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A study determining the physical fitness of elementary school pupils of Worcester using the Kraus-Weber tests

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BOSTON UNIVERSITY
SCHOOL OF EDUCATION

A STUDY DETERMINING
THE PHYSICAL FITNESS OF
ELEMENTARY SCHOOL PUPILS
OF WORCESTER
USING THE KRAUS-WEBER TESTS

Submitted by:
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In Partial Fulfilment of Requirements for the Degree of
Master of Education

Boston University
School of Education
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Chapter I

Introduction

Considerable interest has been shown in the Kraus-Weber (1) tests of muscular fitness which have been given to a number of children in America and in Europe. It has been implied by Dr. Kraus that American children are not fit because there has been such a high percentage of failures on the tests.

The author after reading many reports on this subject and having a conference with his director of Physical Education in Worcester, Massachusetts became interested in conducting these tests to try to evaluate the physical education program in Worcester in meeting the needs of the pupils and what their achievement would show as a result of these tests.

Dr. Kraus in his program tested urban and suburban children. The author shall conduct these tests with urban and suburban children.

- (1) Kraus, Hans and Hirschland, Ruth, "Minimum Muscular Fitness Tests in School Children". Research Quarterly 25:185 May 54

Statement of the Problem

This Study is being conducted to determine if the physical education program that is being offered in the Worcester Public Elementary schools is meeting the needs of the pupils in terms of the Kraus-Weber tests of muscular fitness.

Justification of the Problem

Man by nature is so constituted that he lives and functions more efficiently in an environment which calls for considerable physical activity as opposed to a sedentary form of living in which we now find our society. Muscular activity is essential to the growth and development of youth. Since conditions of modern life tend to eliminate many of the physical activities characteristic of former generations it becomes necessary to plan definitely for muscular activities of a developmental type. (1)

Children in our schools today appear to be victims of the modern life, in that they are unable to perform many activities of a physical nature as report by Kraus. Children coming into the first grade of the school system are already seriously deficient. (2)

(1) Salt-Fox, Douthell, Stevens, Teaching Physical Education in the Elementary School, A.S. Barnes Co. 1942 Pg. 14

(2) Kraus, Hans, Hirschland, Ruth "Muscular Fitness and Health" Journal of the American Assoc. for Health, Physical Education, Recreation December 1953 p 18.

Furthermore it appears the programs are unable to alleviate this situation during the time the children are in the elementary schools. They leave the elementary school in very much the same condition as when they entered it, if
(1)
anything a little worse.

That this problem is not limited to the elementary school is evidence by the concern of our military leaders in testing of American young men upon entering the Armed Services. They found many young men with no visible physical defects but they lacked organic vigor. The endurance shown in the prime of life was deplorable as arms, shoulder and back muscles were noticeably weak.

The college students of today who will presumably be the leaders of tomorrow are found in much the same category as the elementary school children and men entering the armed services. In a study by Cureton⁽²⁾ of one-thousand male students in a mid-western university it was found that many were lacking in simple muscle skills. 14% had soft flabby physiques; 26% could not chin themselves five times; 42% could not "skin the cat"; 64% could not swim fifty yards.

- (1) Kraus, Hans and Hirschland, Ruth "Minimum Muscular Fitness in School Children" Research Quarterly 25:185 May 54
- (2) Cureton T.K. "The Unfitness of Young Men in Motor Fitness" Journal Medical Health Association 123 69-73 September 11-43

SCOPE OF THE PROBLEM

(1)

Bonnie Prudden states that more than half of the American boys and girls (four out of every seven between the ages of six and sixteen) are today unable to measure up to the basic standards of muscular strength and flexibility. They even lack the minimum physical fitness demanded by normal living.

This study is being conducted to try to determine whether or not these needs are being met by the physical education program offered to the children in Worcester, Mass.

The Kraus-Weber tests were given to 12,153 school children representing the entire group in grades three through six in all the public schools. The only children omitted were those who had just returned to school following a serious illness or those who were absent at the time of the tests.

The ages of the group ranged from six through twelve and included boys and girls.

- (1) Prudden, Bonnie Is Your Child Really Fit? Harper Brothers Publishers New York 1956

Chapter II

Review of the Literature

(1)
According to an article by Kraus-Hirschland every child needs at least a minimum of muscular strength and flexibility. What is the minimum strength and flexibility necessary for health? How many children do accomplish this goal?

(2)
Kraus-Weber conducted a study to determine the muscular fitness of children and found that school children in the Northeastern section of America, both urban and suburban communities, showed that 56.6% between the ages of six and nineteen (out of a total of 4,458) failed to meet a minimum standard required for health.

(3)
Fox-Atwood using the same Kraus-Weber tests with five hundred and seventy five (575) children in Iowa, with the children representing the entire group in grades one through six in three non public schools found 66.1% considered deficient as they failed on one or more tests. This is higher than the failure rate given by Kraus principally because of the flexibility failures.

(1)(2) Kraus, Hans-Hirschland, Ruth "Muscular Fitness and Health" Journal of the American Assoc. for Health-Physical Education-Recreation December 1953 p 17

(3) Fox, Margaret-Atwood, Janet, "Results of the Testing Iowa School Children for Health and Fitness" Journal of American Assoc. of Health, Physical Education and Recreation September 55 pg.20

In terms of muscle and ability to do jobs requiring physical strength, the average youth of today appears to be growing soft. His counterpart in some nations of Europe enjoying fewer of the advantages of modern civilization is stronger.
(1)

(2)
William-Brownell maintains many students and adults are inefficient in their work and fail to enjoy the fullness of life due to impaired strength and endurance, so fitness comes normally in the desire to excel as a by product of the joy of successful accomplishment in wholesome life activities. Physical education provides the opportunity and leadership for the development of these skills.

(3)
Irwin states that physical conditioning of the body naturally accompanies participation in a program of physical activities designed for the optimum growth and development of youth. At the elementary, junior and senior high school levels there is little need for special emphasis on physical conditioning if the proper program for growth and development are maintained.

(1) U.S. News and World Report March 19, 1954 pg. 35

(2) Williams, Jess-Brownell, Clifford, Administration of Health and Physical Education. Philadelphia, 1947
W.B. Saunders Co. pg. 205

(3) Irwin, Leslie W. The Curriculum in Health and Physical Education C.F. Mosby St. Louis, Chicago 1948
pg. 9-10

Every child needs sufficient muscular strength to maintain good posture at rest and in motion and to do with ease the tasks of each day. Strength, agility and endurance comes from play that is long and intense enough to tax the body beyond the ordinary.

(1)

Kraus in studies made at Bellevue Medical Center in New York, shows that physical inactivity is also a factor in many disabling diseases, orthopedic, internal and psychosomatic. Kraus also found that the active person is better able to adapt to stress than is the sedentary person. The active person shows less neuromuscular and emotional tension, he tires less easily, he ages later, his blood pressure is lower, he is stronger, more flexible and has a greater capacity and a lower plus rate.

In later life it has been found that back ache is a common ailment. In five thousand or more cases studied at the Posture Clinic of Columbia Presbyterian Hospital⁽²⁾ New York, 80% of the cases were due to muscular deficiency. Of the five thousand odd patients examined only one in five were found to be suffering from a specific illness to which his pain could be attributed. The others had nothing wrong with them except that they could not pass the Kraus-Weber tests.

(1) Kraus, Hans-Hirschland, Ruth "Muscular Fitness and Health" Journal of the American Assoc. for Health, Physical Education, Recreation December 1953 p. 20

(2) Prudden, Bonnie Is Your Child Really Fit? Harper Bros. Publishers New York 1956 pg. 23

(1)
Lloyd Appleton in a study of Cadets entering West Point found that 12% of the cadets whose physical aptitude measured in the lowest 7% left the Academy before graduation with psychiatric endorsement.

The seriousness of the physical fitness problem is further evidenced when we consider that among almost four million young men examined for Selective Service since World War 2 almost half have been rejected as physically and often emotionally unfit for service. (2)

- (1) Appleton, Lloyd, Study on fitness performance of West Point Cadets, New York School of Education, New York University Doctorate Thesis 1949
- (2) Miller, Ben W. Physical Fitness for Boys, New York 1953 A.S. Barnes Co.

Chapter III

Method and Procedure

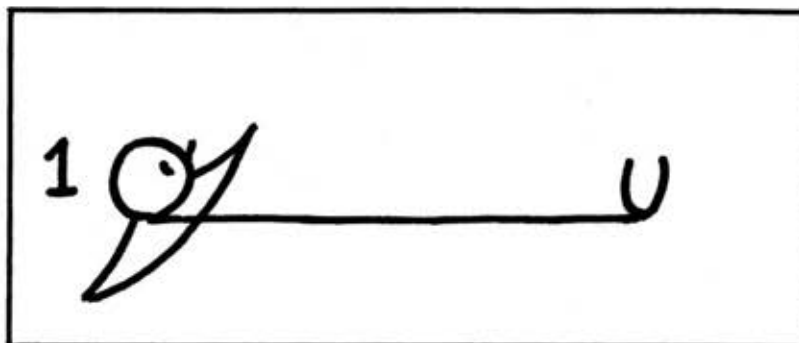
The members of the Elementary School Physical Education Staff in the Worcester Public School System composed the group which administered all the Kraus-Weber tests. One member of the team had been certified by Dr. Kraus in the administration of the tests. The certified member was responsible for supervising and instructing the others in the proper testing procedures. A pre-testing clinic was held with the group for this purpose.

In many schools a special testing room had to be assigned with tables on which to conduct the tests. In other schools the teams could move from room to room and double desks or tables carried along for use in making the tests.

In addition to the above mentioned material a stop watch and pillow were necessary.

Descriptions of the tests follow:

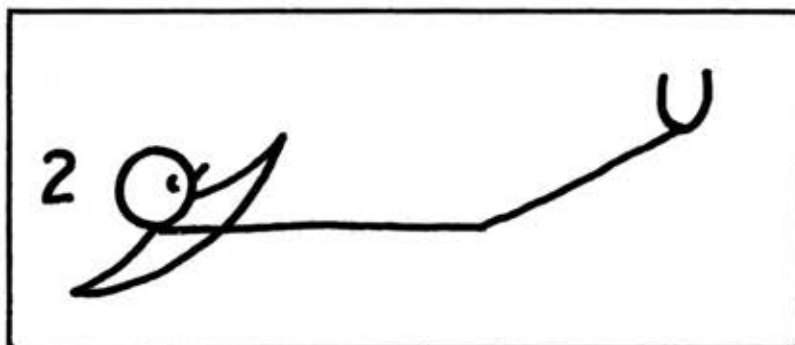
TEST



ONE

This test determines the condition of the abdominal muscles. Subject lies flat on his back, legs outstretched, hands placed behind neck. Examiner holds feet to the floor. Subject then is directed to roll up into sitting position. Just sit up once without using his hands to help him.

TEST



TWO

This test also determines the condition of the abdominal muscles. Subject takes the same position as in Test One, but with knees bent, and again is told to sit up without using his hands.

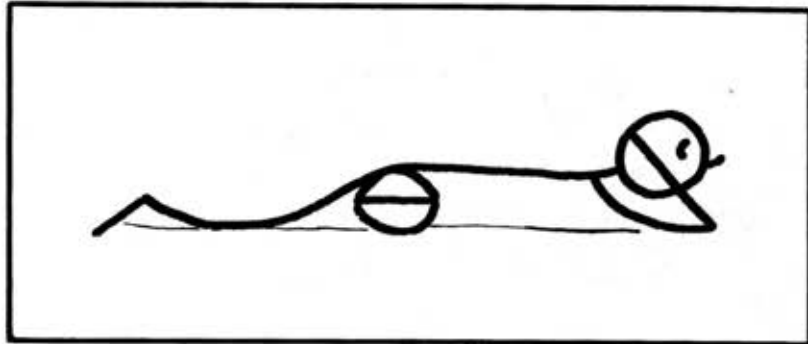
TEST



THREE

The subject lies flat on his back, legs outstretched, hands behind his head. Then he is directed to raise his feet keeping his legs straight about ten inches off the floor. The subject must hold the position for a ten second count.

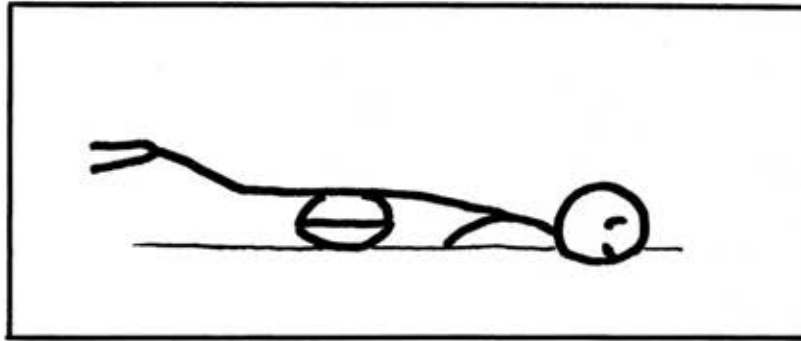
TEST



FOUR

This test shows the strength of the upper back muscles. The subject lies prone, a pillow is placed directly under the hips forming a sort of tester board. With his feet held down the subject is directed to raise his trunk and hold steady for ten seconds.

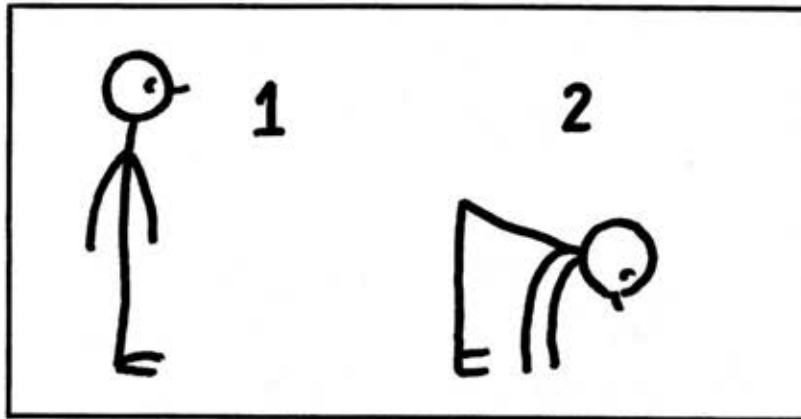
TEST



FIVE

The subject still in prone position, raises his legs keeping his knees straight, and holds for ten seconds, while the examiner holds the upper body down.

TEST



SIX

The subject performs the old and simple floor-touch. He bends from the hips, with knees straight and feet together, touching finger tips to the floor. To pass he must keep them there for a count of three.

The First Five tests were considered by Kraus and Weber to be strength tests of the muscle group concerned. One trial was given on each item of the test and the subject was passed or failed on this basis.

The mimeographed paper included was one of the sheets used to record individual scores by classes.

Each member of the elementary school physical education staff was given ample sheets to record all the children they tested.

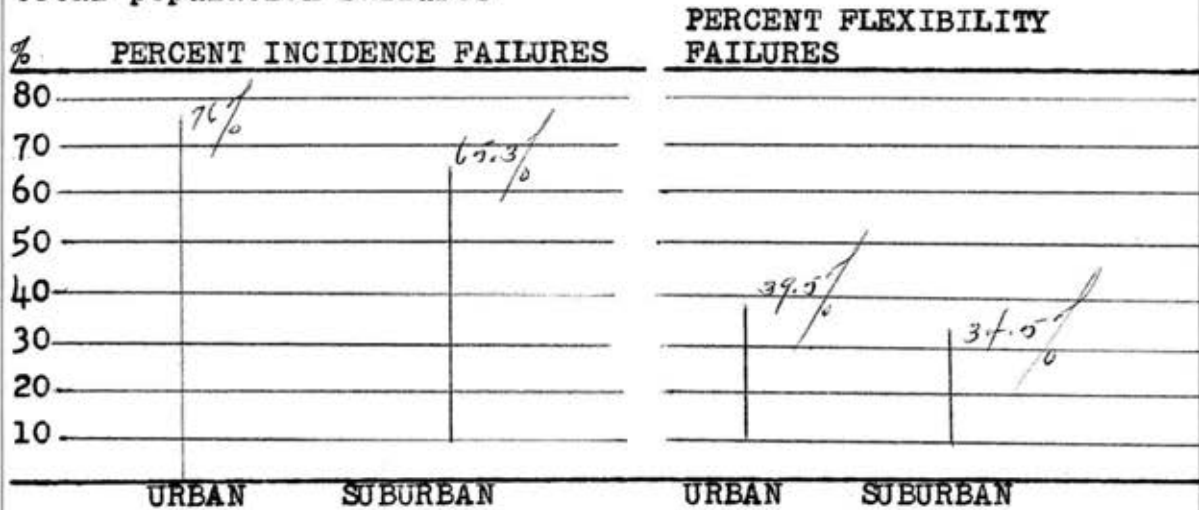
Every child was given a grade for each test as well as their age, sex, and whether they accumulated a passing or failing grade on the whole test.

Chapter IV

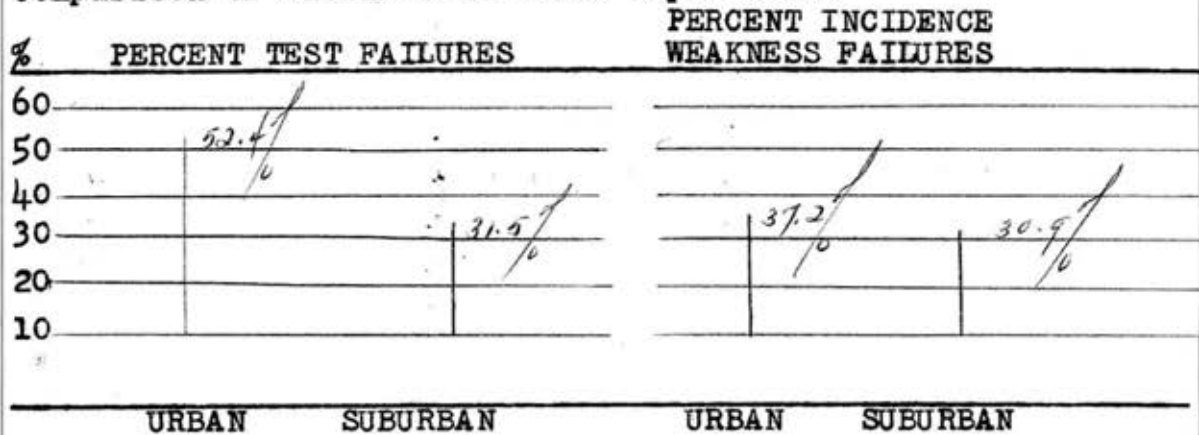
Analysis of the Data

The following chapter is concerned with the results of testing the school children in Worcester, Massachusetts in grades one through six using the Kraus-Weber tests. The children numbered 12,153 including girls and boys. The group was comprised of 6,321 urban children and 5,832 suburban children ranging in age from 6 to 14.

The first figures to be observed will be concerned with total population failures



Comparison of Failures in Total Populations



	<u>Percent. Incidence of Failures</u>	<u>Percent. Test Failures</u>	<u>Percent Flexibility Failures</u>	<u>Percent Incident Weakness Failures</u>
URBAN	76.1	52.4	39.5	37.2
SUBURBAN	65.3	31.5	34.5	30.9

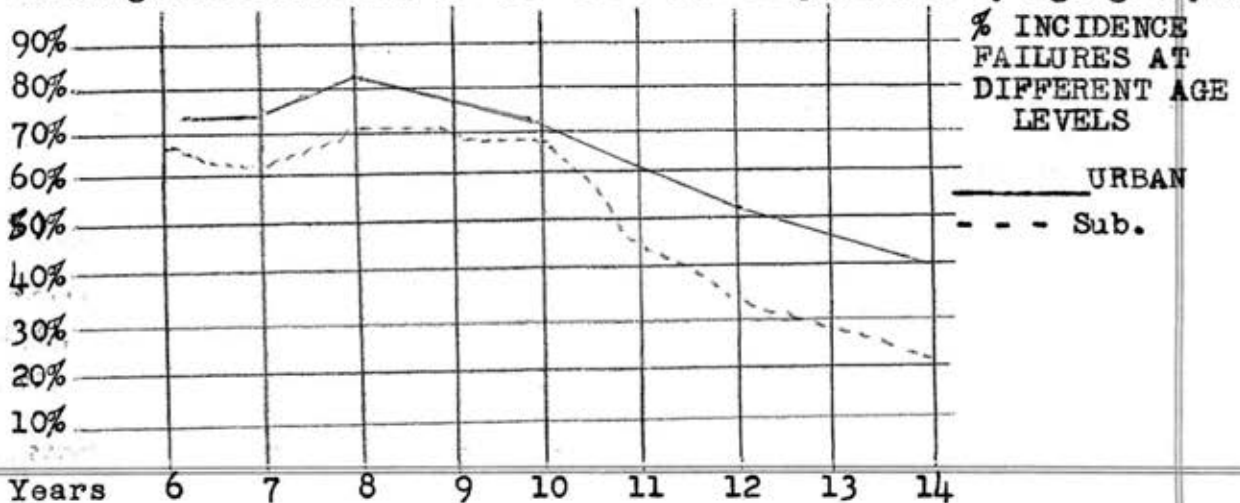
Comparison of Failures at Different Age Levels in Urban and Suburban Schools

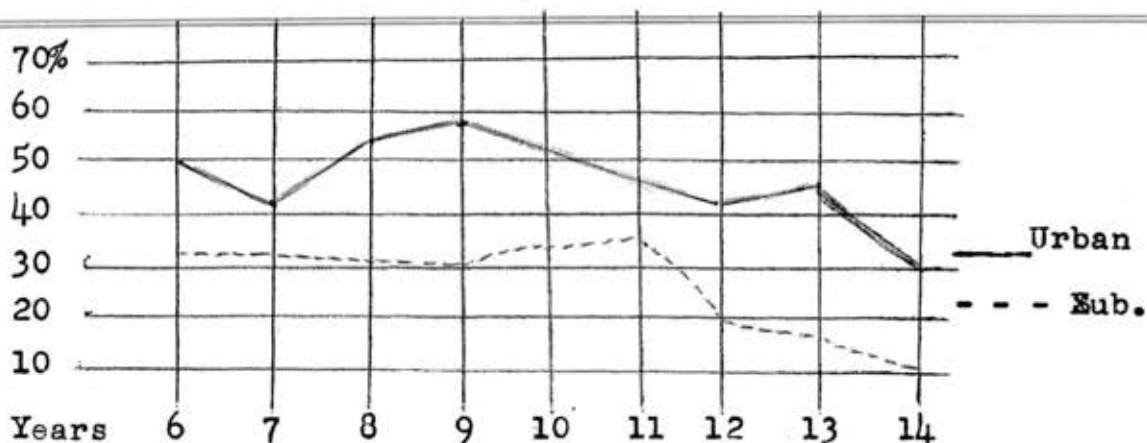
AGES	6	7	8	9	10	11	12	13	14
<u>% Incident Failures</u>									
URBAN	74.6	74	82	80	79	77	61	55	43
SUB.	67.4	68.2	72.8	73.1	72	70.5	43.3	38.4	35.1
<u>% Test Failures</u>									
URBAN	50	45.2	55	54	54	51.6	44.6	47	30.4
SUB.	36.7	36	35.4	36.1	31.9	33.5	21.3	18.4	16.2
<u>% Flexibility Failures</u>									
URBAN	23.5	34.2	44.4	48.2	49.7	40	43.6	33.3	26
SUB.	31.1	30.8	39.4	48.1	36.9	32.1	27.2	33.6	29.7
<u>% Inc. Weak. Failures</u>									
URBAN	44.2	37.9	39.1	34.2	34.3	37.2	20	22.2	13.
SUB.	41.2	35.2	37.2	36.7	30.1	28.4	14.4	12.6	.7

A glance at the figures reveals immediately that the Suburban group is superior to the Urban group in all areas of the Test. The largest difference occurred in the percent test failure area.

In arriving at incidence figures for the Test, the number of flexibility failures, abdominal failures, psoas failures and back failures are summed. The percent shown is on the total tests administered yielding the incidence percentages. A child is counted an abdominal failure if he fails on either or both of the abdominal tests and a back failure if he fails on either or both of the back tests. Thus, a child could be counted four times if he were to fail on each of the four areas of the test. Incidence of weakness failures is found in the same manner, except the flexibility item which is established from the count. Therefore, a child could be counted three times if he failed in each of the weakness areas.

The paper from this point on will be concerned with the findings in each area of the Test and comparisons by age groups.

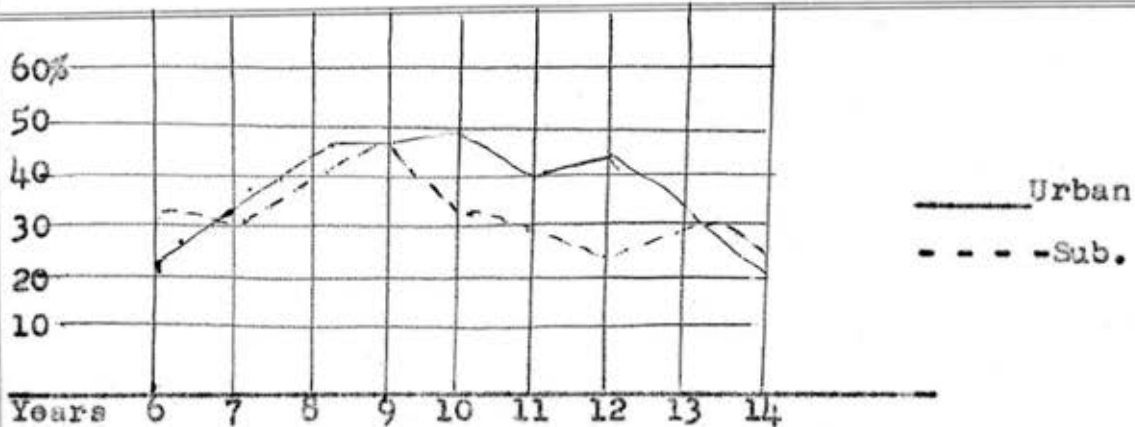




PERCENT TEST FAILURES AT DIFFERENT AGE LEVELS

The number of test failures is considerably higher for the Urban group than for the Suburban group. From age seven through nine in the Urban group an increase in failures is evidenced. However, from age nine through fourteen in the same group a steady decline in failures is seen.

In the Suburban group from age six through age nine a slight decrease is noted at each level. At ages ten and eleven an increase in failures is shown which is completely the opposite of the Urban group. The chart further shows that there is a gradual reduction in the number of failures for both groups after age eleven.

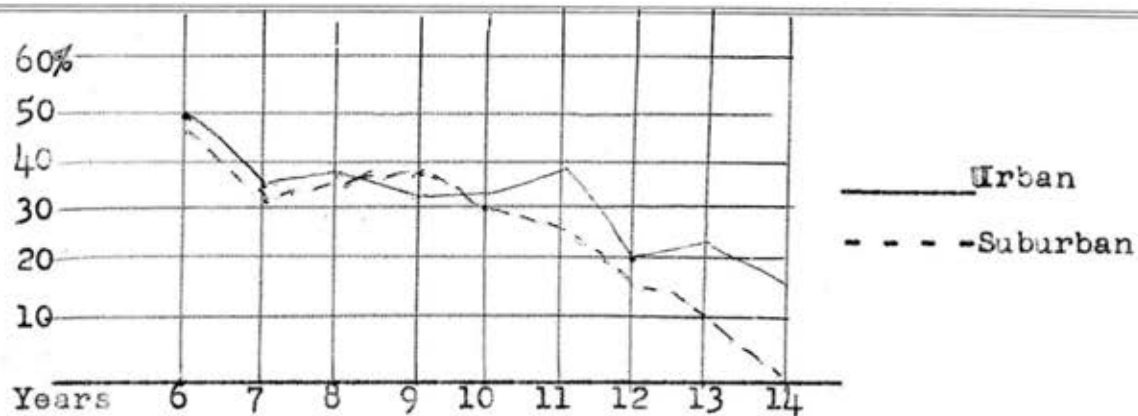


PERCENT FLEXIBILITY FAILURES AT DIFFERENT AGE LEVELS

A flexibility failure is recorded when a child lacks the ability to bend over slowly and touch the finger tips to the floor without bending the knees and holding the position for a count of three.

The findings in the flexibility area reveal that the children in the Urban group have a low failure percentage with a steady increase in failures as the children grow older, reaching the top of the curve at ten years of age and dropping continually to age fourteen.

The Suburban group failures surpass the Urban group failures for the first time in this study and that is at age six. After age six the diagram shows that the Urban figures are higher at every age level than the Suburban figures. The maximum amount of failures for the Suburban children is reached at age nine, and then descends to the lowest point of the curve at age fourteen. The Urban children are lower at both ends of the curve than are the Suburban children.

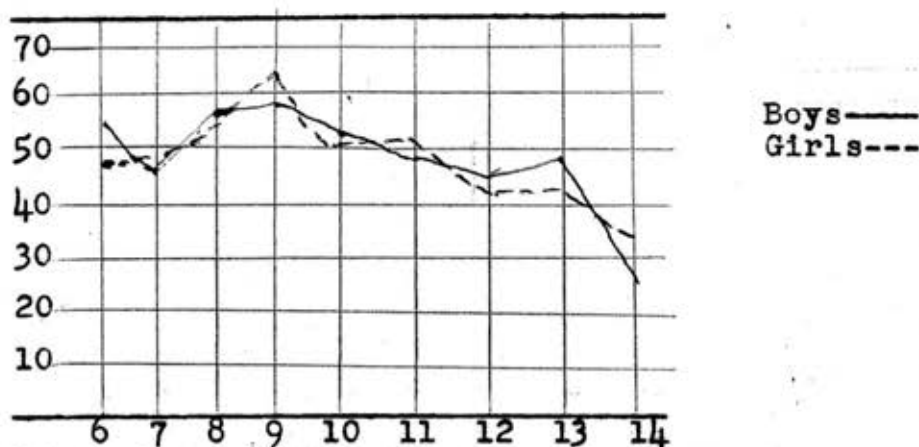


PERCENT WEAKNESS FAILURES AT DIFFERENT AGE LEVELS

A child becomes a weakness failure if he fails in either or both of the abdominal area tests, psoas area test, and if he fails either or both of the back tests. Thus a child could be counted five times if he failed in each of the weakness areas.

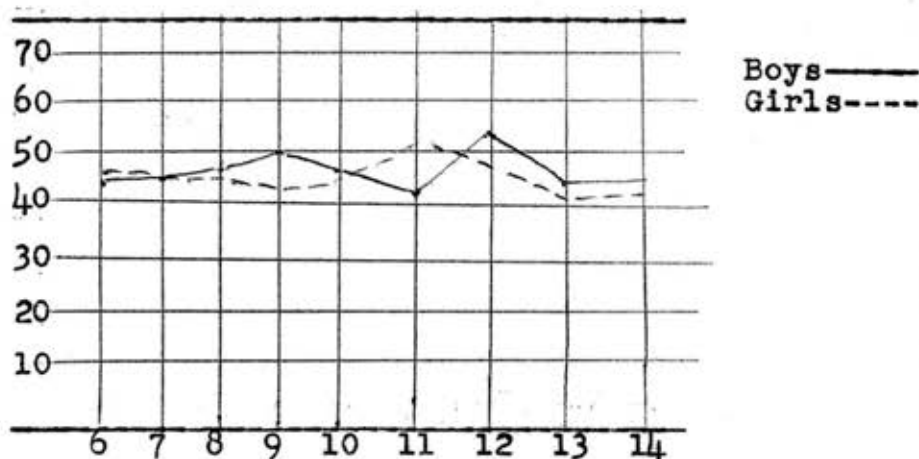
The study on weakness failures indicates that the Urban group fail more tests at each age level than the Suburban child. One encouraging factor derived from the figures is that the highest point of failures occurs at age six and that it is below fifty percent. Percentages continue to drop with each age level until age fourteen where there are very few failures thus implying that as children grow muscle strength increases.

URBAN GROUP



A breakdown of the figures in the urban group study indicated that the boys and girls followed a like pattern. However, the girls had less failures at age six than the boys but had a greater number of failures at age nine and by age fourteen the percent of failures for the boys was decreasing more rapidly than for the girls.

SUBURBAN GROUP



Again in the suburban group study a close similarity occurred between the boys and girls in the percentage of total failures.

The boys percentage of failures increased from age six to age nine while the girls showed a decrease for the corresponding age groups.

There was a reverse trend for both girls and boys from age nine through eleven.

The girls showed a gradual decrease after age eleven and the boys did also after a sudden upsurge at age twelve.

Chapter V

Summary and Conclusions

The Kraus-Weber tests of muscular fitness were administered to 12,153 elementary school children in Worcester, Massachusetts. These tests were conducted to determine if the physical education program in the Worcester Public Elementary Schools was meeting the needs of the pupils in terms of the Kraus-Weber tests of muscular fitness.

The suburban children were found somewhat superior to the urban children in all failure comparisons. The major discrepancy between the two groups occurred in the percent test failures. However, similar trends were found in all areas of comparison in that as the age of the children increased failures progressively decreased.

An analysis of the results by age revealed that the greatest incidence of failures for both urban and suburban children occurred at age eight. By age fourteen the suburban children still showed a noticeable superiority to the urban children.

The general characteristics of the graphs on the flexibility failures and weakness failures for the urban and suburban groups were similar.

The flexibility graph revealed that the middle age groups showed the poorest scores of all age groups.

The study on the weakness failures was encouraging in that the greatest percent of failures occurred at age six and

that was below fifty percent. Percentages dropped at each age level until there were very few at age fourteen. This implies that as children grow muscle strength increases.

A comparison of suburban boys and girls with urban boys and girls showed that the urban group made the greatest improvement. This was especially true of the urban boys who had the greatest number of failures at age six and the least number of failures at age fourteen. The urban girls showed more improvement than the suburban girls although the urban girls had the highest percentage of failures at age nine.

While the suburban children were somewhat superior to the urban children in all areas of the test a breakdown for the two groups by sex revealed that the urban boys and girls made the greatest improvements.

CONCLUSIONS

1. The Suburban group was found to be superior to the Urban group in all failure comparisons. However, the percent of test failures and percent of flexibility failures at the different age levels show similar trends for the two groups.
2. The greatest number of flexibility failures and test failures occurred between the ages of eight and ten years.
3. Weakness failures reach their height at age six and then drop steadily to almost zero at age fourteen.
4. After age ten failures show a steady downward trend in all tests.
5. As children increased in age the number of multiple failures decreased.
6. The impression given is that the greater amount of outdoor facilities and increased exercise are responsible for the Suburban groups superior showing.
7. The smaller classes for Suburban groups allows for greater activity and participation.
8. Smaller schools and longer class periods for the Suburban group better develop the child.
9. Author believes the greater outdoor facilities for large muscle activity is partly responsible for the outcome of the tests.

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