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A Comparative Analysis of Performance of College Women on the Kraus-Weber Test and the AAHPER test

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A COMPARATIVE ANALYSIS OF PERFORMANCE OF COLLEGE WOMEN ON THE KRAUS-WEBER TEST AND THE AAHPER TEST

BY

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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.

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Thesis Advisor

Head of the Major Department

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CHAPTER I

INTRODUCTION

America has become more cognizant of the need for physical fitness through the Kraus-Weber Test of Minimum Muscular Fitness and the Youth Fitness Program instigated by President Eisenhower in 1956. It was first necessary to determine the present fitness status of youth before an improvement program could be initiated. Through the combined efforts of the American Association for Health, Physical Education, and Recreation and the Federal Government, an inventory test, The American Association for Health, Physical Education, and Recreation Youth Fitness Test, was devised. OPERATION FITNESS-U.S.A. was the plan of action aimed at improving fitness.

The low level of physical fitness in the United States has been attributed largely to the high degree of mechanization. Labor saving devices have decreased the natural physical activity, therefore little physical stamina has been developed by day to day living. The rapidly changing mode of American living has left its imprint on the physical fitness of American youth.

The prime objective of life should be total fitness-mental fitness, spiritual fitness, and physical fitness. The interdependence of these three factors was very aptly stated by President John F. Kennedy:

> ... physical fitness is not only one of the most important keys to a healthy body; it is the basis of dynamic and creative intellectual activity...intelligence and skill can only function at the peak of their capacity when the body is healthy and

strong;...hardy spirits and tough minds usually inhabit sound bodies.[1]

Statement of Problem

The purpose of this study was to compare and analyze the Kraus-Weber Test of Minimum Muscular Fitness* and the American Association for Health, Physical Education, and Recreation Youth Fitness Test** as administered to freshmen women in the physical education classes at South Dakota State College.

Delimitations

This study was limited to South Dakota State College freshmen women who were enrolled in the physical education service classes during the fall quarter of 1960.

Significance of Problem

It was the purpose of this study to compare the fitness test results of South Dakota State College freshmen women as measured by the Kraus-Weber Test and the AAHPER Test. It was also the purpose of this study to establish AAHPER physical fitness norms for South Dakota State College freshmen women and to aid in establishing national AAHPER norms for college freshmen women as requested by the American Association for Health, Physical Education, and Recreation.

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[1]John F. Kennedy, "The Soft American", Sports Illustrated, XIII, p. 16, December 26, 1960.

*Hereafter referred to as the Kraus-Weber Test.

**Hereafter referred to as the AAHPER test.

Definition of Terms

Service class. The term service class refers to the physical education activity classes which are required for graduation of all South Dakota State College students.

Physical fitness. For purposes of this study the author has accepted the definition of the AAHPER Youth Fitness Project:

> Physical fitness is understood to include those qualities which permit an individual to perform life activities involving speed, strength, agility, power, and endurance and to engage in the various kinds of physical activities required of modern day living, including sports and athletics, and to be able to maintain his optimum amount of fitness.[2]

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[2]Paul A. Hunsicker, "AAHPER's Youth Fitness Project", Journal of Health, Physical Education, and Recreation, XXVIII, pp. 17, November, 1957.

CHAPTER II

REVIEW OF LITERATURE

The federal government and the American Association for Health, Physical Education, and Recreation have put forth a cooperative effort to improve the acute problem of physical fitness in the United States. The magnitude of the problem was not realized until Kraus and Hirschland, using the Kraus-Weber Test, studied the fitness of a group of American children and a group of European children. The test results were astounding. Fifty-six and six-tenths percent of the United States children tested failed the test while only 8.7 percent of the European group were unable to pass.[3]

The Kraus-Weber Test of Minimum Muscular Fitness was the outcome of 15 years of research by Hans Kraus and Sonja Weber. The test developed at the Posture Clinic, Columbia University, Presbyterian Hospital, New York City, was based upon studies of many people known to have muscularly deficient backs. It was designed as a clinical test to determine the minimum muscular fitness necessary to maintain normal health. The test battery was composed of six subtests, one of which aimed to test flexibility and the other five to test strength. The scoring of this test was on a pass or fail basis.[4]

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[3]Hans Kraus and Ruth P. Hirschland, "Muscular Fitness and Health", Journal of Health, Physical Education, and Recreation, XXIV, pp. 17-19, December, 1953.

[4]Robert H. Boyle, "The Report that Shocked the President", Sports Illustrated, III, p. 30, August 15, 1955.

Kraus and Hirschland, in attempting to determine the reason for the many back disorders of American adults, administered the clinical test to 4,458 children of the United States. The subjects tested ranged in age from 6 to 19 years, and were from suburban and small urban communities located primarily in the northern Atlantic states. Test results showed that 56.6 percent of the group failed to meet the minimum level of muscular fitness necessary to maintain normal health.[5]

As a basis for comparison, the Kraus-Weber Test was then administered to a total of 2,970 children from Austria, Italy, and Switzerland. The testing conditions were as identical as possible to those used in the United States. Only 8.7 percent of these children failed the test.[6]

Following the original study by Kraus and Hirschland, there was a demand for others, particularly physical educators, to become properly certified in the Kraus-Weber testing procedures. Among the first to be certified to conduct these tests were Marjorie Phillips, Margaret Fox, and Janet Atwood. The results of their studies were published in the fall of 1955.[7]

Phillips, in a study of 1,456 Indiana students in grades one through six, found that 45.1 percent of these children failed the test.

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[5]Kraus and Hirschland, loc. cit.

[6]Boyle, loc. cit.

[7]Margaret Fox and Janet Atwood, "Results of Testing Iowa Schoolchildren for Health and Fitness", Journal of Health, Physical Education, and Recreation, XXVI, pp. 20-76, September, 1955.

Girls, as a whole, were more successful in passing the flexibility subtest than boys. In comparing test results of the European study with the test results obtained by Phillips, it was found that the superiority of the European group decreased as age increased. The two groups were found to be equally successful in passing the strength tests by the age of 12 years. It was also noted that as age increased, flexibility decreased but strength increased. Of the Indiana children tested, only five failed the upper back test; six failed the lower back test; and no child failed either of the back tests after the age of nine. Phillips and her associates concluded that the Kraus-Weber Test was of value in locating children with muscular deficiencies in the areas which it tested, but that the value of some of the subtests was questionable.

In one of his reports, Kraus implied that children coming into the first grades of the school system were already seriously deficient. Furthermore, it appeared that the situation was not alleviated during the time the children were in elementary schools. They left elementary school in much the same condition as when they entered it. Phillips found Kraus' inference to be true when the results of all of the tests were combined. A further analysis of the data showed that as age increased the increasing failures on the flexibility subtest counterbalanced the decreasing failures on the strength subtests. Phillips confirmed the reliability of the Kraus-Weber Test.[8]

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[8]Marjorie Phillips, "How Fit Are Our American School Children?" Journal of Health, Physical Education, and Recreation, XXVI, pp. 14-71. September, 1955.

Fox and Atwood tested 575 children in three nonpublic elementary schools in Iowa City, Iowa. The test results showed that 66.1 percent of these children failed. Fewer failures were found in schools where satisfactory physical education programs were being conducted than in the schools which had inadequate programs. The investigators concluded that the test failures decreased as age increased.[9]

Fox and Atwood indicated that the test results would be more meaningful if reported qualitatively. Kraus defended the pass-fail scoring by stating that if one of a battery of minimum tests was failed the individual was below minimum. He further stated that if one had sugar in his urine he could not be considered healthy, even though all other clinical findings were normal.[10] In answer to the question, "Should the time level vary with the age?", Kraus stated that the tests were self-correlating because they tested one's strength against his own body weight and size. Kraus emphasized that as an individual walks he must manage his weight and height with the key posture muscles. These were the muscles being tested and no norms were needed.[11] Fox and Atwood posed two more questions: (1) Was the sample of muscle groups adequate, if the test was to measure muscular fitness? (2) Was the test an adequate measure of muscular power? Kraus answered these questions by

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[9]Fox and Atwood, loc. cit.

[10]Hans Kraus, "Editor's Mail", Journal of Health, Physical Education, and Recreation, XXVII, p. 6, January, 1956.

[11]Kraus, loc. cit.

stating that the tests were not designed to determine optimum levels of muscular fitness, but rather to determine whether or not the individual had sufficient strength and flexibility in the parts of the body upon which demands were made in normal daily living.[12]

Hess, in answer to the question regarding the ten second interval used in the Kraus-Weber test, stated that the arbitrary decision to use ten seconds rather than twelve or nine could be defended on the grounds that our people needed to know something about the ability of the muscles to stabilize as well as the ability to move.[13]

In the years to follow, the issue of physical fitness rapidly gained momentum. The Japanese were interested in comparing the fitness of their youth, as measured by the Kraus-Weber Test, with that of other nations previously studied. Noguchi was responsible for initiating the testing program involving 6,549 Japanese school children. He believed that the way of living, the school physical education curriculum, and variations in body construction accounted for obvious differences in fundamental motor abilities of the various races. It was also noted that leg index in relation to height influenced the test results. Only 3.3 percent of the Japanese students failed the flexibility subtest. Strength tests, primarily the abdominal subtests, accounted for 77

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[12]Robert H. Boyle, op. cit., pp. 30-31.

[13]Ford Hess, "Editor's Mail", Journal of Health, Physical Education and Recreation, XXVII, p. 40, February, 1956.

percent of all failures.[14]

Test results of two more studies involving the Kraus-Weber Test of children in the United States were published in 1957. Kirchner and Glines conducted a study using a group of Oregon children as subjects.[15] Buxton tested a group of Iowa children.[16]

Kirchner and Glines tested a sample of 1,195 students from the elementary schools in Eugene, Oregon. They found that 38.1 percent of the students failed the test. When the flexibility item was excluded from the test battery the number of failures was reduced to 19.4 percent. The total test results implied that girls were more muscularly fit than boys because failure of the flexibility subtest was more prevalent among the boys. Schools providing good physical education programs, as determined by the LaPorte Score Card, had 15 percent fewer failures. The examiners concluded that as age increased there was a decrease in the number of strength test failures and an increase in the flexibility test failures.[17]

Buxton's purpose in studying 1,057 Iowa school children was to expand the Kraus-Weber Test and to provide more differentiating scores

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[14]Yoshiyuki Noguchi, "Fitness Testing of Japanese Children", Journal of Health, Physical Education and Recreation, XXVII, p. 20, October, 1956.

[15]Glenn Kirchner, and Don Glines, "Comparative Analysis of Eugene, Oregon, Elementary School Children Using the Kraus-Weber Test of Minimum Muscular Fitness", Research Quarterly, XXVII, pp. 16-25, March, 1957.

[16]Doris Buxton, "Extension of the Kraus-Weber Test", Research Quarterly, XXVIII, pp. 210-217, October, 1957.

[17]Kirschner and Glines, loc. cit.

at all ability levels. These scores were then used to determine passing or failing. This study showed that strength and flexibility differed with age and sex. On the basis of these results, Buxton believed that the standards should also differ for each sex at the various age levels. The tester modified the scoring of the original Kraus-Weber Test items and included tests for the arms and legs. This revised test included the six original subtests of the Kraus-Weber battery and four additional items.[18]

Shaffer tested all of the girls in the required physical education classes at the Cochran and Garfield Junior High Schools in Johnstown, Pennsylvania. She analyzed certain variables effecting the Kraus-Weber Test failures among junior high school girls. A correlation was found between Intelligence Quotient and the Kraus-Weber Test failures. The test scores of the 1,400 girls participating in this study indicated that as intelligence increased the failure rate decreased. Shaffer found that a well planned conditioning program of about 100 minutes, interspersed throughout the year, would yield desirable results when measured by the Kraus-Weber Test. She concluded that junior high school girls who were free from mental and physical disorders could pass the Kraus-Weber Test if they had participated regularly in physical activities based on their physiological needs during the strength building years.

The tester noted that failure rate was influenced more by weight than by height. Shaffer's study did not support the theory that the

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[18]Buxton, loc. cit.

high failure rate of American children could be attributed to their larger size. Prior to conditioning, the girls classified as tall-overweight and average-overweight possessed a higher failure rate on the strength tests. The short-underweight girls failed more frequently after conditioning. The tall-overweight girls recorded the fewest failures, prior to conditioning, on the flexibility subtest. The girls in the average-underweight, short-overweight, and short-underweight categories failed the flexibility item most frequently after conditioning.[19]

In a study of fourth grade students enrolled in elementary schools at Berkeley, California, Espenschade found a failure rate of 39.9 percent for boys and 24.9 percent for girls. The purpose of the study was to compare the scores of fourth grade children on the Kraus-Weber Test with the scores they achieved on the California Physical Performance Test. The investigator noted that all students failing the Kraus-Weber Test scored lower in running, jumping, throwing, and sit-ups on the California Physical Performance Test. The boys who failed the Kraus-Weber flexibility item scored significantly lower on the dash and sit-ups in the California Test. As a result of her study, Espenschade concluded that the Kraus-Weber Test was reasonably valid as an indicator of motor abilities in elementary school boys.[20]

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[19]Gertrude Shaffer, "Variables Affecting Kraus-Weber Failures among Junior High School Girls", Research Quarterly, XXX, pp. 75-86, March, 1959.

[20]Anna Espenschade, "Fitness of Fourth Grade Children", Research Quarterly, XXIX, pp. 274-278, October, 1958.

Most recent of the Kraus-Weber studies involving foreign children was a study conducted by Kelliher in East Pakistan. He tested a total of 2,325 Pakistani children whose ages corresponded favorably to those of the children included in the American and European studies. The percentage of failures for girls was 56.56 percent and for boys 35.87 percent. Kelliher believed that the lack of girls' physical education programs in East Pakistan may have been responsible for the lower scores earned by the girls. A pronounced abdominal weakness was noted in both boys and girls. The older boys, of grades seven to ten, had fewer failures than any other group. The tester attributed the lower number of failures among older boys to their participation in games and sports. In spite of extremely inferior living conditions, fewer of the Pakistani children failed the test than did children of the United States.[21]

President Eisenhower called a conference on the Fitness of American Youth in June, 1956. Primary stimulus was given to the conference by the Kraus-Weber Test results. Outcomes of the conference were the formulation of the President's Council on Youth Fitness and the President's Citizen's Advisory Committee on the Fitness of American Youth. It was the purpose of the Citizen's Advisory Committee to advise the President, through the President's Council, and to inform and alert the American people in regard to the fitness of American youth.[22]

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[21]M. S. Kelliher, "A Report on the Kraus-Weber Test in East Pakistan", Research Quarterly, XXXI, pp. 34-42, March, 1960.

[22]"President's Conference on Fitness of American Youth", Journal of Health, Physical Education, and Recreation, XXVII, p. 8-10, September, 1956.

Soon after the initial conference under presidential auspices The American Association for Health, Physical Education, and Recreation called the Conference on Fitness which was held in September, 1956. The purpose of this conference was to prepare a statement outlining the facts and beliefs which would serve as a guide to the organization on matters concerning fitness and to plan for the implementation of this statement through programs of health education, physical education, and recreation. One hundred and sixteen Association members and leaders in the field of fitness were in attendance.[23] The slogan, "Fitness for Youth" was adopted by the group and a platform was formulated.[24]

The following February a meeting was called of the American Association for Health, Physical Education, and Recreation Research Council in Chicago. The main points of discussion were: (1) identification of the major aspects of fitness: (2) evaluation of suitable tests already in existence and where such measures were not available, to develop valid, reliable, objective and economical tests; (3) the establishment of norms on the basis of the chosen tests for the various aspects of fitness for both sexes at the different age levels; (4) and consideration of the formation of a fitness profile.[25]

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[23]"The AAHPER Conference on Fitness", Journal of Health, Physical Education, and Recreation, XXVII, pp. 10, November, 1956.

[24]Carl A. Troester, Jr., "Progress Report on AAHPER's Fitness Program", Journal of Health, Physical Education, and Recreation, XXVIII, pp. 20, September, 1957.

[25]Paul A. Hunsicker, "AAHPER's Youth Fitness Project", Journal of Health, Physical Education, and Recreation, XXVIII, p. 17, November, 1957.

Dr. Paul A. Hunsicker from the University of Michigan was appointed director of the Youth Fitness Project at the Chicago meeting. The primary purpose of this project was to investigate the physical fitness of American youth. With this purpose in mind, the Youth Fitness Project Research Committee proposed a battery of tests known as the American Association for Health, Physical Education, and Recreation Youth Fitness Test. The test battery was composed of seven subtests: (1) softball throw for distance, (2) standing broad jump, (3) 50 yard dash, (4) pull-ups or modified pull-ups for girls, (5) sit-ups, (6) shuttle-run, and (7) 600 yard run-walk. Three swimming test items were added later: (1) swim 15 feet, (2) swim 100 yards against time, (3) and jump into deep water, swim 15 yards, turn around, swim back one-half the distance, then turn on to back and rest for one-half minute. Turn on to front and swim to starting point.[26]

National norms for boys and girls from grades five through twelve were established on the basis of test scores secured through a nation-wide study of 8,500 students. To assure a valid sampling, the assistance of the Survey Research Center of the University of Michigan was obtained. Approximately 200 schools in 28 states were included in this study.[27]

The raw test scores were compiled and converted to norms at the

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[26]Paul Hunsicker, loc. cit.

[27]Paul Hunsicker, "AAHPER Physical Fitness Test Battery", Journal of Health, Physical Education, and Recreation, XXIX, pp. 24-25, September, 1958.

University of Michigan. The norms were presented in percentile tables based upon age and the tables were based upon the Neilson-Cozens Classification Index.[28]

In 1958 the American Association for Health, Physical Education, and Recreation edited the AAHPER Youth Fitness Test Manual. It contained an accurate description of the various test items, the percentile scores for boys and girls of ages 10 through 17 years, and the classification indexes and percentile scores based on the classification index for both boys and girls.[29]

In the opening address to the West Point Fitness Conference held in September, 1957, former Vice-President Nixon stated that he had observed the youth of other nations and was certain that the youth of this country had better clothes and better health than any other country in the world. He cautioned that physical education and recreation programs should be planned in view of the technological advancements in order that the youth of this country might have a desire to achieve and maintain fitness as well as knowledge and skills. A major accomplishment of the conference was the outlining of a course for youth fitness requiring more adequate facilities, more time for participation in

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[28] Ibid.

[29] American Association for Health, Physical Education, and Recreation, AAHPER Youth Fitness Test Manual, American Association for Health, Physical Education, and Recreation: Washington, D. C., 1958.

vigorous activities, and more creative leadership.[30]

In 1958 a Fitness Conference was held in September, at Fort Ritchie, Maryland. Some of the goals stressed for the coming year were to establish a systematic means for evaluating fitness, to assist the local projects and programs by sponsoring workshops, and to coordinate youth fitness activities of nationwide youth-serving agencies. During this convention Shane McCarthy, Executive Director of the President's Council on Youth Fitness, stressed the importance of fitness in his statement, "Fitness is not achieved by fitful starts and stops. It is not a crash project...Its efforts will always be required as we become more mechanical and automatic".[31]

In recent years numerous studies have been made to compare the AAHPER Test and the Kraus-Weber Test. Three studies of this type have been conducted at South Dakota State College previous to this study.

In a study of 275 elementary and junior high school students from four eastern South Dakota schools, Lockwood found that 36.7 percent failed the Kraus-Weber Test. The AAHPER Test scores did not show a significant difference among the four schools. It was noted that students attending the schools that were rated higher by the LaPorte Health and Physical Education Score Card achieved higher scores in both fitness

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[30]"The West Point Fitness Conference", Journal of Health, Physical Education, and Recreation, XXVIII, pp. 40-42, November, 1957.

[31]"Fitness Conference", Journal of Health, Physical Education, and Recreation, XXIX, pp. 31-56, October, 1958.

tests.[32]

Eisenbraun administered the AAHPER Test and the Kraus-Weber Test to a total of 233 students in three South Dakota elementary and junior high schools. The .284 correlation indicated there was some relationship between the two tests.[33]

In a study of 380 children from Madelia, Minnesota, in grades five to eleven, Nehowig found that the scores achieved by these students were consistently higher than the national averages in the AAHPER Test. Thirty-three and three-tenths percent of the Minnesota group failed the Kraus-Weber Test. The correlation between the two tests was .210 which was significant at the one percent level of confidence.[34]

Under the direction of Dr. Paul A. Hunsicker test scores were compiled and norms established for college men in the 1959-1960 school year. The percentile norms were based on the AAHPER Test results of approximately 2,200 college men attending eight American universities.[35] No norms were established for college women.

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[32]Joe Lockwood, "Physical Fitness and Physical Education Programs in Selected Schools in South Dakota", Unpublished Master's Thesis, South Dakota State College, 1958.

[33]Dalvin Eisenbraun, "A Comparative Analysis of the Kraus-Weber Test and the AAHPER Test of Physical Fitness", Unpublished Master's Thesis, South Dakota State College, 1958.

[34]Donald Nehowig, "A Comparative Analysis of Performance by the Madelia Public School Students on the Kraus-Weber Test and the AAHPER Test", Unpublished Master's Thesis, South Dakota State College, 1960.

[35]Paul A. Hunsicker, "Fitness Test Norms for College Men", Journal of Health, Physical Education, and Recreation, XXXI, p. 38, September, 1960.

Most states have established committees on fitness. Youth in all 50 states and 16 foreign countries, including Canada, Australia, New Zealand, and Japan, have been tested by use of the AAHPER Test.[36]

President Kennedy followed the pattern established by President Eisenhower and appointed Charles "Bud" Wilkinson, Football Coach at Oklahoma University, as Special Consultant to the President on Youth Fitness. President Kennedy also outlined a four point program for fitness: (1) the establishing of a White House committee on health and fitness to formulate and carry out a program to improve the physical condition of the nation, (2) making physical fitness of our youth the direct responsibility of the Department of Health, Education, and Welfare, (3) inviting the governor of each state to attend an annual National Youth Fitness Congress, and (4) proclaiming through all departments of the government that the promotion of sports participation and physical fitness is a basic and continuing policy of the United States.[37]

On the basis of the studies reviewed it would appear that the American youth were less physically fit than children of other nations. The Kraus-Weber Test results stimulated thinking on this vital problem of youth fitness which resulted in a plan of action. The American Association for Health, Physical Education, and Recreation in conjunction

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[36] American Association for Health, Physical Education, and Recreation, Operation Fitness-U.S.A., January 1, 1959 to June 15, 1960.

[37] "John F. Kennedy's Statement on Health and Physical Education", Journal of Health, Physical Education, and Recreation, XXXII, p. 4, January, 1961.

with the federal government instigated the National Fitness Program which included a nation-wide evaluation of the present level of physical fitness and a plan for improvement. Much has been learned through the numerous studies, but much more must be learned before the problem of physical fitness will cease to exist.

CHAPTER III

PROCEDURES

The AAHPER Youth Fitness Test and the Kraus-Weber Test were administered to members of the 1960 fall quarter service classes. A total of 211 South Dakota State College freshmen women were tested.

The Kraus-Weber Test

The Kraus-Weber Test was administered by the author and two staff members from the Department of Physical Education for Women. Prior to testing the service classes, those persons administering the test were properly certified in administration of the Kraus-Weber Test by Glenn E. Robinson, Director of the Graduate Program in Physical Education at South Dakota State College.

Before the actual testing, each class was given a brief history and background of the test. No warm-up was allowed prior to the actual testing. Two testing stations were used and each station was supplied with a 6' x 3' x 4' wooden table and two towels folded into eighths. Two students were allowed in the testing station at a time. While one was taking the test the second girl was observing. As soon as one test was completed a new observer was permitted to enter. Each student's test score was recorded on her individual score sheet.

Directions and description of the Kraus-Weber Test battery are found in Figures I-VI, pages 23-28. This testing procedure was advocated

by Dr. Kraus, and was reproduced with the permission of Logterman.[38] The test instructions were closely followed during the administration of the tests.

The AAHPER Test

The methods and procedures used in conducting the AAHPER Test were secured from the AAHPER Youth Fitness Test Manual. The test items were administered by the author and two staff members from the Department of Physical Education for Women. Junior and senior women physical education major students assisted in routine matters related to the actual testing.

It was necessary to give the 600-yard run-walk and the softball throw out of doors because of the space required to administer these two test items. The remaining five items were conducted at four separate stations inside the gym. The students rotated from station to station until they had completed all seven test items.

Test descriptions and instructions for administering the AAHPER battery are found on pages 29-38. It was imperative to follow specific test directions which were taken from the AAHPER Youth Fitness Test Manual, therefore detailed instructions have been included. A brief warm-up preceded the actual testing. Portions of the test which did not apply to this study were omitted from the test description. The three

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[38]Melvin Logterman, "A Study Made to Determine the Muscular Fitness Status of a Group of Sioux Indian and Caucasian Children as Determined by the Kraus-Weber Test of Minimum Muscular Fitness", Unpublished Master's Thesis, South Dakota State College, 1957.

aquatic test items were eliminated because testing facilities were not available.

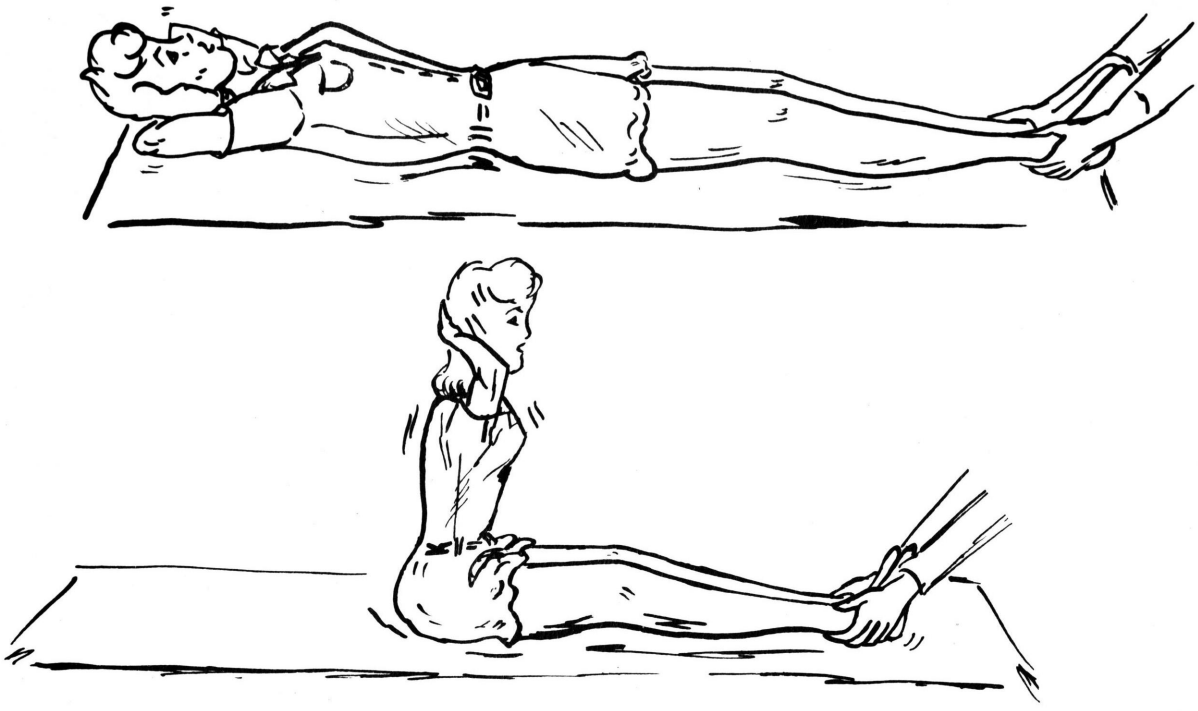

Figure I. Test no. I - Abdominal plus

1. Purpose - To test the strength of the abdominals and psoas.
2. Designation - "Abdominals plus psoas" or "A+"
3. Position of Person Being Tested - Lying supine, hands behind neck. The examiner holds the testee's feet on the table.
4. Command - "Keep your hands behind your neck and try to roll up into a sitting position."
5. Marking - (Pass or Fail) A "pass" consists of raising the trunk from a supine position to a sitting position (trunk makes a right angle to the legs). Anything less than a full sit-up position constitutes a "fail".

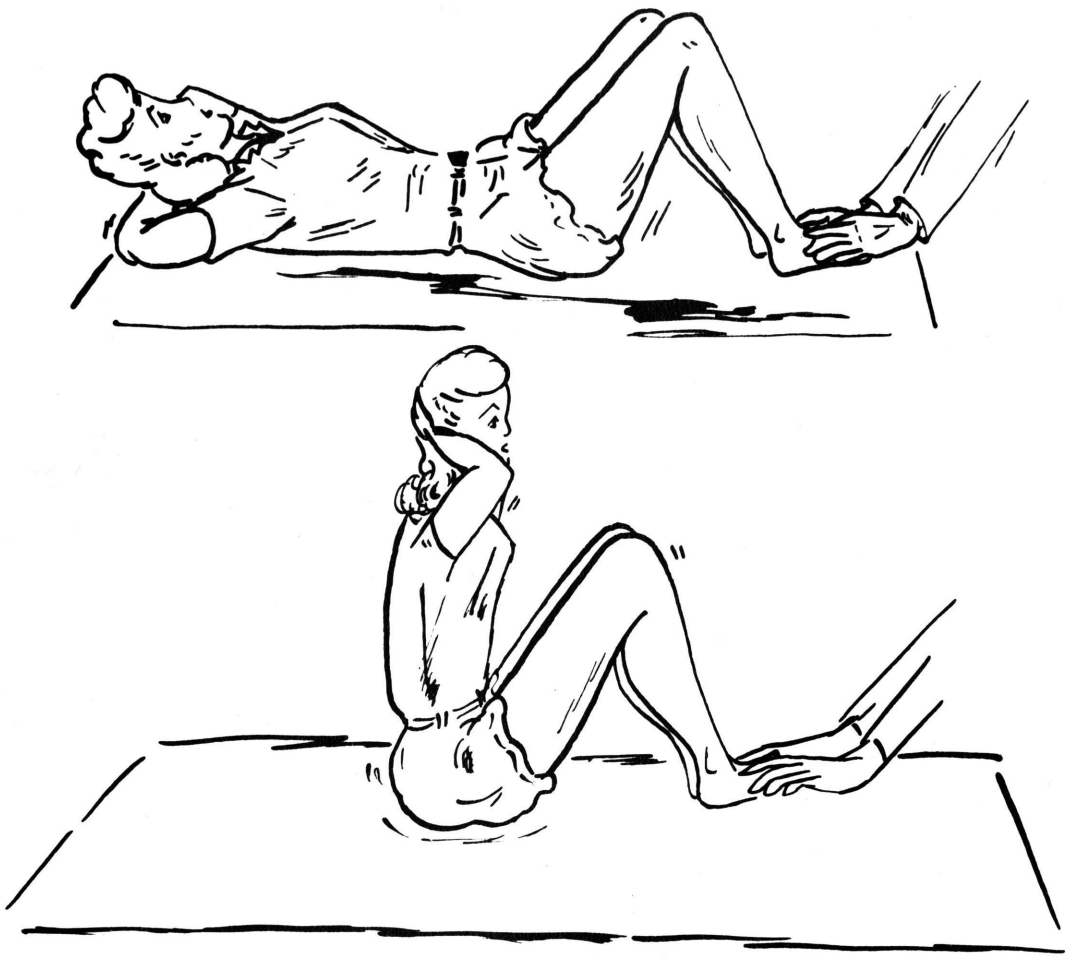

Figure II. Test no. II - Abdominal minus

1. Purpose - Further test for abdominals.
2. Designation - "Abdominals minus psoas" or "A-."
3. Position of Person Being Tested - Lying supine, hands behind neck and knees bent. Examiner holds his feet down on the table.
4. Command - "Keep your hands behind your neck and try to roll up into a sitting position."
5. Marking - The marking is exactly the same as for "abdominals plus."

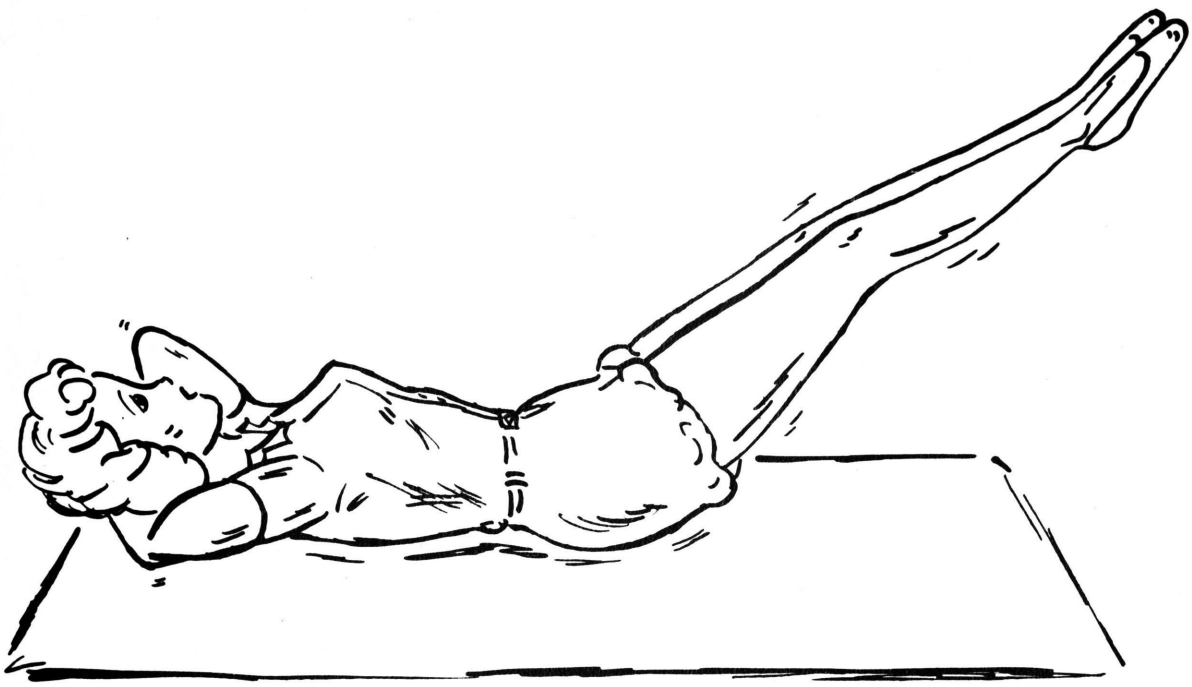

Figure III. Test no. III - Psoas (lower abdomen)

1. Purpose - Test the strength of the psoas, and lower abdomen.
2. Designation - "Psoas" or "P."
3. Position of the Person Being Tested - Supine position with hands behind neck and legs extended.
4. Command - "Keep your knees straight and lift your feet ten inches off the table. Keep them there while I count." The count is ten seconds.
5. Marking - Holding for ten full seconds constitutes a pass. Anything less is recorded as a failure.

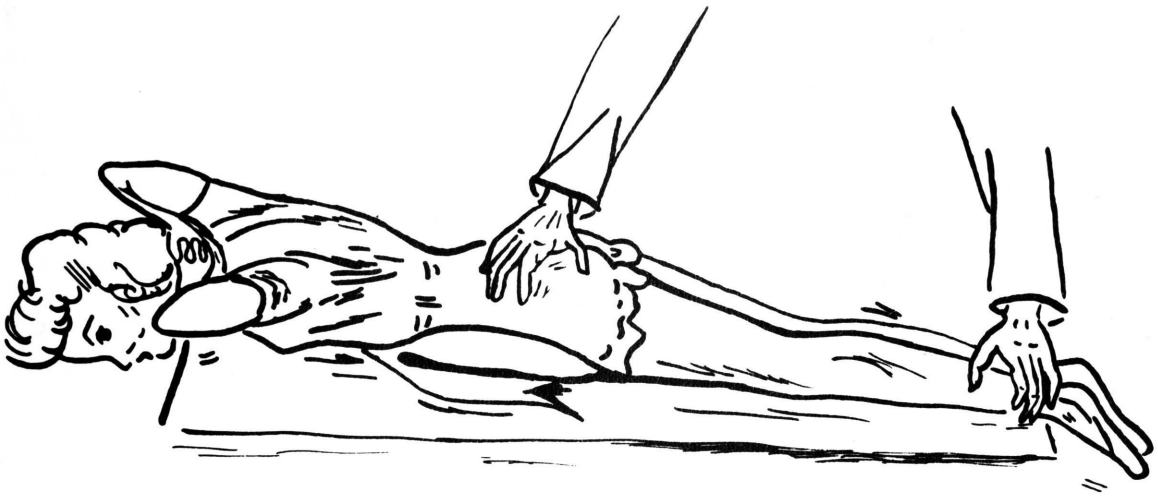

Figure IV. Test no. IV. - Upper back

1. Purpose - Tests the strength of upper back muscles.
2. Designation - "Upper back" or "U.B."
3. Position of Person Being Tested - Lying prone with a blanket under his abdomen, but far enough down as to give the body the feeling of being a see-saw which if weighted at either end, would be able to hold the other end in the air. This is most easily accomplished with the following commands.
4. Command - "Roll over onto your stomach and lift up the middle so that I can slide this blanket under you. Now I am going to hold your feet down while you put your hands behind your neck and raise up your chest, head and shoulders. Hold them up while I count." The count is ten seconds.
5. Marking - Holding for ten seconds constitutes a pass. Anything less is recorded as a failure.

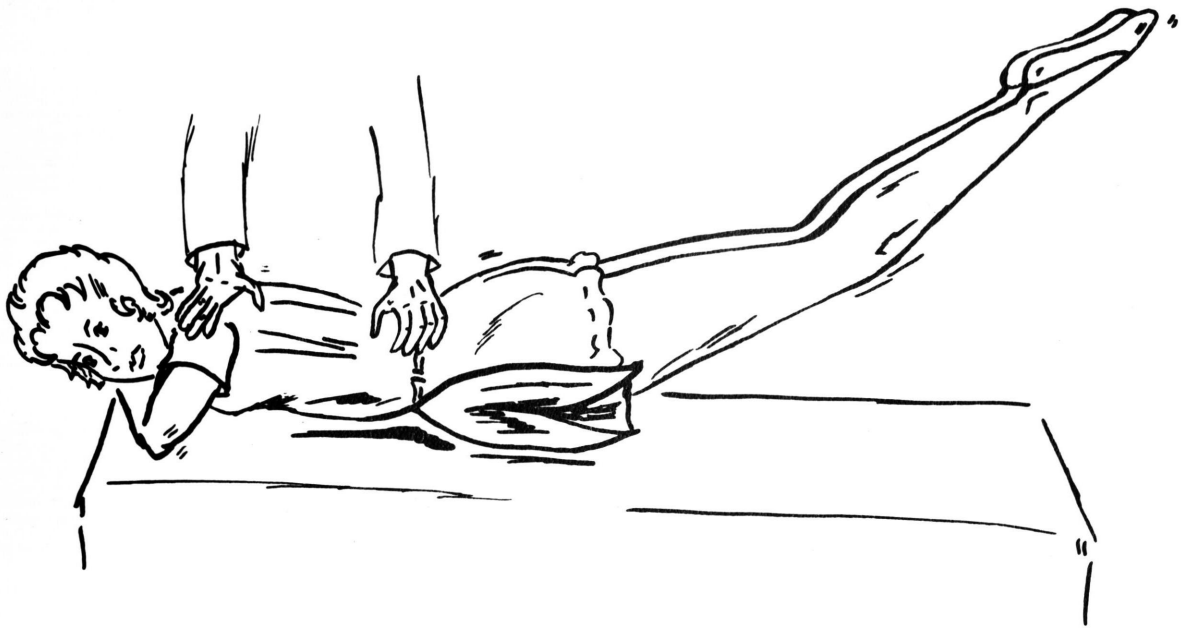

Figure V. Test no. V - Lower back

1. Purpose - Test the strength of lower back.
2. Designation - "Lower back" or "L.B."
3. Position of Person Being Tested - The person remains prone over the blanket, but removes his hands from behind his neck, placing them folded on the table and rests his head on them.
4. Command - "I am going to hold your chest down on the table, try to lift your legs up, but do not bend your knees. Now hold this position while I count." The count is ten.
5. Marking - Holding for ten full seconds constitutes a pass. Anything less is recorded as a failure.

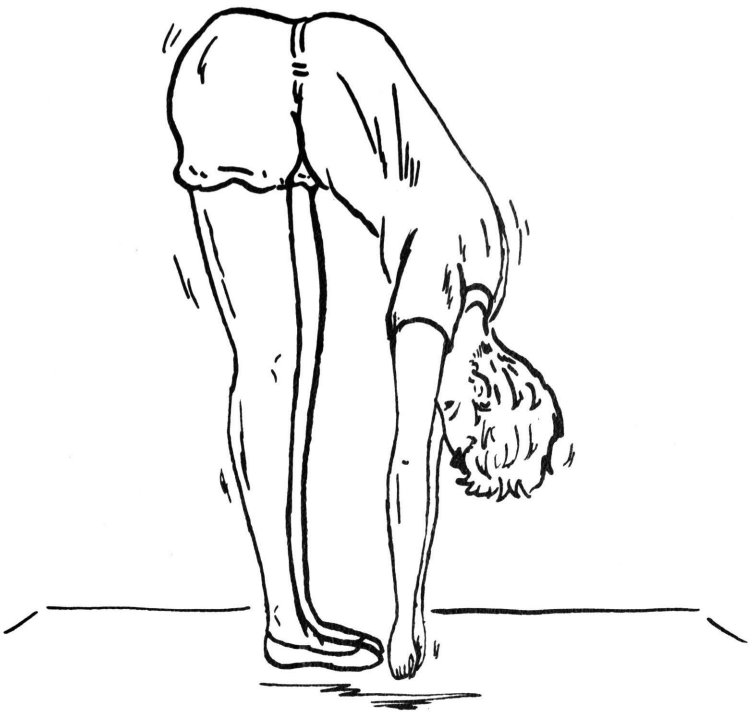

Figure VI. Test no. VI - Length of back and hamstrings

1. Purpose - Tests the length of back and hamstring muscles (known as the flexibility test).
2. Designation - "Back and hamstrings" or "flexibility."
3. Position of Person Being Tested - Standing erect in stocking or bare feet, hands at testee's sides.
4. Command - "Put your feet together, keep your knees straight, now lean down slowly and see how close you can come to touching the floor with your finger tips."
5. Marking - Touching the floor with the finger tips constitutes a pass. Any degree less is recorded as a failure.

Test No. 1 - Modified Pull-up

1. Equipment: A doorway gym bar

2. Description: The height of the bar was adjusted so it was approximately at nipple level. An overhand grasp was used. The pupil extended her legs under the bar and then fully extended her arms. The arms formed an angle of 90 degrees with the body line and the body line formed an angle of 45 degrees with the floor. To prevent slipping the testee rested her heels against the scorer's foot. From this position the pupil raised her body by her arms until her chest touched the bar, then lowered her body to a full hang. The exercise was repeated.

3. Rules: (a) No resting was permitted, (b) No pull-up was counted in which the pupil failed to keep her body straight, come to a full extension of her arms, or touch her chest to the bar. (c) The maximum number of modified pull-ups was 40.

4. Scoring: The number of completed pull-ups was recorded to the nearest whole number, with a maximum of 40.

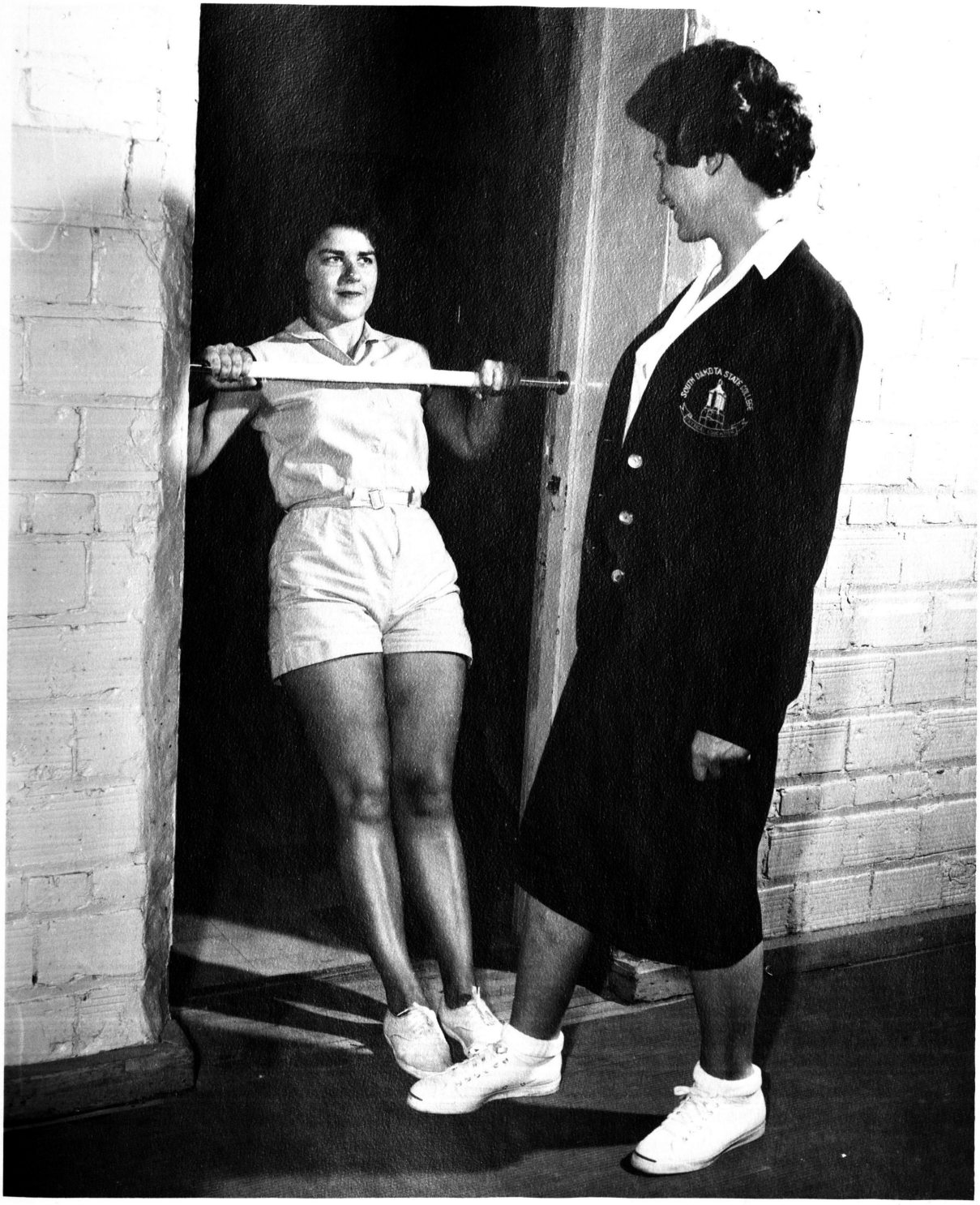

Figure VII. Test No. 1 - Modified Pull-Up

Test No. 2 - Sit-up

1. Equipment: None

2. Description: The pupil was lying on her back on the floor with legs extended and feet about two feet apart. Her hands were placed on the back of her neck with the fingers interlaced. Elbows were retracted. A partner held the ankles down, keeping the heels in contact with the floor at all times.

   The pupil sat up, turned the trunk to the left and touched the right elbow to the left knee, returned to starting position, then sat up, turned the trunk to the right and touched the left elbow to the right knee. The exercise was repeated, alternating sides.

3. Rules: (a) The fingers remained in contact behind the neck throughout the exercise. (b) The knees remained on the floor during the sit-up but were slightly bent when the elbow was touched to the knee. (c) The back was rounded and the head and elbows brought forward when the pupil sat up as in a "curl" up. (d) After returning to starting position, the elbows were flat on the floor before sitting up again.

4. Scoring: One point was given for each complete movement of touching elbow to knee. No score was counted if the finger tips did not remain in contact behind the head, if the knees were bent when the pupil was lying on her back or when she began to sit up, or if the pupil pushed off the floor from an elbow. The maximum number of sit-ups was 50.

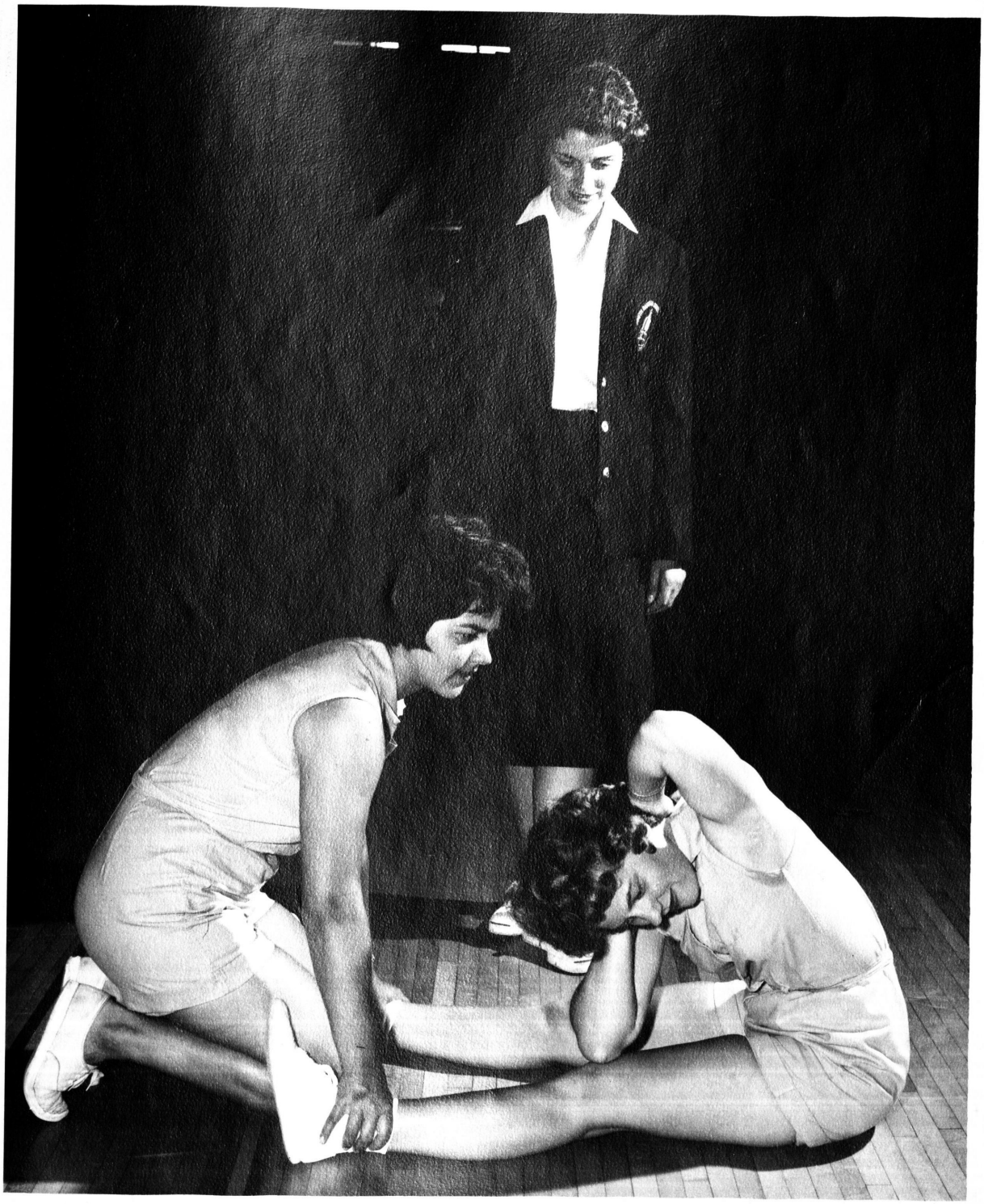

Figure [illegible]. Test No. 2 - Sit-Up

Test No. 3 - Shuttle Run

1. Equipment: Two blocks of wood, 2 inches by 2 inches by 4 inches, and a stopwatch. Pupils ran barefooted.
2. Description: The 30 foot width of the volleyball court was used. The blocks of wood were placed behind one of the side lines. The pupil started from behind the opposite line. On the signal, "Ready? Go!", the pupil ran to the block, picked one up, ran back to the starting line and placed the block behind the line. She then ran back and picked up the second block which she carried back across the starting line. Since the scorer had a split-second timer, two girls ran at the same time. To eliminate the necessity of returning the blocks after each race, the races were started alternately, first from behind one line and then from behind the other.
3. Rules: One trial was allowed.
4. Scoring: The score was recorded to the nearest tenth of a second.

Test No. 4 - Standing Broad Jump

1. Equipment: Floor and tape measure.
2. Description: The pupil stood with feet several inches apart and the toes just behind the take-off line. Preparatory to jumping, she swung her arms backward and bent her knees. The jump was accomplished by simultaneously extending the knees and swinging the arms forward.
3. Rules: (a) Three trials were allowed. (b) The distance was measured from the take-off line to the heel or other part of the body that touched the floor nearest the take-off line. The tape measure was taped to the floor at right angles to the take-off line and the girls jumped along the tape. The scorer stood at the side and observed the mark to the nearest inch.
4. Scoring: The best of three trials was recorded in feet and inches to the nearest inch.

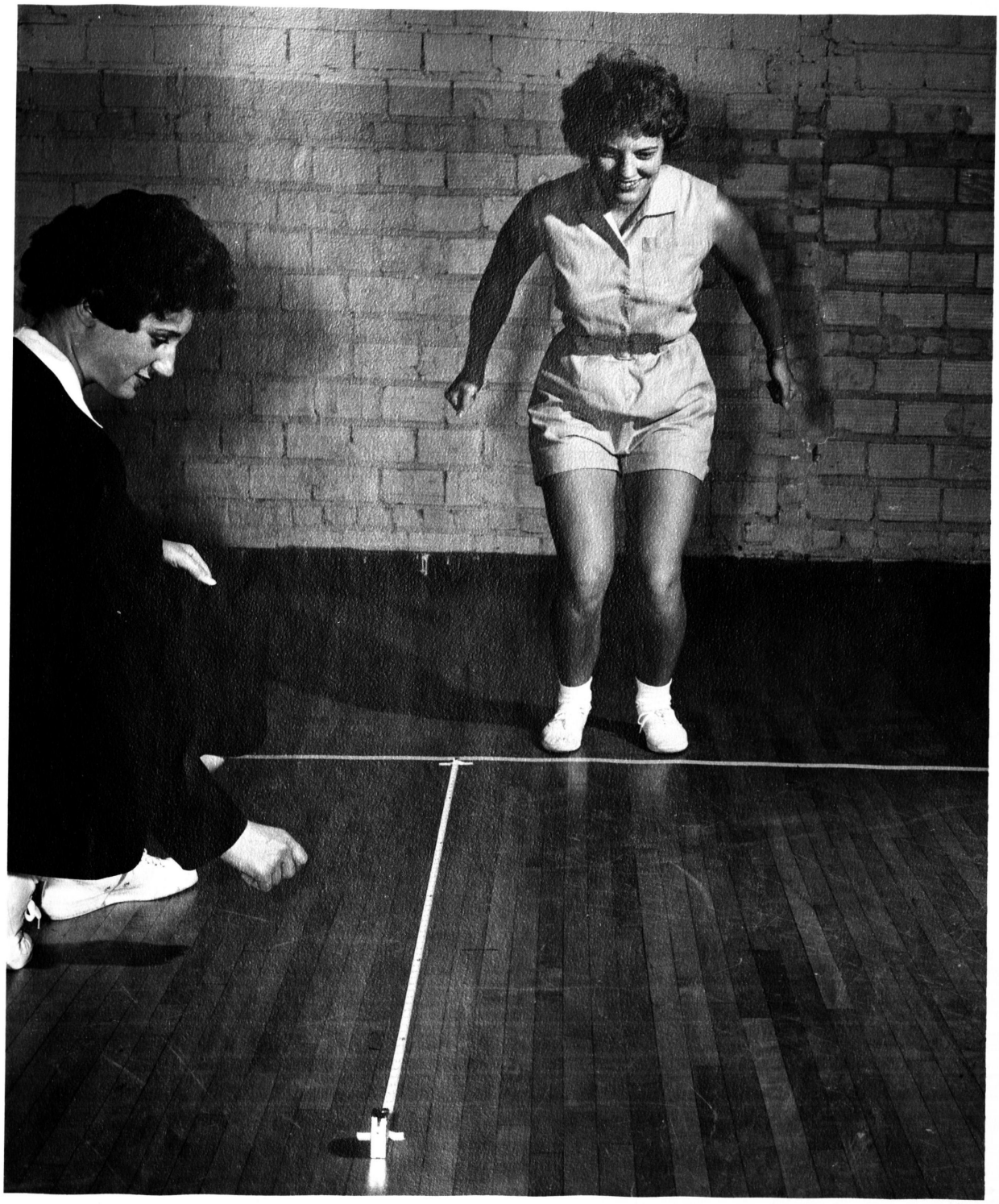

Figure IX. Test No. 4 - Standing Broad Jump

Test No. 5 - 50-Yard Dash

1. Equipment: Two stopwatches or one with a split-second timer.
2. Description: It was preferable to administer this test to two pupils at a time. Both girls took positions behind the starting line. The starter used the commands, "Are you ready?" and "Go!" The latter was accompanied by a downward sweep of the starter's arm which gave the timer a visual signal.
3. Rules: The score was the amount of time between the starter's signal and the instant the pupil crossed the finish line.
4. Scoring: The score was recorded to the nearest tenth of a second.

Test No. 6 - Softball Throw for Distance

1. Equipment: Softball (12 inch), small metal stakes, and tape measure.
2. Description: The football field made an ideal area for this test. The pupil threw the balls while remaining within two parallel lines, six feet apart. The point of landing was marked with one of the stakes. If her second or third throw was farther, the stake was moved accordingly so that after three throws the stake was at the point of the pupil's best throw.
3. Rules: (a) Only an overhand throw was used. (b) Three throws were allowed. (c) The distance recorded was the distance from the point of landing to the nearest point on the restraining line.
4. Scoring: The best of three trials was recorded to the nearest foot.

Test No. 7 - 600-Yard Run-Walk

1. Equipment: Track or other 600 yard area.
2. Description: A standing start was used. At the signal, "Ready? Go!", the subject started running the 600-yard distance. The running was interspersed with walking. The pupils paired off before the start of the event. The timer called out the time in minutes and seconds as the pupils crossed the finish line. Each pupil listened and remembered her partner's time so that it could be recorded later.
3. Rules: Walking was permitted, but the object was to cover the distance in the shortest possible time.
4. Scoring: The score was recorded in minutes and seconds.

CHAPTER IV

TREATMENT AND ANALYSIS OF DATA

The correlation between the AAHPER Test results and the Kraus-Weber Test results was calculated to determine if there was a similarity between the two tests as administered to college freshmen women. The raw scores on the AAHPER Test were used to establish norms for college freshmen women.

It was necessary to convert the raw scores from the AAHPER Test into common scores. This was accomplished through use of the Percent position formula. The raw scores from each subtest in the AAHPER Test battery were tabulated on separate frequency tables ranging from high to low. Each interval was ranked in order of merit, then the Percent position formula was applied as described by Garrett.[39]

$$\text{Percent position} = \frac{100(R-.5)}{N}$$

The percent of the normal curve values was transformed into units of amount or "scores" by use of Table 49 in Garrett.[40] The common scores for the AAHPER Test are found in the Appendix. An average score for the test battery was obtained for each individual by averaging the seven common scores that each girl achieved on the subtests.

The average AAHPER Test scores were placed on a frequency distribution in intervals of five, ranging from 25 to 79. The Kraus-Weber

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[39]Henry E. Garrett, Statistics in Psychology and Education, Fifth edition, pp. 328-332, Longmans, Green, and Company, New York, 1958.

[40]Ibid., p. 329.

Test results were also placed on this distribution. The correlation between the two tests was determined by use of the Bi-serial r formula. Garrett recommends use of this formula when computing the correlation between traits and other attributes if the members of the group can be measured in the one variable, but can be classified into only two categories in the second or dichotomous variable.[41] The Bi-serial r formula is:

$$r_{bis} = \frac{M_p - M_q}{S.D.} \times \frac{pq}{u}$$

The correlation between the total Kraus-Weber Test results and the AAHPER Test average was .300. (See Table 1.) This indicates that there was some relationship between the two tests. Using 209 degrees of freedom (N-2) the correlation was significant at the one percent level. This indicates that the same results would not be obtained by chance in more than one time out of one hundred cases, therefore the null hypothesis was rejected. The level of significance was determined from Table 25 in Garrett.[42] The five percent level of significance was accepted for this paper.

The AAHPER Test scores were used to establish norms for South Dakota State College freshmen women. The 211 scores, obtained for each subtest, were averaged to determine a norm for that particular test item.

The subjects tested ranged in age from 17 years to 22 years but

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[41]Garrett, op. cit., p. 378.

[42]Garrett, op. cit., p. 201.

Table 1. Bi-serial Correlation between Kraus-Weber Test Results and AAHPER Test Results

AAHPER Scores	Kraus-Weber Pass p	Fail q	Total T	
75-79	1		1	
70-74	2	1	3	M_p = 51.23
65-69	7		7	M_q = 46.90
60-64	12	2	14	MT = 50.23
55-59	30	4	34	p = .768
50-54	44	11	55	q = .232
45-49	32	13	45	u = .305
40-44	24	9	33	S.D. = 8.415
35-39	7	6	13	
30-34	3	2	5	
25-29	___	1	1	
	N = 162	N = 49	N = 211	

$$r_{bis} = \frac{51.23 - 46.70}{8.415} \times \frac{.768 \times .232}{.305} = .300$$

Significant at the .01 level.

the majority of the girls, 180, were in the 18 year old group. Norms were also established for this age group of freshmen women at South Dakota State College. To determine these norms the 180 test scores for each subtest were averaged. Norms were not calculated for any other age group due to a lack of subjects.

The data in Table 2 are the norms which were established for South Dakota State College freshmen women and for the 18 year old freshmen attending South Dakota State College. National norms have not been established for college women but the national norms for 17 year old girls are included in Table 2.[43]

From a comparison of the norms in Table 2 it is indicated that age was a determining factor in performance of the AAHPER Test. The 17 year old group possessed greater arm strength as evidenced by their scores on the modified pull-up test and the softball throw for distance. They also scored higher on the agility test. The South Dakota State College freshmen women and the 18 year old group both displayed greater abdominal strength, speed, and endurance than the 17 year olds. The three groups were all equal in the test for explosive power. The two South Dakota State College groups performed equally well on all test items with two exceptions. The 18 year old group had better endurance for sustained activity and had better throwing ability.

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[43]Paul Hunsicker, "AAHPER Physical Fitness Test Battery", Journal of Health, Physical Education, and Recreation, XXIX, pp. 24-25, September, 1958.

Table 2. A Comparison of Norms of the AAHPER Test for All Freshmen Women at South Dakota State College, the National Norms for 17 Year Old Girls and for 18 Year Old Freshmen Women at South Dakota State College

	SDSC Freshmen Women	17 Year Old National Norms	18 Year Old SDSC Women
Modified Pull-Up	19	20	19
Sit-up	21	19	21
Shuttle Run	12.2 sec.	11.9 sec.	12.2 sec.
Standing Broad Jump	60 inches	60 inches	60 inches
50-Yard Dash	:08.2 sec.	:09.0 sec.	:08.2 sec.
Softball Throw	68.7 feet	78 feet	69 feet
600-Yard Run	3 min. 16 sec.	3 min. 20 sec.	3 min. 10 sec.

The average for the modified pull-up test for each South Dakota State College group was one less than the nation-wide average for 17 year old girls. From this comparison it appears that freshmen women attending South Dakota State College did not continue to develop arm strength after their 17th year of age.

Both South Dakota State College groups averaged two more sit-ups than the national norm for 17 year old girls. This tends to indicate that the South Dakota group continued to develop abdominal strength after their 17th year or have been using these muscles more extensively.

The 17 year old girls were more agile as shown by the shuttle run test item. Their average was 3 seconds better than that of the

older girls. This could be attributed to the type of physical education program in which they participated or the extent and kind of agility developing activities which were a part of their daily living.

It was interesting to note that all three groups averaged 60 inches on the standing broad jump test. These results indicate that most girls possess about the same degree of explosive power at ages 17 and 18.

The group averages for the 50-yard dash showed a definite superiority among the South Dakota State College girls. It was interesting to note that the average of South Dakota State College women was inferior to the 17 year old norm when speed and agility were combined, but the average for college women was superior to the norm when the test was for sheer speed.

In the softball throw for distance the national norm exceeded the South Dakota State College test average by about 9 feet. The 18 year old norm exceeded the freshmen women's norm by 5 inches. It was noted that the South Dakota State College groups were weak in the tests for arm strength and arm power.

The 18 year old group ran the 600 yard run-walk in a time which was 4 seconds faster than the average for freshmen women at South Dakota State College and 10 seconds better than the 17 year old girls norm. This indicates that the 18 year old girls had a greater endurance for sustained activity.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The American Association for Health, Physical Education, and Recreation Youth Fitness Test and the Kraus-Weber Test of Minimum Muscular Fitness were administered to 211 South Dakota State College freshmen women during the fall quarter of 1960. The Test results were analyzed and norms were established. This study seemed to warrant the following conclusions and recommendations.

Conclusions

1. The correlation obtained between the AAHPER Test scores and the Kraus-Weber Test scores was high enough to indicate that there was some relationship between the two tests.

2. Age was a determining factor in performance on the AAHPER Test.

3. The South Dakota State College freshmen women possessed greater abdominal strength, speed, and endurance for sustained activity than the 17 year old girls for whom national norms have been established.

4. The girls tested for the national norms had greater arm strength. The 17 year old girls were also more agile.

5. Age was not a factor in determining the results of the test for explosive power.

6. The 18 year old freshmen girls attending South Dakota State College possessed better throwing ability and greater endurance for sustained activity than the freshmen girls of other ages who were attending South Dakota State College.

Recommendations

1. It is recommended that the AAHPER Test be administered to the freshmen women at South Dakota State College during each fall quarter and that the test results be averaged with the norms established by this study to obtain a more valid norm.

2. To the author's knowledge this is one of the first studies using the AAHPER Test to study college freshmen women. It is recommended that the AAHPER Test be administered to freshmen women in colleges throughout the state of South Dakota to determine state norms.

3. It is recommended that the AAHPER Test be administered to college freshmen women throughout the nation and national norms be established.

4. The author recommends both the AAHPER Test and the Kraus-Weber Test as a means of evaluating muscular fitness.

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APPENDIX

Table 3. Test Results of Kraus-Weber Test and AAHPER Test - Section One

AAHPER test									Kraus-Weber test						
Sit-ups	Modified pull-up	Shuttle run	Standing broad jump	50-yard dash	Softball throw	600-yard	Test average		Abdominal plus	Abdominal minus	Psoas	Upper back	Lower back	Flexibility	Total test results
47	53	43	50	48	38	48	47	Brown, J.	X	X	X	X	X	X	X
84	65	62	54	59	42	60	61	Davis, D.	X	X	X	X	X	0	0
40	44	41	50	51	42	48	45	Elliott, G.	X	X	X	X	X	0	0
47	51	69	84	82	58	68	66	Erickson, D.	X	X	X	X	X	X	X
47	37	67	53	55	56	57	53	Graverson, C.	X	X	X	X	X	X	X
48	47	55	37	60	70	55	53	Griesse, E.	X	X	X	X	X	X	X
40	79	55	49	60	52	60	56	Haberman, K.	X	X	X	X	X	X	X
53	64	55	46	62	31	57	53	Hanson, J.	X	X	X	X	X	X	X
54	53	67	63	62	35	*	56	Hanson, J.	X	X	X	X	X	X	X
33	37	33	24	38	35	42	35	Hofstad, K.	X	X	X	X	X	X	X
47	60	55	55	54	40	65	54	Keller, L.	X	X	X	X	X	X	X
44	73	62	60	62	58	49	58	Kingsley, B.	X	X	X	X	X	X	X
53	48	49	45	39	44	15	42	Langford, J.	X	X	X	X	X	X	X
49	64	64	54	60	45	55	56	MaComb, R.	X	X	X	X	X	X	X
47	91	69	55	66	45	75	64	Maurer, S.	X	X	X	X	X	X	X
43	64	49	50	64	52	73	56	Opp, M.	X	X	X	X	X	X	X
58	76	49	47	43	30	55	51	Parliament, N.	X	X	X	X	X	X	X
48	55	44	63	60	44	47	52	Severson, L.	X	X	X	X	X	X	X
51	76	62	53	55	38	55	56	Simel, L.	X	X	X	X	X	X	X
43	55	55	35	46	41	80	51	Thoreson, N.	X	X	X	X	X	X	X
43	64	52	60	82	45	55	57	Wilson, B.	X	X	X	X	X	X	X

*This subject was not tested because of a recent case of rheumatic fever.

Table 4. Test Results of Kraus-Weber Test and AAHPER Test - Section Two

AAHPER test									Kraus-Weber Test						
Sit-ups	Modified pull-up	Shuttle run	Standing broad jump	50-yard dash	Softball throw	600-yard	Test average		Abdominal plus	Abdominal minus	Psoas	Upper back	Lower back	Flexibility	Total test results
71	29	62	53	59	50	11	48	Anderson, M.	X	X	X	X	X	X	X
46	21	8	42	57	24	45	35	Coffett, J.	X	X	X	X	X	X	X
63	35	37	43	55	46	45	46	Diehl, P.	X	X	X	X	X	X	X
47	24	15	32	43	36	43	34	Frazeur, A.	X	X	X	X	X	X	X
48	45	64	63	52	31	43	49	Galemba, E.	X	X	X	X	X	X	X
39	51	52	39	46	56	50	48	Hammer, S.	X	0	X	X	X	X	0
47	57	46	46	59	62	35	50	Hardy, D.	X	X	X	X	X	X	X
48	41	48	54	55	41	38	46	Hogarth, L.	X	X	X	X	X	X	X
54	56	67	66	62	52	68	61	Johnson, M.	X	X	X	X	X	X	X
37	41	31	45	48	40	43	41	Johnson, M.	X	X	X	X	X	X	X
58	38	64	55	71	64	63	59	Kemper, M.	X	X	X	X	X	X	X
58	37	63	63	49	50	46	52	Longman, L.	X	X	X	X	X	X	X
42	33	40	39	34	38	36	37	Martin, V.	X	X	X	X	X	X	X
42	37	53	49	59	45	34	46	Rudd, B.	X	X	X	X	X	X	X
28	38	44	9	43	34	29	32	Schmidt, F.	X	X	X	X	X	X	X
37	44	57	40	62	68	57	52	Soukup, M.	X	X	X	X	X	X	X
34	44	54	59	62	72	53	54	Soukup, M.	X	0	X	X	X	X	0
47	37	44	47	41	33	51	43	Smith, N.	X	X	X	X	X	X	X
58	52	69	51	54	44	53	54	Speckels, C.	X	X	X	X	X	X	X
37	9	53	46	53	34	43	39	Spencer, N.	X	X	X	X	X	X	X
67	48	51	50	55	58	57	55	Starr, L.	X	X	X	X	X	X	X
61	35	58	65	66	43	50	54	Swanson, C.	X	X	X	X	X	0	0
40	44	59	58	60	43	52	51	Tellinghuisen,J	X	X	X	X	X	X	X
46	31	57	21	52	55	34	42	Wagner, K.	X	X	X	X	X	X	X
36	16	25	32	46	38	37	33	Wallner, M.	X	X	X	X	X	X	X
39	27	29	51	43	27	34	36	Wickander, A.	X	X	X	X	X	0	0
47	40	34	21	52	31	29	36	Wright, M.	X	X	X	X	X	X	X

Table 5. Test Results of Kraus-Weber Test and AAHPER Test - Section Three

AAHPER test									Kraus-Weber test						
Sit-ups	Modified pull-up	Shuttle run	Standing broad jump	50-yard dash	Softball throw	600-yard	Test average		Abdominal plus	Abdominal minus	Psoas	Upper back	Lower back	Flexibility	Total test results
71	76	63	54	57	42	65	61	Bartling, S.	X	X	X	X	X	X	X
57	62	62	63	66	50	60	60	Benson, L.	X	X	X	X	X	X	X
51	55	55	46	51	48	53	51	Berg, A.	X	X	X	X	X	X	X
49	53	44	39	18	22	53	40	Berry, S.	X	O	X	X	X	X	O
57	62	67	91	82	85	89	76	Brandenberger, S.	X	X	X	X	X	X	X
46	50	69	50	59	58	*	55	Burcham, J.	X	X	X	X	X	O	O
71	76	48	53	48	36	60	56	Byg, D.	X	X	X	X	X	X	X
46	50	55	49	57	60	46	52	Calkins, S.	X	O	X	X	X	X	O
37	41	38	46	49	31	40	40	Cole, K.	X	X	X	X	X	X	X
71	76	55	60	57	38	50	58	Diede, D.	X	X	X	X	X	X	X
49	53	48	40	78	34	43	49	Doering, S.	X	X	X	X	X	X	X
42	45	67	45	45	56	50	50	Entwistle, M.	X	O	X	X	X	X	O
49	53	46	47	45	44	40	46	Gilligan, M.	X	O	X	X	X	X	O
52	56	49	54	57	40	6	45	Gross, L.	X	O	X	X	X	X	O
64	67	59	57	60	43	51	57	Hoyme, P.	X	X	X	X	X	X	X
58	64	59	65	64	54	55	60	Krier, J.	X	X	X	X	X	X	X
39	43	47	55	57	46	36	46	Monahan, M.	X	X	X	X	X	X	X
58	55	44	47	62	31	36	48	Mangels, H.	X	X	X	X	X	X	X
92	65	63	73	64	59	58	68	Murphy, F.	X	X	X	X	X	X	X
80	29	92	49	45	42	34	53	Oltmanns, K.	X	X	O	X	X	X	O
47	56	51	61	52	40	51	51	Peacock, K.	X	X	X	X	X	X	X
48	65	49	43	60	40	33	48	Peterson, G.	X	X	X	X	X	X	X
39	55	58	51	66	45	43	51	Peterson, J.	X	O	X	X	X	X	O
77	50	54	46	55	28	48	51	Sorensen, S.	X	X	X	X	X	X	X
56	64	73	70	64	76	52	65	Stuelpnagel, C.	X	X	X	X	X	X	X
47	64	53	55	66	58	63	58	Werth, L.	X	X	X	X	X	X	X
60	38	58	46	45	48	20	45	Wolf, J.	X	X	X	X	X	O	O

*This subject was not tested because of a recent case of rheumatic fever.

Table 6. Test Results of Kraus-Weber Test and AAHPER Test - Section Four

AAHPER test									Kraus-Weber test						
Sit-ups	Modified pull-up	Shuttle run	Standing broad jump	50-yard dash	Softball throw	600-yard	Test average		Abdominal plus	Abdominal minus	Psoas	Upper back	Lower back	Flexibility	Total test results
47	41	52	49	45	44	30	44	Allen, C.	X	X	X	X	X	X	X
60	53	67	65	60	73	78	65	Ashbaugh, L.	X	X	X	X	X	X	X
43	40	43	39	46	49	22	40	Blume, B.	X	X	X	X	X	X	X
48	47	52	66	54	57	48	53	Bowers, M.	X	X	X	X	X	X	X
47	55	60	68	69	50	67	59	Boyd, S.	X	X	X	X	X	X	X
40	40	53	53	62	44	55	50	DeBoise, J.	X	X	X	X	X	X	X
23	55	67	55	57	48	27	47	Dupraz, L.	X	X	X	X	X	O	O
53	44	59	65	82	69	68	63	Garrett, J.	X	X	X	X	X	X	X
40	33	44	58	48	27	45	42	Goins, M.	X	X	X	X	X	X	X
47	35	50	49	36	12	30	37	Hall, H.	X	X	O	X	X	X	O
39	47	37	43	59	31	22	40	Hanson, S.	X	X	X	X	X	O	O
52	69	69	66	74	82	82	71	Horning, J.	X	X	X	X	X	X	X
47	27	50	42	48	32	35	40	Indseth, S.	X	X	X	X	X	O	O
33	29	53	66	66	73	44	52	Iverson, J.	X	X	X	X	X	X	X
43	38	46	51	48	39	47	45	Carbo, L.	X	X	X	X	X	X	X
8	35	50	32	45	24	47	34	Kluck, M.	O	O	X	X	X	X	O
31	38	38	46	52	42	45	42	Krumm, E.	X	O	X	X	X	X	O
46	37	49	45	48	43	57	46	Lippert, C.	X	X	X	X	X	X	X
40	45	49	50	49	39	34	44	Loken, E.	X	X	X	X	X	X	X
31	56	69	51	64	62	65	57	Murphy, M.	X	X	X	X	X	X	X
40	45	50	45	54	38	59	47	Pirlet, C.	X	X	X	X	X	X	X
31	44	55	40	57	50	51	47	Postukla, J.	X	O	X	X	X	X	O
47	38	54	53	41	37	49	46	Rae, S.	X	X	X	X	X	X	X
47	64	53	35	49	52	50	50	Richardson, B.	X	X	X	X	X	X	X
53	55	62	50	57	45	63	55	Schafer, L.	X	X	X	X	X	X	X
46	40	54	50	51	38	57	48	Schafer, Y.	X	X	X	X	X	X	X
92	44	54	46	41	52	47	54	Shaffer, R.	X	X	X	X	X	X	X
47	41	52	46	52	66	20	46	Sheimo, J.	X	X	X	X	X	X	X
31	41	49	40	43	47	50	43	Steurwald, M.	X	O	O	X	X	X	O
66	41	60	47	55	32	43	49	Sullestad, J.	X	X	X	X	X	X	X
40	41	37	34	51	48	50	45	Walser, M.	X	X	X	X	X	X	X

Table 7. Test Results of Kraus-Weber Test and AAHPER Test - Section Five

AAHPER test									Kraus-Weber test						
Sit-ups	Modified pull-up	Shuttle run	Standing broad jump	50-yard dash	Softball throw	600-yard	Test average		Abdominal plus	Abdominal minus	Psoas	Upper back	Lower back	Flexibility	Total test results
28	48	44	27	26	33	47	36	Balsiger, R.	O	O	X	X	X	X	O
53	44	49	43	22	52	32	42	Bartelt, C.	X	X	X	X	O	X	O
49	57	36	40	29	38	50	43	Bim, B.	X	X	X	X	X	X	X
49	53	63	57	62	43	70	57	Boldt, S.	X	X	X	X	X	O	O
47	56	58	58	55	78	50	57	Booth, D.	X	X	X	X	X	X	X
47	51	47	47	46	32	22	42	Booth, Y.	X	X	X	X	X	X	X
40	45	50	57	59	38	55	49	Brown, E.	X	X	X	X	X	O	O
40	47	64	66	71	63	60	59	Campbell, C.	X	X	X	X	X	O	O
39	38	51	57	60	44	60	50	Crake, L.	X	X	X	X	X	X	X
54	50	44	40	54	57	60	51	Ells, C.	X	X	X	X	X	X	X
64	51	52	46	41	50	57	52	Elofson, E.	X	X	X	X	X	X	X
37	47	48	49	45	53	48	47	Frahm, J.	X	X	X	X	X	X	X
48	47	55	54	54	68	52	54	Fraser, M.	X	X	X	X	X	X	X
37	64	41	54	39	52	60	50	Graves, A.	X	X	X	X	X	O	O
69	59	60	53	57	39	52	56	Heer, R.	X	X	X	X	X	X	X
34	71	71	61	60	45	62	58	Horak, R.	X	X	X	X	X	X	X
92	65	60	79	74	50	85	72	Genter, S.	X	X	X	X	X	O	O
53	64	51	51	51	45	50	52	Kakonis, B.	X	X	X	X	X	X	X
39	43	50	54	41	44	42	45	Kruse, D.	X	X	X	X	X	X	X
34	52	51	51	22	94	56	51	Larson, L.	X	X	X	X	X	X	X
34	57	66	47	51	48	50	50	McVay, L.	X	X	X	X	X	X	X
58	53	52	53	69	35	45	53	Montagne, J.	X	X	X	X	X	X	X
40	40	46	49	54	62	43	48	Munger, J.	X	X	X	X	X	X	X
71	52	51	66	60	42	57	57	Pearson, W.	X	X	X	X	X	X	X
*	*	*	*	*	*	*	*	Quail, J.	X	X	X	X	X	X	X
48	48	55	60	60	36	64	53	Rabbenberg, D.	X	X	X	X	X	X	X
53	71	44	53	64	76	64	61	Rudd, M.	X	X	X	X	X	X	X
39	52	63	54	59	45	64	54	Steinheusen, M.	X	X	X	X	X	X	X
33	53	44	35	38	37	50	41	Vollenweider, S	X	X	X	X	X	O	O
36	57	57	43	45	50	40	47	Wendt, J.	X	X	X	X	X	O	O

*This subject was not tested because of a recent appendectomy.

Table 8. Test Results of Kraus-Weber Test and AAHPER Test - Section Six

AAHPER test									Kraus-Weber test						
Sit-ups	Modified pull-up	Shuttle run	Standing broad jump	50-yard dash	Softball throw	600-yard	Test average		Abdominal plus	Abdominal minus	Psoas	Upper back	Lower back	Flexibility	Total test results
53	52	40	53	38	50	42	47	Arnsdorf, D.	X	X	X	X	X	X	X
57	60	49	60	60	52	55	56	Bahr, L.	X	X	X	X	X	X	X
46	51	63	43	54	45	55	51	Balzek, J.	X	X	X	X	X	X	X
48	50	47	51	55	52	45	50	Hanson, K.	X	X	X	X	X	X	X
16	41	44	35	31	80	29	39	Hurd, H.	X	0	X	X	X	X	0
40	45	59	45	51	53	18	44	Mannes, R.	X	X	X	X	X	X	X
37	45	47	35	22	15	29	33	Mazourek, A.	X	0	X	X	X	X	0
39	55	49	50	54	46	72	52	Roggow, S.	X	X	X	X	X	X	X
47	51	55	39	48	36	18	42	Sather, D.	X	X	X	X	X	X	X
44	43	19	63	60	67	20	45	Stortvedt, E.	X	X	X	X	X	X	X
31	57	52	32	59	38	65	48	Sutley, D.	X	X	X	X	X	X	X
44	33	43	45	46	52	37	43	Taylor, C.	X	X	X	X	X	X	X
31	45	50	61	57	47	82	53	Van't Haaff, J.	X	X	X	X	X	X	X
53	52	66	76	66	70	54	62	Warren, K.	X	X	X	X	X	X	X
66	62	75	61	90	68	39	66	Williamson, L.	X	X	X	X	X	X	X
54	67	75	61	74	61	95	70	Wilson, B.	X	X	X	X	X	X	X
31	37	53	16	49	50	65	43	Wilson, G.	X	X	0	X	X	0	0
40	56	55	51	51	37	76	52	Wilson, K.	X	X	X	X	X	X	X
33	47	58	48	54	31	37	43	Woodman, J.	X	X	X	X	X	X	X

Table 9. Test Results of Kraus-Weber Test and AAHPER Test - Section Seven

AAHPER test									Kraus-Weber test						
Sit-ups	Modified pull-up	Shuttle run	Standing broad jump	50-yard dash	Softball throw	600-yard	Test average		Abdominal plus	Abdominal minus	Psoas	Upper back	Lower back	Flexibility	Total test results
33	52	44	27	18	58	33	38	Benson, D.	X	0	0	X	X	0	0
47	44	22	40	41	46	58	43	Blair, L.	X	X	X	X	X	X	X
47	48	54	42	60	88	65	58	Cavanaugh, K.	X	X	X	X	X	X	X
33	45	50	32	55	60	51	47	Christensen, S.	X	X	X	X	X	X	X
74	57	63	53	64	78	67	65	Christophersen,	X	X	X	X	X	X	X
40	38	59	42	39	50	51	46	Dockter, C.	X	X	X	X	X	X	X
34	57	48	53	36	55	48	47	Donery, O.	X	X	X	X	X	0	0
34	57	55	27	36	34	35	40	Dupraz, R.	X	X	X	X	X	X	X
36	43	64	43	60	41	67	51	Fowler, J.	X	X	X	X	X	X	X
58	50	52	47	57	73	70	58	Hogie, C.	X	X	X	X	X	X	X
42	64	54	39	46	45	65	50	Horn, L.	X	X	X	X	X	X	X
43	50	57	51	10	64	45	46	Jess, J.	X	X	X	X	X	X	X
53	37	58	39	18	63	39	44	Joachiam, K.	X	X	X	X	X	X	X
77	57	69	45	59	46	71	61	Johnson, J.	X	X	X	X	X	X	X
37	44	63	61	69	65	50	56	Jones, A.	X	0	X	X	X	X	0
47	37	54	50	46	24	34	42	Jones, D.	X	X	X	X	X	X	X
23	52	48	54	49	52	62	49	Knickrehm, R.	X	0	X	X	X	0	0
47	47	57	51	46	24	40	45	Kodis, M.	X	X	X	X	X	X	X
53	44	42	21	39	33	41	39	Lauster, S.	X	X	X	X	X	0	0
33	41	51	42	49	67	35	45	Mach, C.	X	X	X	X	0	X	0
40	47	55	37	52	69	52	50	Martin, J.	X	0	X	X	0	X	0
58	29	50	37	36	40	43	42	Massa, A.	X	X	X	X	X	X	X
49	73	57	40	44	45	45	50	Monahan, M.	X	X	X	X	X	X	X
47	41	50	43	31	63	45	46	Nelson, M.	X	X	X	X	X	X	X
34	53	69	37	54	47	55	50	Taute, C.	X	X	X	X	X	X	X
47	51	50	47	41	35	60	47	Thompson, G.	X	X	X	X	X	X	X
40	84	69	43	54	67	62	60	Vander Wal, J.	X	0	X	X	X	X	0
53	44	78	53	71	80	73	65	VanSchoiach, S.	X	X	X	X	X	X	X

Table 10. Test Results of Kraus-Weber Test and AAHPER Test - Section Eight

AAHPER test									Kraus-Weber test						
Sit-ups	Modified pull-up	Shuttle run	Standing broad jump	50-yard dash	Softball throw	600-yard	Test average		Abdominal plus	Abdominal minus	Psoas	Upper back	Lower back	Flexibility	Total test results
60	48	67	61	74	74	55	63	Blomster, J.	X	X	X	X	X	X	X
58	44	57	47	62	44	71	55	Brown, B.	X	X	X	X	X	X	X
42	48	53	65	69	35	65	54	Bruchmann, E.	X	X	X	X	X	O	O
58	43	55	63	62	51	60	56	Burg, L.	X	X	X	X	X	X	X
37	40	63	60	78	55	47	54	Cass, S.	X	O	X	X	X	X	O
47	45	64	57	52	43	32	49	Clements, S.	X	X	X	X	O	X	O
53	38	53	76	62	62	43	55	Deckert, N.	X	X	X	X	X	X	X
48	38	62	57	55	35	43	48	Eddy, C.	X	X	X	X	X	X	X
39	48	38	50	71	49	60	51	Eitreim, J.	X	X	X	X	X	X	X
58	55	53	63	62	50	44	55	Fossum, S.	X	X	X	X	X	X	X
66	45	63	50	66	38	60	55	Fox, S.	X	X	X	X	X	X	X
44	47	57	43	64	48	58	52	Gilbertson, L.	X	X	X	X	X	X	X
42	38	59	51	57	50	22	46	Hanson, M.	X	X	X	X	X	X	X
46	48	55	43	48	37	24	43	Hendrickson, M	X	X	X	X	X	X	X
53	37	53	42	57	18	36	42	Horst, D.	X	X	X	X	X	O	O
33	31	27	49	43	39	29	36	Jackson, D.	X	X	X	X	X	X	X
20	29	27	29	26	21	25	25	Kahre, E.	O	O	O	X	X	O	O
67	52	64	65	51	32	53	55	Kilker, J.	X	X	X	X	X	X	X
63	50	69	68	57	76	65	64	Looby, J.	X	X	X	X	X	X	X
54	40	41	49	48	26	38	42	Morrill, S.	X	X	X	X	X	X	X
43	48	85	55	55	40	48	53	Ogstad, S.	X	X	X	X	X	O	O
33	43	63	35	52	50	60	48	Olson, J.	X	X	X	X	X	X	X
58	47	64	76	69	56	55	61	Osborne, A.	X	X	X	X	X	X	X
40	43	55	50	55	6	42	42	Purrington, K.	X	X	X	X	X	X	X
47	45	81	53	55	50	49	54	Schmeling, N.	X	X	X	X	X	X	X
48	52	57	55	71	36	67	55	Smith, E.	X	X	X	X	X	X	X
53	45	57	58	62	36	56	52	Svihel, K.	X	X	X	X	X	X	X
40	47	64	58	74	65	61	58	Thompson, G.	X	X	X	X	X	X	X
42	41	27	37	48	32	38	38	Wahley, L.	X	X	X	X	X	X	X