examination which has been used for several years consists of the six tests. The order of the tests has been arranged to alternate linguistic and quantitative tests because of the fatigue element. All of the tests have been included in several test experiments with factorial analyses to determine the primary mental abilities. These studies by the American Council on Education have justified the grouping of the six tests in two general classes as follows:

Quantitative Tests: (the Q-score)  Linguistic Tests: (the L-score)
Arithmetical Reasoning  Same-Opposite
Number Series  Completion
Figure Analogies  Verbal Analogies

Norms for the interpretation of scores have been prepared by the Cooperative Test Division of the Educational Testing Service on the basis of the reports sent in by the colleges using the test. Tables of percentile ranks are given for the three sets of scores: (1) the Q-scores, which represent ability to think in quantitative terms; (2) the L-scores, which depend upon linguistic ability; and (3) the total scores, which involve both abilities. It is these total scores that the author used
Rather frequently, inquiry is made about the translation of test scores into intelligence quotients and mental ages. Mental ages and intelligence quotients do not exist for these tests. The intelligence quotient is, by definition, the ratio of the mental age to the chronological age. The mental age equivalent of a test performance is the chronological age for which that test performance is the average. It follows from this definition that mental ages and intelligence quotients are indefinite for the upper half of the adult population. If a person scores above the average for adults in a psychological examination, then there exists no age for which his score is the average. College students can be assumed to score above the average for the adult population of the country, and, consequently, they cannot be assigned any mental ages or intelligence quotients. This is not a debatable question. It is a question of very simple and straightforward logic.34

Office of Admissions and Records: The Office of Admissions and Records personnel furnished the author with important information concerning the results of the American Council on Education psychological examination administered with the entrance examinations. Grade point averages and standings, individuals who were no longer enrolled at the college, and persons whose disciplinary behavior in the nature of absences might give some indication for the specific case study were also furnished.

Basal Metabolism Rate (BMR): The resting metabolism rate (basal lying) is of some value as an indicator of fitness. Since the lying

34 Ibid.
metabolism tests are predictable fairly close from blood pressure and pulse rate data simultaneously taken, the meaning of the basal metabolism rate on normal individuals is quite well understood. The best known equations for prediction of the basal metabolism rate are as follows:

1. The Gale Equation: Based on 1,006 subjects of all kinds, the Gale equation for basal metabolism rate gives a score which correlates moderately well with the actual basal metabolism rate. The formula is as follows:

\[
\text{BMR (in raw scores)} = \text{pulse pressure} + \text{pulse rate}
\]

This Gale equation has been quite fully explored with 110 normal young men in Cureton's 1947 work and it correlates .193 with a composite twenty-two item criterion of other fitness tests, .025 with a three-item motor performance criterion, and .253 with the five-minute-step test.

2. Read Equation: Read made three hundred observations on adult males and females and derived the following equations:

\[
\text{BMR (in raw scores)} = .75 \text{pulse rate} + .56 \text{pulse pressure} - 72
\]

\[
\text{BMR (in standard scores)} = .39 \text{pulse pressure} + .52 \text{pulse rate}
\]

\[ R = .77 \]

3. Jenkins Equations: Jenkins derived the following equation

---


36 Cureton, op. cit., pp. 251, 288-90, 541.


after testing 364 men:

\[
\text{BMR} = 0.534 \text{ pulse rate} + 0.436 \text{ pulse pressure} - 62.55
\]

This equation gave a result which correlated \(0.73 \pm 0.029\) with the measured BMR compared to \(0.64 \pm 0.036\) for Read's formula and \(0.68 \pm 0.033\) for pulse rate + pulse pressure. (Erlanger-Hooker Equation for blood flow)

In these three equations it is obvious that faster pulse rates will produce higher basal metabolism rates and it is recognized that men with relatively lower pulse rates will have lower basal metabolism rates. Such men with lower pulse rates are usually in better physical condition, because the influence of training tends to lower the pulse rate. Higher pulse pressure is usually correlated with better endurance, and this part of the equation would cause the basal metabolism rate to correlate positively with endurance.

Harris and Benedict\(^39\) reported in their study that athletes averaged a 7.24 per cent higher basal metabolism rate than the average for the entire sample. Zuntz and Schumberg\(^40\) trained two subjects in marching with 31.5 kilogram packs, 24.75 kilometers daily for two and one half months. The basal metabolism rate increased 3.4 per cent in one and 11.2 per cent in the other despite considerable weight loss. These results confirm the trend shown by Benedict and Smith\(^41\) who found that athletes had somewhat


\(^40\) Cited by A. H. Steinhaus, American Journal of Physiology, LXXXIII, March, 1901, p. 216.

higher basal metabolism rates than non-athletes.

Several studies have failed to confirm a positive relationship between athletic training and an increase in the basal metabolism rate. Ring\textsuperscript{42} on a single sedentary subject indicated that training slightly reduced the basal metabolism rate.

Knehr, Dill, and Neufeld\textsuperscript{43} also studied men cut for track three times a week, who ate at the same tables, and concluded the basal metabolism rates were not significantly altered by the training.

Cureton\textsuperscript{44} reported that highly trained athletes exhibit a positive basal metabolism rate above the average of normal young men by about 18 per cent. Twenty-six outstanding athletes averaged 8.83 per cent compared to -10.2 per cent for fifty-four normal young men not in athletics.

In this investigation the basal metabolism rate for each subject was taken at the beginning and the end of the conditioning program. In order to get a more reliable basal metabolism rate the following instructions were given each subject prior to taking the test:

1. Eat a light dinner the evening before the test.
2. Go to bed early (by 10 p.m. at the latest).
3. Don't rush when you get up in the morning; omit morning


exercises; dress slowly.

4. Don't eat any breakfast and this means nothing to eat or drink except water.

5. Come to the testing room—between 6:00 and 7:30 a.m.—with as little exertion as possible.

When the subject arrived, he was greeted and asked to remove his shoes and lie down on the plinth. Extreme precaution was used to have the room temperature as comfortable as possible. Following a one-half hour rest, the Benedict-Roth Metabolism Apparatus was used to record the subject's basal metabolism rate.

When the oxygen consumption was recorded, it was multiplied times a corrected temperature at $0^\circ$ C and a barometric pressure of 76 mm of mercury. Thus the actual oxygen consumption was obtained. The subject's surface area in square meters was determined by calculating the subject's height and weight on the Dubois Body Surface Chart.\textsuperscript{45} Next, the calories per square meter per hour were determined by age and sex on the Dubois Normal Standards Chart.\textsuperscript{45} These two were multiplied to obtain the normal oxygen consumption. By subtracting the larger result from the smaller and dividing the difference by the normal consumption, the basal metabolism rate in per cent was obtained.

It is now recognized that many conditions other than true hyper- or hypothyroidism cause variations in the metabolic rate. Some of the most common conditions which influence the metabolism test are: thyroiditis,

leukemia, anemia, Hodgkin's disease, fever, epilepsy, hypo-adrenalism, and cretinism.

**Personal Interview:** Rapport was established among the group with little difficulty. The author's position as a graduate student made it possible for informal chats and friendly conversation around the campus and in the dormitories with the subjects.

In addition each subject was formally interviewed in his living quarters at the end of the fall term. While each interview was based on the information gathered earlier, each subject was asked specific questions. A list of questions is found in the appendix.

**Other Sources:** Several physical education instructors of South Dakota State College supplied reliable information pertaining to individuals in the test group, which the author would not have known otherwise. In several cases the information suggested the general pattern for the personal interview.
CHAPTER IV

ANALYSIS OF THE DATA

This chapter contains the twenty-nine case studies of the individuals used in the test group. The information is presented in abbreviated form for the sake of clarity and ease in review. The case-study data were designed to give recognition only to the items which seemed to be of significance; those which appeared to be irrelevant in the eyes of the investigator were omitted. The following information will describe the form used in presenting each case study.

There are twelve headings in each case study form and under each heading is listed pertinent information relating to the particular subject being tested. The headings and their definition are:

Age: The age of the subject in years at the time he took the first physical fitness test.

Initial Physical Fitness Index: This numerical score is the physical fitness index attained by the subject on the first physical fitness test.

Final Physical Fitness Index: The physical fitness index attained by the subject on the final physical fitness test. This final physical fitness test was given ten weeks after the first test.

Physical Fitness Index Difference: The numerical score representing the increase or decrease in the physical fitness index during the ten weeks between the first and the final testing.

American Council On Education Score: The American Council On Education score is the percentile rank based on national norms for the American Council on Education Psychological Examination. The purpose of the test is
to appraise what has been called scholastic aptitude or general intelligence. Only the total score which combines the ability to think in quantitative terms and linguistic ability is recorded.

**Fall Quarter Grade Point Average:** The grade point average is obtained from the work of the fall quarter. All work graded is given a numerical point value per quarter hour as follows: A, four points; B, three points; C, two points; D, one point; F, zero points. The grade point average is the quotient of total points divided by the total quarter hours for which grades are received.

**Winter Quarter Grade Point Average:** This grade point average is obtained from the work of the winter quarter only. (South Dakota State College's school year is divided into three quarters of approximately twelve weeks of classes each quarter.)

**Grade Point Average Difference:** The numerical score representing the increase or decrease in the grade point average for the fall quarter and the winter quarter.

**Initial Basal Metabolism Rate:** The basal metabolism rate, in per cent, at the beginning of the developmental program.

**Final Basal Metabolism Rate:** The basal metabolism rate, in per cent, at the end of the developmental program.

**Bell Adjustment Inventory:** The description of the individual compared to national norms in the four separate measures of personal and social adjustment.

**Personal Interview:** The interview section contains an amalgamation of the information and impressions obtained from each subject during the formal and informal talks with the investigator.
Conclusions: In this section is presented pertinent conclusions and inferences drawn from the case study data concerning each individual.
Case Study Number 1

Age: 20
Initial PFI: 82
Final PFI: 89
PFI Difference: 7
ACE Percentile Score: 18th
Fall GPA: 0.6667
Winter GPA: 2.1724
GPA Difference: 1.5057
Initial BMR: -7.2%
Final BMR: -14.2%
Bell Adjustment Inventory
a. Home: Good
b. Health: Average
c. Social: Aggressive
d. Emotional: Good
e. Total Score: Good

Personal Interview:

This subject had no regular physical education classes in high school but he did participate in basketball, football, and track. After the subject enrolled in college and found that he was low in physical fitness, he felt there should be more emphasis on physical education in high school.

He stated that the quarter of developmental physical education helped his grade point average and gave him an "all-around" better feeling.

During the summer before college, he played baseball and worked on a construction crew. This subject stated, "I have had very little physical activity since I started college."

Conclusions:

The absence of a physical education program in high school and the lack of an organized activity program may be one reason for the low initial physical fitness index. Another contributing factor might be the lack of physical activity during the fall quarter.
The improved fitness rating was attained by an increase in arm strength and leg lift.
CASE STUDY NUMBER 2

<table>
<thead>
<tr>
<th>Age</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>88</td>
</tr>
<tr>
<td>Final PFI</td>
<td>89</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>1</td>
</tr>
<tr>
<td>ACE Percentile Score</td>
<td>36th</td>
</tr>
<tr>
<td>Full GPA</td>
<td>1.3571</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>1.0000</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>-.3571</td>
</tr>
</tbody>
</table>

Initial BMR: -2.4%  
Final BMR: 2.1%  
Bell Adjustment Inventory  
a. Home: Average  
b. Health: Average  
c. Social: Retiring  
d. Emotional: Average  
e. Total Score: Unsatisfactory

Personal Interview:

The subject said he did not have adequate instruction in physical education in high school. The instructor allowed the students to do as they wanted. The subject participated in basketball and softball and played one year of professional baseball.

Hay fever and asthma kept the subject from participating in football. He is self-conscious because of being overweight. He stated that the quarter of developmental physical education did him some good and thought the calisthenics were especially beneficial.

Conclusions:

Overweight is probably a contributing factor to the initial low physical fitness index score. However, a weak left shoulder, caused from a baseball injury, could affect his arm strength.

The betterment of leg lift, and the loss of weight helped in the subject's second physical fitness index score, but the arm strength again held
his final score down.

This subject has a tendency to be emotionally upset and has a very difficult time adjusting socially to college life.
CASE STUDY NUMBER 3

Age: 19
Initial PFI: 72
Final PFI: 84
PFI Difference: 12
ACE Percentile Score: 31st
Fall GPA: 0.6667
Winter GPA: 1.1111
GPA Difference: 0.4444
Initial BMR: -28%
Final BMR: -13.1%
Bell Adjustment Inventory
a. Home: Unsatisfactory
b. Health: Unsatisfactory
c. Social: Average
d. Emotional: Average
e. Total Score: Average

Personal Interview:

This subject was quite pleased with the improvement made in his physical fitness index score and thought that all freshmen should be required to take a developmental class in physical education.

He was not surprised to find he was below average in physical fitness and he admitted he was overweight.

This subject was in poor health most of the winter quarter because of colds and virus infections. The fact that his parents are divorced has made his home life very unsatisfactory.

Conclusions:

This subject improved in all items of the physical fitness index test.

There appear to be several contributing factors for his initial low physical fitness index. An unsatisfactory home life, poor health, overweight, and lack of physical activity are apparent causes for the initial low physical fitness index.
### CASE STUDY NUMBER 4

<table>
<thead>
<tr>
<th>Age</th>
<th>18</th>
<th>Initial BMR: -4.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>65</td>
<td>Final BMR: -16.4%</td>
</tr>
<tr>
<td>Final PFI</td>
<td>73</td>
<td>Bell Adjustment Inventory</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>ACE Percentile Score: 90th</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall GPA</td>
<td>2.1212</td>
<td></td>
</tr>
<tr>
<td>Winter GPA</td>
<td>2.1281</td>
<td></td>
</tr>
<tr>
<td>GPA Difference</td>
<td>.0069</td>
<td></td>
</tr>
</tbody>
</table>

#### Personal Interview:

This subject had four years of required physical education in high school. He felt as though his high school provided the best possible physical education program.

He indicated a dislike for athletics in general, and has never done much that would aid in maintaining an adequate standard of muscular strength. This subject’s summer employment consisted of an office job which offered very little physical activity.

#### Conclusions:

The admission of little physical activity and the lack of interest in sports were probably the underlying causes of his low scores in the physical fitness index tests.

A slight increase in weight and an increase in the arm strength, leg and back lift, account for the rise in the physical fitness index score. He could give no specific reason for disliking athletics in general. His aggressive social life, as indicated by the Bell Adjustment Inventory, tends
to indicate his spare time pursuits are of a sedentary nature in such activities as card playing, "bull sessions," and pool-playing.
CASE STUDY NUMBER 5

<table>
<thead>
<tr>
<th>Age</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>77</td>
</tr>
<tr>
<td>Final PFI</td>
<td>87</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>10</td>
</tr>
<tr>
<td>ACE Percentile Score: 41st</td>
<td></td>
</tr>
<tr>
<td>Fall GPA</td>
<td>2.3030</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>2.3714</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>.0684</td>
</tr>
</tbody>
</table>

**Initial BMR: 1.5%**

**Final BMR : -11.1%**

**Bell Adjustment Inventory**

a. Home : Excellent
b. Health : Good
c. Social : Aggressive
d. Emotional : Good
e. Total Score: Excellent

**Personal Interview:**

This subject was excused from physical education classes in high school because he participated in athletics.

He was surprised to find he was low in physical fitness. The subject had been on the college freshman football squad the fall quarter and felt he was in better condition than was indicated by the initial physical fitness index.

He thought that being overweight was the only cause of his low physical fitness index. He stated, "I have trouble keeping my weight down."

**Conclusions:**

A slight decrease in weight and an increase in strength items, especially the grip strength, account for the rise in the physical fitness index score.

Overweight, weakness in arm strength, and lack of activity, are probably contributing factors in this subject's low physical fitness index score.
CASE STUDY NUMBER 6

<table>
<thead>
<tr>
<th>Age</th>
<th>18</th>
<th>Initial BMR: -12%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>88</td>
<td>Final BMR: -12.5%</td>
</tr>
<tr>
<td>Final PFI</td>
<td>97</td>
<td>Bell Adjustment Inventory</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>9</td>
<td>a. Home : Excellent</td>
</tr>
<tr>
<td>ACE Percentile Score:</td>
<td>39th</td>
<td>b. Health : Good</td>
</tr>
<tr>
<td>Fall GPA</td>
<td>2.0606</td>
<td>c. Social : Average</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>2.7429</td>
<td>d. Emotional : Good</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>.623</td>
<td>e. Total Score: Good</td>
</tr>
</tbody>
</table>

Personal Interview:

The high school from which this subject graduated required physical education for all students with the exception of athletes. He participated for one semester and then was excused from physical education class. He rated his high school program as, "One of the best there is."

The subject was surprised to find he was low in physical fitness, and offered the reason of inactivity during the summer months as the cause of his initial low physical fitness index. He stated that he hardly ever goes anywhere without driving his car.

Conclusions:

The gradual increase in all phases of the test which would indicate improvement in general body development is probably the contributing factor to the subject's improvement to within three points of an average physical fitness index.

Physical inactivity and the habit of riding in his car rather than
walking tend to be the causes of his initial low physical fitness index.
CASE STUDY NUMBER 7

<table>
<thead>
<tr>
<th>Age</th>
<th>19</th>
<th>Initial BMR: -9.4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>60</td>
<td>Final BMR: -12.4%</td>
</tr>
<tr>
<td>Final PFI</td>
<td>68</td>
<td>Bell Adjustment Inventory</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>8</td>
<td>a. Home: Excellent</td>
</tr>
<tr>
<td>ACE Percentile Score: 94th</td>
<td></td>
<td>b. Health: Good</td>
</tr>
<tr>
<td>Fall GPA</td>
<td>2.3567</td>
<td>c. Social: Very Aggressive</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>3.0442</td>
<td>d. Emotional: Excellent</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>.6875</td>
<td>e. Total Score: Excellent</td>
</tr>
</tbody>
</table>

Personal Interview:

This subject stated he had physical education in high school twice a week for four years. He rated the program as good, and said he learned many skills and fundamentals. The subject said he was "laid up" in high school with a broken collarbone, a broken little finger, and a broken ankle. He received these injuries in a car accident during his junior year.

The subject stated that overweight and the fact that his ankle bothered him in certain activities were probably the reasons for his low physical fitness index. He also stated a dislike for climbing the ropes and thought the calisthenics were too strenuous in the developmental physical education class.

Conclusions:

From the data on the Rogers' physical fitness index tests, it is indicated that this subject is extremely weak in the shoulder girdle, and is probably handicapped by the mended collarbone. The subject has had very
little physical activity since entering college.

Overweight, lack of physical activity, and lack of desire seem to be the contributing factors to his low physical fitness index.
CASE STUDY NUMBER 8

Age : 18
Initial PFI : 82
Final PFI : 90
PFI Difference : 8
ACE Percentile Score: 60th
Fall GPA : 2.2424
Winter GPA : 3.3143
GPA Difference : 1.0719
Initial BMR : -19.1%
Final BMR : -16.6%
Bell Adjustment Inventory
a. Home : Average
b. Health : Unsatisfactory
c. Social : Average
d. Emotional : Average
e. Total Score: Average

Personal Interview:

This subject stated he had two years of required physical education, three times a week with each class meeting for an hour while he was in high school. He felt his high school physical education program had a good variety of activities. The subject said the instruction was poor and classmates missed class often without being reprimanded. He indicated a strong dislike for calisthenics.

This subject had spent one week before entering college in bed with a severe virus infection, "almost pneumonia." He stated he thought the developmental class was worth the effort.

Conclusions:

This subject seemed to be underweight and rather pale in appearance. He was exceptionally low in leg strength on his physical fitness index test.

The probable causes for this subject's low physical fitness index are the facts that he was under a doctor's care prior to entering college last fall, that he suffered from several colds during the developmental program.
CASE STUDY NUMBER 9

Age : 18
Initial PFI : 74
Final PFI : None
PFI Difference : None
ACE Percentile Score: 39th
Fall GPA : 2.8485
Winter GPA : None
GPA Difference : None
Initial BMR: None
Final BMR : None
Bell Adjustment Inventory
a. Home : None
b. Health : None
c. Social : None
d. Emotional : None
e. Total Score: None

Personal Interview:

There was no personal interview conducted. The subject withdrew from college the second week of the developmental program.

Conclusions:

Very few records were obtained because the subject withdrew from college the second week of the winter quarter. Neither the Admissions and Records Office nor his advisor could supply a reason for his withdrawal.

From the author's observation the first two weeks, lack of interest was apparent in the subject's actions and attitude.
CASE STUDY NUMBER 10

<table>
<thead>
<tr>
<th>Age</th>
<th>19</th>
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</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>89</td>
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<tr>
<td>Final PFI</td>
<td>108</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>19</td>
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<tr>
<td>ACE Percentile Score: 30th</td>
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<tr>
<td>Fall GPA</td>
<td>1.8182</td>
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<tr>
<td>Winter GPA</td>
<td>1.4857</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>-0.3325</td>
</tr>
<tr>
<td>Initial BMR: -6.4%</td>
<td></td>
</tr>
<tr>
<td>Final BMR: None</td>
<td></td>
</tr>
<tr>
<td>Bell Adjustment Inventory</td>
<td></td>
</tr>
<tr>
<td>a. Home: Excellent</td>
<td></td>
</tr>
<tr>
<td>b. Health: Average</td>
<td></td>
</tr>
<tr>
<td>c. Social: Aggressive</td>
<td></td>
</tr>
<tr>
<td>d. Emotional: Excellent</td>
<td></td>
</tr>
<tr>
<td>e. Total Score: Good</td>
<td></td>
</tr>
</tbody>
</table>

Personal Interview:

This subject participated in two years of required physical education twice a week in high school. There was a good variety of activities offered but the subject stated, "I wouldn't have participated if it hadn't been required."

This subject felt the developmental activities could have been varied more during the winter quarter. When asked if he was surprised to find he had a low physical fitness index, he stated, "I felt like I didn't need it," referring to the developmental physical education program. The subject missed classes frequently and didn't appear for the final basal metabolism rate test.

Conclusions:

This subject had the poorest attitude of all the subjects in the developmental class.

He showed above average strength in all the activities from the
very start. There was an indication that he didn't give his maximum on the initial physical fitness index test. The subject had a tendency to want to "show off" and to be noticed by the rest of the class.

Probably the main causes for his low physical fitness index was his lack of interest and lack of desire to do his very best.
CASE STUDY NUMBER 11

Age: 24  Initial BMR: -1.4%
Initial PFI: 84  Final BMR: -14.8%
Final PFI: 100  Bell Adjustment Inventory
PFI Difference: 16  a. Home: Good
ACE Percentile Score: 66th  b. Health: Average
Fall GPA: 1.3548  c. Social: Retiring
Winter GPA: 0.7879  d. Emotional: Average
GPA Difference: -0.5669  e. Total Score: Unsatisfactory

Personal Interview:

This subject participated in two years of required physical education in high school. The activities in his high school physical education program consisted of the sports in season and soccer.

This subject spent six years in the United States Navy before entering college.

He stated he was not interested in sports but didn't mind playing basketball. When asked about the developmental program during the winter quarter, he stated, "The calisthenics were hard work, but they built a guy up. It was worth it."

Conclusions:

The improvement in the subject's physical fitness index is the second to the largest increase for the entire group of case studies.

This subject received much benefit from the developmental program.

At the onset of the program he was unable to hang by his arms from the
horizontal ladder; at the end of the program he was advancing the entire length of the ladder using his arms only.

The fact that he is retiring in social adjustment and doesn't care for athletics and consequently gets little physical activity is indicated by his initial low physical fitness index.
CASE STUDY NUMBER 12

Age : 19
Initial PFI : 71
Final PFI : 76
PFI Difference : 5
ACE Percentile Score: 39th
Fall GPA : 2.3030
Winter GPA : 2.4571
GPA Difference : .1541

Initial BMR: -8.3%
Final BMR : -9.4%
Bell Adjustment Inventory
a. Home : Good
b. Health : Average
c. Social : Very Aggressive
d. Emotional : Unsatisfactory
e. Total Score: Average

Personal Interview:

The high school from which this subject was graduated required only two years of physical education. A large part of the time in his high school physical education classes was devoted to dancing. There was very little done to develop strength and fitness. He also stated he had been rather inactive as far as athletics were concerned.

Conclusions:

From the data on the case study instruments, it is indicated that this subject would benefit from counseling. Perhaps an active interest in athletics would be to his advantage.

The lack of physical activity is the only apparent reason for this subject's low physical fitness index scores.
CASE STUDY NUMBER 13

Age : 20  Initial BMR: -6.4%
Initial PFI : 61  Final BMR : -7.1%
Final PFI : 61  Bell Adjustment Inventory
PFI Difference : 0  a. Home ; Average
ACE Percentile Score: 09th  b. Health ; Average
Fall GPA : 0.8512  c. Social ; Very Aggressive
Winter GPA : 1.2581  d. Emotional ; Average
GPA Difference : .4069  e. Total Score; Average

Personal Interview:

This subject participated in two years of required physical education in high school. The activities in his high school physical education program consisted of sports in season and dancing. The subject is interested and participated in athletics.

His own explanation for his low physical fitness index scores was, "I had too many colds which left me in a weak condition." He also dieted for three months prior to entering college and lost 40 pounds.

Conclusions:

The sudden loss of 40 pounds is a probable factor in this subject's low physical fitness index scores.

This subject missed four of the developmental physical education classes and presented excuses from the Student Health Service. Poor health and a lack of desire shown in the developmental physical education class activities are probably the causes of the low physical fitness index scores.
CASE STUDY NUMBER 14

Age : 18
Initial PFI : 85
Final PFI : 100
PFI Difference : 15
AGE Percentile Score: 41st
Fall GPA : 1.6364
Winter GPA : 1.8108
GPA Difference : .1744
Initial BMR: -18.3%
Final BMR : -6.6%
Bell Adjustment Inventory
a. Home : Good
b. Health : Good
c. Social : Aggressive
d. Emotional : Good
e. Total Score: Good

Personal Interview:

This subject blames his low physical fitness rating on his high school physical education program. He stated that students were not required to attend physical education classes in his high school. The physical education program that was conducted consisted of merely one or two sports with no conditioning exercises. Basketball and baseball were the two varsity sports in which he participated in high school.

Conclusions:

There is little evidence in the case study instruments to suggest any reason other than lack of previous physical activity for the initial low physical fitness index.

The subject made a 15 point improvement on the final physical fitness index test. This improvement was realized by a general increase on each of the physical fitness index test items.
CASE STUDY NUMBER 15

Age : 19
Initial PFI : 77
Final PFI : 81
PFI Difference : 9
ACE Percentile Score: 19th
Fall GPA : 1.0857
Winter GPA : 1.2308
GPA Difference : .1451
Initial BMR: -14.6%
Final BMR : -.3%
Bell Adjustment Inventory
a. Home : Excellent
b. Health : Average
c. Social : Average
d. Emotional : Average
e. Total Score: Average

Personal Interview:

This subject had no organized physical education in the small public school which he attended. He considers this fact the reason for his low physical fitness.

The subject stated he expected to be in the lower group of physical fitness index scores. He feels as though he is in better shape now but doubts that he will stay up there.

Conclusions:

The absence of any previous physical education program is probably the key to the subject's low physical fitness index score. The subject seemed very eager to learn athletic and recreational skills. He expressed a desire to continue in some type of conditioning program if it was at all possible.
CASE STUDY NUMBER 16

Age: 20  
Initial PFI: 75  
Initial BMR: -3.4%  
Final PFI: None  
Final BMR: None  
Bell Adjustment Inventory

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE Percentile</td>
<td>No Record</td>
</tr>
<tr>
<td>Fall GPA</td>
<td>No Record</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>None</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>None</td>
</tr>
</tbody>
</table>

Personal Interview:

The interview was not conducted as the subject dropped from college in the middle of the winter quarter after numerous absences from the developmental physical education class.

Conclusions:

From the data on the adjustment inventory, it is indicated that this subject would have benefited from counseling.

Neither his advisor nor the Office of Admissions and Records could offer an explanation as to why he dropped from college. He was undoubtedly unhappy in college as indicated by his adjustment score.
CASE STUDY NUMBER 17

<table>
<thead>
<tr>
<th>Age</th>
<th>20</th>
<th>Initial BMI: 6.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>85</td>
<td>Final BMI: 2.9%</td>
</tr>
<tr>
<td>Final PFI</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>PFI Difference</td>
<td>20</td>
<td>Bell Adjustment Inventory</td>
</tr>
<tr>
<td>ACE Percentile Score: 09th</td>
<td>a. Home : Average</td>
<td></td>
</tr>
<tr>
<td>Fall GPA</td>
<td>0.9091</td>
<td>b. Health : Average</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>1.0000</td>
<td>c. Social : Average</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>.0909</td>
<td>d. Emotional : Average</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Total Score: Average</td>
</tr>
</tbody>
</table>

Personal Interview:

Lack of physical education in high school was the explanation given by the subject for his initial low physical fitness index.

He stated he had injured his back, while riding a horse, the summer before entering college. The only treatment was administered by a chiropractor.

The subject stated there was some pain in his back during certain activities of the developmental physical education program. The author was unaware of this injury until the personal interview was conducted.

Conclusions:

A marked improvement in leg strength of 530 points is the only apparent factor in the subject's physical fitness index improvement.

The cause of the initial low physical fitness index score probably was a result of the apparent back injury. He possibly was fearful of a re-occurrence and this feeling hindered him from exerting his maximum on
the first test.

It is also apparent the subject had no great adjustment problem when entering college.
CASE STUDY NUMBER 18

Age: 18
Initial PFI: 79
Final PFI: None
PFI Difference: None
ACE Percentile Score: 74th
Fall GPA: 1.6000
Winter GPA: 2.1176
GPA Difference: .5176
Initial BMR: -1.6%
Final BMR: -6.5%
Bell Adjustment Inventory
a. Home: Good
b. Health: Excellent
c. Social: Very Aggressive
d. Emotional: Excellent
e. Total Score: Excellent

Personal Interview:

This subject had no physical education in high school. He stated that most of the boys participated in varsity sports and he felt, "sports were enough."

During the last week of the winter quarter, this student had an appendectomy; therefore, it was impossible for him to take the second physical fitness index test.

He gave the reason, "my body outgrew my muscles," for his initial low physical fitness index score. He was surprised to find he had a low physical fitness index.

Conclusions:

During the winter quarter this subject showed signs of being in a run-down condition. He looked tired and appeared lifeless in activities during the developmental program.

His admission of playing independent basketball and traveling many
miles during the week probably accounts for his condition. This lack of endurance is a probable factor in his initial low physical fitness index score.
CASE STUDY NUMBER 19

Age : 19
Initial PFI : 77
Final PFI : 82
PFI Difference : 5
ACE Percentile Score: 90th
Fall GPA : 2.1818
Winter GPA : 2.4118
GPA Difference : .2300
Initial BMR: 8%
Final BMR : -.5%
Bell Adjustment Inventory
a. Home : Average
b. Health : Average
c. Social : Aggressive
d. Emotional : Average
e. Total Score: Average

Personal Interview:

This subject had quite a history of indigestion, sore throats, eye strain, and hay fever.

He blamed his low physical fitness on a summer of inactivity. He gained five pounds during the winter quarter.

Physical education was discouraged during his four years of high school. Basketball was the only high school sport in which he participated.

Conclusions:

The subject enjoyed physical activity and plans to participate on an intramural softball team during the spring quarter.

It was his recommendation that all freshman men with low physical fitness index scores be required to enroll for three quarters in a developmental physical education program similar to the one in which he participated.

His physical fitness undoubtedly reflects the history of illness.

The gain of five pounds in weight is a probable indication that the sub-
ject was somewhat underweight at the beginning of the developmental pro-
gram.
CASE STUDY NUMBER 20

<table>
<thead>
<tr>
<th>Age</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>89</td>
</tr>
<tr>
<td>Final PFI</td>
<td>93</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>4</td>
</tr>
<tr>
<td>ACE Percentile Score:</td>
<td>11th</td>
</tr>
<tr>
<td>Fall GPA</td>
<td>1.0000</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>1.7333</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>.7333</td>
</tr>
<tr>
<td>Initial BMR:</td>
<td>-2.9%</td>
</tr>
<tr>
<td>Final BMR:</td>
<td>-2.8%</td>
</tr>
<tr>
<td>Bell Adjustment Inventory</td>
<td></td>
</tr>
<tr>
<td>a. Home</td>
<td>Average</td>
</tr>
<tr>
<td>b. Health</td>
<td>Average</td>
</tr>
<tr>
<td>c. Social</td>
<td>Aggressive</td>
</tr>
<tr>
<td>d. Emotional</td>
<td>Good</td>
</tr>
<tr>
<td>e. Total Score:</td>
<td>Average</td>
</tr>
</tbody>
</table>

Personal Interview:

This subject had no physical education in high school but participated on his high school football team. He enjoyed participating in athletics and feels there should have been at least two years of physical education required in high school.

The subject just finished serving two years in the United States Army where he played volleyball and softball.

He was surprised to find he was below average in physical fitness. The subject stated he had rheumatic fever during his junior year in high school.

Conclusions:

The absence of any previous physical education program is probably the key to the subject's low physical fitness index score.

The fact that the subject had rheumatic fever several years ago might have left him in a poor physical condition.
He seemed to be rather quiet and had trouble expressing himself in the developmental physical education program. This observation is contrary to the results of Social Adjustment on the Bell Adjustment Inventory which rated him as aggressive.
CASE STUDY NUMBER 21

Age : 19
Initial PFI : 54
Final PFI : 66
PFI Difference : 12
ACE Percentile Score: 48th
Fall GPA : 2.1714
Winter GPA : 2.3333
GPA Difference : .1619
Initial BMR: -10.4%
Final BMR : -19.6%
Bell Adjustment Inventory

Personal Interview:

This subject participated four years in a high school physical education program. The required program consisted of roller skating, swimming, football, basketball, track, and many other activities. He enjoyed the physical education classes very much.

This subject said the reason for his low physical fitness index scores was, "My arms and shoulders aren't strong enough."

He had a part time job working at the college radio station in the evenings during the winter quarter.

Conclusions:

This subject appeared to be extremely under-developed in the arms and shoulders. This is probably the cause of his low physical fitness index scores.

Although the subject had a well-rounded physical education program in high school, he has been very inactive since graduation from high school.
His job at the college radio station was of such a nature that he received very little physical activity.

It would probably be to this subject's advantage if he would participate on a college intramural team and take an active part in such individual and dual sports as golf, tennis, etc.
CASE STUDY NUMBER 22

<table>
<thead>
<tr>
<th>Age</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PPI</td>
<td>84</td>
</tr>
<tr>
<td>Final PPI</td>
<td>97</td>
</tr>
<tr>
<td>PPI Difference</td>
<td>13</td>
</tr>
<tr>
<td>ACE Percentile Score:</td>
<td>57th</td>
</tr>
<tr>
<td>Fall GPA</td>
<td>1.2571</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>1.6000</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>.3429</td>
</tr>
</tbody>
</table>

Initial BMR: -3.3
Final BMR: -14.5
Bell Adjustment Inventory

a. Home : Good
b. Health : Average
c. Social : Average
d. Emotional : Average
e. Total Score: Average

Personal Interview:

This subject had no physical education in high school. He felt that the lack of physical activity in high school was the reason for his initial low physical fitness index score. He would have enjoyed a physical education program if it had been offered; however, he did not participate in the offered varsity sports.

This subject has had a chest deformity since birth. The deformity is known as a "funnel chest." He believed it was inherited because his mother and maternal grandfather have the same deformity. He stated it bothered him very little, but he did have some difficulty doing push-ups and pull-ups.

Conclusions:

The subject's chest deformity and the absence of physical education or any physical activity in high school are probable causes for his initial low physical fitness index.
The increase in his physical fitness index can be explained by an increase of 300 pounds in the leg lift and a marked improvement in push-ups and pull-ups.
CASE STUDY NUMBER 23

<table>
<thead>
<tr>
<th>Age</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>76</td>
</tr>
<tr>
<td>Final PFI</td>
<td>84</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>8</td>
</tr>
<tr>
<td>ACE Percentile Score: 46th</td>
<td></td>
</tr>
<tr>
<td>Fall GPA</td>
<td>1.0270</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>2.0528</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>1.0318</td>
</tr>
<tr>
<td>Initial BMR: 6%</td>
<td></td>
</tr>
<tr>
<td>Final BMR: -7.6%</td>
<td></td>
</tr>
<tr>
<td>Bell Adjustment Inventory</td>
<td></td>
</tr>
<tr>
<td>a. Home : Good</td>
<td></td>
</tr>
<tr>
<td>b. Health : Average</td>
<td></td>
</tr>
<tr>
<td>c. Social : Average</td>
<td></td>
</tr>
<tr>
<td>d. Emotional : Excellent</td>
<td></td>
</tr>
<tr>
<td>e. Total Score: Good</td>
<td></td>
</tr>
</tbody>
</table>

Personal Interview:

This subject had two years of required physical education in high school. His high school physical education program had a variety of activities, including gymnastics, rope climbing, etc. Athletes were excused from physical education while participating in a sport.

This subject just completed six years of active duty in the United states Army.

He felt the time and effort spent in the developmental physical education class was well worth it. He also thought being overweight and the lack of physical work were the reasons for his low physical fitness index scores.

Conclusions:

The probable cause of this subject's low physical fitness index scores are overweight and the lack of physical activity.

An improvement of 900 pounds in the leg lift was a prominent factor
contributing to his physical fitness index score increase, even though the subject gained five pounds.

The subject realized a need for physical activity and enrolled in physical education for the spring quarter. His veteran status makes him exempt from the required physical education program.
CASE STUDY NUMBER 24

Age: 19  Initial BMR: -11.6%

Initial PFI: 89  Final BMR: 5.7%

Final PFI: 100  Bell Adjustment Inventory

PFI Difference: 11

ACE Percentile Score: 12th

a. Home : Excellent

b. Health : Good

c. Social : Aggressive

d. Emotional : Excellent

e. Total Score: Good

Personal Interview:

The high school from which this subject was graduated required only two years of physical education. He stated a large part of the physical education classes was devoted to basketball. He also said he had been rather inactive as far as athletics were concerned.

The reason he gave for the initial low physical fitness index score was a "soft" job and no exercise during the summer months preceding registration in the fall quarter.

Conclusions:

The improvement in back and leg lift were the most outstanding factors contributing to the physical fitness index increase.

It is apparent that the spare time habits of this individual are of a sedentary nature.

Probably the absence of a desire for physical activity would be the main cause for the first low physical fitness index score.
CASE STUDY NUMBER 25

Age : 18
Initial PFI : 80
Final PFI : 89
PFI Difference : 9
ACE Percentile Score: 52nd
Fall GPA : 1.2000
Winter GPA : 1.6471
GPA Difference : .4471
Initial BMR : -2.5%
Final BMR : -4%
Bell Adjustment Inventory
a. Home : Average
b. Health : Average
c. Social : Very Aggressive
d. Emotional : Good
e. Total Score: Good

Personal Interview:

This subject attended a high school which required two years of physical education. His instructor set up numerous requirements in skill activities for a basis in grading. The subject acted as student manager for his high school athletic teams.

He had virus pneumonia last fall and lost 20 pounds in one week. At the conclusions of the developmental physical education program he was still 15 pounds underweight.

The subject gave the reason of a weak back for his low physical fitness index score. He expressed a great interest in swimming.

Conclusions:

From the data received in the personal interview, it was evident that the extreme loss of weight had left the subject in poor physical condition.

The fact that the subject has a weak back is verified by the low
score on his back and leg lift.

The subject worked in a store and had very little physical activity the summer before entering college. It is recommended that this subject take an active part in the college intramural program and consult the Student Health Service in regard to his weight. There is an indication that his diet might be poor.
CASE STUDY NUMBER 26

Age : 19
Initial PFI : 82
Final PFI : 72
PFI Difference : -10
ACE Percentile Score : 35th
Fall GPA : 1.8182
Winter GPA : 1.8333
GPA Difference : .0151

Initial BMR : -23.2%
Final BMR : -17.8%
Bell Adjustment Inventory
a. Home : Good
b. Health : Good
c. Social : Average
d. Emotional : Excellent
e. Total Score : Good

Personal Interview:

This subject participated in one year of required physical education in high school but said, "I don't like physical education and I don't care for sports."

When asked why he thought he was low in physical fitness he indicated, "My body can't take it."

The subject has been treated by a private doctor for a curvature of the spine (scoliosis) which accounts for his right leg being 5/8 of an inch shorter than his left leg. He wears a built-up shoe on his right foot which caused him to sprain his right ankle quite frequently.

This subject also had an abscess on his chest, but he stated, "It was cured with penicillin." He feels his chest bothered him some during the weight lifting in the developmental physical education program.

Conclusions:

This subject's physical defects and lack of interest in physical
activity seem to be the contributing factors to his low physical fitness index scores.

A drop in his back and leg lift tests accounted for the decrease in the physical fitness index score. This decrease in physical fitness index cannot be considered too seriously, because after studying this subject's orthopedic condition it is doubtful if the results are reliable.

This subject with a doctor's approval, would benefit a great deal from some special corrective exercises for his deformity.

As the developmental physical education program progressed, the author observed a marked improvement in this subject's interest.
CASE STUDY NUMBER 27

<table>
<thead>
<tr>
<th>Age</th>
<th>19</th>
<th>Initial PFI: 72</th>
<th>Initial EMR: -22%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>72</td>
<td>Final PFI: 84</td>
<td>Final EMR: -13.1%</td>
</tr>
<tr>
<td>Final PFI</td>
<td>84</td>
<td>Bell Adjustment Inventory</td>
<td></td>
</tr>
<tr>
<td>PFI Difference</td>
<td>12</td>
<td>a. Home: Unsatisfactory</td>
<td></td>
</tr>
<tr>
<td>ACE Percentile Score</td>
<td>31st</td>
<td>b. Health: Unsatisfactory</td>
<td></td>
</tr>
<tr>
<td>Fall GPA</td>
<td>0.6667</td>
<td>c. Social: Average</td>
<td></td>
</tr>
<tr>
<td>Winter GPA</td>
<td>1.1111</td>
<td>d. Emotional: Average</td>
<td></td>
</tr>
<tr>
<td>GPA Difference</td>
<td>4444</td>
<td>e. Total Score: Average</td>
<td></td>
</tr>
</tbody>
</table>

Personal Interview:

This subject attended a high school that required four years of physical education. The physical education program offered a wide variety of activities and the community in which this student was raised emphasized physical activity.

He stated that overweight was the reason for his low physical fitness index scores. The subject was surprised to find he was below average in physical fitness and said, "I didn't know weight was that important."

He stated that he is subject to frequent colds during the winter months.

This subject indicated that his parents were separated and he is living with his grandparents.

Conclusions:

It was apparent that this subject had a good background in physical activity.
Overweight, frequent sickness, and poor adjustment in two areas of the Bell Adjustment Inventory indicates lack of physical activity and consequently a low physical fitness index score.

An over-all improvement in all items on the physical fitness index test accounts for the 12 point increase following the developmental program. The subject is probably in need of more physical activity. Possibly participation in the college intramural program would be sufficient.
CASE STUDY NUMBER 28

Age : 19
Initial PFI : 88
Final PFI : 89
PFI Difference : 1
AGE Percentile Score: 36th
Fall GPA : 1.3571
Winter GPA : 1.0000
GPA Difference : -.3571
Initial BMR : -2.4%
Final BMR : 2.1%
Bell Adjustment Inventory
a. Home : Average
b. Health : Average
c. Social : Retiring
d. Emotional : Average
e. Total Score: Unsatisfactory

Personal Interview:

This subject had one year of required physical education in high school. He also was a member of the high school football, basketball, and softball teams. He stated that his physical education instructor in high school allowed students to do as they wanted, but his grade school physical education instructor gave them conditioning exercises.

An attack of hay fever and asthma kept him from playing football his junior year in high school. This subject stated, "I was really fat in high school but I have lost it now."

He thought that a weak left shoulder, injured while playing professional baseball, was the reason for the low physical fitness index scores.

Conclusions:

Low arm strength score in the physical fitness index test indicates that the subject is probably weak in the upper arms and shoulders. The
attainment of only one pull-up tends to verify this fact.

Being overweight approximately 45 pounds until he was a junior in high school apparently did not hinder this subject from being physically active.

The results of the Social Adjustment in the Bell Adjustment Inventory rate him as retiring. This subject is apparently in need of some physical activity of a social nature.
CASE STUDY NUMBER 29

<table>
<thead>
<tr>
<th>Age</th>
<th>20</th>
<th>Initial BMR: -7.2%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PFI</td>
<td>82</td>
<td>Final BMR: -14.2%</td>
</tr>
<tr>
<td>Final PFI</td>
<td>89</td>
<td>Bell Adjustment Inventory</td>
</tr>
<tr>
<td>PFI Difference</td>
<td>7</td>
<td>a. Home</td>
</tr>
<tr>
<td>ACE Percentile Score: 18th</td>
<td>b. Health</td>
<td></td>
</tr>
<tr>
<td>Fall GPA</td>
<td>0.6667</td>
<td>c. Social</td>
</tr>
<tr>
<td>Winter GPA</td>
<td>2.1724</td>
<td>d. Emotional</td>
</tr>
<tr>
<td>GPA Difference</td>
<td>1.5057</td>
<td>e. Total Score: Good</td>
</tr>
</tbody>
</table>

Personal Interview:

This subject had no organized physical education in high school but he did participate in basketball, football, and track.

He attributes his low physical fitness index scores to lack of desire to do his best on the tests.

He believed he was in good shape from playing baseball and working on a construction crew during the summer months before entering college.

Conclusions:

It is felt by the author that this student did not try to do his best on the physical fitness index tests. During the activities of the developmental physical education program, he appeared to be at least average in physical condition.

His attitude seemed to imply that life was fun and to worry took the fun out of it. Probably the dominant factor concerning his low physical fitness index scores was his poor attainment on the leg lift test.
CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

In this study, case studies were conducted on 29 South Dakota State College freshman men with low physical fitness indices as measured by the Rogers' Physical Fitness Test. The following information was obtained for these low physical fitness students: physical fitness scores, psychological examination scores, grade point averages, basal metabolism rates, and adjustment inventory ratings. The students were then personally interviewed in an attempt to further uncover factors which might contribute to their low physical fitness status.

The results of the study as applied to individual students were presented as 29 separate case studies. An analysis and summary of these case studies appears below.

Age: The average age of the study group was 19.2 years; the range of ages was from 18.2 to 24.3 years.

Physical Fitness Indices: The mean physical fitness index at the start of the study was 78.4; the range was from 54 to 89. This mean is well below the national first quartile of 85. As a result of the intensive developmental physical education program conducted for these men by the author over a period of nine weeks from the time of the initial testing for the study, the mean physical fitness index rose to 86.4; the range of scores was from 61 to 108. The group as a whole was still definitely below the national mean of 100.
Thus, the mean gain in physical fitness indices was eight points, or 10.2 per cent. This gain is highly significant beyond the .01 level of confidence. This critical ratio has a value of 5.53 compared to 2.79 for the .01 level.

**Scholastic Achievement:** The mean American Council on Education examination score for the low physical fitness group is at the 42nd percentile with a standard deviation of 27.38 compared with national norms. The range of scores was from the 94th to the 6th percentile. The study group was lower in scholastic aptitude or general intelligence than college freshman as a whole.

The mean grade point average for the low physical fitness students during the fall quarter was 1.5491. During the same period the mean grade point average for all the freshman men, excluding the low physical fitness students, was 2.0255. The mean grade point average for the study group was .4764 less than the mean for all freshman men.

Accompanying an increase in physical fitness indices, the study group also made the greatest gain in scholastic achievement. Their mean grade point average for the winter quarter was 1.9249, a gain of .3758 points or 24.3 per cent. This improvement is statistically significant beyond the .01 level of confidence. This critical ratio has a value of 2.96 compared to 2.79 for the .01 level. The freshman men, less the study group, made a gain of .0328 points or 1.6 per cent. One might assume that with an increase in physical fitness index scholastic achievement would also increase.

**Basal Metabolism Rates:** The mean basal metabolic rate for the low physical fitness group at the start of the study was -6.1 per cent; the
range was from 9.3 per cent to -28 per cent. Following the developmental physical education program, the mean basal metabolic rate decreased to -8.3 per cent; the range was from 5.7 per cent to -19.6 per cent. The group as a whole was still -8.3 per cent below the normal oxygen consumption for individuals who were the same height, weight, age, and sex. Thus the mean decrease in metabolic rate was 2.2 per cent.

**Adjustment Inventory**: The four separate measures of personal and social adjustment of the low physical fitness students according to the results with the Bell Adjustment Inventory are as follows:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Number of Students</th>
<th>Per Cent of Study Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HOME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>Good</td>
<td>9</td>
<td>32.1</td>
</tr>
<tr>
<td>Average</td>
<td>10</td>
<td>35.7</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>21</td>
<td>7.1</td>
</tr>
<tr>
<td>Very Unsatisfactory</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>HEALTH</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>Good</td>
<td>8</td>
<td>28.6</td>
</tr>
<tr>
<td>Average</td>
<td>16</td>
<td>57.1</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>3</td>
<td>10.7</td>
</tr>
<tr>
<td>Very Unsatisfactory</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>SOCIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Aggressive</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>Aggressive</td>
<td>10</td>
<td>35.7</td>
</tr>
<tr>
<td>Average</td>
<td>8</td>
<td>28.6</td>
</tr>
<tr>
<td>Retiring</td>
<td>3</td>
<td>10.7</td>
</tr>
<tr>
<td>Very Retiring</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>EMOTIONAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>8</td>
<td>28.6</td>
</tr>
<tr>
<td>Good</td>
<td>9</td>
<td>32.1</td>
</tr>
<tr>
<td>Average</td>
<td>9</td>
<td>32.1</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>Very Unsatisfactory</td>
<td>1</td>
<td>3.6</td>
</tr>
</tbody>
</table>
The most dominant measures with below average results were Health Adjustment and Social Adjustment which were 10.7 per cent. Thus, 10.7 per cent of the low physical fitness group have definite health problems and have difficulties in adjusting to people and in maintaining satisfying social relationships. Seven and two tenths per cent of the study group were below average in Emotional Adjustment while 7.1 per cent were low in Home Adjustment.

Personal Inventory: Twenty-seven of the subjects of the study group were personally interviewed by the author. During these interviews any statements or impressions created by the subjects deemed important to the author were noted.

By far the most outstanding item in the interview is that 21 subjects or 77.7 per cent of the entire sample expressed dissatisfaction with their own physical condition. Of special note to physical educators should be the fact that 16 men or 59.3 per cent of the entire sample felt that their high schools did not provide adequate physical education programs. This feeling was prevalent among those men who received no physical education instruction or only a limited amount of physical education instruction during their high school careers. Lack of physical work prior to entering college and being overweight were reasons given by 14 students or 51.9 per cent of the entire sample as factors contributing to their low initial
physical fitness index scores. Nineteen students or 70.4 per cent of the entire sample felt that one year of required physical education and the activity program taken at South Dakota State College was adequate. Twenty-two subjects or 81.5 per cent of the entire sample were satisfied with the developmental program. The most prevalent complaints by the dissatisfied group were that there were too many calisthenics and there wasn't enough variation in the activities.

Eleven or 40.7 per cent of the low physical fitness students participated on interscholastic athletic teams. The communities in which 21 students or 77.8 per cent of the entire sample lived were of an urban nature. These subjects indicated they did not live on a farm and were not accustomed to strenuous physical labor. Not one student in the low physical fitness group indicated that his religious affiliations prevented him from participating in the physical activities which are found in South Dakota State College’s physical education program.

Conclusions and Recommendations

Conclusions: This study definitely indicated that an improvement in physical fitness, as measured by the Rogers’ physical fitness index, can be made in one quarter of developmental physical education. However, this length of time is not sufficient for the weaker individual to achieve normal fitness. At the end of the developmental program, 11 individuals or 42.3 per cent of the sample still have a physical fitness index below 85 which is the national first quartile. Two students had retrogressed in physical fitness index scores during the quarter, the greatest decrease being ten points. These students should be thoroughly examined by a medi-
cal doctor to determine the cause of their retrogression.

An apparent relationship was found between scholastic success and physical fitness. The 29 low physical fitness index students were considerably lower in average scholastic aptitude or general intelligence (42nd percentile) upon entrance at South Dakota State College than freshman men as a whole. The standard deviation in the scholastic aptitude test for the low physical fitness group was 27.36.

During the winter quarter the study group improved their grade point average by 24.3 per cent over the fall grade point average; whereas, the rest of the freshman men increased only 1.6 per cent.

There was a slight decrease in the basal metabolic rate for the low physical fitness index group following the developmental physical education program. While the low physical fitness group consumed 6.1 per cent less oxygen than the normal individual, they only consumed 8.3 per cent less at the conclusion of the developmental program. There is a slight indication that when there is an increase in the physical fitness index of an individual there will be a decrease in his oxygen consumption.

There was a tendency for the study group (10.7 per cent) to be unsatisfactory or below average in personal and social adjustments, as determined by the Bell Adjustment Inventory. The most prevalent adjustment problems were in the areas of Home and Social Adjustment.

The most prevalent medical conditions blamed by the low fitness group were flu and frequent colds. An effort was made by the author to send these students to the Student Health Service for treatment.

A low physical fitness index indicates a lack of physical condition and a lowered body vitality, but it does not indicate what the cause might
be. In personal interviews, 77.7 per cent of the low physical fitness students expressed dissatisfaction with their physical condition. Many of these men felt that their high school physical education programs were inadequate for the development of physical fitness. Forty and seven tenths per cent of the study group were on interscholastic teams. Thus, it may be inferred, for these students at least, that the interscholastic athletics in which they participated did not develop and maintain adequate bodily strength.

Twenty-one students or 77.8 per cent in the study group indicated they were from urban communities. Thus, it may be inferred, for these students at least, that individuals from rural communities are more physically fit than individuals from urban communities.

Recommendations: The recommendations made as a result of this study are of two kinds: (1) Those pertaining to the study itself; and (2) Those pertaining to the required physical education program at South Dakota State College.

The major weakness of this study is the lack of adequate control groups with which to compare the low physical fitness index students. This weakness was a calculated one, as it was felt by the author and his advisor that as many case studies of low physical fitness students as possible should be conducted. In this way the value of the case study method could be demonstrated. For a future study, however, it is recommended that case studies be conducted on the following three physical fitness index groups, in order that contrasts between the groups may be made: low physical fitness index students, mid-range of physical fitness index students, and high physical fitness index students.
The major weakness of the present required physical education program at South Dakota State College is that it does not include a developmental program for the students who are low in physical fitness. Considerable progress in the improvement of bodily strength was found by the author as a result of this study, but it falls short of meeting the physical and other needs of some students. As pointed out above, 42.3 per cent of these students were still below a physical fitness index of 85 at the end of their developmental program, and two students had retrogressed in physical fitness index scores. To improve this situation, the following recommendations are made:

1. That the physical fitness test be administered to each male freshman student. This testing could be accomplished during freshman week. In this way the persons needing a developmental class could be so advised during registration.

2. That low physical fitness index students be required to attend a developmental physical education class as many quarters as are necessary to increase their physical fitness index scores to a satisfactory level. This class should be a pre-requisite for entering general physical education class and should be taken without credit.

3. That the physical fitness index level of South Dakota State College freshman men be increased to 100, the national norm, as rapidly as resources permit.

4. That a syllabus be prepared for the developmental physical education class as well as for all required physical education classes in order that there will be continuity and more meaning to the physical education program.
5. That upperclassmen and graduate students in the Department of Physical Education and Recreation receive additional laboratory experiences in testing and the conduct of developmental classes as part of their training experiences. In this way the essential phases of conditioning and administering an effective physical fitness program would be transmitted to the various public school physical education programs these men will eventually conduct.
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APPENDIX

PERSONAL INTERVIEW QUESTIONS

1. Did you participate in a high school physical education program?

2. If you participated in a high school physical education program, how often did the class meet?

3. If you participated in a high school physical education program, was it required?

4. If you participated in a high school physical education program, what activities were offered?

5. If you participated in a high school physical education program, what is your opinion of it?

6. What is your opinion of South Dakota State College's physical education program?

7. What suggestions do you have for improvements of the South Dakota State College physical education program?

8. What is your opinion of the developmental program in which you participated during the winter quarter?

9. What suggestions do you have for improvement of the above developmental program?

10. What is your religious affiliation?

11. In your own opinion are there any reasons for your low physical fitness index score at the beginning of the winter quarter?
Typed by Mrs. Jack K. Richardson