

THE STANDARDIZATION OF A PHYSICAL FITNESS TEST

by

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A THESIS

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THE STANDARDIZATION OF A PHYSICAL FITNESS TEST FOR
FRESHMEN BOYS AT SAM HOUSTON STATE COLLEGE

A Thesis
Presented to
the Faculty of the Department of Physical Education
Sam Houston State College

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

by
Gerald Pete Kokenes
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ABSTRACT

Kokenes, Gerald Pete, The Standardization of a Physical Fitness Test for Freshmen Boys at Sam Houston State College. Master of Arts (Physical Education), May, 1967, Sam Houston State College, Huntsville, Texas.

Purpose

It was the purpose of this thesis (1) to establish local physical efficiency norms for the freshmen boys enrolled in physical education classes at Sam Houston State College; (2) to compare results of the Sam Houston State College Physical Efficiency Test to certain national norms to determine areas of physical weakness of the student; (3) to assign T-scores and letter grades to each student in each event tested; (4) to state uses for which established T-scores and letter grades may be used.

Methods

The methods used to obtain data for this thesis were (1) testing the freshmen boys in physical education classes at Sam Houston State College using the Sam Houston State College Physical Efficiency Test; (2) examination and study of books and journals.

Findings

From the evidence presented in this thesis the

following conclusions were found:

1. Sam Houston State College freshmen boys are not notably weak in any area of physical fitness scored on the Sam Houston State College Physical Efficiency Test.
2. The letter grades and T-scores should be posted in all areas where test is given.
3. The physical fitness letter grade should determine one-fourth of the physical education grade.
4. Instructors should be reviewed each semester in methods of administering the physical efficiency test.

Approved:

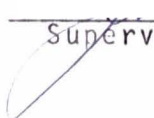
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CHAPTER I

THE PROBLEM AND DEFINITIONS OF TERMS USED

The establishment of physical efficiency norms for students is primarily a function performed to evaluate a group of students in terms of physical fitness. The group is evaluated by comparison of scores with one another and a comparison of scores to national norms all over the nation. Standardization of a physical fitness test for a local group serves to aid in the assignment of grades, motivation of students, as well as evaluation of students, programs, tests, and instruction.

I. THE PROBLEM

Statement of the problem. It was the purpose of this thesis (1) to establish local physical efficiency norms for the freshmen boys enrolled in physical education classes at Sam Houston State College; (2) to compare results of the Sam Houston State College Physical Efficiency Test to certain national norms to determine areas of physical weakness of the student; (3) to assign T-scores and letter grades to each student in each event tested; (4) to state uses for which established T-scores and letter grades may be used.

Importance of the study.

The results of a study by the AAHPER in 1957-58, confirmed what many have suspected--American boys and girls did not demonstrate outstanding performance on the measures of fitness.

Comparisons between scores of youngsters in other countries and those of American children showed that our boys and girls were not as physically fit as those of some other lands in the qualities measured. On the basis of these findings, programs of health education, physical education, and recreation around the country were strengthened.¹

In no other peacetime period in our country has there been more evidence of real concern for the fitness of our youth than at present. In July, 1956, President Eisenhower created the President's Council on Youth Fitness, composed of the Vice-President of the United States and five members of the Cabinet. Then in July, 1957, the Citizen's Advisory Committee on Fitness of American Youth was established.²

¹American Association for Health, Physical Education, and Recreation, AAHPER Youth Fitness Test Manual (Washington: NEA Publications, 1965), p. 9.

²Bureau of Health Education, Physical Education, and Recreation, California Physical Performance Tests (Sacramento: California State Printing Office, 1962), p. 1.

These groups recommended physical fitness testing as one of the first steps in increasing overall fitness of American youth.³ This study follows as a part of the nation's concern for fitness.

II. DEFINITIONS OF TERMS USED

T-Score. A normative scale, which means that raw scores may be converted for reasons of comparatibility and ease of interpretation.⁴

Standard Deviation. That measure which indicates the scatter or spread of the middle 68.26 per cent of the scores about the mean.⁵

Mean. The value in the distribution which represents the average performance.⁶

³American Association for Health, Physical Education, and Recreation, op. cit., p. 10.

⁴Harold M. Barrow and Rosemary McGee, A Practical Approach to Measurement in Physical Education (Philadelphia: Lea and Febiger, 1964), p. 78.

⁵Donald K. Mathews, Measurement in Physical Education (London: W. B. Saunders Company, 1958), p. 33.

⁶Barrow, op. cit., p. 75.

CHAPTER II

REVIEW OF THE LITERATURE

There are many types of physical efficiency tests that may be administered to college freshmen boys. There is also much completed research concerning physical fitness. However, only a brief summary of the literature written on physical fitness and physical efficiency tests will be reviewed for the reasons of standardizing a physical efficiency test at Sam Houston State College.

I. LITERATURE ON PHYSICAL FITNESS AND PHYSICAL EFFICIENCY TESTS

Physical education has a rich heritage in measurement and evaluation.⁷ Since the early work of Dr. Edward Hitchcock, who began measuring students in physical education at Amherst in 1861, research leading to the construction of evaluation instruments has been a consuming interest of many workers in the field.⁸

⁷H. Harrison Clarke, Application of Measurement to Health and Physical Education (Englewood Cliffs: Prentice-Hall, Inc., 1959), p. 19.

⁸John F. Bovard, Frederick W. Cozens, and Patricia W. Hagman, Tests and Measurements in Physical Education (Philadelphia: W. B. Saunders Company, 1949), p. 95.

In 1887, Hitchcock asked an assembled group of the American Association for the Advancement of Physical Education, meeting in Brooklyn, New York, to take time in their teaching to make a careful study of how to find and point out remote and immediate weaknesses and tendencies to weakness in those they were instructing.⁹

In the years that followed, Dr. Dudley A. Sargent, of Howard University, practiced what he preached regarding the study of physical development. Sargent measured muscular strength and endurance and related them to some forty-four anthropometric measurements in an attempt to understand and appraise his college men.¹⁰

The shift of emphasis (about 1880) from symmetry and size to the measurement of the actual work of an individual was no doubt hastened by the invention of the dynamometer. Sargent's strength test idea was first worked out in 1873, at Yale. It was concluded that body size and measurement of muscles alone did not furnish sufficient data upon which to base a judgment

⁹"Proceedings of the Association for the Advancement of Physical Education", (Brooklyn: Rome Brothers Steam Printers, 1885).

¹⁰Carl E. Willgoose, Evaluation in Health Education and Physical Education (New York: McGraw Hill Book Company, Inc., 1961), p. 4.

of a man's power and working capacity.¹¹

A number of factors led to the decline of the strength test and the development of an interest in the ability to handle the body in running, jumping, climbing, throwing and the like. The strength test was criticized on the ground that it was not a good test of endurance, heart and lung development.¹² Physical educators began looking for a test in which strength was a minor factor and speed and endurance of first importance. Sargent was the first to devise such a test.¹³

Credit must be given, however, to R. L. Meylan of Columbia University for the development of a comprehensive test utilizing the elements of running, jumping, vaulting, climbing and the like. His work was begun in 1904. In 1916, this method of measurement was almost universal.¹⁴

A number of departments of physical education for men in colleges and universities followed the example

¹¹Bovard, op. cit., p. 21.

¹²Ibid., p. 25.

¹³Ibid., p. 25.

¹⁴Francis Stroup, Measurement in Physical Education (New York: The Ronald Press Company, 1957), p. 4.

set by Meylan and set up their own tests. The Physical Ability Test at the University of Oregon was developed in 1921, under the direction of Professor Harry A. Scott. The test was designed to find out whether a man possessed those abilities which the department was trying to develop.¹⁵

A. J. Schuettner, while at University of Illinois in the period following World War I, worked out a very elaborate scheme of testing to stimulate interest in physical education among the men of the university. The students were graded on a point system and received awards for each division in which he scored.¹⁶

T. N. Metcalf proposed a minimum and a maximum test for college men and based the test on "natural movements which are the foundation of practically all forms of work and play", running, climbing, throwing, lifting, and swimming.¹⁷

¹⁵"The Pentathlon, A Physical Ability Test," American Physical Education Review, XXIX (Jan., 1924), pp. 30-32 and XXIX (Feb., 1924), pp. 88-94.

¹⁶A. J. Schuettner, "The University of Illinois Plan to Stimulate Interest in Physical Education for Men," University of Illinois Bulletin, Vol. 16, No. 33, (April 14, 1919).

¹⁷N. Metcalf, "Standards and Tests in Physical Education," American Physical Educational Review, XXVII (September, 1922), p. 320-326.

At the turn of the century and near the beginning of World War I, physical educators turned their attention toward measuring the physical fitness of young men to determine readiness for military duty.¹⁸ This new term, physical fitness, was defined in many ways. Clarke defines it to mean: "the development and maintenance of a sound physique and of soundly functioning organs, to the end that the individual realizes his capacity for physical drains or by a body lacking in physical strength and vitality."¹⁹ Another definition for physical fitness is the capacity of an individual to perform a given task. Karpovich defines physical fitness as "a fitness to perform some specified task requiring muscular effort."²⁰

Another definition of physical fitness is that organic condition which permits the individual to skillfully utilize the body in activities involving strength, motor ability, speed or velocity, and endurance without

¹⁸Clarke, op. cit., p. 4.

¹⁹Ibid., p. 16.

²⁰Peter V. Karpovich, Physiology of Muscular Activity (Philadelphia: W. B. Saunders Company, 1953), p. 26.

material experience of fatigue or exhaustion.²¹

During World War II testing for overall physical fitness replaced testing for separate components of physical fitness, because of the need for overall physically fit men. This type of testing included tests for power, strength, endurance and speed in one test. Each branch of the service had its own test. The Navy Standard Physical Fitness Test included squat jumps, push-ups, pull-ups, sit-ups, 100-yard run carrying a man of own weight pick-a-back, 20-second squat thrust, and 300-yard shuttle run.²²

At the present time the Army recommends a four item battery for use in conjunction with its physical training program consisting of: pull-ups, two-minute sit-ups, and 200-yard shuttle run.²³

Recognizing the importance of motor fitness in the total fitness program, the United States Office of Education appointed a special committee on Wartime Physical Education for High Schools, and a similar

²¹Ben W. Miller, Karl W. Bookwalter, and George E. Schlafer, Physical Fitness for Boys (New York: A. S. Barnes and Company, Inc., 1943), p. 2.

²²Bovard, op. cit., p. 173.

²³United States Army, Basic Field Manual, FM 21-20, Physical Training (Washington: U. S. Govt. Printing Office, 1946).

committee for the college program. These groups prepared two publications which outlined physical education programs designed to contribute to physical fitness of pupils and students as a part of the World War II effort.²⁴

The University of Illinois also measured physical fitness, but tried to recognize the characteristics present in one who is physically fit. The six components of physical fitness found were balance, flexibility, agility, strength, power, and endurance.²⁵

Since 1955, many new tests have been developed. President John F. Kennedy's Council on Physical Fitness stimulated many of these. The American Association of Health, Physical Education, and Recreation prepared the most popular test. This was the AAHPER Youth Fitness Test. They also set up a program whereby awards were furnished for high performances. The purpose of the test was to measure the status and achievement in physical fitness objective. The test items were pull-ups, sit-ups, shuttle run, standing broad jump, softball throw, 50-yard dash and 600-yard walk-run.²⁶

²⁴Bovard, op. cit., p. 174.

²⁵Clarke, op. cit., pp. 234-235.

²⁶Barrow, op. cit., p. 184.

The Harvard-Step Test was designed to measure general capacity of the body and especially the heart and circulatory system to adapt to and recover from hard work.²⁷

The Indiana Physical Fitness Test, a very popular test in high schools, was designed to measure the components of physical fitness. The test included straddle chins, push-ups, squat thrust, and vertical jump.²⁸

The New York State Physical Fitness Test in addition to measuring the recognized components of physical fitness, measured each student for posture. The purpose of the posture test was to evaluate lateral and anteroposterior posture.²⁹

The North Carolina Fitness Test included sit-ups, side-step, standing broad jump, pull-ups, and squat thrust. Its purpose was to measure achievement in the physical fitness objective.³⁰

Following the publications of these tests, many schools designed their own physical fitness tests and established local norms.

²⁷Ibid., p. 206.

²⁸Ibid., p. 217.

²⁹Ibid., p. 234.

³⁰Ibid., p. 255.

CHAPTER III

SAM HOUSTON STATE COLLEGE PHYSICAL EFFICIENCY TEST

Measurement in the form of physical fitness testing is a valuable aid to the physical educator. This type of measurement enables the teacher to place pupils of like ability in the same group. Because much of the physical education program is made of team activities, it is necessary that pupils on the same level of skills participate together.³¹

The use of physical efficiency test results for motivational purposes is somewhat nebulous but nevertheless quite significant. This use is closely related to the teacher-student rapport covering the whole area of testing. Students can be motivated to perform at their maximum because of their inherent competitive spirit, because they are anxious to make the best possible showing, and because the subject itself is important to them.³²

They should be motivated to perform well as they compete with themselves and not with other members of

³¹Willgoose, op. cit., p. 2.

³²Barrow, op. cit., p. 36.

the class. They should be motivated to perform well to contribute to a team effort. The teacher should be very cautious about stimulating individual competitiveness among class members.³³

Physical efficiency test results can also be used for grading, guidance, and evaluation of the program, methods and instruction. It is indicated that the use of standards measuring physical achievement is a desirable procedure in a class of physical education. A test to provide the means whereby it is possible to measure improvement in certain selected items has been designed for pupils in their first year of college. The test is the Sam Houston State College Physical Efficiency Test. This test was designed to measure students and report physical fitness scores for students enrolled in physical education classes at Sam Houston State College.

The test consists of six events, all of which can be performed indoors. The indoor events were specifically chosen because of limited outdoor facilities of the college. The tests included were push-ups, pull-ups, burpee, triple broad jump, vertical jump, and

³³Ibid, p. 37.

sit-ups. The tests were given to 511 freshmen boys during the third week of the fall semester of the 1966-67 school year. Two weeks or six one-hour periods of conditioning exercises were administered prior to the test. The test was given again during the last week of the first semester.

The test was given to small groups of students and scores recorded on forms (Appendix H) that included the following information: name, hometown, major in college, class section, date of test. Spaces also were provided to enter raw scores and T-scores for each event. The form provides spaces for the test to be given eight times.

In the gymnasium at Sam Houston State College, facilities include one large floor area and two small rooms. The large area (approx. 14,400 sq. ft.) includes one regulation basketball court, two intramural cross-court basketball courts, six badminton courts, two volleyball courts, gymnastic area and trampoline area. Equipment in the gym includes two high bars, four trampolines, and two vertical jump machines. The floor of one of the small rooms is completely padded with mats. The floor of the other is covered with a wall to wall rubber mat. Both rooms contain a 16-rung horizontal ladder. Pull-ups are performed on the ladders and high

bars. The vertical jump is performed on the vertical jump machines. The four other events are performed on the floor of the main gymnasium and in the small rooms.

Students were tested one at a time or in small groups. Groups of ten to fifteen students were tested in sit-ups, burpee and push-ups. Students were tested one at a time in pull-ups, vertical jump, and triple broad jump.

Before administering the Burpee Test, push-ups and sit-ups, each student chooses a partner in another group. While one group is performing an exercise his partner is counting the number of exercises and acting as spotter. The partner also records raw scores on the fitness form. In the sit-up test the partner aids by applying pressure to the performers ankles to hold down his legs and counts the number of sit-ups done. In the push-up test the spotter places his clinched fist under the chest of the performer to act as a down point for each push-up.

When the student is tested for the vertical jump, triple broad jump, and pull-ups, the instructor counts each exercise for each student. Students in the class also aid by recording scores. Students act as spotters in the pull-up test by keeping the performer from gaining an advantage by swinging.

Each student was given a grade of A, B, C, D, or F for each event. This grade was determined by computing the mean and standard deviation and plotting the graph of the frequency distribution as shown in Figures 1, 2, 3, 4, 5, 6. The normal curve contains six standard deviations. Each standard deviation contains ten T-scores. In order to give five letter grades it is necessary to divide six by five to determine the number of T-scores per letter grade. Each letter grade contains 1.2 standard deviations or twelve T-scores. T-scores above 68 equal the grade of A. T-scores from 56 through 68 equal the grade of B. T-scores from 44 through 56 equal the grade of C. T-scores from 32 through 43 equal the letter grade of D. T-scores 32 and below equal the grade of F.³⁴

³⁴Henry E. Garrett, Elementary Statistics (New York: Longmans, Green and Company, 1958), p. 83.

The Push-up Test

Push-ups are to be done on the floor. They are completed from a front leaning rest position in which the body is supported on the hands and feet with the arms and body straight. From a squat position, the pupil places hands on the floor and extends his legs backwards so that the feet are close together, the back straight, the legs straight, with weight on hands and toes only. This position is the starting position. The first part of exercise calls for a bending (flexing) of the arms, allowing the body to come down so that the chest barely touches his partner's clinched fist which is on the floor. The second phase of the exercise calls for the arms to be extended so that the body may be brought to the starting position. This complete procedure counts as one push-up. The body cannot rest on the floor at the conclusion of the first part of the exercise. The chest must barely touch his partner's fist and the body then is pushed back away at once. The head, trunk and legs are to remain in a straight line. The push-ups are to be done without rest between parts of the exercise or during the complete exercise. If any part of the body, except hands, toes or chest, touches the floor, the trial is not counted. The

number of successful completions of the complete exercise indicates the number of push-ups. Push-ups are not counted unless the arms are fully extended in the up position. Also it is required that the back be straight throughout the exercise.

The test for push-ups was given to 511 freshmen boys at Sam Houston State College. The range for push-ups was 80 with maximum of 85 and a minimum of five. The average score, just under 35 is shown in Table II. A distribution chart for push-ups is shown in Table I. The table indicates that 117 pupils did 36-40 push-ups.

Tables I and II show that 27 students performed above a T-score of 80 in the fall semester and that 32 students performed below a T-score of 20. In the spring semester the performances of push-ups above a T-score of 80 increased to 79 and the performances below a T-score of 20 decreased to eleven. T-scores above 80 and below 20 are out of the normal range of scores and need to be considered at this time.

Of the 27 fall semester performances above a T-score of 80, six were by students who were physical education majors, 24 were by students from large schools (AAA or AAAA). Of the six athletes in the group, four were members of the gymnastic team. Of the 27, only four weighed above 170 pounds. All of the 27 students

performed above average in all of the other events especially in pull-ups where all performed above twelve pull-ups.

Of the 32 scores below the T-score of 20, more than one-half, seventeen, weighed more than 200 pounds, ten were from small towns, all did less than seven pull-ups and sixteen did none at all indicating an overall lack of strength. Nineteen of these students were overweight and three were underweight according to Table XX.

After one semester of physical education and four months of growth most scores increased in push-ups and 79 students performed above the 80 T-score as shown in Table I under Spring Distribution. Twenty-three of these had just completed one semester of weight training, including the student who performed 84 push-ups. He was also a physical education major. All 32 of the first semester above normal scores were included in the group. The student who performed 85 push-ups the first time did 80 the second time. He was enrolled in a regular activity class.

TABLE I
DISTRIBUTION CHART FOR PUSH-UPS

Push-up Interval	Fall Distribution	Spring Distribution
81-85	1	1
76-80	0	1
71-75	1	2
66-70	0	7
61-65	2	6
56-60	3	18
51-55	20	44
46-50	36	81
41-45	56	75
36-40	117	119
31-35	113	76
26-30	84	52
21-25	46	18
16-20	21	11
11-15	6	0
6-10	4	0
1- 5	1	0
Total	511	511
Mean	34.95	41.19

TABLE II

T-SCORES AND LETTER GRADES FOR
PUSH-UPS GIVEN TO FRESHMEN
BOYS AT SAM HOUSTON
STATE COLLEGE

Push-ups	T-Scores	Grade
49	79	
48	77	
47	75	A
46	73	
45	71	
44	69	
43	67	
42	65	
41	63	B
40	61	
39	59	
38	57	
37	55	
36	53	C
35	51	
34	49	

TABLE II (continued)

Push-ups	T-Scores	Grade
33	47	C
32	45	
31	43	
30	41	
29	39	D
28	36	
27	34	
26	32	
25	30	
24	28	
23	26	F
22	24	
21	22	
20	20	

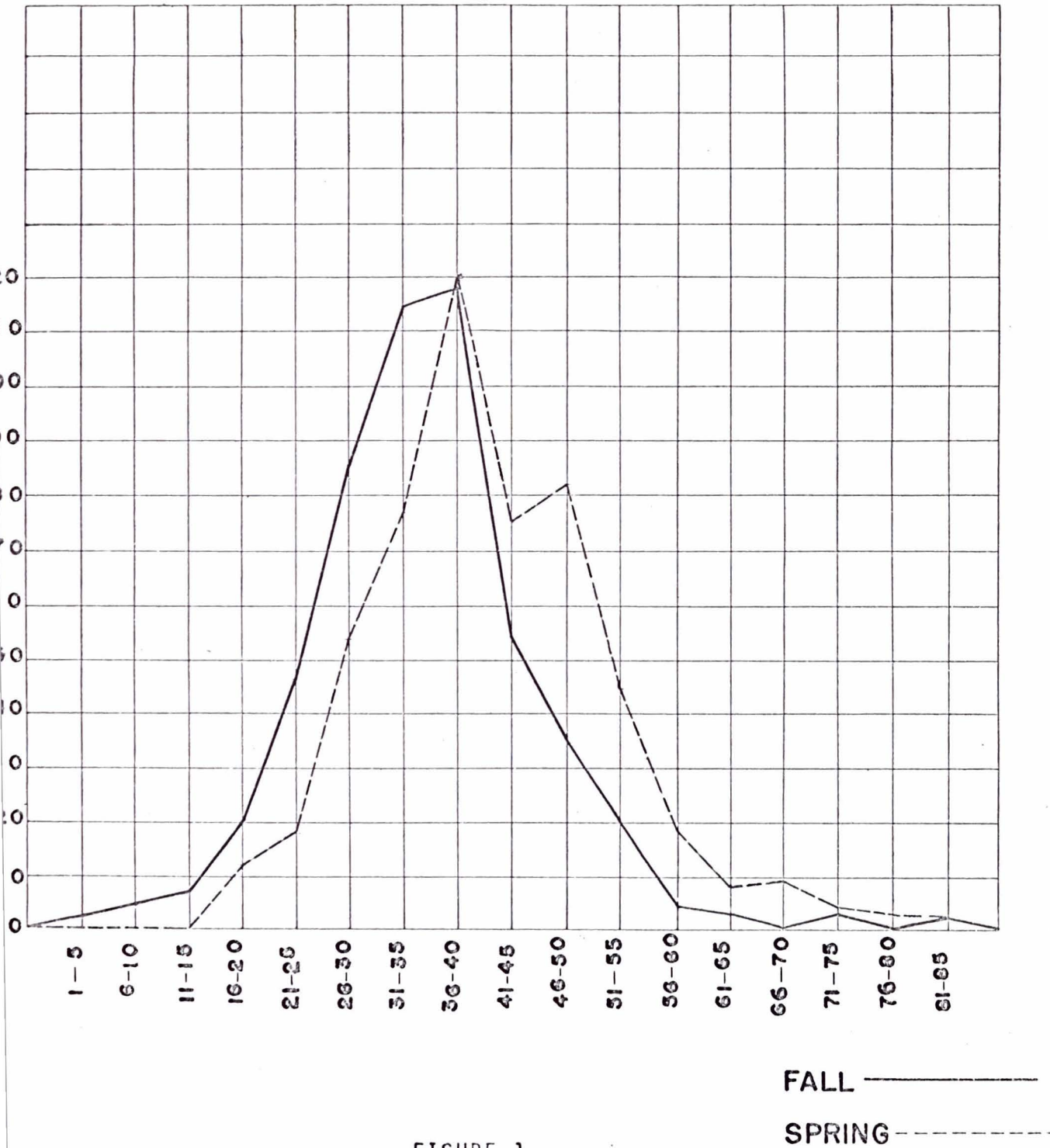


FIGURE 1

DISTRIBUTION OF PUSH-UPS FOR THE FALL AND
 SPRING SEMESTERS 1966-67 AT
 SAM HOUSTON STATE COLLEGE

The Sit-up Test

The sit-up exercise is done from a lying position, back on the floor, fingers of both hands interlaced behind the neck, and feet held together and down by another member of the class who serves as a partner or counter. Ankles are held with just enough pressure to keep the heels on the floor, but allow the calf and thigh of the leg or knees to rise slightly if they are inclined to do so. The first part of the test calls for the trunk to be raised forward and moved downward, rotating so that the right elbow touches the left knee. The second part of the test calls for a return of the body to the starting position. On the next sit-up the left elbow touches the right knee. Thus, alternate elbows touching alternating knees each time the trunk is raised. The complete exercise is to touch the right knee with the elbow or vice versa. Each time the pupil sits up and touches a knee, it counts as one sit-up. The counter who holds the pupil's feet counts aloud as the exercise progresses. A resting period may be allowed at anytime during the exercise. Two minutes is the time allowed to complete as many sit-ups as possible. Correct form is emphasized.

The test for sit-ups was given to 511 freshmen boys at Sam Houston State College. The range for sit-ups was 68 with a maximum of 87 and a minimum of nineteen. The

average number of sit-ups was 56. This is shown in Table IV. A distribution chart for sit-ups is shown in Table III. The table indicates that 111 students performed 54-58 sit-ups.

In the fall distribution as shown in Table III there were thirteen students who performed above a T-score of 80 and 30 students who scored below a T-score of 20. Of the thirteen exceptionally high students, twelve weighed less than 170 pounds. The lone overweight student was a football player. The group also included three gymnasts and one basketball player. Of the 30 low performers, 20 were below the average in the Burpee Test and five weighed above 200 pounds and were in the exceptionally low group in the push-up test. Eleven students in this group were overweight, for their height, more than ten pounds. All of these overweight students were below average in push-ups.

Under Spring Distribution in Table III there were three exceptionally high scores. These scores were by physical education majors who scored high in the first test on sit-ups. One scored above a T-score of 70 in each event. Of the four low scores, two were by students who also scored low in push-ups and had scored below average on the fall test.

TABLE III
DISTRIBUTION CHART FOR SIT-UPS

Sit-up Interval	Fall Distribution	Spring Distribution
89-93	0	2
84-88	1	1
79-83	1	11
74-78	11	14
69-73	34	85
64-68	65	83
59-63	92	108
54-58	111	81
49-53	98	51
34-48	37	44
39-43	28	17
34-38	16	10
29-33	10	3
24-28	4	1
19-23	3	0
Total	511	511
Mean	56.00	59.96

TABLE IV
T-SCORES AND LETTER GRADES FOR
SIT-UPS GIVEN TO FRESHMEN
BOYS AT SAM HOUSTON
STATE COLLEGE

Sit-ups	T-Scores	Grade
75	80	
74	79	
73	77	
72	75	A
71	74	
70	72	
69	70	
68	69	
67	67	
66	66	B
65	64	
64	62	

TABLE IV (continued)

Sit-ups	T-Scores	Grade
63	61	
62	59	B
61	58	
60	56	
59	54	
58	53	
57	51	C
56	49	
55	48	
54	46	
53	45	
52	43	
51	41	
50	40	
49	38	D
48	36	
47	35	
46	34	
45	32	

TABLE IV (continued)

Sit-ups	T-Scores	Grade
44	30	
43	28	
42	27	
41	25	F
40	24	
39	22	
38	20	

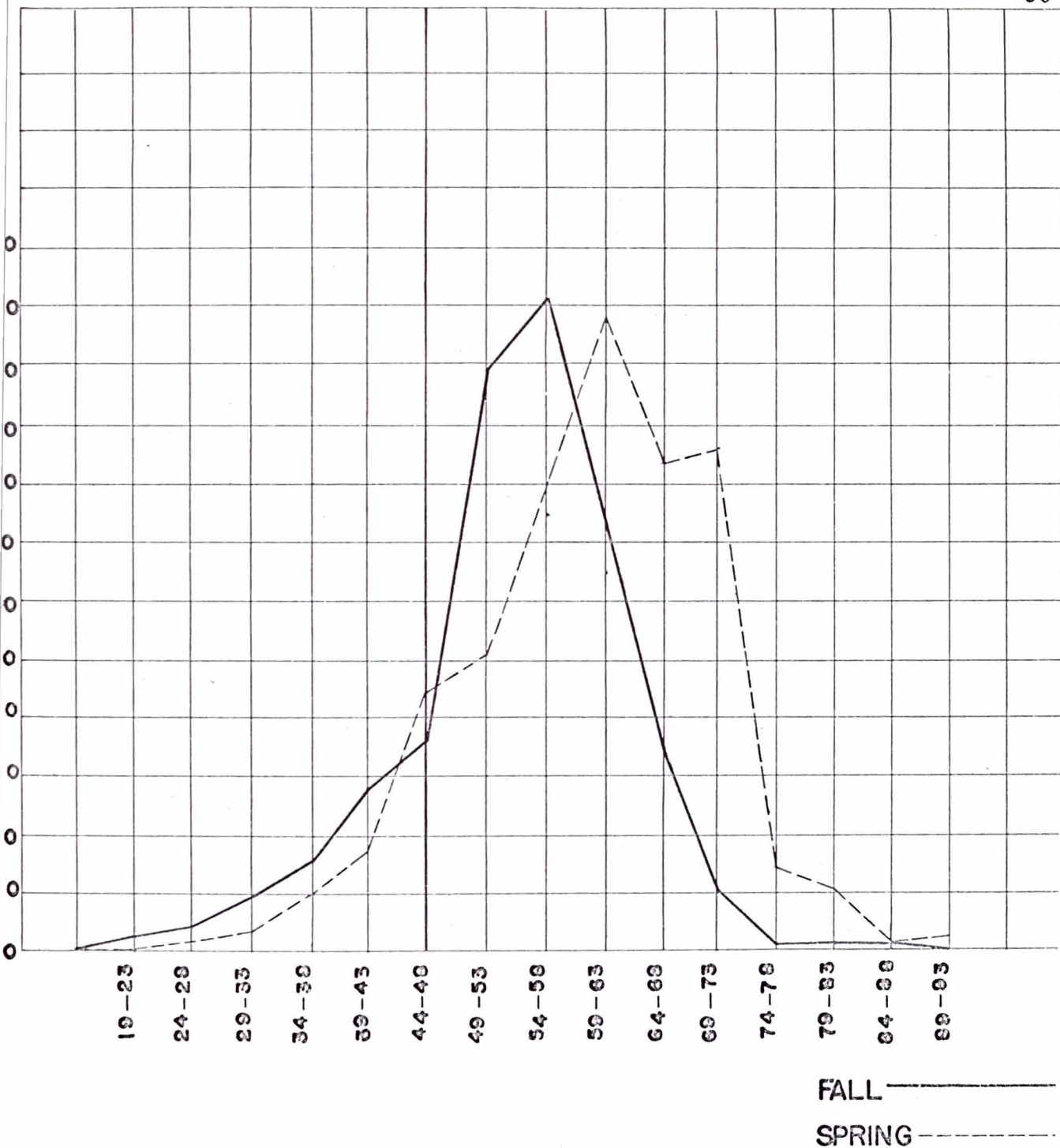


FIGURE 2

DISTRIBUTION OF SIT-UPS FOR THE FALL
AND SPRING SEMESTERS 1966-67 AT
SAM HOUSTON STATE COLLEGE

The Vertical Jump Test

The pupil takes a position facing the wall, feet together, toes touching the wall, and heels touching the floor. With both hands he reaches as high as possible (stretches), keeping the heels on the floor and the hands and forearms against the wall, and pushes the movable part of the vertical jump machine as high as he can. The pupil then turns making a right or left face so that the foot next to the wall is touching the wall. He then swings both arms vigorously and makes a jump vertically into the air, reaching up and touching the jump board as high as possible for him to touch. The number or line that he touches is the height in inches that he jumps. Pupils should be tested one at a time. The better of two jumps is recorded.

The vertical jump test was given to 511 freshman boys at Sam Houston State College. The range for the vertical jump was 25 inches with a maximum of 32 inches and a minimum of seven inches. The mean or average score of 21.44 inches is shown in Table VI. The table indicates that 162 pupils jumped 21 inches to 22.5 inches.

Of the two scores above 80 on the T-scale, as shown in Table V under Fall Distribution, one was by a

basketball player and the other was a physical education major. Of ten relatively high scores above the T-scale of 71, seven were physical education majors, four were basketball players and one was a baseball player. Only three of these high scores were by students overweight according to Appendix J. All three of these students were athletes.

The one exceptionally low score of 7.5 inches was by the student already mentioned, who scored below 30 on the T-scale in every event and was 30 pounds overweight.

Under Spring Distribution, as shown in Table V, the four scores above 78 on the T-scale were by students who were above a T-score of 70 under Fall Distribution. The one low score was the same low score shown under Fall Distribution.

TABLE V
DISTRIBUTION CHART FOR
THE VERTICAL JUMP TEST

Vertical Jump Interval	Fall Distribution	Spring Distribution
31"-32.5"	1	0
29"-30.5"	1	4
27"-28.5"	8	22
25"-26.5"	40	63
23"-24.5"	100	153
21"-22.5"	162	146
19"-20.5"	132	91
17"-18.5"	44	22
15"-16.5"	22	9
13"-14.5"	0	0
11"-12.5"	0	1
9"-10.5"	0	0
7"- 8.5"	1	0
Total	511	511
Mean	21.44"	22.41"

TABLE VI
T-SCORES AND LETTER GRADES FOR
THE VERTICAL JUMP TEST GIVEN
TO FRESHMEN BOYS AT SAM
HOUSTON STATE COLLEGE

Distance	T-Scores	Grade
30 "	82	
29 "	78	A
28 "	74	
27 "	71	
26 "	67	
25 "	63	B
24 "	60	
23 "	56	
22 "	52	
21 "	48	C
20 "	45	
19 "	41	
18 "	37	D
17 "	33	

TABLE VI (continued)

Distance	T-Scores	Grade
16 "	30	
15 "	26	F
14 "	22	
13 "	19	

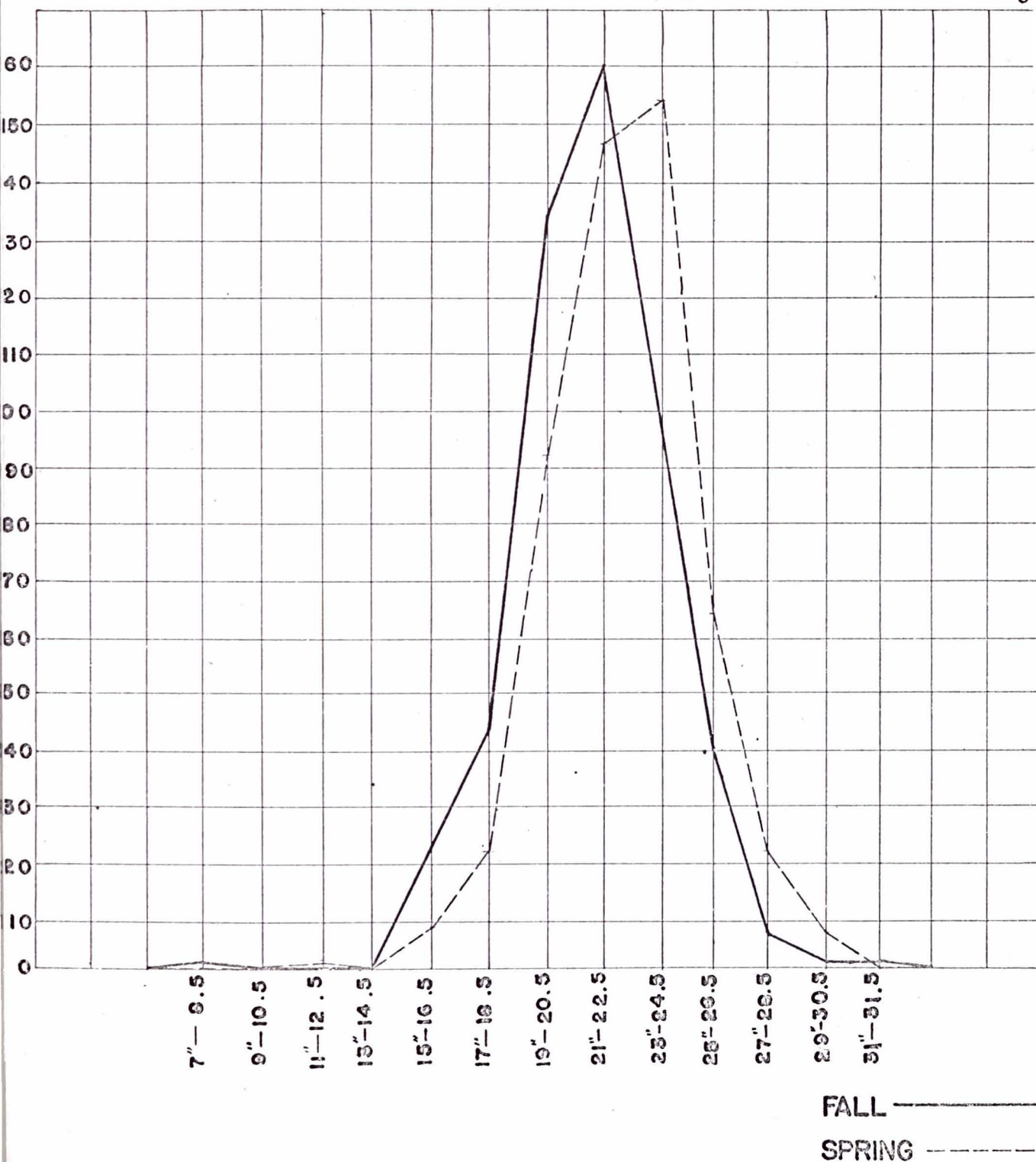


FIGURE 3

DISTRIBUTION OF VERTICAL JUMP SCORES FOR THE
FALL AND SPRING SEMESTERS 1966-67
AT SAM HOUSTON STATE COLLEGE

The Burpee Test

The Burpee Test consists of four distinct counts. On the first count, the pupil bends to the squatting position, placing his hands on the floor with the arms outside the legs. On the count of two, the pupil extends his legs straight backward, feet together, and assumes the same position as though he was ready to start dipping for the push-up exercise. The feet cannot be extended backward until the position for count one has been definitely taken. On the count of three, he resumes the same position as he was in at the count of one and on the count of four, he resumes the starting position, coming to a definite upright position with knees straight. Each position must be definitely and deliberately executed. The test is to determine the number of times a pupil can go through the complete cycle in thirty seconds. Failure to execute any of the positions properly results in loss of count for the complete cycle in which the failure occurred. Count each cycle, completed according to directions, as one successful completion. Form should be emphasized.

The Burpee Test was given to 511 freshmen boys at Sam Houston State College. The range for the Burpee Test was 21 with a maximum of 28 and a minimum of seven.

The mean or average score of 17.96 is shown in Table VIII. A distribution chart is shown in Table VI. The table indicates that 128 pupils did 18-19 Burpees.

Of the two scores above 70 on the T-scale, as shown in Table VII under Fall Distribution, one was by a baseball player and the other by a student who had no apparent outstanding physical attributes that would aid him in the Burpee Test except his height (67"). Both were underweight by at least ten pounds. Of the relatively high scores all but one were by students who were within ten pounds of their average weight as shown in Table XX. Three of the six lowest scores were by students weighing 200 or more pounds.

In the spring, seven of the nine top scores were by students who scored above T-scores of 50 in all other events. The other two students were below average in the two jumping events. The nine included three physical education majors, one football player, and one gymnast. All nine weighed below 200 pounds.

TABLE VII
DISTRIBUTION CHART FOR THE BURPEE TEST

Burpee Interval	Fall Distribution	Spring Distribution
28-29	1	0
26-27	1	9
24-25	13	51
22-23	40	122
20-21	106	165
18-19	128	114
16-17	111	32
14-15	81	17
12-13	24	0
10-11	4	1
8- 9	1	0
6- 7	1	0
Total	511	511
Mean	17.96	20.48

TABLE VIII

T-SCORE AND LETTER GRADES FOR THE
BURPEE TEST GIVEN TO FRESHMEN
BOYS AT SAM HOUSTON
STATE COLLEGE

Burpees	T-Scores	Grade
31	80	
30	78	
29	75	A
28	73	
27	71	
26	68	
25	66	
24	64	
23	62	B
22	59	
21	57	
20	55	
19	52	
18	50	C
17	48	
16	45	

TABLE VIII (continued)

Burpee	T-Scores	Grade
15	43	
14	40	
13	39	D
12	36	
11	34	
10	32	
9	29	
8	27	F
7	25	
6	23	

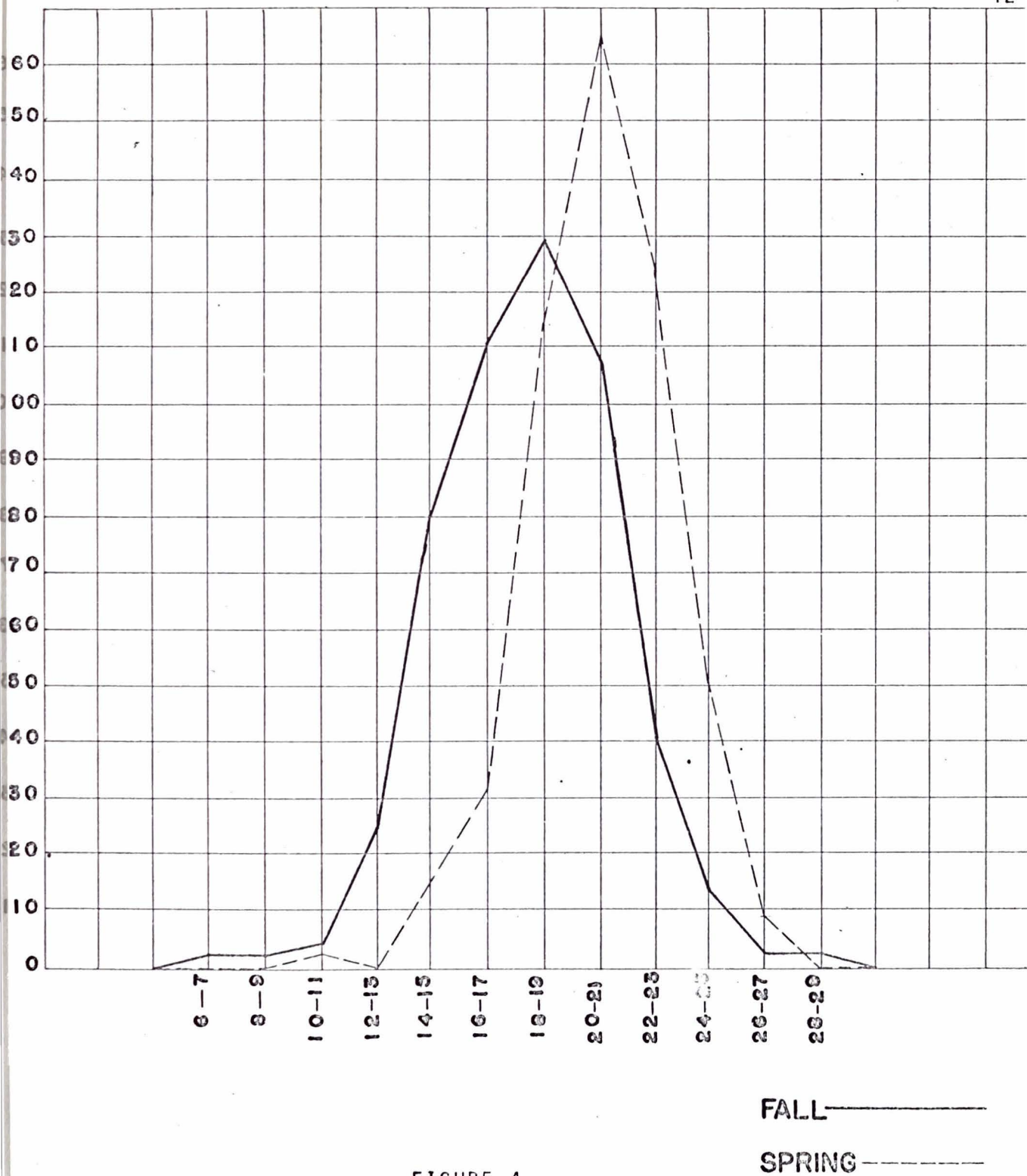


FIGURE 4

DISTRIBUTION OF BURPEES FOR THE FALL
AND SPRING SEMESTERS 1966-67
AT SAM HOUSTON STATE
COLLEGE

The Triple Broad Jump Test

The pupil stands with both feet held together toeing a take-off line. He makes three successive forward jumps, landing on both feet each time, and performing without a pause between jumps. The feet may or may not be kept together throughout the performance. The pupils should swing arms and hands to help in jumping. The better of the two jumps is recorded. Pupils should be tested one at a time. The distance jumped is measured from the nearest heel mark made on the last jump, to the take off line. The distance should be measured to the nearest inch and recorded in feet and inches.³⁵

The triple broad jump test was given 511 freshmen boys at Sam Houston State College. The range for the triple broad jump was 15 feet 6 inches with a maximum of 27 feet 6 inches and a minimum of 12 feet. The mean or average score of 22.23 feet, is shown in Table X. A distribution chart for the triple broad jump is shown in Table IX. The table indicates that 97 pupils jumped 22 feet to 22 feet 11 inches.

According to Table XI under the Fall Distribution,

³⁵N. P. Neilson and Frederick W. Cozens, Achievement Scales in Physical Education Activities (New York: A. S. Barnes and Company, 1934), p. 31-37.

there were no exceptionally high scores in the triple broad jump. The one score above 70 on the T-scale was a student who also scored high in the vertical jump. He was a basketball player.

The very low score in Table IX was by a student who scored below 30 on the T-scale in every event. He had the lowest score in both the vertical jump and in pull-ups. He was overweight by 32 pounds.

When the test was given the second time, the distribution moved up with many more relatively high scores showing up in Table IX. Of the six who scored above 70 on the T-scale, all scored at least 60 on the vertical jump and triple broad jump in the fall semester. None were more than 12 pounds overweight or underweight.

Of the four low scores below the T-score of 27, two were by students who were more than 25 pounds overweight. All did less than three pull-ups. All four scored less than a T-score of 57 in push-ups and burpees.

TABLE IX
DISTRIBUTION CHART FOR THE
TRIPLE BROAD JUMP TEST

Triple Broad Jump Interval	Fall Distribution	Spring Distribution
28'-28.9'	0	2
27'-27.9'	1	4
26'-26.0'	14	13
25'-25.9'	26	44
24'-24.9'	50	61
23'-23.9'	75	82
22'-22.9'	97	95
21'-21.9'	93	78
20'-20.9'	59	60
19'-19.9'	56	40
18'-18.9'	27	20
17'-17.9'	8	8
16'-16.9'	2	1
15'-15.9'	2	1
14'-14.9'	0	1
13'-13.9'	0	1
12'-12.9'	1	0
Total	511	511
Mean	22.33'	22.33'

TABLE X

T-SCORES AND LETTER GRADES FOR
THE TRIPLE BROAD JUMP GIVEN TO
FRESHMEN AT SAM HOUSTON
STATE COLLEGE

Distance	T-Scores	Grade
28'9"	80	
28'6"	79	
28'3"	77	
28'	77	
27'9"	76	A
27'6"	74	
27'3"	73	
27'	72	
26'9"	71	
26'6"	70	
26'3"	69	
26'	68	
25'9"	67	
25'6"	65	B
25'3"	64	
25'	63	
24'9"	62	

TABLE X (continued)

Distance	T-Scores	Grade
24'6"	61	
24'3"	60	
24'	59	B
23'9"	58	
23'6"	57	
23'3"	55	
23'	54	
22'9"	53	
22'6"	52	
22'3"	51	
22'	50	C
21'9"	49	
21'6"	48	
21'3"	46	
21'	45	
20'9"	45	
20'6"	43	
20'3"	42	D
20'	41	
19'9"	40	

TABLE X (continued)

Distance	T-Scores	Grade
19'6"	39	
19'3"	37	
19'	37	
18'9"	36	D
18'6"	34	
18'3"	33	
18'	32	
17'9"	31	
17'6"	30	
17'3"	29	
17'	28	
16'9"	27	
16'6"	25	F
16'3"	24	
16'	23	
15'9"	22	
15'6"	21	
15'3"	20	

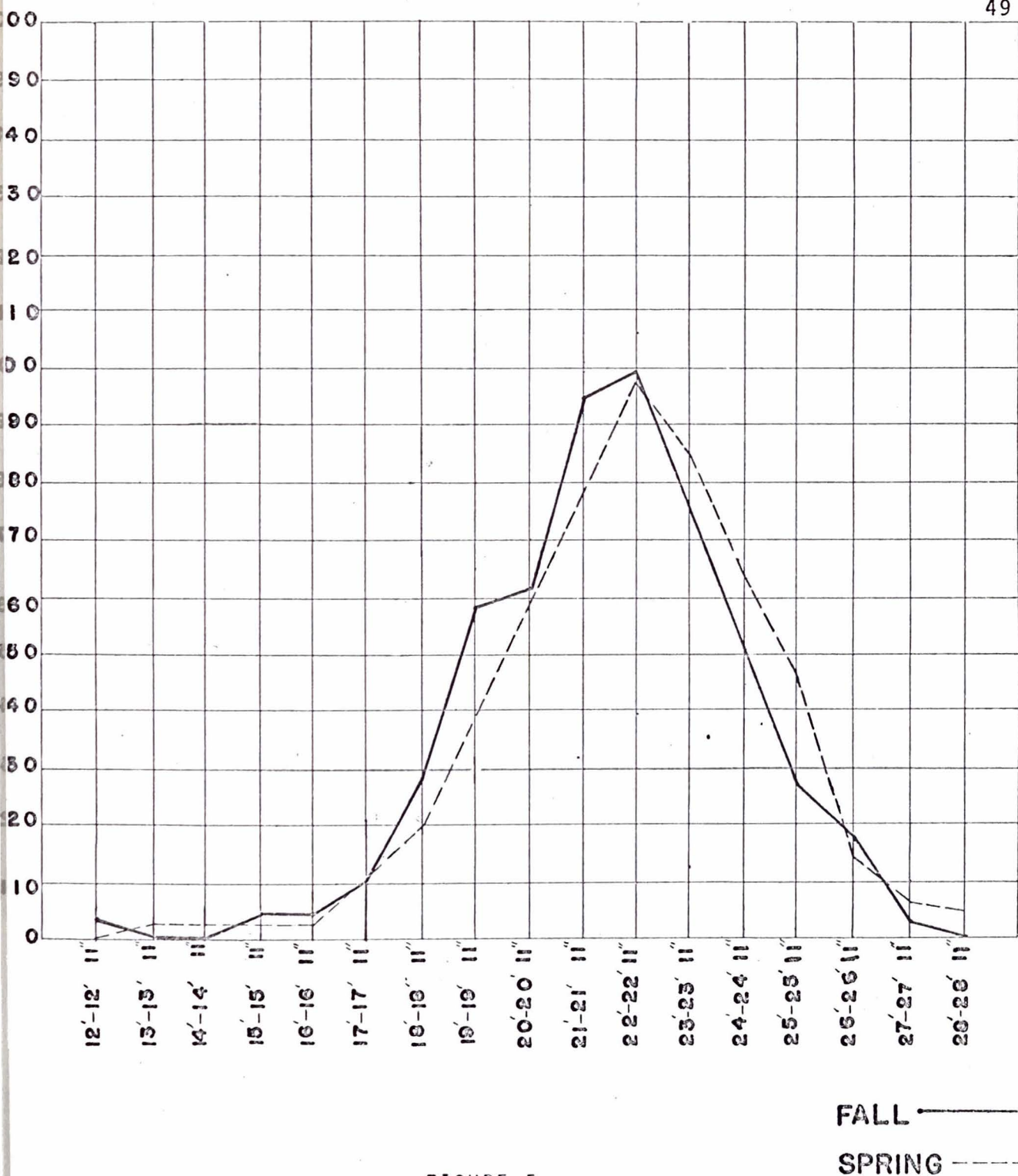


FIGURE 5

DISTRIBUTION OF TRIPLE BROAD JUMP SCORES
 FOR THE FALL AND SPRING SEMESTERS
 1966-67 AT SAM HOUSTON STATE
 COLLEGE

The Pull-up Test

The pupil is positioned with hands on a horizontal bar, arms and legs fully extended. The arms must be straight in the starting position of the pull-up or chin-up. In this exercise the pupil pulls the body up until the chin is above the bar. This counts as one pull-up. No swinging or kicking is allowed in order to help lift the body. Next the pupil lowers the body to the starting position. The hands are placed so the knuckles and thumbs are over the bar, and the palms of the hands facing away from the body. This is called the overhand grasp. The knees are kept straight during the exercise. The exercise is repeated as many times as the pupil can pull up so that the chin is over the bar. In counting the pull-ups, the instructor may indicate successful completion of the pull-ups when the pupil lowers the body to the starting position for the next pull-up. The bar should be at a height that allows each student to hang free without touching the floor. Pupils are tested one at a time. The arms must be fully extended in the starting position, and after each successful pull-up.

The test for pull-ups was given to 511 freshmen boys at Sam Houston State College. The range for pull-

ups was 24 with a maximum of 24 and a minimum of zero. The mean or average score of 7.57 pull-ups is shown in Table XII. The table indicates that 136 pupils did seven to eight pull-ups.

Of the seven scores above seventeen pull-ups or above a T-score of 75, as shown in Table XI under Fall Distribution, four were by members of the gymnastics team. The highest weight of the seven students was 177 pounds with two students being more than 20 pounds underweight. All but one of these seven students scored a T-score of 60 or above in every other event. Of 30 low scores who did below two pull-ups, nineteen were by students who were overweight by at least twenty pounds and sixteen weighted at least 200 pounds.

Under Spring Distribution in Table XI one student performed 26 pull-ups. He was a physical education major and was within six pounds of his average weight according to Appendix J. He scored above 70 on the T-scale in every event.

TABLE XI
DISTRIBUTION CHART FOR PULL-UPS

Pull-up Interval	Fall Distribution	Spring Distribution
25-26	0	1
23-24	1	0
21-22	0	0
19-20	1	7
17-18	5	11
15-16	16	25
13-14	26	46
11-12	38	64
9-10	97	119
7- 8	136	101
5- 6	76	62
3- 4	50	42
1- 2	39	24
0	16	9
Total	511	511
Mean	7.57	8.83

TABLE XII
T-SCORES AND LETTER GRADES FOR
PULL-UPS GIVEN TO FRESHMEN
BOYS AT SAM HOUSTON
STATE COLLEGE

Pull-ups	T-Scores	Grade
19	80	
18	77	
17	75	A
16	72	
15	70	
14	67	
13	64	
12	62	B
11	59	
10	56	

TABLE XII (continued)

Pull-ups	T-Scores	Grade
9	54	
8	51	C
7	48	
6	46	
5	43	
4	41	
3	38	D
2	35	
1	33	
0	30	F

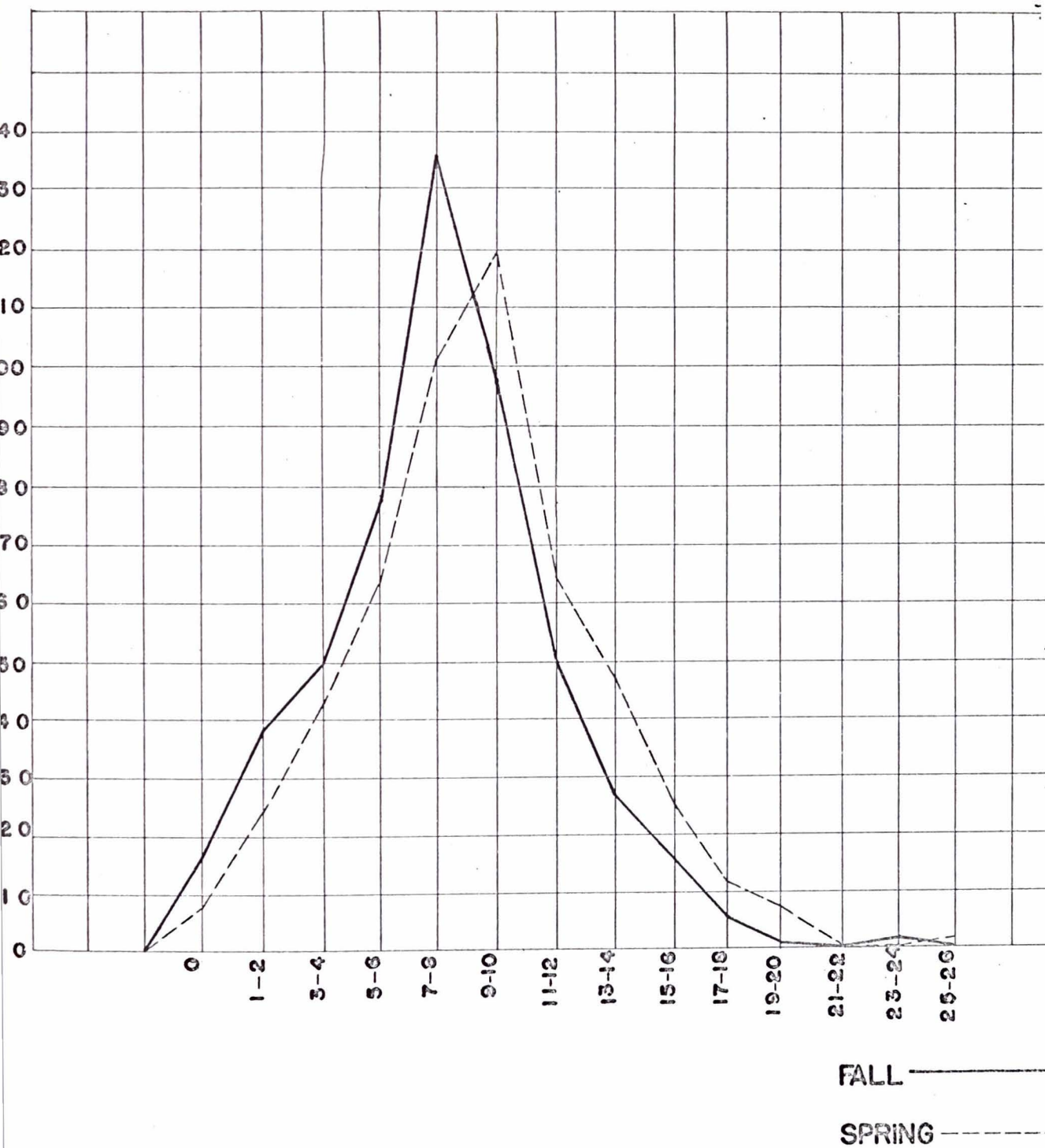


FIGURE 6

DISTRIBUTION OF PULL-UPS FOR THE FALL
AND SPRING SEMESTERS 1966-67
AT SAM HOUSTON STATE
COLLEGE

CHAPTER IV

INTERPRETATION OF DATA

When baking a cake, the average homemaker does not understand the chemical effects of the ingredients which one uses. However, if one is careful and follows directions, the product is quite gratifying. Somewhat similar application of this principle will yield excellent results in manipulation of statistical formulas. In this chapter an attempt will be made to review methods of comparing and analyzing test results.³⁶

A large number of test scores can be more efficiently handled if they are grouped than if they are considered individually. Grouping is accomplished by constructing a frequency table. To do so these steps would be followed:

1. Find the range by subtracting the lowest score from the highest.
2. Select the step interval (i) which will result in not more than twenty or less than ten intervals.
3. Begin constructing the frequency table by selecting a starting position which will include the lowest test score in the first step interval.³⁷
4. Tally the test scores.

³⁶Mathews, op. cit., p. 29.

³⁷Ibid., p. 31.

Measures of central tendency indicate typical performance for a group or for test scores as a whole. It is important to know the one best score which is most representative of the group. The mean or average is the measure of central tendency most commonly used. It may be computed by adding up the scores and dividing by the number. It can also be computed by using this formula:

$$\text{MEAN} = \text{ASSUMED MEAN} + (\sum fd/n \times SI)^{38}$$

The assumed mean is the middle score of the interval guessed to have contained the mean. $\sum fd$ is the sum of the frequency column times the deviation column. The deviation column is found by counting the deviations that each step interval is removed from the interval in which you have guessed the mean to fall. The deviations above the mean are assigned positive values, while those below are given negative ones. The SI is the value of each step interval.³⁹

The next step is to consider the variability of these scores, that is, of the scatter or spread of the scores around the measure of central tendency.

³⁸Philip A. Smithells and Peter E. Cameron, Principles of Evaluation in Physical Education (New York: Harper and Brothers, 1962), p. 168.

³⁹Ibid., p. 168.

In the normal curve, the measures of variability include certain constant fractional amounts of the total area of the curve. Special reference will be given to the standard deviation.⁴⁰

Like the mean, as a measure of central tendency, the standard deviation, SD or the Greek sigma, is the most reliable of the measures of variability and consequently is usually employed in advanced statistics and in research. The SD may be defined as that measure which indicates the scatter or spread of the middle 68.26 per cent of the scores taken from the mean. Within the limits of three standard deviations lie 99.73 per cent of the scores.⁴¹

In arriving at the standard deviation, these steps should be followed:

1. Carry out same steps as were followed in calculating the mean.
2. Add another column (fd^2) which represents the "d" column times the "fd" column.
3. Add the fd^2 column.
4. Compute $(\sum fd/n)^2$ and subtract this figure from $\sum fd^2/n$.
5. Substitute the figures in the formula and obtain the square foot.
6. Multiply the square root by the size of the step interval.⁴²

⁴⁰Clark, op. cit., p. 425.

⁴¹Ibid., p. 432.

⁴²Willgoose, op. cit., p. 397.

The formula for the standard deviation is:

$$= i \sqrt{(fd^2/n) - (fd/n)^2}^{43}$$

The T-scale is based upon SD values of the distribution. Unlike the percentile scale, where the distances on the base line are close together near the mean and spread out at the extremities of the distribution, T-scores are based upon equal distances on the base line of the normal curve. The T-score, named in honor of Terman and Thorndike, principle figures in the field of tests and measurement, was devised by William A. McCall of Columbia University in the early 1920's.⁴⁴ The advantage of the T-scores are that all scores are positive, that they use equal units and do not involve fractions and that an average score is worth 50 points, (or halfway along a hundred-point scale). T-scores are the most popular standard score used to report test results being versatile and easily understood.⁴⁵

Two other characteristics of T-scores are:

1. One standard deviation on the raw-score scale is equal to ten units on the T-score scale.
2. T-Scores extend from 3σ above and 3σ below the mean.⁴⁶

⁴³Mathews, op. cit., p. 34.

⁴⁴Stroup, op. cit., p. 69.

⁴⁵Ibid., p. 70.

⁴⁶Ibid., p. 70.

The formula for finding a T-score is:

$$T = 50 + 10 (X - M)/SD$$

X = raw score

M = mean

SD = standard deviation⁴⁷

The practical range of T-scores is usually 60 with 80 the highest score and 20 the lowest. The percent of scores that fall above 80 or below 20 on the T-scale is .27%.⁴⁸ This means that normally out of 10,000 scores only 135 would score above 80 and 135 below 20 on the T-scale.

There are three different charts necessary for this study for each event of the physical efficiency test. They are a distribution chart, T-scores and letter grades and a graph of the curve formed by the frequency distribution. The distribution chart was compiled by establishing an interval and tallying the numbers of scores for each interval. The T-score and letter grade chart was formed by using the T-score formula found earlier in this chapter. The letter grades were established and this explanation is in Chapter III. The graph was es-

⁴⁷Ibid., p. 71.

⁴⁸Bovard, op. cit., p. 393.

tablished by simply plotting the frenquency of scores with the value of the interval shown in the distribution chart.

CHAPTER V

SUMMARY AND CONCLUSIONS

It was the purpose of this study to establish physical efficiency norms for freshmen boys at Sam Houston State College and to suggest uses for the results. This task was attempted by administering a physical fitness test to all freshmen boys enrolled in physical education classes at Sam Houston State College and computing the results. T-scores were established and letter grades assigned for each raw score. The method used to obtain data in this study was the Sam Houston State College Physical Efficiency Test.

The standardization of a physical fitness test involves testing students and grouping data by use of elementary statistics, comparing local norms with national norms and determining strengths and weaknesses of students tested. Established norms for freshmen boys were also compared to the norms established for all students in physical education at Sam Houston State College in the school year 1965-66 (Table XVIII). The national norms for pull-ups are shown using percentile rank instead of T-scores. A T-score-percentile conversion is found in Appendix K.

It was concluded from this study that:

1. Sam Houston State College freshmen boys are not notably weak in any area of physical fitness scored on the Sam Houston State College Physical Efficiency Test. Their scores at the 50th T-score were higher than the national norms used in each event except one. The score in that event was the same as the national norm.

2. For motivational purposes, the norms from the Sam Houston State College Physical Efficiency Test should be posted in each designated area used for physical fitness testing.

3. The average of the letter grades scored by each student should determine at least one-fourth of his physical education grade.

4. A review session for instructors in the physical education activity program should be conducted each semester to discuss proper methods of proctoring each event of the Sam Houston State College Physical Efficiency Test to insure maximum validity.

5. Even though this study is complete, the author feels it is only a beginning step in the investigation of a physical fitness test. Further study is needed in this area of physical education.

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APPENDIX A

TABLE XIII

*NAVY STANDARD PHYSICAL
FITNESS TEST T-SCORES
FOR PUSH-UPS

T-Scores	Push-ups	T-Scores	Push-ups
80	54	47	26
77	51	44	24
74	48	41	23
71	44	38	21
68	41	35	20
65	39	32	18
62	36	29	17
59	34	29	15
56	32	26	14
53	29	23	13
50	28	20	12

*Carl E. Willgoose, Evaluation in Health Education and Physical Education (New York: McGraw-Hill Company, Inc., 1961), p. 434.

APPENDIX B

TABLE XIV
*T-SCORES FOR TWO-MINUTE
SIT-UPS

Sit-ups	T-Score	Sit-ups	T-Score
86	82	54	48
84	77	52	46
82	75	50	44
80	73	48	42
78	70	46	41
76	69	44	39
74	67	42	37
72	66	40	35
70	64	38	32
68	61	36	31
66	60	34	29
64	58	32	28
62	56	30	26
60	54	28	23
58	52	26	20
56	50	24	16

*I. F. Waglow, "A Scoring Table for Two-Minute Sit-Ups," Research Quarterly of the American Association for Health, Physical Education and Recreation, Vol. 23, March 1952, p. 111.

APPENDIX C

TABLE XV

*T-SCORES FOR THE VERTICAL JUMP TEST
GIVEN TO COLLEGE MEN ON LARSON'S
MOTOR ABILITY TESTS

T-Scores	Raw Score	T-Scores	Raw Score
78	26.0	50.5	18.5
76	25.5	49	18.0
74	25.0	47	17.5
72	24.5	45	17.0
70	24.0	43.5	16.5
68	23.5	42	16.0
66	23.0	40	15.5
64	22.5	38	15.0
62	22.0	36.5	14.5
60.5	21.5	35	14.0
59	21	33	13.5
57.5	20.5	31	13.0
56	20.0	29	12.5
54	19.5	27	12.0
52	19.0	25.5	11.5

*Leonard A. Larson, "A Factor Analysis of Motor Ability Variables and Tests, with Tests for College Men," The Research Quarterly, XII (October, 1941), p. 501.

APPENDIX D

TABLE XVI
 *T-SCORES FOR THE STANDING
 TRIPLE BROAD JUMP

T-Score	Raw Score	T-Score	Raw Score
100	27'8"	50	21'0"
95	27'0"	45	20'4"
90	26'4"	40	19'8"
85	25'8"	35	19'0"
80	25'0"	30	18'4"
75	24'4"	25	17'8"
70	23'8"	20	17'0"
65	23'0"	15	16'4"
60	22'4"	10	15'8"
55	21'8"	5	15'0"

*N. P. Neilson and Frederick Cozens,
Achievement Scales in Physical Education Ac-
tivities (New York: A. S. Barnes and Company,
 Inc., 1934), p. 104.

APPENDIX E

TABLE XVII
 *PERCENTILE SCORES FOR
 PULL-UPS FOR COLLEGE
 MEN AAHPER YOUTH
 FITNESS TEST

Percentile	Pull-ups	Percentile	Pull-ups
100	20	45	5
95	12	40	5
90	10	35	4
85	10	30	4
80	9	25	3
75	8	20	3
70	8	15	2
65	7	10	1
60	7	5	0
55	6	0	0
50	6		

*American Association for Health, Physical Education, and Recreation, "AAHPER Physical Fitness Test Norms For College Students", (Washington: NEA Publications, 1961), p. 2.

APPENDIX F

TABLE XVIII

PHYSICAL EFFICIENCY SCORES FOR MEN
AT SAM HOUSTON STATE COLLEGE

FALL 1966

Sit-Ups 2 Min.	Burpee 30 Sec.	Vertical Jump	Push-Ups	Triple Broad Jump	Pull-Ups	Grade	T-Score	Sit-Ups 2 Min.	Burpee 30 Sec.	Vertical Jump	Push-Ups	Triple Broad Jump	Pull-Ups
17	..	..	3	15'0"	..	C	50	50	..	19.0"	30	21'9"	7
18	..	10.5"	4	15'3"	..	C	51	51	..	..	31	22'0"	..
20	..	..	5	15'6"	..	C	52	52	18	19.5"	..	..	..
21	10	11.0"	6	16'9"	..	C	53	53	..	..	32	22'3"	8
22	..	..	7	..	..	C	54	54	..	20.0"	33	22'6"	..
23	..	11.5"	8	16'0"	..	C	55	55	..	20.5"	34	22'9"	9
24	11	12.0"	9	16'3"	..	C	..	..	..	..	..	..	..
25	..	..	..	16'6"	..	C	..	..	..	..	..	..	..
26	..	12.5"	10	16'9"	..	B	56	56	19	..	35	23'0"	..
27	..	..	11	17'0"	..	B	57	58	..	21.0"	36	23'3"	..
28	12	13.0"	12	17'3"	..	B	58	59	..	..	37	23'6"	10
29	..	13.5"	13	17'6"	..	B	59	60	..	21'5"	38	23'9"	..
..	..	..	..	..	..	B	60	61	20	22.0"	..	24'0"	11
30	..	..	14	17'9"	..	B	61	62	..	..	39	..	..
31	13	14.0"	15	..	..	B	62	63	..	22.5"	40	24'3"	..
33	..	..	16	18'0"	..	B	63	64	21	..	41	24'6"	12
34	..	14.5"	..	18'3"	1	B	64	65	..	23.0"	42	24'9"	..
35	..	..	17	18'6"	..	B	65	66	..	..	43	25'0"	13
36	14	15.0"	18	18'9"	..	B	66	67	..	23.5"	44	25'3"	..
37	..	15.5"	19	19'0"	2	B	67	68	22	24.0"	45	25'6"	..
38	..	..	20	19'3"	..	B	..	..	..	..	..	..	..
39	..	16.0"	21	19'6"	3	A	68	70	..	..	46	25'9"	14
40	15	..	22	19'9"	..	A	69	71	..	24.5"	..	26'0"	..
41	..	16.5"	23	20'0"	..	A	70	72	23	..	47	..	15
42	..	17.0"	24	..	4	A	71	73	..	25.0"	48	26'3"	..
..	..	..	..	..	..	A	72	74	..	25.5"	49	26'6"	..
..	..	..	..	..	..	A	73	75	..	..	50	26'9"	16
43	16	..	..	20'3"	..	A	74	76	24	26.0"	51	27'0"	..
45	..	17.5"	25	20'6"	5	A	75	77	..	..	52	27'3"	17
46	..	..	26	20'9"	..	A	76	78	..	26.5"	53	27'6"	..
47	..	18.0"	27	21'0"	..	A	77	79	..	..	..	27'9"	..
48	17	..	28	21'3"	6	A	78	80	25	27.0"	54	28'0"	18
49	..	18.5"	29	21'6"	..	A	79	81	..	27.5"	55	28'3"	..
50	..	19.0"	30	21'9"	7	A	80	83	..	..	56	..	19

APPENDIX G

TABLE XIX

T-SCORES AND LETTER GRADES FOR
FRESHMEN BOYS ON SAM HOUSTON
STATE COLLEGE PHYSICAL
EFFICIENCY TEST

FALL 1966

Grade	T-Score	Sit-Ups 2 Mins.	Burpee 30 Secs.	Vertical Jump	Push-Ups	Triple Broad Jump	Pull-Ups	Grade	T-Score	Sit-Ups 2 Mins.	Burpee 30 Secs.	Vertical Jump	Push-Ups	Triple Broad Jump	Pull-Ups
A	80	75	31	..	..	28'9"	19	C	50	56	18	..	..	22'0"	..
	79	74	..	..	..	28'6"	..		49	56	..	..	34	21'9"	..
	78	73	30	29"	..	28'3"	..		48	55	17	21"	..	21'6"	7
	77	73	..	..	48	28'0"	18		47	54	..	..	33	..	..
	76	72	..	..	..	27'0"	..		46	54	..	..	..	21'3"	6
	75	72	29	..	47	..	17		45	53	16	20"	32	21'0"	..
	74	71	..	28"	..	27'6"	..	C	44	53	..	..	..	..	..
	73	70	28	..	46	27'3"	..								
	72	70	..	..	..	27'0"	16								
	71	69	27	27"	45	26'9"	..	D	43	52	15	..	31	20'6"	5
	70	69	..	..	..	26'6"	15		42	51	..	..	..	20'3"	..
	69	68	..	..	44	26'3"	..		41	51	..	19"	30	20'0"	4
A	68	68	26	..	..	26'0"	..		40	50	14	..	..	19'9"	..
									39	49	13	..	29	19'6"	..
									38	49	..	..	..	..	3
B	67	67	..	26"	43	25'9"	14		37	48	..	18"	..	19'3"	..
	66	66	25	..	..	..	..		36	48	12	..	28	18'9"	..
	65	65	..	..	42	25'6"	..		35	47	..	..	..	18'6"	2
	64	65	24	..	..	25'3"	13		34	46	11	..	27	..	..
	63	64	..	25"	41	25'0"	..		33	45	..	17"	..	18'3"	1
	62	64	23	..	..	24'9"	12	D	32	45	10	..	26	18'0"	..
	61	63	..	..	40	24'6"	..								
	60	62	..	24"	..	24'3"	..								
	59	62	22	..	39	24'0"	11	F	31	44	..	..	..	17'9"	..
	58	61	..	..	..	23'9"	..		30	44	..	16"	25	17'6"	0
	57	61	21	..	38	23'6"	..		29	43	9	..	..	17'3"	..
B	56	60	..	23"	..	..	10		28	43	..	..	24	17'0"	..
									27	42	8	..	..	16'9"	..
									26	41	..	15"	23	..	..
C	55	59	20	..	37	23'3"	..		25	41	7	..	..	16'6"	..
	54	59	..	..	..	23'0"	9		24	40	..	..	22	16'3"	..
	53	58	..	..	36	22'9"	..		23	39	6	..	..	16'0"	..
	52	57	19	22"	..	22'6"	..		22	39	..	14"	21	15'9"	..
	51	57	..	..	35	22'3"	8		21	38	..	..	..	15'6"	..
C	50	56	18	..	..	22'0"	..	F	20	38	..	..	20	15'3"	..

APPENDIX H

Name _____

Hometown _____

WHAT OCCUPATION OR PROFESSION HAVE YOU CHOSEN FOR LIFE'S WORK? _____

P. E. Class _____ P. E. Class _____

Date _____ Ht. _____ Wt. _____ Date _____ Ht. _____ Wt. _____

P. E. Class _____ P. E. Class _____

Date _____ Ht. _____ Wt. _____ Date _____ Ht. _____ Wt. _____

EVENT	AVERAGE	Date		Date		Date	
		SCORE	POINTS	SCORE	POINTS	SCORE	POINTS
SIT-UPS 2-MIN.							
BURPEE 30-SEC.							
VERTICAL JUMP							
PUSH-UPS							
TRIPLE BROAD JUMP							
PULL-UPS							

APPENDIX I

P. E. Class _____ P. E. Class _____

Date _____ Ht. _____ Wt. _____ Date _____ Ht. _____ Wt. _____

P. E. Class _____ P. E. Class _____

Date _____ Ht. _____ Wt. _____ Date _____ Ht. _____ Wt. _____

EVENT	Date		Date		Date		Date	
	AVERAGE	SCORE	POINTS	SCORE	POINTS	SCORE	POINTS	POINTS
SIT-UPS 2-MIN.								
BURPEE 30-SEC.								
VERTICAL JUMP								
PUSH-UPS								
TRIPLE BROAD JUMP								
PULL-UPS								

APPENDIX J

TABLE XX
*AVERAGE WEIGHT FOR MEN
AGE 20

Height	Weight
60"	122
61"	125
62"	128
63"	132
64"	136
65"	139
66"	142
67"	145
68"	149
69"	153
70"	157
71"	161
72"	166
73"	170
74"	174
75"	178
76"	181

*Harold S. Diehl, Healthful Living (New York: McGraw-Hill Company, 1964), p. 116.

APPENDIX K

TABLE XXI

*CONVERSION TABLE OF PERCENTILE RANKS INTO T-SCORES

(Based on Approximate Standard Deviation Values)

Percentile	T-Scores	Percentile	T-Scores
99.9	80	85	60
99.75	78	84	60
99.5	76	83	59.5
99.25	75	82	59
99.0	74	81	59
98.5	72	80	58.5
98	70	79	58
97	69	78	58
96	68	77	57.5
95	67	76	57
94	66	75	56
93	65	74	56
92	64	73	56
91	63	72	55.5
90	62.5	71	55
89	62	70	55
88	61.5	69	54.5
87	61	68	54.5
86	60.5	67	54

TABLE XXI (continued)

Percentile	T-Scores	Percentile	T-Scores
66	54	45	48.5
65	53.5	44	48
64	53.5	43	48
63	53	42	47.5
62	53	41	47.5
61	52.5	40	47
60	52.5	39	47
59	52	38	46.5
58	52	37	46.5
57	52	36	46
56	51.5	35	46
55	51.5	34	45
54	51	33	45.5
53	51	32	45
52	50.5	31	45
51	50	30	44.5
50	50	29	44.5
49	50	28	44
48	49.5	27	44
47	49	26	43.5
46	49	25	43

TABLE XXI (continued)

Percentile	T-Scores	Percentile	T-Scores
24	43	9	36
23	42.5	8	35
22	42	7	34
21	42	6	33
20	41.5	5	32
19	41	4	31
18	41	3	30
17	40.5	2	29
16	40	1.5	28
15	40	1.0	26
14	39	.75	25
13	38.5	.5	24
12	38	.25	22
11	37.5	.1	20
10	37		

*Philip A. Smithells and Peter E. Cameron,
Principles of Evaluation in Physical Education
 (New York: Harper & Brothers, Publishers, 1962), p.
 226.

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