A COMPARATIVE STUDY OF THE PHYSICAL FITNESS OF FRESHMEN BOYS AT THE SIX WABAUNSEE COUNTY HIGH SCHOOLS WITH THE NATIONAL YOUTH FITNESS TEST

by

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TABLE OF CONTENTS

LIST OF TABLES

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PART I

INTRODUCTION

Although interest in physical fitness has been high since 1885, efforts in the field have, in general, reached their peak during the war years. This is because of concern over the number of men rejected by the military draft. The cessation of hostilities usually brought a drop-off in interest in fitness. For this reason, it is unusual that so much interest is shown at the present time, the United States not being in a major war.

Kraus and his associates are responsible for the revitalization of much of this interest. The Kraus-Weber Test, indicated a great difference in the fitness of European and American youth.[1] The test showed Americans far inferior to the European youth. This, coupled with the failure of the American Olympic Team to do as well in the 1956 and 1960 Olympic Games as it had in the past, caused much concern at home.

As a result, and at the urging of President Eisenhower, a nation-wide program was established, calling for the cooperation of state, city and national officials to improve the level of fitness. The President's Council on

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[1] Youth Fitness Test Manual, 1958, p. 1.

Youth Fitness was formed in 1956, with Bud Wilkinson, former football coach at Oklahoma University, as a special consultant.

The Council noted the existence of many fine fitness and physical education programs, but recognized the need for improvement in many communities.[2]

The Council indicated that physical fitness was but one aspect of fitness; however, it is a very significant aspect and one which is basic to other forms of excellence. Efforts to improve physical fitness should be carried on with full regard for all fitness qualities--spiritual, mental, emotional and social. American parents need to be concerned that their children have every opportunity to develop and maintain physical fitness. School programs should emphasize the physical aspects of fitness as a part of total fitness. Only through the cooperative efforts of all concerned, the school board, the school administration, the teachers and the organized citizenry can this "total program" be achieved.[3]

School programs should be directed toward helping all pupils attain a high degree of fitness with special attention

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[2]AAHPER Youth Fitness Project, (Washington, D. C.: National Education Association, 1962), p. 3.

[3]Youth Fitness Test Manual, 1958, p. 3.

being given to those children who are physically underdeveloped:[4]

1. Physically gifted youngsters usually have adequate programs.
2. The needs of the physically underdeveloped frequently have been overlooked; these require special assistance.
3. The school physical education program offers the best means of reaching these children.
4. Fitness programs should give emphasis to a program for girls as well as boys.

It is of great importance that every American youth be given an opportunity to make and keep himself physically fit--fit to learn, fit to understand, fit to grow in grace and stature, fit to live the full life.

Exercise is an essential element to achieving physical fitness. Strength, stamina, endurance and other desirable qualities are best developed through vigorous activity.[5] Lack of a program containing vigorous physical activity is a serious problem.

Today we live in a civilization where the genius of man has removed the necessity for much of the physical

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[4] Ibid., p. 4.

[5] President's Council on Youth Fitness, Youth Physical Fitness, Suggested Elements of a School-Centered Program, Parts One and Two, (Washington: Government Printing Office, 1962), p. 2.

activity from our daily tasks. Man has moved out of his natural environment into an artificial world of mechanical gadgets and electrical devices which not only eliminate the opportunity to develop physical fitness but make it practically impossible. We are becoming a nation of sitters instead of doers.

Parents, teachers and other adults see too many children unwilling to participate as they sit passively and watch a few engage in work or sport. They are only following the patterns set by adults. While the incentives to be fit are basically important, the environment in which boys and girls live must provide safe and readily available opportunities for fitness endeavours.

If our youth are soft and physically unfit, it seemingly is a result of the automation, laboring saving devices and gadgets era in which they live.

Fundamentally, our youth are healthier than the youth of any previous generation, but the majority have not developed strong, agile bodies.[6] The softening process of our civilization seemingly must accept much of the responsibility for this.

The President's Council of Youth Fitness has made great strides in its campaign against "unfit citizens".

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[6]President's Council for Youth Fitness, op. cit., p. 8.

Under the direction of Presidents Eisenhower, Kennedy, and Johnson and their very able consultants, a wide range of activities have been suggested for persons of all ages. Special programs for youth, for college students and adults, and for use in the nation's armed forces program have been suggested. The program's success is heartening, but we must realize it is only the beginning in a nation where general levels of physical vitality are seemingly being surpassed by other less privileged nations.

Testing. Validated tests have long been a part of a good physical education program:[7]

1. Only through tests can standards be developed.
2. Tests provide the best means of measuring achievement and diagnosing weakness.
3. Physical achievement tests provide self-evaluation and a strong motivation for development within the individual pupil.

Tests should be used by the teachers, not just given. They are useful only if they help achieve the teacher's purpose.[8] Proper evaluation of tests help teachers determine needs of students, to classify students into homogeneous groups, to motivate students, and most important of all

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[7] Ibid.

[8] Edward F. Voltmer, and Arthur A. Eslinger, The Organization and Administration of Physical Education, p. 509.

to measure progress. The measurement of progress toward the objectives of improved strength, muscular endurance, posture, body mechanics, skills, knowledge and health, helps physical educators in developing improved physical education programs.

PART II

PURPOSE

The purpose of the report is threefold: (1) to serve as a means of evaluating the physical fitness phase of the present physical education programs existing in the six Wabaunsee high schools; (2) to provide the State of Kansas with data in its study of the physical fitness problem; and (3) to compare the fourteen year old freshmen boys in the Wabaunsee County schools with the existing national norms.

PART III

DEFINITION OF TERMS USED

Fitness. In a broad sense fitness may be used to refer to over-all well being, which has moral, intellectual, social and emotional components as well as physical ones.[9]

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[9]Fred V. Hein, "What is Physical Fitness?," National Education Association Journal, 51(2):34, February, 1962.

Physical fitness. Mixture of the best possible body health plus the physical condition to perform everyday tasks effectively and to meet emergencies as they arise.[10]

Endurance. Ability to continue muscular exertion of sub-maximal magnitude.[11]

Agility. Speed in changing body positions or in changing direction.[12]

Muscular strength. Maximum strength applied in a single muscular contraction.[13]

Mean. The sum of the scores divided by their number, commonly called average or a score which represents all scores.[14]

Range. Measurement of variability showing the extreme scores of lowest and highest.[15]

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[10] Ibid.

[11] H. Harrison Clarke, Application on Measurement to Health and Physical Education, p. 22.

[12] Ibid.

[13] Ibid.

[14] Ibid.

[15] Ibid.

Percentile. Measurement of decile points in distribution.[16]

PART IV

DESCRIPTION OF TESTS

The President's Youth Fitness Test was administered to sixty-five freshmen boys attending the six Wabaunsee County high schools. The following schools were involved: Alma, Alta Vista, Eskridge, Harveyville, Maple Hill and Paxico.

Of these schools, three, (Alma, Eskridge, and Alta Vista) are class "B" according to the Kansas State High School Activities Association classifications, and three, (Harveyville, Maple Hill, and Paxico) are "BB".

As far as my review of literature was concerned, no test results were available for schools of the same size in the state, although similar tests have been administered within the state in high schools somewhat larger than these.

The administration of the test was complicated because test subjects attended different schools. The first step in arranging for the test was to meet with the various principals of the schools for the purpose of obtaining permission to conduct the tests. The author was able to

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[16] Ibid.

contact them all at one time while they were attending a county teachers' meeting. After explaining the tests and the purpose, it was possible to set up a schedule of visitation at the convenience of each individual school, for the actual administration of the tests.

The tests were given during a five day period, one school tested each of the first four days and two schools tested the fifth day. In each instance, the physical education teachers expressed interest in the project and cooperated fully in the actual testing. All equipment was furnished by the author with the exception of a ladder used in the pull-up test. Conditions were duplicated as near as possible to insure uniformity.

Prior to testing, the students were advised about the project and its purpose. Each event was explained and demonstrated. A suitable warm-up was allowed and each boy was encouraged to do his best. It appeared to the author that each participant took part with a high degree of interest and vigor.

Although all the freshmen boys were included in the test, only the results of those who were fourteen years of age are included in this report.

Norms. The norms used as a basis of this study were established through the use of pilot studies administered

to 8,500 school students in 1957-58 carried out by the President's Council on Youth Fitness, and by the American Association of Health, Physical Education and Recreation as a result of studies and surveys on fitness carried out in the United States from 1956 to 1957.[17] These students tested were from every walk of life; from rural and urban areas; public and private schools; and included both boys and girls.

For the purpose of this report, the seven test items were each administered and scored, with slight modification, according to directions in the test manual. Test scores were compared to the national norms by referring to the appropriate table, based on age, in the test manual. (See Table I.)

Locating the test score in the appropriate column will give a percentile score. A percentile score indicates the per cent of individuals who have not attained a certain score.[18] For instance, a percentile score of 60 means the boy has scored higher than 60% of the boys tested on that particular event. The percentiles are in steps of fives--the highest percentile tested should always be scored.

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[17] AAHPER, Youth Fitness Test Manual, (Washington, D. C.: National Education Association, 1960), p. 9.

[18] Ibid.

TABLE I

CHART OF NORMS ESTABLISHED FOR 14 YEAR OLD BOYS BY THE PRESIDENT'S COUNCIL ON YOUTH FITNESS*

Pull-ups	Sit-ups	Standing broad jump	Shuttle run	50 Yd. dash	Softball throw	600 Yd. run-walk
Excellent						
10	99	7'2"	9.4 Sec.	6.5 Sec.	190'	1:50 Mins
Good						
9	98	7'1"	9.5	6.6	189'	1:51
	90	7'0"	9.6		185'	1:54
8	85	6'11"	9.7	6.7		1:56
	80	6'10"			180'	1:58
7	75	6'9"	9.8	6.8	175'	2:00
	70	6'8"			170'	2:02
	65		9.9	6.9	165'	2:04
6	60	6'7"	10.0	7.0	163'	2:05
Satisfactory						
5	59	6'6"	10.1	7.1	162'	2:06
	55	6'5"	10.2		160'	2:10
	50	6'4"	10.3	7.2	155'	2:12
		6'3"	10.4		150'	2:16
4	44	6'1"	10.5	7.3	147'	2:18
Poor						
3	43	6'0"	10.6	7.4	146'	2:19
	40	5'11"	10.7	7.5	145'	2:22
2	38	5'9"	10.8		140'	2:25
	36	5'8"	10.9	7.6	135'	2:28
1	33	5'7"	11.0	7.7	131'	2:30

*Youth Physical Fitness, 1958, p. 44.

PART V

ADMINISTRATION OF TESTS

Pull-up. In testing the pull-up a ladder was used as suggested in the Youth Fitness Test Manual. Each boy was allowed one fair trial. The student was instructed to turn his palms away from his body as he gripped the rung. His feet were to clear the ground and no swing of the body was allowed. The number of completed pull-ups to the nearest whole number was recorded.

Sit-up. In administering the sit-up, the "buddy system" was used. The group paired off with first one boy doing the exercise while his partner held his feet and counted the sit-ups. The process was then reversed.

The subject lay on his back, with legs extended and feet about two feet apart. Hands are placed on the back of the neck with the fingers interlaced. Elbows are retracted. The feet are held down by a partner, with the heels being in contact with the floor at all times. The subject sits up, turning the trunk and touches the right elbow to the left knee, returns to starting position, sits up again touching left elbow to right knee. The exercise is repeated, alternating sides. One point is given for each complete movement of touching elbow to knee. No score was counted

if the fingertips did not maintain contact behind head, if knees were bent at the start of sit-up, or if an elbow was used to push up from the floor. There was a maximum of 100 sit-ups for boys.[19]

Shuttle Run. In the shuttle run two lines are drawn on the gym floor, thirty feet apart. Two ordinary blackboard erasers are placed behind one line. The other line serves as a starting line. The subject toes the starting line; on the signal, "Ready? Go!" the subject runs to the eraser, picks one up, runs back to the starting line, places the eraser down behind the line; he then runs back and picks up the second eraser and sprints back across the starting line. To save time two stop watches and two sets of erasers were used in order that two boys could be tested at once. Each boy was allowed two trials, with ample rest between. The better of his two times to the nearest tenth of a second was recorded.[20]

Standing Broad Jump. In the standing broad jump, an ordinary 12 foot retractable measuring tape was used. By using a strip of "trainers" tape as a toeing marker, and stretching the tape measure to its full length and taping

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[19] Ibid.

[20] Ibid.

it to the floor, an accurate, portable means of measuring each jump was attained. Three trials were allowed. Measurement was taken from the toe line to the nearest heel or other part of the body which touches the floor nearest to the toe line. The best of three trials in feet and inches to the nearest inch was recorded.[21]

50 Yard Dash. Two stop watches were used and two runners were tested at a time. The test was conducted on the respective football fields of each school. On the signal "Are you ready? Go!," the runners were started. A downward sweep of the arm signaled the timer to start the watch. The amount of elapsed time to the nearest tenth of a second was recorded.[22]

Softball Throw. The softball throw was also conducted on the football fields. Standard archery arrows were used as stakes with number attached to identify the contestant. Each contestant was allowed three throws, the best being measured to the nearest foot and recorded. Each throw had to be made behind a toe line and within a designated area six feet wide. A regulation softball was used.[23]

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[21] Ibid.

[22] Ibid.

[23] Ibid.

600 Yard Run-Walk. In the 600 yard run-walk a starting point was decided upon, from which point a rope 50 yards long was stretched in a straight line. An archery arrow was used to mark the point and to serve as a boundary. A square with a 200 yard perimeter was thus laid out, an arrow marking each corner. Three trips were made around the area. To speed up testing the test group was paired off, then half the group ran the course. As a runner crossed the finish line his time was called out and his partner was responsible for remembering the time for recording. Walking was permitted but not encouraged. The time in minutes and seconds was recorded to the nearest second.[24] The author found that only one test subject out of the entire group found it necessary to walk part of the distance.

PART VI

MUSCLE GROUPS AFFECTED

The test battery is heavily weighted in certain aspects of muscular fitness. This is shown by listing the items of the test battery and after each indicating the aspect of muscular area efficiency that the test is supposed to measure.

The pull-up is an exercise that taxes the strength

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[24] Ibid.

and endurance of the forearm muscles, the arm depressors muscles, and the scapulae abductor muscles of the back.

Sit-ups show strength and endurance of the trunk, mainly the rectus abdominis and hip flexor muscles.

The standing broad jump shows the explosive leg and foot power of the extensor muscle groups. This item tests basically the following muscles: gluteus maximus, quadriceps femoris, hallusis longus, and digiterum lengus.

The shuttle run tests primarily leg power of the hamstring muscle group and the quadriceps femoris muscles, some endurance, and agility.

The fifty yard dash tests ordinary leg power of the explosive nature for speed usage and to some degree endurance.

The softball throw for distance tests the power of the upper and lower arm muscles and wrist, both flexors and extensors, with total body coordination brought into play. The primary muscles involved are the pectoralis major, the biceps brachii, and triceps brachii.

The 600 yard run-walk indicates the endurance of the upper and lower leg muscles and the relationship of the cardio-respiratory systems under sustained working conditions.[25]

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[25]Ben H. Massey, "The AAHPER Fitness Test," Physical Education Newsletter, January 12, 1960.

PART VII

TEST RESULTS

The maximum number of pull-ups done by any one individual during the test was eleven. Eight students could do no pull-ups at all. The mean number of pull-ups done by the Wabaunsee County freshmen boys during the pull-up test was 4.72. The group ranked in the "satisfactory" category, being 1.28 pull-ups below the "good" category minimum.

The tested students scored higher in this test than they did in the others, with the exception of the sit-up test. This is somewhat unusual according to others who have made similar studies. Just why this should occur is not known. It is assumed by the author that the fact that a majority of the test participants live on farms and are used to heavy chores. Table II has the final results.

TABLE II

PULL-UP TEST RESULTS

Classification	Percentile	Number	Per cent
Excellent	95%	4	6
Good	80%	18	27
Satisfactory	60%	18	27
Poor	40%	25	40
Total	100%	65	100
	Range: 11 - 0	Mean: 4.72	

Sit-ups. The highest number of sit-ups done by one individual participant in the test was 102. Some students stopped after completing 99 sit-ups, realizing that this ranked them in the "excellent" category. One student failed to complete even one sit-up. Forty-one students ranked in the "good-satisfactory" range while 20 ranked in or below the "poor" category. The mean number for the sit-up test was 58.03 sit-ups. The group ranked in the "satisfactory" category, being 1.97 sit-ups below the "good" category minimum. Table III shows final results.

TABLE III

SIT-UP TEST RESULTS

Classification	Percentile	Number	Per cent
Excellent	90%	4	6
Good	80%	17	26
Satisfactory	60%	24	37
Poor	40%	20	31
Total	100%	65	100
	Range: 102 - 0	Mean:	58.03

Shuttle Run. The shuttle run was conducted in the gymnasiums of the respective schools. Each floor was swept before the test to insure good traction. All students being tested were wearing tennis shoes and all were allowed

a test run before being timed. The best time recorded by any one test subject was 9.4 seconds, while the poorest time recorded was 12.2 seconds. The mean score for the test was 10.87 seconds. This ranked the group in the "poor" category, being .3 seconds below the "satisfactory" group. See Table IV.

TABLE IV

SHUTTLE RUN TEST RESULTS

Classification	Percentile	Number	Per cent
Excellent	90%	1	2
Good	80%	7	11
Satisfactory	60%	18	27
Poor	40%	39	60
Total	100%	65	100
Range: 9.4 - 12.2		Mean: 10.87	

Standing Broad Jump. In the standing broad jump, the group mean score was 5.87. Only two students were able to achieve the excellent category. In all, only nine of the students tested ranked above "satisfactory". Fifteen students ranked in the "satisfactory" category and forty-one in the "poor" category. The longest jump was 7 feet, 4 inches. However, it is the opinion of the author that the standing broad jump can be improved by practicing the

technique involved. If this is true, then it is assumed that a person could improve his score on such a test without necessarily increasing the level of his fitness. See Table V.

TABLE V

STANDING BROAD JUMP TEST RESULTS

Classification	Percentile	Number	Per cent
Excellent	90%	2	3
Good	80%	7	11
Satisfactory	60%	15	23
Poor	40%	41	63
Total	100%	65	100
Range:	7'4" - 5'4"	Mean:	5.87 feet

50 Yard Dash. The results of this test were by far the poorest based on the established norms. Fifty-four of the sixty-five students failed to rise above the "poor" category. Eight were classified as "satisfactory" and only three managed to reach the level of "good".

The group mean was 7.88 seconds, 5.8 seconds below the level necessary to achieve "satisfactory". The fastest time recorded was 7.0 seconds, achieved by three students. The slowest time was 10.6 seconds.

The abnormally poor showing might indicate that some

factor other than the level of fitness was partly responsible. It is the opinion of the author that the area over which the dash was run had some effect. Each race was run on the respective football fields of the schools. The grass was quite high and each contestant had trouble gaining traction since they were wearing tennis shoes. Also it appeared that the wind was a definite factor on three of the test days. Table VI shows complete results.

TABLE VI

50 YARD DASH TEST RESULTS

Classification	Percentile	Number	Per cent
Excellent	95%	0	0
Good	80%	3	5
Satisfactory	60%	8	12
Poor	40%	54	83
Total	100%	65	100

Range: 7.0 - 10.6 sec. Mean: 7.88 sec.

Softball Throw for Distance. The test results on this item proved to be more encouraging than the 50 yard dash. The mean score of 144 feet ranked above the percentile on the national norm table. Although 48 per cent of the students were classified in the "poor" category, 13 per cent ranked in the "excellent" category. The longest

throw was 235 feet, the shortest 95 feet. Thirty-four of the students tested ranked in the "satisfactory" level or higher.

It is assumed by the author that the relative good showing in this event might be a result of the fact that each of the schools attended by the test participants before coming to high school, was involved in an organized softball league, both spring and fall. It is therefore assumed that some of the outstanding throws in this event might be a result of the effects of these softball programs. See Table VII.

TABLE VII

SOFTBALL THROW FOR DISTANCE TEST RESULTS

Classification	Percentile	Number	Per cent
Excellent	95%	5	8
Good	80%	12	18
Satisfactory	60%	17	26
Poor	40%	31	48
Total	100%	65	100
Range:	235 - 95 feet	Mean:	144 feet

600 Yard Run-Walk. The test results for this item also were considerably more encouraging than some of the others. Although none of the students tested ranked in the

"excellent" category, thirty-four of them were able to score in the "good-satisfactory" range. The fastest time recorded was 1 minute, 54 seconds while the slowest was 3 minutes, 41 seconds. The fact that the low range included several very poor times is partly responsible for the low mean score of 2 minutes, 27 seconds. This ranked the group in the "poor" group, but, as Table VIII points out, the mean is misleading since over half of the students ranked above the "poor" category. See Table VIII.

TABLE VIII

600 YARD RUN-WALK TEST RESULTS

Classification	Percentile	Number	Per cent
Excellent	95%	0	0
Good	80%	17	26
Satisfactory	60%	17	26
Poor	40%	31	48
Total	100%	65	100
Range:	1:54 - 3:41	Mean:	2:27

PART VIII

SUMMARY AND CONCLUSIONS

Summary. Careful analysis and evaluation of the AAHPER tests seem to indicate that the over-all fitness of

the freshmen boys in the Wabaunsee County high schools does not reach a desired level.

In five of the items tested, the group ranked in the "poor" category. In only the sit-ups and the pull-ups was the group able to achieve the level of "satisfactory".

According to the norms established by the AAHPER, it is possible to score as high as the 59th percentile and still be ranked below the "satisfactory" category. This means that even though a student is ranked higher than "half" of the students tested nationally, he is still below what is considered to be a desirable level of fitness.

The mean score of 4.72 pull-ups and 58.03 sit-ups indicate that approximately 40% of the students tested nationally achieved better scores in these events. In the standing broad jump the mean score of 5'8" placed the group at the 45th percentile. Fifty-five out of every hundred students tested nationally scored higher on this test. For the shuttle run, 55 out of every hundred scored higher; in the 50 yard dash, it was 61 out of every hundred tested that scored higher; for the softball throw, 45 out of every hundred; and for the 600 yard run-walk, 55 out of every hundred tested scored higher.

Conclusion. From this study, the results of the pull-up and sit-up tests indicate an over-all "satisfactory"

measurement in muscles of the arms and shoulders. However, these results do not indicate that improvement is not needed. Improvement is still desired, and activities such as rope climbing, chinning, push-ups, tumbling and parallel bar activities would be effective in developing arm and shoulder strength.

The low rating in the other test areas indicate a weakness in leg power, endurance and the cardio-respiratory system. Such activities which require agility, endurance and speed would be desirable. Activities such as soccer, speed ball, football and basketball would be helpful as would certain track activities.

The most important conclusion from this report seems to be the indication that improvement in the physical fitness phase of the physical education programs within the county may be needed. The test results strongly indicate that a careful study of the existing programs seems warranted.

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MASTER OF SCIENCE

Department of Physical Education

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Interest in physical fitness has been high for a long time, especially during the war years. However, recently there has been considerably more interest as a result of several factors. The high military draft rejection rate, the failure of the American Olympic teams to measure up to expectations, and the Kraus-Weber test are among these factors.

Presidents Eisenhower, Kennedy and Johnson have taken an active part in promoting physical fitness. The President's Council on Youth Physical Fitness was formed in 1956. Since that time a program has been set up and recommended to schools and other organizations designed to meet the needs of all ages. Testing programs were carried out and national norms for the test scores were established.

This report was undertaken to (1) compare the 14 year old freshmen boys in the Wabaunsee County high schools at Alma, Alta Vista, Eskridge, Harveyville, Paxico and Maple Hill with the national norms, (2) to serve as a means of evaluation for their present programs, and (3) to provide the State of Kansas with data in their study of the fitness problem.

Tests should be used, not just given. The measurement of progress toward objectives of improved strength, muscular endurance, posture, body mechanics, skills, knowledge and health, helps physical educators in developing

improved physical education programs.

The test administered included: sit-ups, pull-ups, standing broad jump, shuttle run, 50 yard dash, softball throw, and the 600 yard run-walk. The norms established by pilot studies conducted by the President's Council on Youth Fitness were used as a means of evaluation.

The mean score in the pull-ups was 4.72 and ranked the group in the "satisfactory" category. The group also ranked in the "satisfactory" range in the sit-ups with a mean score of 58.03. But the mean scores of 10.87 seconds for the shuttle run; 5.87 feet for the standing broad jump; 7.88 seconds for the 50 yard dash; 144 feet in the softball throw, and 2 minutes, 27 seconds for the 600 yard run-walk all ranked in the "poor" category.

This would seem to indicate the need for an extensive study of the existing programs in Wabaunsee County schools. From this study changes could be recommended which could better meet the needs of the students.