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PHYSICAL FITNESS TEST ITEMS FOR BOYS AND GIRLS
APPROVAL SHEET
IN THE FIRST, SECOND, AND THIRD GRADES

This thesis has been approved by the following committee of
the Faculty of the Graduate School at the Woman's College of the
University of North Carolina, Greensboro, North Carolina.
by
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CHAPTER I

INTRODUCTION

The history of nineteen of the twenty-one great civilizations is "the story of people trudging up a hill in wooden shoes and coming down in silk stockings."⁽⁷⁶⁾ These civilizations existed in the same pattern of birth, growth, breakdowns, and decline. The decline of these civilizations was not by external means, but through internal decay initiated by man, "master of his own destiny."^(28:30) Will America follow the same pattern of other civilizations? If so, what position does America hold on the "hill" today?

In the last sixty years great industrial and cultural progress have developed in this country and have enabled man to do less work and to have more leisure time. Yet technology has increased the pace of life and caused an increase in emotional tensions and a decrease in physical activity. During the two world wars, fifty percent of the draftees were rejected because they were physically and mentally defective.⁽²⁶⁾ This was a threat to the national survival and caused many people to doubt the "fitness" of the nation.

As a result of the two world wars, a high interest in fitness developed; and much research on fitness was instigated. One controversial study, the Kraus-Weber Test⁽⁴⁷⁾ measuring minimum muscular fitness,

brought this interest to a climax. The Kraus-Weber results showed that four out of seven children between the ages of six to sixteen failed to pass one or more of the six simple tests given; thus these children were unfit. In comparison, the test results of the European children showed that only one out of eleven failed one or more tests.⁽²⁴⁾ The Kraus-Weber studies also stressed the fact that in the public and private schools a child received only twelve to thirteen hours of physical activity from a 120-hour school week.⁽²⁴⁾ Even though more recent studies^(33, 42, 43, 49, 51, 53, 54) have questioned the use of the Kraus-Weber Test, the fact that it received such a dynamic response from the public makes it important.

After the publication of the Kraus-Weber Test studies, the President of the United States organized a Fitness Conference which involved all organizations related to the area of fitness. This conference pointed out the necessity for a nation-wide youth fitness program. Consequently, the American Association for Health, Physical Education, and Recreation set-up a physical fitness test⁽⁵⁷⁾ for young people between the ages of ten and seventeen. This spurred state health, physical education, and recreation associations to organize fitness programs. Several state associations have devised fitness tests, and every state association has developed programs stressing vigorous physical activity in the schools.⁽³⁰⁾

The surge for increased physical fitness continues. Recently the President of the United States addressed members of school boards, school administrators, teachers, and pupils; and he urged them to main-

tain a program that would "enable them to build the energy and strength of their American heritage." (64) The President made the following statement:

The strength of our democracy is no greater than the collective well-being of our people. The vigor of our country is no stronger than the vitality and will of all our countrymen. The level of physical, mental, moral, and spiritual fitness of every American citizen must be our constant concern. (64)

The President's Council on Youth Fitness recommended that every child have at least thirty minutes of physical activity every day, and this should be set aside from the time spent at recess, dressing, and showering. (64) "Active participation and vigorous movement should be highlighted"; and, in the primary grades, "emphasis should be placed upon the fundamentals of movement and building a foundation of physical fitness." (64:107) Unfortunately, in many school systems, the child in the primary grades does not have any physical activity outside of that which is obtained at recess. These schools are depriving children of their physiological foundation by not giving them the minimum amount of activity needed to develop the musculature with which to build the fundamental movement patterns of running, jumping, hopping, throwing, catching, etc.

A child "functions as a whole organism, and it is not possible to look at any piece of behavior without considering the whole." (1:210) However, "a very important part of the whole is physical growth." (1:238) "Without frequent activity in harmony with their natural functions, the

various structures and capacities of the body will not develop and mature properly. "(23:115) Furthermore, a child's conception of himself is acquired by the mastery of certain skills and by the reaction of his peers to his physical ability to handle these skills. (10) Many of the fundamental skills are acquired without the benefit of the school. (14) Perhaps this is the reason many schools overlook education of the child's physical development.

One of the four basic recommendations adopted by the President's Council of Youth Fitness follows:

Objective valid tests of physical achievement should be used to determine pupil status, measure programs, and motivate pupils to achieve increasingly higher levels of physical fitness. (64:14)

The actual testing of physical fitness in the primary grades is lacking in most of the studies that have been reported and tests that have been developed. Some sources question the advisability of testing the physical fitness of children in the primary grades. "...difficulty may be experienced with the testing of first graders. It may be desirable to do little or no testing of first graders." (25:373) Even the Council on Youth Fitness which recommends "objective valid tests of physical achievement" (64:14) fails to present or provide a measure of evaluating the child's progress at the primary grade level. The child's need to assess his achievement in strength and skill should not be denied. Failure to meet this need is suppressing rather than stimulating his innate desire for activity. Achievement tests in activities measuring motor fitness can be easily

administered, and they stimulate the interest of the primary grade child.

Fitness is a dynamic, constantly changing quality, the development of which should be continuous and satisfying from early infancy through maturity so that the inherent potentialities of each person can be realized. The achievement of optimum fitness during the formative years is fundamental to education for the maintenance of fitness through adulthood. (61:54)

DEFINITION OF PHYSICAL FITNESS

Physical fitness is actually a part of total fitness. Total fitness is man's capacity to survive the extreme, strenuous conditions demanded of him physically, mentally, emotionally, and socially. Total fitness should be measured in varying degrees, for "it is impossible to make an absolute decision of individuals into the fit and the unfit. There is a continuous gradation from the most fit at one extreme to the least fit at the other extreme." (21:310) It is difficult to measure total fitness. Various resources indicate an interrelationship in the measurement of the different areas of fitness. (17, 21, 48, 55, 61)

Physical fitness is an individual's present capacity to endure certain strains of dynamic action placed upon him. Presently, "physical fitness measures merely the ability to pass physical fitness tests; and therefore, the so-called degree of fitness of the individual depends on the character of the test." (16:262)

All living individuals have some degree of physical fitness; and this degree may be interpreted in terms of their capacity for performance and their endurance in physical activities. Thus, physical fitness is a qualitative element, with many, many variations among individuals and even within each individual at different times of

life. It should not be considered in the two categories, 'sick' and 'well' as, unfortunately is so generally done today. (2:55)

At the meeting of the Fitness Section during the 1962 Convention of the American Association for Health, Physical Education, and Recreation in Cincinnati, Ohio, Donald K. Mathews and Carl E. Willgoose explained the difference between physical fitness and health. Mathews said that physical fitness is composed of four factors. These factors are strength, flexibility, muscular endurance, and cardio-respiratory performance. Changes can be seen in these factors at the end of a four week period providing that there is exercise three times a week. Willgoose said that health is actually a total type of fitness, and physical fitness which is the "work capacity from the physical point of view" is a basic part of total fitness.

The many factors composing physical fitness enable it to be measured through various means. Karpovich classified physical fitness tests into three main categories: "muscular performance, organic function, and a combination of muscular performance and organic function." (16:278) Muscular performance is measured by motor fitness test items such as chinning, sit-ups, running, etc. A test of organic function, a cardio-respiratory performance measure, may include such items as vital capacity at rest, pulse rate to exercise, or oxygen consumption during exercise. The Harvard Step Test is an example of a test measuring both muscular performance and organic function. In this test the subject performs a motor sequence, and the pulse rate is taken on the recovery from exercise.

Thus, physical fitness may be either a physiological or a motor performance measure. In this study, the measure of physical fitness was approached through motor fitness tests because they were suitable for the school situation.

The purpose of this study was to identify some test items which would measure differences in physical fitness factors of boys and girls in the first, second, and third grades. The components of motor fitness which were considered in the selection of the test items were strength, speed, endurance, and power. These components were selected because they measure the voluntary movements of the individual.

DEFINITIONS OF MOTOR FITNESS AND THE RELATED COMPONENTS

- Strength** - an aspect of physical fitness which emphasizes the capacity for muscular activity through the least muscle movements of the body rather than the intricate learned movements. (1)
- Speed** - the individual's inherent capacity to exert explosive force against an object. (2)
- Power** - the individual's ability to perform explosive force with maximum effort and without the element of speed. (3)
- Endurance** - the individual's ability for continuous exertion. (4)

CHAPTER II

STATEMENT OF PROBLEM

The purpose of this study was to identify some test items which would measure achievement in physical fitness factors of boys and girls in the first, second, and third grades. The components of motor fitness which were considered in the selection of the test items were strength, speed, endurance, and power. These components were selected because they measure the dynamic movements of the individual.

DEFINITIONS OF MOTOR FITNESS AND THE SELECTED COMPONENTS

- Motor Fitness an aspect of physical fitness which emphasizes the capacity for vigorous activity through the large muscle movements of the body rather than the smaller refined movements. (3)
- Strength the individual's inherent capacity to exert explosive force against an object⁽¹⁹⁾
- Power the individual's ability to perform explosive force with maximum effort and without the element of speed⁽⁸⁾
- Endurance the individual's ability for continuous exertion⁽⁸⁾

Speed

the individual's rate of performing a repetitive action(7)

The criteria which were used in the selection of the items follow:

1. Items should be selected which can be administered indoors as well as outdoors.
2. Items should be selected which are simple to administer.
3. Items should be selected which can be scored easily by the teacher or by an older child.
4. Items should be selected which provide a continuum of scores rather than a pass or fail score.
5. Items should be selected which require little or no equipment.
6. Items should be selected which can be performed by children who are six, seven, and eight years of age.
7. Items should be selected which are inherently interesting to the children.
8. Items should be selected which sample the defined components of motor fitness.

The criteria and components are very similar to those selected by the North Carolina Fitness Committee when developing the North Carolina Fitness Test. (58) The North Carolina Fitness Test is for boys and girls between the ages of nine and seventeen. No measures of achievement in the factors of fitness have been devised for the children in the primary grades in the state of North Carolina. It is hoped that, if proven appro-

appropriate, the test items presented here will fulfill that need and, with the North Carolina Fitness Test, provide achievement measures of fitness items for all twelve grades in the public schools of the state.

REVIEW OF LITERATURE

The specific objectives in reviewing the literature pertaining to the study were first, to establish in general the motor development of the primary grade child second, to investigate the physical and motor fitness areas for deficiencies, characteristics, and identification of factors; and third, to review specific studies pertaining directly to fitness measures for primary and elementary school children.

MOTOR DEVELOPMENT OF BOYS AND GIRLS

IN THE FIRST, SECOND, AND THIRD GRADES

The period from six to twelve is considered a time when the child's motor interests and activities flower and flourish. The literature in this area was in agreement with the belief that the first grades is most capable of engaging in activities such as running, jumping, throwing, climbing, crawling, crawling, sliding, galloping, skipping, and hopping. (Gibby, 1931, p. 11, 12, 13, 14, 15) (Gibby, 1931, p. 11, 12, 13, 14, 15) In a study made of motor development of primary children, Gibby found that children in the first three grades are "in the process of the motor and physical development." (Gibby, 1931, p. 11, 12, 13, 14, 15)

In describing the motor development of the first grade, Gibby and Gibby made the following statement:

CHAPTER III

REVIEW OF LITERATURE

The specific objectives in reviewing the literature pertaining to this study were first, to explore in general the motor development of the primary grade child; second, to investigate the physical and motor fitness areas for definitions, clarifications, and identification of factors; and third, to review specific studies pertaining directly to fitness measures for primary and elementary school children.

MOTOR DEVELOPMENT OF BOYS AND GIRLS

IN THE FIRST, SECOND, AND THIRD GRADES

"The period from six to twelve is conspicuously a time when the child's motor interests and abilities flower and flourish." (14:103) The literature in this area was in agreement with the belief that the first grader is most capable of executing such activities as running, jumping, throwing, climbing, catching, bouncing, sliding, galloping, skipping, and hopping. (6,7,15,22,27,44,50) Gutteridge, in a study made on motor achievement for young children, showed that children, four years and up, are "far in advance of the common belief and tradition." (44:168)

In describing the motor development of the first grader, Hutt and Gibby made the following statement:

By the time he reaches six years of age his body proportions are about what they will be when he is an adult, his motor controls are adequate for all but fine coordinations, he has a freedom and rhythm of movement which parallels his sense of self identity and self-assurance, and he is basically able to take care of himself in very many, if not most, physical skill areas. (12:182)

Espenchade⁽⁴¹⁾ stated that the normal child of school age can perform the motor acts of everyday life, but the precision and facility of the movement differs in a wide range among individuals.

Olsen⁽²²⁾ proclaimed that all children go through the same sequence of motor development, but there is a difference in the rate and in the details of pattern from child to child. By the time the child reaches the first grade his growth slows down. His most important motor skills have already been developed; but many of the skills may emerge or not emerge, "depending upon the presence or absence of the opportunity for learning." (22:88) Olsen also said that children seek to play "because of inner urges of growth and function." (22:88)

Lane and Beauchamp presented an excellent description of the motor development of the child at this age level.

From five to eight the child is busy trying out a variety of physical skills and perfecting others. He takes great delight in putting his body through unbelievable contortions, thus drilling himself in his newly-dawned capacities. He much prefers to walk on top of ledges than on the sidewalk. He fancies himself a future trapeze artist. (18:240)

Jersild⁽¹⁵⁾ conceded that motor activities play a crucial role in the child's earliest intellectual enterprises. The child explores "the world about him with his eyes and his hands, and they provide the means

for a larger proportion of his social contacts with other children. Throughout life a person's view of himself is influenced by his perception of his body and its properties, his strength and skill in physical activities."(15:94)

DEFINITIONS OF PHYSICAL FITNESS AND MOTOR FITNESS

Cureton said, "Physical fitness means the ability to handle the body well and the capacity to work hard over a long period of time without diminished efficiency."(39:111) He further stated that physical fitness is only a part of total fitness and does not include "all of the aspects of emotional fitness, mental fitness, or social fitness."(3:18) Mathews stated the simplest definition for physical fitness: "the capacity of an individual to perform a given task."(20:4) Darling, Eichna, Heath, and Wolff also defined physical fitness as that which "describes the functional capacity of the individual for a task"(40:767), and it is the task that must be defined. Willgoose defined physical fitness as "a capacity for sustained physical activity", which can be "demonstrated through motor activity involving the total organism."(29:105) Sigereth⁽⁷²⁾, in his study of isolating and identifying fundamental factors of motor fitness, made two basic assumptions: first, physical fitness is largely dependent upon motor fitness; and second, "motor fitness is indicated by motor performance."(72:39) In defining motor fitness, Clarke stated that it "is a limited phase of motor ability."(2:221)

These definitions of physical fitness seem to cover a wide area of

physical measurement ranging from functional capacity to a limited phase of motor ability. It appears that physical fitness is measurable through motor measurements. Brock, Cox, and Pennock⁽³²⁾ substantiated this theory with their definition of motor fitness. "Motor fitness is the final criterion through which all other elements of physical fitness are seen and measured in man."^(32:407)

PHYSICAL FITNESS FACTORS

Isolating the factors composing physical fitness was not difficult since many of the studies tended to present certain components. Moore⁽⁷⁰⁾ reviewed forty-one studies and found the strength factor represented in most of the test batteries. Bookwalter⁽³¹⁾ found that the most frequently measured factors of physical fitness were strength, endurance, velocity, agility, motor ability, and speed. Kounovsky's six factors of physical fitness⁽¹⁷⁾ were flexibility, balance, speed, coordination, endurance, and strength. O'Conner and Cureton⁽⁵²⁾ selected balance, flexibility, agility, strength, power, and endurance as the factors for their test of motor fitness for high school girls. Larsen and Yocom⁽¹⁹⁾ identified the components of physical fitness as resistance to disease, muscular power, flexibility, speed, agility, coordination, balance, and accuracy.

Two basic components, strength and endurance, seem to be included in all the studies. Rogers, in his review of strength tests, stated that, "the positive and very high relation of muscle strength to general

health, physical fitness, or 'capacity for activity' can hardly be questioned. "(55:43) Larsen and Yocom defined strength as "the ability of an individual to exert single explosive force against an object;" and they define muscular power as "the force exerted times the speed of exertion. "(19:78) According to Larsen and Yocom, muscular endurance is also related to these two factors, power and strength, in that it is "the ability to continue performance of muscular strength and power at a maximum rate of speed over an unlimited time span. "(19:78) Davis and Logan defined endurance as "the ability to engage in prolonged activity for a continuous period of time. "(4:67); and they further stated that the best approach for measuring endurance is through means of muscular and cardio-respiratory endurance. This involves a physiological measurement.

Many components appeared in the literature which might be underlying factors of fitness; and some of these were flexibility, coordination, agility, balance, and accuracy. However, those components which appeared to be definite factors of physical fitness were strength, endurance, power, and speed. These definite factors indicated that this measurement of physical fitness is one of measuring the dynamic responses of movement of the individual, and it should involve the total being.

From definitions and identification of factors the measurement of physical fitness covers an extensive area. It involves physiological measurements as well as motor measurements. Since this study was related to the muscular measurement, rather than the functional or organic

measurement of physical fitness, only those studies pertinent to some phase of muscular performance are discussed.

Very few studies have been reported on physical or motor fitness measurements of boys and girls in the primary grades. Therefore, many of the studies in this review concerned other phases of motor measurement. These studies were reviewed because they included certain test items which could be adapted for fitness measurements.

STUDIES AND TESTS RELATED TO PHYSICAL FITNESS OF THE PRIMARY GRADE CHILD

Many of the resources for this study were from studies of some phase of motor measurement which reported an adaptable component of physical fitness. One of the first studies in this area of motor measurement for primary grade children was Jenkins' study⁽¹³⁾ on motor achievement in 1930. Jenkins compared the motor achievement of three hundred children five, six, and seven years of age. Some of the children were tested twice for reliability. The games and their reliability coefficients were as follow:

35-yard dash	.74
50-foot hop	.89
Baseball throw for distance	.90
Soccer kick for distance	.65
Standing broad jump	.82
Running broad jump	.75
Jump and reach	.69
Baseball throw for accuracy	no coefficient
Beanbag toss for accuracy	no coefficient

Stress was placed on giving several trials. The children made their best performance on the first trial in the 35-yard dash, 50-foot hop, and baseball throw for distance. The best performance for the standing broad jump, soccer kick for distance, and jump and reach was on the third trial. The games which the children preferred to perform were the baseball throw for accuracy, hopping, and the beanbag toss for accuracy. The least interesting game for them was the jump and reach. In all events except the 50-foot hop, the boys were superior in achievement to the girls; however, the girls showed superior motor achievement in the 50-foot hop.

Cowan and Pratt⁽³⁸⁾ made a diagnostic and developmental study on motor coordination of children from three to twelve years of age in 1934. The study consisted of a hurdle jump test. The following statement designated the purpose of the test:

We felt the need of a test for motor coordination which would not involve any eye-coordination, which would be a true index of the child's capacity to make adjustments to situations confronting him hour after hour in his play and home life. (38:107)

Five hundred and forty children were tested with the hurdle jump, and the scoring of the test was on a A, B, and C scale. The factors of age, height, and weight played a part in the study. Cowan and Pratt found the following conclusions to be indicative in determining the height of each subject's jump:

1. There is no relationship of height to weight.
2. Height of stature is only a slight factor.
3. Weight is not a factor.

4. Chronological age is a definite factor.

In 1934 Hartman⁽⁴⁵⁾, using the Cowan and Pratt hurdle jump, did a study on measuring motor proficiency of children between the ages of four and six and a half years of age. The purpose was to find the reliability coefficient of the hurdle jump and to show its adequacy as a single measure for motor proficiency of kindergarten children. The established reliability coefficient for the hurdle jump was .88. The children were also given four other gross motor tests, and these tests and their reliability coefficients were as follow:

Jump and reach	.63
Standing Broad jump	.86
Baseball throw	.83
35-yard dash	.88

A multiple correlation verified that the hurdle jump was inadequate as a single measure of motor proficiency for these children.

In 1936 the National Recreation Association distributed a pamphlet⁽⁶²⁾ which contained fifty-three skills for girls between the ages of eight and eighteen years. These events were measured in units of time and distance, success or failure, and the number of successful attempts in a given number of trials. They were not test batteries, but isolated items and levels of performance on each item for the different age groups. At the eight year age level, there were eighteen items which involved various motor performances in throwing, hopping, running, kicking, jumping, climbing, and catching.

During the early forties, Carpenter did four studies which were related to some phase of motor measurement in the first three grades. The

first study⁽³⁴⁾ was a test battery of motor educability. The second study⁽³⁵⁾ was the measurement of speed in primary grade children, and two batteries were selected. The reliability coefficients were .87 on the battery for the girls and .88 on the battery for the boys. The test items included in both batteries and their reliability coefficients follow:

Run and over	.79
Hop	.62
Run and under	.59

One additional item was added to each battery. The broad jump, with a reliability coefficient of .89, was included in the girls' battery; and the 30-yard dash, with a reliability coefficient of .91, was included in the boys' battery.

Carpenter's third study⁽³⁶⁾ dealt with testing the strength of primary grade children. One hundred girls and one hundred and seventeen boys were the subjects for this study. The items considered in developing this battery were age, height, weight, right and left grips, push, pull, broad jump, and four-pound shot put. The scores of the push, pull, and right and left grips were added to give the total shoulder girdle strength for each subject. These scores were correlated with the scores made on the test battery, which included the broad jump, four-pound shot put, and weight. The multiple correlations produced coefficients of .63 for the boys and .50 for the girls. Carpenter stated that there was no leg strength in the criterion while there was considerable leg and back strength in the test items of the battery; therefore, the battery was pro-

bably a more adequate measure of general total strength than the multiple correlations indicated.

The fourth study⁽³⁷⁾ was a measure of general motor capacity and general motor ability of children in the primary grades. This study made use of all the previous test items developed in Carpenter's studies.

Taylor⁽⁵⁶⁾ made a study in Jackson, Mississippi, on 1,560 first, second, and third graders and devised the achievement scales in physical education skills of these children. The items used were the 30-yard dash, kicking for distance, jumping rope, bouncing the ball, beanbag throwing for accuracy, ball throwing for accuracy, and standing broad jump. The six-inch ball was used with all the throwing and kicking events. Age and sex were used for classification purposes in the achievement scales.

Holloway⁽⁷³⁾ conducted a study on the performance of first grade children in three motor skills: running, throwing, and jumping. The test items were the broad jump, soccer throw for distance, and 30-yard dash. Three trials were given for the broad jump and the soccer throw, and two trials were given for the 30-yard dash. Holloway found that the children improved on the second and third trials as the result of motivation and imitation. A recommendation was made to compose a reliable, valid, and objective measurement of motor skills measuring not only the selected skills of this study, but also "strength, coordination, flexibility, and agility."^(73:31)

In a study showing the effectiveness of practice in developing

motor skills in first grade children, Sparks⁽⁷⁸⁾ used the soccer throw, broad jump, 30-yard dash, and low ladder walking for the test items. There were two trials each for the soccer throw, broad jump, and 30-yard dash. Sparks concluded that practice and specific teaching were effective in developing motor skills for throwing a soccer ball and executing a standing broad jump, but they were not effective when applied to the 30-yard dash and low ladder walking.

Seils⁽⁷⁷⁾ did a study on measures of physical growth and gross motor performance of first, second, and third grade children. Five hundred and ten boys and girls were tested in the areas of running, throwing for distance, throwing for accuracy, jumping, balance, agility, striking, and catching. At two preliminary testing sessions the test items were administered to thirty-seven girls and thirty-eight boys between the ages of six and no months to eight and eleven months. Reliability coefficients were obtained from correlating the data of the two tests. Those items in the areas of running, jumping, and agility and their established reliability coefficients were as follow:

Running

20-yard dash	.803
30-yard dash	.856
35-yard dash	.896
40-yard dash	.904
Baserunning	.736
Adapted shuttle run	.796
50-foot hop	.869

Jumping

Jump and reach	.874
Jump and turn	.695

Standing broad jump	.906
Running broad jump	.913

Agility

Potato race	.576
Side stepping	.956
Short potato race	.809

Seils selected those items which had the highest reliability coefficients and were easiest to administer and placed them into a battery. The items in the areas of running, jumping, and agility which were selected for the battery were the 40-yard dash, standing broad jump, and side stepping.

Kane⁽⁴⁶⁾, in studying the standing broad jump ability of elementary school children seven, nine, and eleven years of age, found the reliability coefficient to be .97 and .99 at each of the three age levels.

In 1954 the Kraus-Weber Test⁽³⁴⁾, a measure of minimum muscular fitness for children six to sixteen years of age, was published. It consisted of six items scored on a pass or fail basis. Since then, many studies have been made of the Kraus-Weber Test, and some have questioned the testing procedures or the test results. Buxton's study⁽⁶⁸⁾ concerned with children six to fifteen years of age, concluded that the Kraus-Weber Test was reliable and easily administered. She later stated that the "empirically derived and undifferentiating type of scoring is not valid for use in physical education."^(33:116) Atwood⁽⁶⁷⁾ also made a study of the Kraus-Weber Test on elementary school children. Flexibility seemed to be the main factor prohibiting a child's success on the test.

Morris⁽⁷¹⁾ composed a test to measure the effects of selected playground equipment on primary school children. The test items were touching the finger tips to the toes while sitting, bent arm hang, vertical pull test, grip test, push and pull test. The reliability coefficient of the bent arm hang, which seemed to be an endurance and strength type test, was .67. The reason given for the low reliability was because of the slow learners in the group.

Peacock⁽⁶³⁾ set up achievement scales in physical education activities for boys and girls ages seven to fifteen. The test items were the softball throw for distance, soccer ball punt for distance, 40-yard run, standing broad jump, side stepping, tennis ball throw for accuracy, and grip strength.

STUDIES AND TESTS RELATED TO PHYSICAL FITNESS OF THE UPPER ELEMENTARY SCHOOL CHILD

Several tests and studies conducted in this area in the late fifties need to be mentioned because they contain certain items which might be adapted for use in this study. The AAHPER Youth Fitness Test⁽⁵⁷⁾ measures the ability of boys and girls from the fifth grade to the twelfth grade to do pull-ups, push-ups, sit-ups, 30-foot shuttle, standing broad jump, 50-yard dash, softball throw for distance, and 600-yard run-walk.

The California Physical Performance Test⁽⁵⁹⁾ involves the standing broad jump, jump and reach, modified pull-ups, push-ups, sit-ups, 50-yard

and 75-yard dashes, shuttle race, and throw for distance. The lowest grade to which this test is given is the fifth grade. Espenschade made this statement about the test:

The California Physical Performance Test has a number of advantages over the Kraus-Weber as a measure of fitness of elementary school children. It provides a direct measure of the natural activities of children--running, jumping, throwing, and climbing. Scoring is on the continuum basis rather than pass or fail, permitting evaluation of performance in relation to the group or norm as well as measurement of progress from time to time. (42:277)

The New York State Physical Fitness Test⁽⁶⁵⁾ measures posture, accuracy, strength, agility, speed, balance, and endurance of boys and girls from the fourth grade to the twelfth grade. The test items are a posture rating chart, target throw, pull-ups, push-ups, side stepping, 50-yard dash, squat stand, and treadmill.

Lundegren⁽⁷⁵⁾ studied the measurement of motor ability of fourth, fifth, and sixth grade boys and girls. The most reliable and valid measures of motor ability were basketball throw, playground ball throw, sand-bag throw, and broad jump. The Burpee Test, 30-yard dash, and 15-yard shuttle were reported as being unreliable and invalid.

Anhalt⁽⁶⁶⁾ developed a motor fitness test for girls in the fourth through the sixth grades. The items measured factors of strength, endurance, flexibility, agility, speed, and power of the total individual. Ninety-nine subjects were involved in this study from which two batteries resulted. The short battery had a reliability coefficient of .91. The following test items, with reliability coefficients, were included in this

battery:

Hanging in arm-flexed position	.73
Standing broad jump	.83
Crossed-arm curl-ups	.88
Shuttle race	.91

The long battery, which had a reliability coefficient of .95, consisted of all those items in the short battery plus two more items. These items and their reliability coefficients follow:

Modified pull-ups	.93
Knee touch sit-ups	.95

Lawson⁽⁶⁹⁾ analyzed several motor fitness tests to find measures of agility which applied to the elementary school girl. Lawson found the validity and objectivity of twelve test items. Then the Wherry-Doolittle test selection method was applied in order to determine those items which were the best measures of agility. The items which were recommended by Lawson follow along with their validity and objectivity coefficients:

	<u>Validity</u>	<u>Objectivity</u>
Obstacle race	.903	.77
Illinois agility run	.897	.84
Shuttle run adaptation	.895	.82
Zigzag run	.887	.88
Potato race for 30 ft.	.886	.91

The criterion used for acquiring the validity was a correlation of the individual scores of each test with the sum of the standard scores of all the test items. Although the validity appears to be higher than the objectivity in most of the items, Lawson gave no reason in her study for this unusual statistical finding.

The North Carolina Fitness Test⁽⁵⁸⁾ measured strength, endurance, power, speed, and agility of boys and girls from nine to seventeen years of age. Side stepping, modified pull-ups, sit-ups, squat thrust, and broad jump were the specific test items which were administered to the elementary school children.

Some of the studies and tests which have been reviewed consisted of test items which measured factors of motor fitness. Other studies and tests in this review contained items which were merely a measure of motor performance. With careful selection, many of these test items might be appropriately used to develop a test for measuring the physical fitness of the child in the primary grades.

SUMMARY

This review presented evidence that there is a need for a fitness measure in the primary grades. It seems that many kinds of measurements have been performed in motor development of the primary grade child. However, studies, tests and other sources have neglected to touch the area of motor fitness for these children. In this period of time when fitness is stressed so greatly, it seems feasible that there should be a fitness measure for primary grade children as well as one for the older boys and girls. The children in the primary grades, being especially interested in themselves, their growth and activities, need some way of evaluating their progress and development. The studies in this review indicate that

these children are probably capable of handling the activities they would encounter in a fitness battery. Furthermore, performing activities which consist of fitness factors and large muscle movements are enjoyable, a challenge, and of interest to the primary grade child.

INVESTIGATION OF POSSIBLE PHYSICAL FITNESS TEST ITEMS

An investigation was made of the major measurement criteria for boys and girls of the first, second, and third grades and the physical fitness tests for boys and girls of the fourth, fifth, and sixth grades. The items of these tests and studies were selected on the basis of their ability to measure certain components of physical fitness as defined in this study. These components were the head shoulder girth, arm strength, abdominal strength, endurance, power, agility, and speed. Later, agility was removed from the list of components because the test items measuring agility involved too much learning for this age child.

A list was made of those test items which seemed feasible to include as physical fitness measures of children in the first, second, and

CHAPTER IV

PROCEDURE

The plan used in developing this study was first, to investigate and construct possible tests of physical fitness factors; second, to select the test items; third, to administer the items to a group of first, second, and third graders; and fourth, to outline the procedures for treating the data.

INVESTIGATION OF POSSIBLE PHYSICAL FITNESS TEST ITEMS

An investigation was made of the motor measurement studies for boys and girls of the first, second, and third grades and the physical fitness tests for boys and girls of the fourth, fifth, and sixth grades. The items of these tests and studies were selected on the basis of their ability to measure certain components of physical fitness as defined in this study. These components were arm and shoulder girdle strength, leg strength, abdominal strength, endurance, power, agility, and speed. Later, agility was removed from the list of components because the test items measuring agility involved too much learning for this age child.

A list was made of those test items which seemed feasible to include as physical fitness measures of children in the first, second, and

third grades. Some of the test items were reported to be both valid and reliable measures, either of motor performance or of fitness achievement, in the studies investigated. These items were the standing broad jump, jump and reach, 30-yard dash, 35-yard dash, 40-yard dash, side stepping, 50-foot hop, hanging in arm-flexed position, modified pull-ups, and sit-ups.

Two further test items were adaptations of valid and reliable fitness measures in the studies investigated. The modified squat thrust was developed from a suggested modification of performing the squat thrust. (74) The shuttle race was an adaptation of the shuttle race performed in Anhalt's study. (66)

The seal crawl test, three-legged walk, obstacle race, bear walk test, and jumping race were items created from stunts and self-testing activities which involved gross muscle movements of the body.

There were eighteen test items in the initial compilation which were described in written form. (The revised descriptions appear in the Appendix.) All of these test items originally appeared practical to administer and of interest to this age child, but later some items were deleted because they failed to adhere to these standards.

SELECTION OF THE PHYSICAL FITNESS TEST ITEMS

Plans were made to have the test items evaluated by a group of judges. Ten people whose interests and professions were related to this

area were contacted personally. After giving the details of the study, how the items were to be selected, and time required of each judge in the evaluation, the author asked the services of these people. Nine of these ten people volunteered to judge the test items. Their names appear in the Appendix. This contact was followed by a letter which again explained the study and the manner in which the tests were to be evaluated. Copies of the eighteen possible physical fitness test items and the chart listing the items and the factors of fitness each measured were enclosed with the letter. The judges were requested to make a judgement to either revise, remove, or retain the test items and to make pertinent comments about them. The judges were asked to return their revisions of the fitness test items within a week. The letter and the chart which accompanied the test descriptions appear in the Appendix.

The revisions and comments of the judges were studied closely. Their suggestions were summarized, as shown in Table I, and on these bases twelve of the eighteen fitness items were retained and reconstructed. The items which were removed from the list were side stepping, bear walk test, obstacle race, hurdle jump, 40-yard dash, and 35-yard dash. The general opinion on the side stepping test item was that it was too complicated, and it involved too much learning and coordination. In the bear walk test, the judges thought difficulty would arise in scoring the item uniformly. Some children would perhaps pretend that they were walking on all "fours". The obstacle race was too much like a motor ability item and was

TABLE I

THE EVALUATION OF THE JUDGES ON THE EIGHTEEN
POSSIBLE PHYSICAL FITNESS TEST ITEMS

TEST ITEMS	PERCENTAGE			APPRAISAL
	RETAIN	REVISE	REMOVE	
Standing Broad Jump	100%			Retain
Hurdle Jump	56%	11%	33%	Remove
Jump and Reach	67%	33%		Retain and Revise
30-Yard Dash	89%	11%		Retain and Revise
35-Yard Dash	56%		22%	Remove
40-Yard Dash	56%		22%	Remove
Shuttle Race	56%	44%	11%	Retain and Revise
Side Stepping	67%	11%	11%	Remove
Jumping Race	78%	11%		Retain and Revise
50-Foot Hop	56%	11%	22%	Retain and Revise
Hanging in Arm-Flexed Position	56%	22%	11%	Retain and Revise
Modified Pull-ups	56%	22%		Retain and Revise
Seal Crawl Test	100%			Retain and Revise
Bear Walk Test	67%	11%	22%	Remove
Obstacle Race	44%	33%	22%	Remove
Three-Legged Walk	100%			Retain and Revise
Modified Squat Thrust	33%	44%		Retain and Revise
Sit-Ups	78%	22%		Retain and Revise

too complicated for the first and second graders. However, the third graders might be able to remember the sequence of the obstacle course and enjoy this item. The hurdle jump and the jump and reach seemed to test the same thing; and the hurdle jump was more time-consuming, more dangerous to the child, and more elaborate in its requirements of equipment. Most of the judges felt that the dash of thirty yards was an adequate distance for the first, second, and third grade child to run; thus, this eliminated the 35-yard and 40-yard dashes. The revisions on the test items were made mostly in the wording of the descriptions and rules, explanations, and scoring methods. Some of the judges thought that the explanations were too adult-like for the children, and it was suggested a red ribbon be the finish marker for the dash and the other races using the time element. The shuttle race was revised by lengthening the distance between the two baskets from twenty feet to forty feet and by shortening the number of times the child goes around both baskets from four times to two times. It was suggested that this revision would perhaps make this test a more practical one and an adequate replacement for the dash. The child would still have the distance to run and at the same time be able to acquire more speed between baskets.

The test revisions were returned to the judges with a rating sheet and a letter, which stated the date, the time, and the place of the preliminary testing session. This letter requested the presence of the judges to observe and evaluate the items. (A copy of the rating sheet and letter

appear in the Appendix.)

The boys and girls in the first, second, and third grades at Curry School were used as subjects of this study. Permission was granted by the principal for the use of the Curry School playroom and the use of the students as subjects. Permission was also granted by the first, second, and third grade teachers for the use of their students as participants in the study.

The subjects for the preliminary testing session consisted of two boys and two girls from each first, second, and third grade. These subjects were supposedly children of average motor performance and were selected by their classroom teachers. The parents of each child were contacted by telephone to ask about the availability of the child to participate in the study. Thus, a total of twelve children was acquired for the preliminary testing session.

The children were divided into four groups; and each group, which consisted of a boy and girl in the first, second, and third grade, performed three of the twelve test items. To make certain that each boy and girl was familiar with the items, a thirty-minute practice session was held for those participants in each grade two days before the preliminary testing session.

During the practice sessions with the children, the author discovered that some of the boys and girls could easily do the seal crawl and three-legged walk twenty or thirty feet before the fifteen second period

ended. Therefore, the scoring of both items was revised. The seal crawl was scored in the number of seconds it took the subject to crawl for twenty feet. The three-legged walk was scored in the seconds it took the subject to perform the walk for thirty feet. In addition, the modified pull-up was revised by moving the bracing foot of the teacher from a position on the floor directly under the bar to a position on the floor eighteen inches forward from a spot directly under the bar. The explanation of the modified squat thrust was also changed. This change enabled the modified squat thrust to be exactly like the squat thrust with the exception of the full-extended thrust of the legs. The thrust in the modified version was from a squat position to the knees.

On the day of the preliminary testing session, the boys and girls came to the playroom immediately after school and were placed in their respective groups. Each child was given a tag which had his name and grade on it. There was also a score card for each individual. The score card listed only the specific three items in which the child was performing. The physical fitness test items were administered by the author after a brief introductory comment to the judges to explain the method for evaluating the test items. The author was assisted by a faculty member, three graduate students, and an undergraduate student. Four of the assistants kept the children organized and recorded the subject's score. The remaining assistant timed those items which entailed a time element. The items were performed in the following order:

1. Standing broad jump
2. Jump and reach
3. Shuttle race
4. Jumping race
5. 50-foot hop
6. Three-legged walk
7. Seal crawl test
8. Hanging in arm-flexed position
9. Modified pull-ups
10. Sit-ups
11. Modified squat thrust

The 30-yard dash was not performed because it was felt that the judges were familiar with the item, and there was not enough time for it. The administration of the items took one hour to complete.

At this preliminary testing session, seven of the nine judges were present. They observed the performance of the twelve boys and girls in the first, second, and third grades on eleven fitness test items. After the testing of the boys and girls, the judges conferred about the items. Questions, suggestions, and final decisions were made at this time. After the discussion of the items, each judge indicated on the rating sheet those five or six test items which he thought should be included as possible physical fitness measures for boys and girls in the first, second, and third grades. A summary of the responses on the rating sheet appears in

Table II.

Six of the twelve items were deleted from the group of possible physical fitness test items. These items were the jumping race, 50-foot hop, three-legged walk, hanging in arm-flexed position, modified squat thrust, and modified pull-ups. The jumping race was entirely too difficult to score uniformly. The boys and girls in all grades had a tendency to gallop rather than jump on both feet at the same time. The 50-foot hop and the three-legged walk presented the problem of penalizing the subject who dropped his free foot; therefore, these items seemed worthless as fitness measures since there was doubt as to the ability of all first, second, and third graders to perform them adequately. Hanging in arm-flexed position seemed to be dangerous and a very difficult item to administer to a large number of subjects. It was noted that some of the children held their breaths while performing this item, thus preventing a true performance level. The children's performance of the modified squat thrust presented two problems: (1) this item could damage the knees if not done properly and if not done on mats; and (2), it demanded a type of rhythm and coordination which some first and second graders were unable to perform adequately. However, it was felt that the modified squat thrust might have some value in measuring agility of the third grader. Further testing showed that this item possessed a learning factor which made it too hard for the third grader. The modified pull-up item was considered to be one of the least interesting items for this age child. The

TABLE II

THE FINAL EVALUATION AND SELECTION OF THE TEST ITEMS

ITEMS	JUDGES' VOTE							PERCENTAGE
	I	II	III	IV	V	VI	VII	
STANDING BROAD JUMP	X	X	X	X	X	X	X	100%
JUMP AND REACH	X	X	X	X	X	X	X	100%
30-YARD DASH	X	X		X	X		X	71%
SHUTTLE RACE	X	X	X			X		57%
JUMPING RACE							X	14%
50-FOOT HOP	X		X					29%
THREE- LEGGED WALK						X		14%
SEAL CRAWL TEST	X		X	X	X	X	X	86%
HANGING IN ARM- FLEXED POSITION				X	X			29%
MODIFIED PULL-UPS		X		X			X	43%
SIT-UPS	X	X	X	X	X	X	X	100%
MODIFIED SQUAT THRUST		X		X				29%

administration of this item was time-consuming since the adjustable gym bar had to be raised and lowered according to the child's height. This item was retained for exploratory purposes only. It was thought that the modified pull-ups, a substantial measure of arm and shoulder girdle strength, would further evaluate the seal crawl as a measure of arm and shoulder girdle strength.

The final six physical fitness test items selected were the standing broad jump, jump and reach, seal crawl test, sit-ups, 30-yard dash, and shuttle race. Several judges suggested the use of either the 30-yard dash or the shuttle race, but not both of them. Further selection and evaluation of these six items selected by the judges and the modified pull-ups depended upon the results of further testing the boys and girls in the first, second, and third grades.

ADMINISTRATION OF THE PHYSICAL FITNESS TEST ITEMS

Two weeks after the preliminary testing to a small group for evaluation purposes, the physical fitness test items were administered to seventy-one boys and girls in the first three grades of Curry School. Arrangements were made with the girls' physical education director and each first, second, and third grade teacher to give the seven test items to each grade in two one-hour sessions. Therefore each grade performed the test items twice on two consecutive days.

On the first testing day the second and third grades were the groups to which the test items were administered. The children came into the playroom, sat down, and were told that they were going to play games and do stunts. The author had the assistance of seven volunteers to help administer the items. With the help of these assistants the class was able to complete the entire test (every item) in one session. Each test, with the exception of the 30-yard dash, had a test administrator. The 30-yard dash had both a starter and a timer. The children were divided into seven groups; and upon completing each test, they took their score cards and rotated from station to station. The rotation plan was as follows:

Station 1	Sit-ups
Station 2	Jump and reach
Station 3	Seal crawl test
Station 4	Standing broad jump
Station 5	Shuttle race
Station 6	Modified pull-ups
Station 7	30-yard dash

The first grade was tested on the third and fourth days of the testing session. These boys and girls were told that they were going to play some games. They were divided into seven groups and sent to specific stations. The test administrators filled out the score cards and gave them to the subjects as they moved on to the next station. The same rotation

procedure was followed on these two days as was followed for the second and third graders.

There was a total of eighteen volunteers assisting with the administration of the test items. All of the assistants were approached before the testing day and were given copies of the test item which they were to administer. They also were told personally about the manner in which the test item was to be administered. A review of the entire method of testing the class was explained just before the class appeared, and each test administrator was familiarized with the rotation plan.

TREATMENT OF DATA

The first step in treating the data was to make a table showing the number of subjects who completed each of the physical fitness test items twice. The next steps were to find the reliabilities of each test item; to correlate six of the test items for further evaluation; to derive at means and standard deviations for the total group and the boys and the girls at the different age levels; and to establish a tentative percentile scale for comparison with fitness scores of older boys and girls.

The reliability coefficients of each test item were derived by correlating the test-retest results of each test item.⁽⁹⁾ Correlations were made on the total group, the total number of boys and the total number of girls.

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formed between several items. The seal crawl was correlated against the modified pull-up; the standing broad jump, against the jump and reach; and the shuttle race, against the 30-yard dash. The first test results for the total group were the scores used in these correlations. All correlations were done by the Pearson Product-Moment Method. (9)

Means and standard deviations were derived for each item with the following groups:

1. The total number of subjects
2. The total number of boys
3. The total number of girls
4. The six year-old boys
5. The six year-old girls
6. The seven year-old boys
7. The seven year-old girls
8. The eight year-old boys
9. The eight year-old girls
10. The nine year-old boys
11. The nine year-old girls

Although the number of subjects was insufficient for the development of norms, the author decided to develop tentative percentile scores for two reasons: one, these scores could show a gradual progression when compared with the North Carolina Fitness Test percentile scores for the boys and girls in the fourth, fifth, and sixth grades; and two, the tentative

percentile scores could give at least an indication of what the first, second, and third graders are able to accomplish in the area of fitness measures.

CHAPTER V

ANALYSIS OF DATA

In this study the validity of the test items was ascertained through a subjective evaluation of eighteen items to arrive at the selection of seven of the items. The data obtained from the administration of the seven items were analyzed to indicate the number of participants in the study, the means and standard deviations of each item by age group, the reliability of each item, the intercorrelation of the items, and cumulative percentile scores for each test item.

VALIDITY OF THE TEST ITEMS

The test items in this study were verified by their use as valid fitness measures in other studies and by the subjective judgement of nine judges who were familiar with the primary grade child. The judges evaluated the eighteen test items on two occasions. On the first occasion the judges either selected, revised, and deleted each of the eighteen items. This first evaluation, as shown in Table I on page 21, resulted in the selection of twelve test items which the judges considered as good measures of physical fitness for primary grade children. On the second occasion the judges evaluated these twelve test items observing the performance of the items by a small group of primary grade children.

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At the end of the observation each judge selected five or six items which he thought to be the best measures of physical fitness for primary grade children. The results of this second evaluation, as shown in Table II on page 37, determined the seven test items which were administered to the primary grade children. These test items were the standing broad jump, jump and reach, modified pull-ups, seal crawl test, shuttle race, 30-yard dash, and sit-ups.

NUMBER OF SUBJECTS

The seven test items were administered to the entire first, second, and third grades at Curry School. The data obtained were analyzed by grade, age, and sex. Table III classifies the number of participants. There was a total of sixty-six subjects, twenty-nine boys and thirty-seven girls; and the table shows the number of subjects in each grade and at each age level; six years, seven years, eight years, and nine years old. The age level rather than the grade level was used as a basis of classification because there was too great of a range of ages in the primary grades. The number of subjects tested was an inadequate number except for initial exploratory purposes. The greatest number of subjects fell within the seven and eight year-old levels. There was a total of forty-five subjects in this area. At the six year-old level there were only ten subjects; and at the nine year-old level, eleven subjects.

TABLE III

NUMBER OF STUDENTS WHO PERFORMED THE FITNESS TESTS
BY AGE AND GRADE

Grade	Ages								Total	
	6		7		8		9		B	G
	B	G	B	G	B	G	B	G		
1	4	6	4	7					8	13
2			5	5	6	7			11	12
3					3	8	7	4	10	12
Total	4	6	9	12	9	15	7	4	29	37

MEANS AND STANDARD DEVIATIONS

The means and standard deviations of the test items were determined for each age group and for the total group. Tables IV and V present the results for the boys and the girls. Examination of the mean scores for both boys and girls showed a developmental trend from six years through nine years in the performance of the jump and reach and the 30-yard dash. The mean scores for the girls also showed a developmental trend in the performance of the standing broad jump, modified pull-ups, shuttle race, and sit-ups.

The mean scores of the seven test items for boys and girls are also presented in graphic form. Before drawing any conclusions from these graphic presentations it is necessary to note that there was a small number of subjects involved in this study. There was also a wide difference in the number of subjects at each age level. The means presented in these graphs are merely average levels of the children's performance which occurred on one day. At the primary grade level, this performance level of the child could vary a great deal from day to day.

Through graphic presentation the mean scores for the broad jump, indicated in Figure 1, showed that the boys had a better performance than the girls at the six, seven, and eight year-old levels. The girls surpassed the boys in the broad jump performance at the nine year-old level. There was a slight drop-off in the performance of the nine year-old boys.

The mean scores for the jump and reach, presented in Figure 2,

TABLE IV

MEANS AND STANDARD DEVIATIONS FOR BOYS
ON EACH TEST ITEM BY AGE GROUPS

Items	Ages				Total
	6	7	8	9	
N	4	9	9	7	
Broad Jump (inches)					
M.	42.25	48.00	52.33	51.57	49.84
S. D.	3.90	6.57	8.25	8.96	7.83
Jump and Reach (inches)					
M.	7.50	8.78	8.89	9.71	8.86
S. D.	1.50	1.62	2.08	1.75	1.91
Modified Pull-ups (number)					
M.	13.75	17.22	21.22	19.14	20.84
S. D.	1.48	3.29	3.05	4.94	4.40
Seal Crawl Test (seconds)					
M.	14.45	11.07	13.78	12.57	12.90
S. D.	1.93	2.34	4.23	6.34	4.38
Shuttle Race (seconds)					
M.	17.25	16.44	15.60	15.81	16.01
S. D.	1.03	.70	1.01	1.46	1.17
30-Yard Dash (seconds)					
M.	6.90	6.33	6.11	6.11	6.31
S. D.	.42	.31	.33	.58	.49
Sit-ups (number)					
M.	7.75	10.44	16.78	14.43	13.05
S. D.	6.80	6.48	6.76	5.63	7.29

TABLE V
 MEANS AND STANDARD DEVIATIONS FOR GIRLS
 ON EACH TEST ITEM BY AGE GROUPS

Items	Ages				Total
	6	7	8	9	
N	6	12	15	4	
Broad Jump					
(inches)					
M.	39.17	47.00	48.07	55.00	46.58
S. D.	5.98	4.85	7.84	4.47	8.09
Jump and Reach					
(inches)					
M.	8.50	9.42	9.13	10.00	9.22
S. D.	2.99	1.66	1.96	.71	1.77
Modified Pull-ups					
(number)					
M.	13.50	17.75	19.27	20.75	17.96
S. D.	2.57	3.54	5.14	8.87	5.50
Seal Crawl Test					
(seconds)					
M.	27.38	17.68	21.24	12.13	20.35
S. D.	9.01	8.45	15.10	2.25	3.78
Shuttle Race					
(seconds)					
M.	18.08	17.00	16.35	15.25	16.60
S. D.	1.40	.64	1.20	1.03	1.32
30-Yard Dash					
(seconds)					
M.	6.80	6.46	6.47	6.03	6.53
S. D.	.75	.52	.53	.29	.54
Sit-ups					
(number)					
M.	6.33	10.50	11.13	13.50	10.39
S. D.	3.25	5.56	7.49	7.70	6.74

showed that the girls had a better performance than the boys at all age levels. They also showed the similiarity in scores for the seven and eight year-old boys and girls.

The mean scores of the modified pull-ups, depicted in Figure 3, showed a slight difference in the performance of boys and girls at the six and seven year-old levels. There was a much greater difference in the performance of the boys and girls at the eight and nine year-old levels. There was also a drop-off for the boys at the nine year-old level which permitted the girls to surpass the boys in performance.

The performance of the boys on the seal crawl test, as shown in Figure 4, was far superior to the girls. At the nine year-old level, the girls began to perform at about the same level as the boys in this item. Both the boys and girls had a drop-off in performance at the eight year-old level. The large range of scores was due to the poor performance of the six and seven year-old girls. This indicated a lack of arm strength which the girls seemed to acquire around nine years of age.

In Figure 5, the mean scores of the 30-yard dash showed some similiarity in performance for both boys and girls at all age levels. The greatest difference in the mean scores was at the eight year-old level, and this appeared to be due to the fact that the girls had a plateau at the seven and eight year-old levels, and the boys had a later plateau at the eight and nine year-old levels.

Similiarity in the performance of the boys and girls is shown in

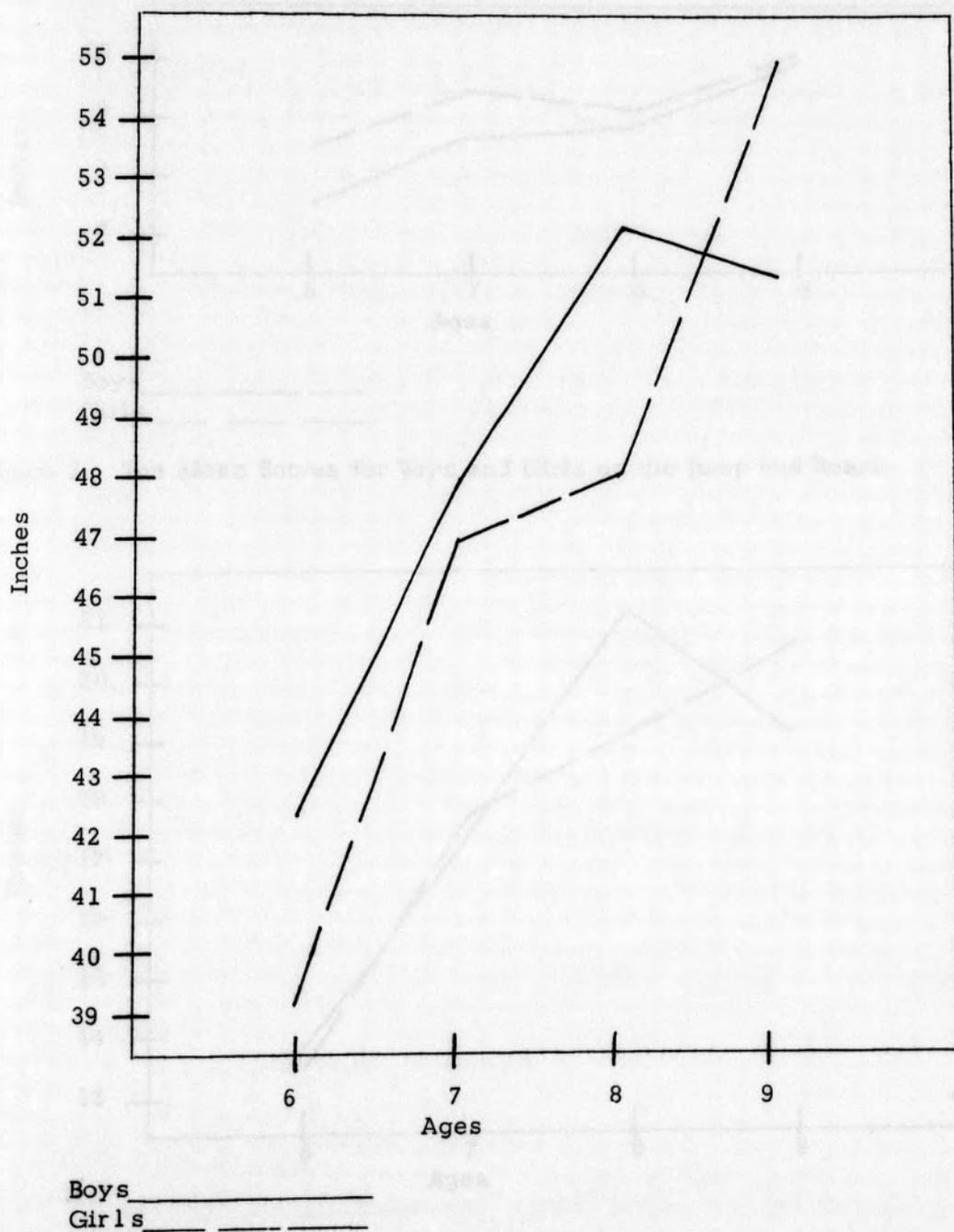


Figure 1: The Mean Score for Boys and Girls on the Standing Broad Jump

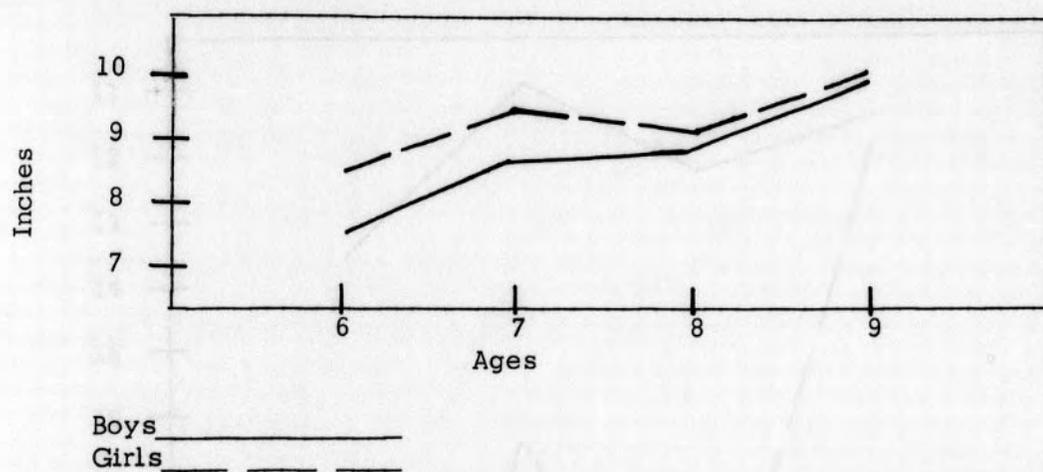


Figure 2. The Mean Scores for Boys and Girls on the Jump and Reach

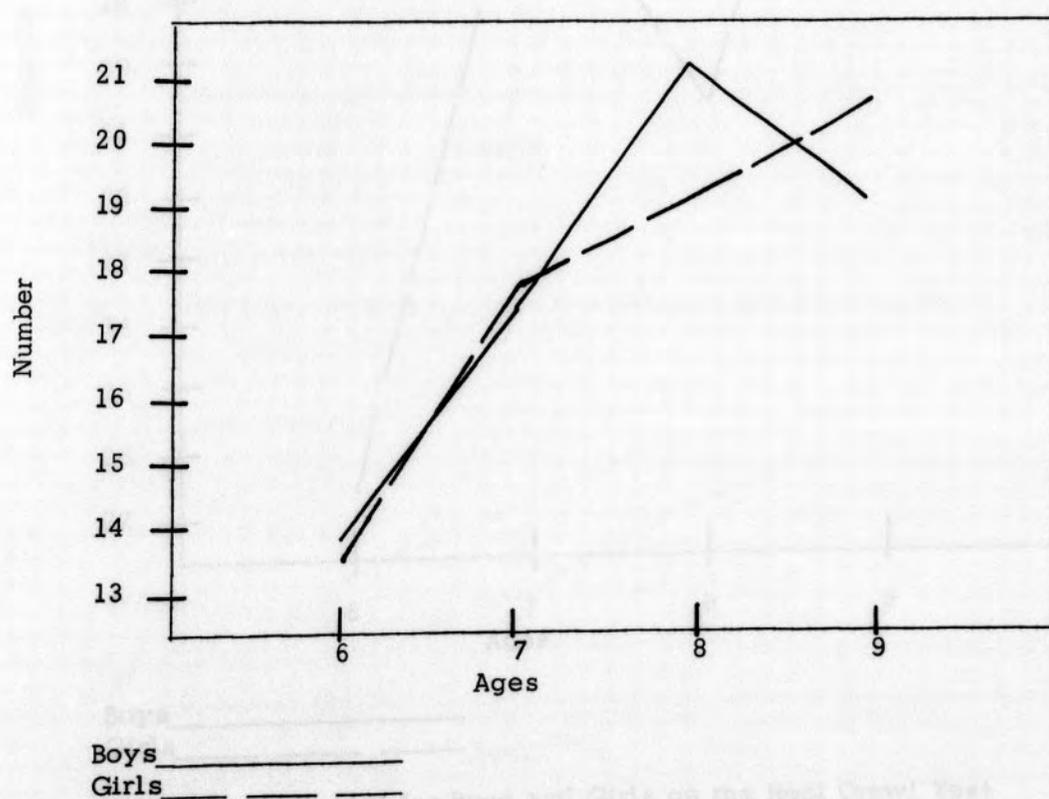


Figure 3. The Mean Scores for Boys and Girls on the Modified Pull-ups

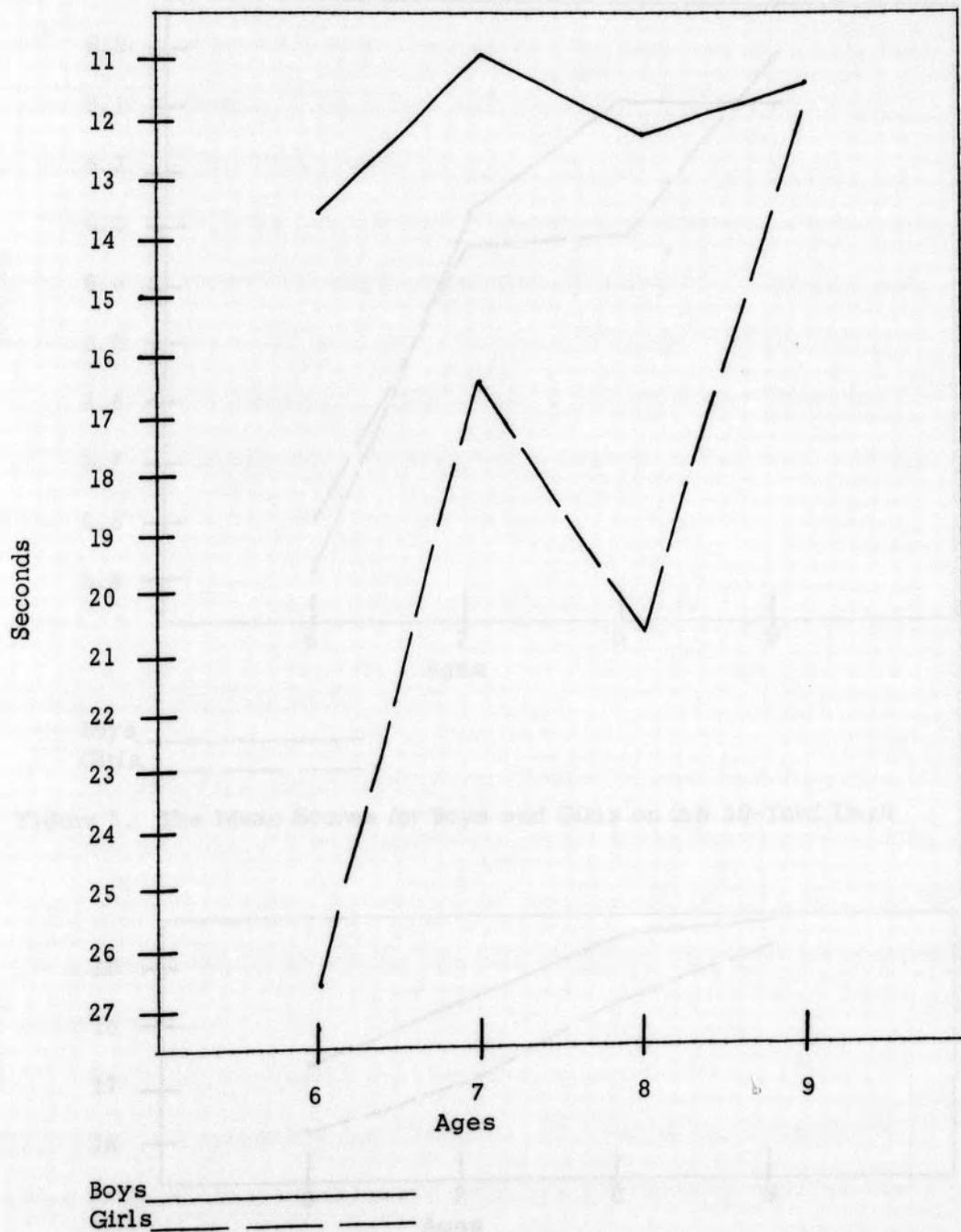
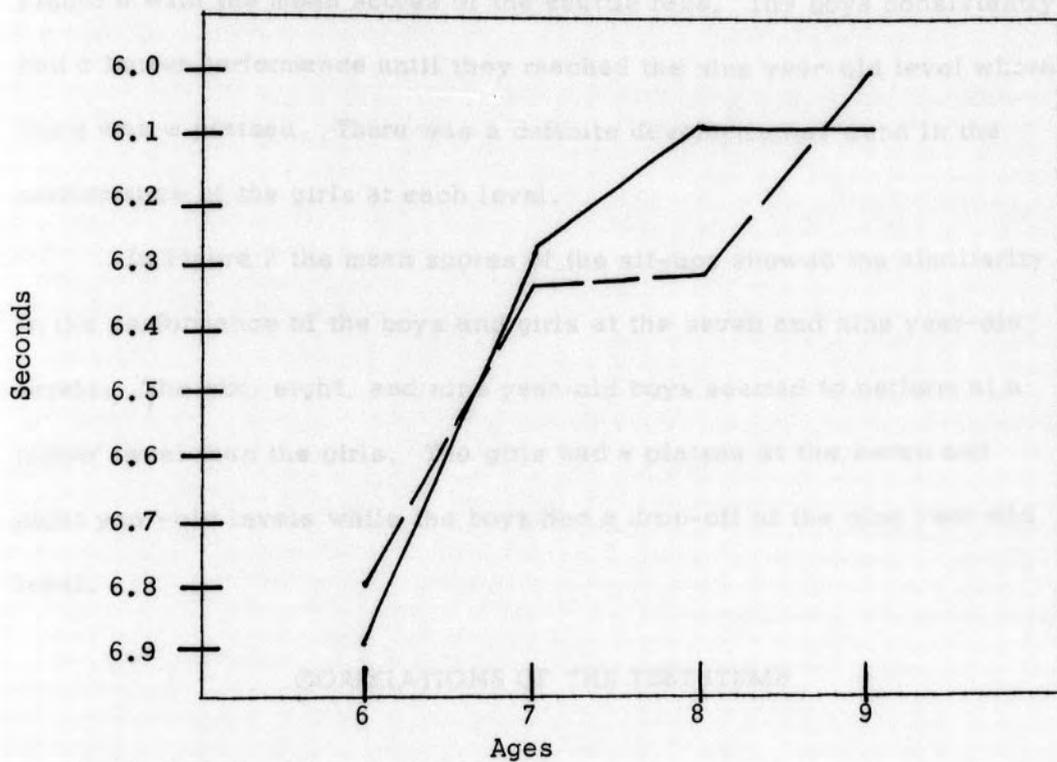
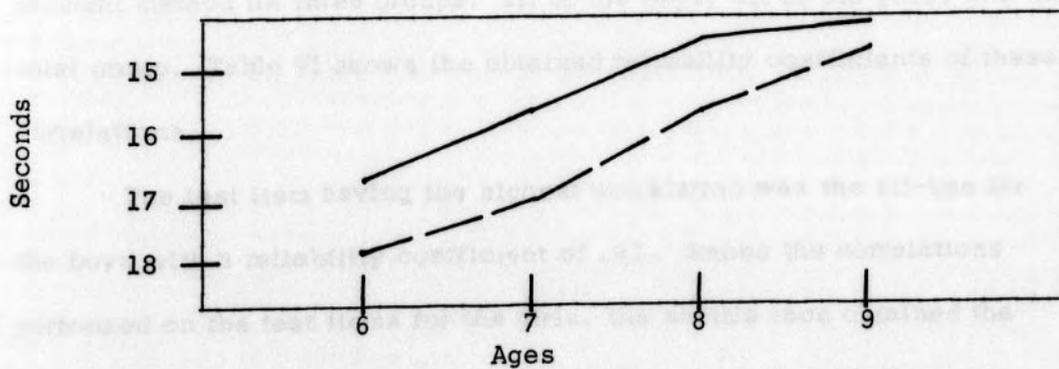


Figure 4. The Mean Scores for Boys and Girls on the Seal Crawl Test



Boys _____
 Girls _____

Figure 5. The Mean Scores for Boys and Girls on the 30-Yard Dash



Boys _____
 Girls _____

Figure 6. The Mean Scores for Boys and Girls on the Shuttle Race

Figure 6 with the mean scores of the shuttle race. The boys consistently had a better performance until they reached the nine year-old level where there was a plateau. There was a definite developmental trend in the performance of the girls at each level.

In Figure 7 the mean scores of the sit-ups showed the similiarity in the performance of the boys and girls at the seven and nine year-old levels. The six, eight, and nine year-old boys seemed to perform at a higher level than the girls. The girls had a plateau at the seven and eight year-old levels while the boys had a drop-off at the nine year-old level.

CORRELATIONS OF THE TEST ITEMS

Reliability of the Test Items

To determine the reliability coefficients of each test item, the data of the two trials of each item were correlated by the Pearson Product-Moment method for three groups: all of the boys, all of the girls, and the total group. Table VI shows the obtained reliability coefficients of these correlations.

The test item having the highest correlation was the sit-ups for the boys with a reliability coefficient of .91. Among the correlations performed on the test items for the girls, the shuttle race obtained the highest reliability coefficient which was .90. In the correlations performed on the test items for the total group, the shuttle race, with a

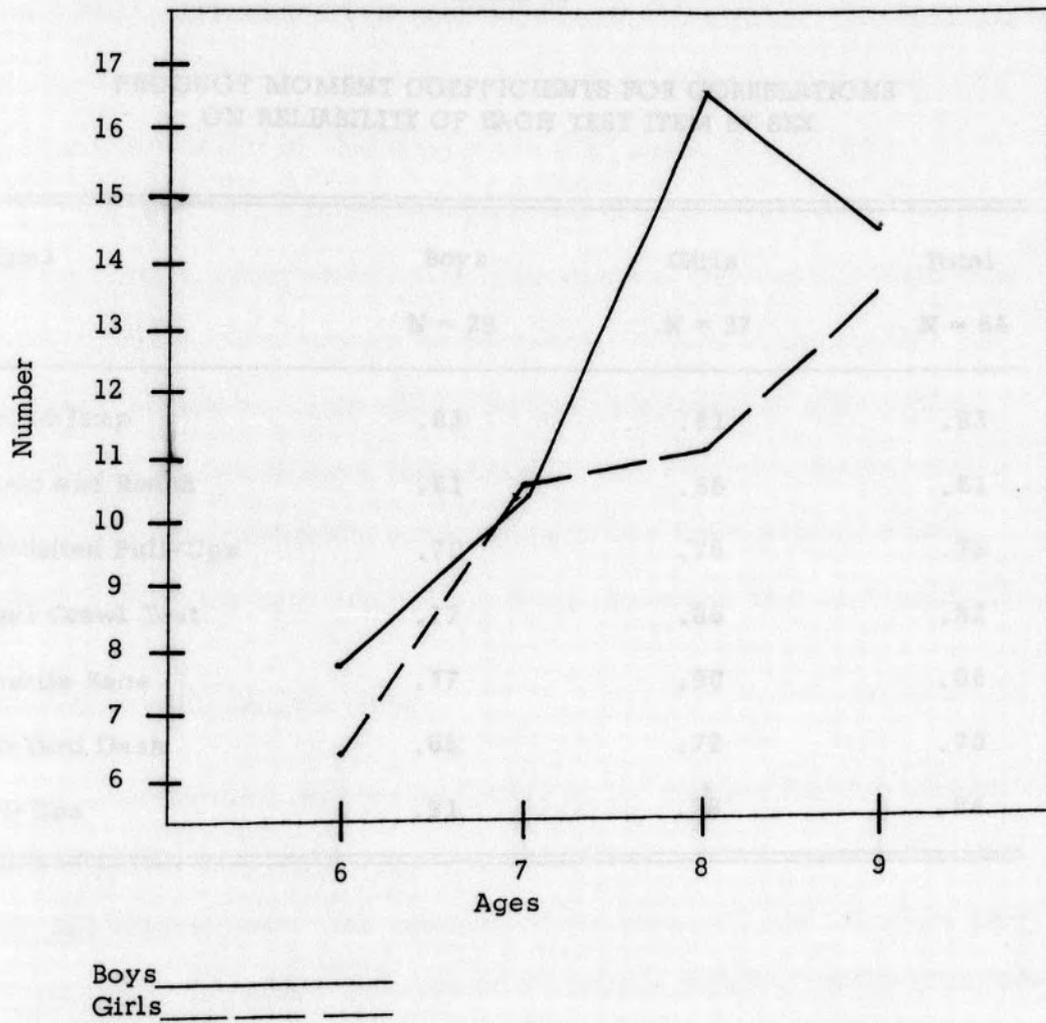


Figure 7. The Mean Scores for Boys and Girls on the Sit-Ups

TABLE VI

PRODUCT MOMENT COEFFICIENTS FOR CORRELATIONS
ON RELIABILITY OF EACH TEST ITEM BY SEX

Items	Boys N = 29	Girls N = 37	Total N = 66
Broad Jump	.83	.81	.83
Jump and Reach	.61	.56	.61
Modified Pull-Ups	.70	.76	.75
Seal Crawl Test	.77	.86	.82
Shuttle Race	.77	.90	.86
30-Yard Dash	.66	.72	.70
Sit-Ups	.91	.78	.84

reliability coefficient of .86, had the highest correlation. The jump and reach had the lowest correlation. For the boys it was .61; for the girls it was a coefficient of .56; and for the total group, one of .61.

There were definite limitations which attributed towards lowering the correlation coefficients. One limitation was the fact that there were many different administrators for each test. Another limitation was the fact that the primary grade child's performance level can change daily. Therefore, in view of these limitations, it may be concluded that these correlation coefficients are acceptable and that the reliability coefficients would have been even higher if the limitations had been controlled.

Intercorrelations of Test Items

Intercorrelations were performed by the Pearson Product-Moment method for the total group on three pairs of items which appeared to measure the same factors. The obtained coefficients of these items are shown in Table VII. The intercorrelation of the shuttle race and the 30-yard dash resulted in a coefficient of .84; and it was the only intercorrelation which had an acceptable coefficient. The result of the intercorrelation between the shuttle race and the 30-yard dash presents substantial evidence that the two items measure the same factors; therefore, the 30-yard dash which had a lower reliability coefficient of .70 could be eliminated as a fitness measure.

The other intercorrelations showed a slight relationship between

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The other intercorrelations showed a slight relationship between

the test items, but the coefficients were not high enough to be acceptable. The correlation coefficients for the seal crawl test against the modified pull-ups was .39, and the correlation coefficient for the standing broad jump against the jump and reach was .44. Although, according to Edwards' table⁽⁵⁾, these coefficients are significant, they are extremely low. Therefore these items were correlated again by age level using the Spearman Rho Rank Difference method. The obtained intercorrelation coefficients for these test items are also shown in Table VII. The only rank difference intercorrelation coefficients which might be acceptable are the intercorrelations between the six year-old seal crawl test and modified pull-ups, with a coefficient of .64, and the intercorrelation between the eight year-old jump and reach and standing broad jump, with a coefficient of .58.

TENTATIVE PERCENTILE SCORES

It is important to look first at a limitation of this study before considering the percentile scales presented. Not enough data was collected to make a separate percentile scale for the boys and the girls at each age level. The one reason for continuing with the development of a percentile scale, even though there was not enough data, was to present a basis for the comparison of the group, the primary grades, with older groups. The percentile scales appear in the Appendix in Table IX.

Table VIII shows a comparison of the range of the raw scores and

TABLE VIII

THE RAW SCORE RANGES AND THE FIFTIETH PERCENTILE SCORES
FOR THE STANDING BROAD JUMP, THE MODIFIED PULL-UPS, AND
THE SIT-UPS ON THE NORTH CAROLINA FITNESS TEST AND ON
THIS STUDY

Items	NORTH CAROLINA FITNESS TEST				THIS STUDY	
	Raw Score Ranges		50th Percentile		Raw Score	50th
	Nine Year Boys	Nine Year Girls	Nine Year Boys	Nine Year Girls	Ranges	Percentile
Standing Broad Jump (inches)	39-64	36-61	53	49	30-66	49
Modified Pull-Ups* (number)	1-18	0-15	8	6	6-29	18
Sit-Ups (number)	3-22	2-19	13	12	0-30	11

*The Modified Pull-Ups in this study were administered differently from the descriptions given in the North Carolina Fitness Test; thus these norms are not comparable.

the 50th percentile score for the nine year-old boys and girls on the North Carolina Fitness Test⁽⁵⁸⁾ with the same scores for the six, seven, eight, and nine year-old boys and girls in this study. This comparison was made only with the standing broad jump, modified pull-ups, and sit-ups.

In comparing the scores on the tentative percentile scale for the primary grades with the scores on the percentile scale for the nine year-old boys and girls in the North Carolina Fitness Test, there was some close similiarity in the range of the scores on the three test items. The sit-ups and the modified pull-ups exhibited a larger range of scores in this study than in the North Carolina Fitness Test. This was probably due to the fact that in this study the administration of the sit-ups and modified pull-ups was slightly different than the administration of the items in the North Carolina Fitness Test. The sit-ups in the North Carolina Fitness Test required the subject to touch each knee with the opposite elbow and to rest the elbows on the floor before performing each sit-up. The modified pull-up item in the North Carolina Fitness Test was performed from a sitting position, and the subject was required to lift his whole body up to a chinning bar which extended between two chairs. Thus it seems that these two items in the North Carolina Fitness Test were a little more difficult to perform than the items in this study.

Another interesting observation of Table VIII was the fact that, for the sit-ups and the standing broad jump, the 50th percentile scores

were almost identical for both the North Carolina Fitness Test and this study.

The tentative percentile scale showed the greatest range of scores to be those of the seal crawl test. This large range was partly due to the poor arm strength of the girls. This test also seemed to be an extremely difficult one to perform. The jump and reach had the smallest range of scores and thus, seemed to discriminate poorly. There was no change in the range of scores for the jump and reach from the 45th percentile to the 70th percentile. The range of scores on the standing broad jump, modified pull-ups, and sit-ups was fairly large and discriminating. The range of scores on the shuttle race were more discriminating than the range of scores for the 30-yard dash. This difference was probably due to the longer course which the shuttle race required. All of the ranges indicated that separate scales should be devised for boys and girls as well as for each age group.

SUMMARY

The standing broad jump, the seal crawl test, the sit-ups, and the shuttle race were the most valid, reliable, and discriminating fitness measures for these children of primary grade age. The modified pull-ups did not have a high reliability coefficient, which was .75, but it was adequate enough to be acceptable for the group. If the modified pull-ups were performed in a different manner, the reliability might be even

higher. The reliability coefficient for the 30-yard dash was .70, which is acceptable but not as high as desirable. The jump and reach had the lowest reliability coefficient of .61.

The means of all the test items showed some developmental trend in the fitness performance of the boys and girls at each age level. They also showed that plateaus occurred mostly in the fitness performance level of boys and girls at the ages of seven and eight years old. The nine year-old boys had a drop-off in their performance on most of the items while the girls had a sudden spurt in their performance on the items at that same age.

The intercorrelations showed a good degree of relationship between the shuttle race and the 30-yard dash. Only a slight degree of relationship was shown between the modified pull-ups and the seal crawl test and between the jump and reach and standing broad jump. The slight relationship in these two intercorrelations indicated at least two things. The scoring method, which was different for both items might have played an important part in the relationship between the seal crawl test and modified pull-ups. The seal crawl was scored by the amount of time it took the subject to pull his body weight with his hands for 20 feet. The modified pull-up item was scored by the number of times the subject could bend his arms and lift his chest or chin to the bar in 30 seconds. There was a greater degree of difficulty in performing the seal crawl test than in performing the modified pull-ups. The

height factor could have played a definite part in the low degree of relationship between the standing broad jump and the jump and reach. The subject's height is not controlled in the standing broad jump and it is controlled in the jump and reach.

The tentative percentile scales showed that the test items, with the exception of the jump and reach, were discriminating. They also presented evidence that six, seven, eight, and nine year-old boys and girls were capable of performing fitness items. Some of the test items in this study were new items, but most of the test items were established items which have been recommended for older boys and girls for some time. In this study these items showed evidence of being reliable, discriminating, and challenging to the six, seven, and eight year-old boys and girls.

CHAPTER VI

SUMMARY AND CONCLUSIONS

This study was an exploration of the primary grade child and his achievement in items which measure physical fitness. An investigation was made of motor performance items which could be adapted to measures of physical fitness.

Eighteen test items were evaluated twice by a group of selected people who were familiar with physical fitness and the primary grade child. From both evaluations seven test items were chosen as items to be given to a group of boys and girls in the first, second, and third grades.

The data collected were treated statistically for reliability, means and standard deviations, and intercorrelations between items. The validity of the test items was based on the literature reviewed and the empirical judgement of the nine people evaluating the test items. Tentative percentile scores were found in order to use them as a basis for comparison with the physical fitness scores on the same items for older boys and girls.

FINDINGS

The broad jump is a valid and reliable test. It had a reliability coefficient of .83 for the total group of first, second, and third grade boys and girls. It is a discriminating test and shows the gradual development of the child at each age level.

The jump and reach is a valid test, but it had the lowest reliability score of .61 and is not discriminating. It is very time consuming and difficult to administer to a group of primary grade children. However this item was a favorite one with the children.

There is very little relationship between the jump and reach and the broad jump. This could be due to a height factor. Height is controlled in the jump and reach, and it is not controlled in the broad jump.

The modified pull-up item is not as valid and reliable as some of the other tests. The manner in which the test is given in this study makes it a difficult test to administer and probably has something to do with the low reliability and validity. Its reliability coefficient for the total group was .75.

The seal crawl test is a valid, reliable, and discriminating item. It had a reliability coefficient of .82 for the total group of primary grade children. It is a test which children enjoy, and its difficulty makes it a challenge for them.

There is no relationship between the seal crawl test and the modified pull-ups. This may be due to the differences in the scoring

method of the two items. The seal crawl test was scored by the amount of time it took the subject to perform the test twenty feet. The modified pull-up item was scored by the number of pull-ups the subject performed in thirty seconds. It should also be noted that the seal crawl test appeared to be a more difficult item to perform than the modified pull-ups.

The shuttle race is a reliable, valid, and discriminating test for boys and girls of the first, second, and third grades. It had the highest reliability coefficient (.86) of all the selected test items.

The 30-yard dash is a valid and discriminating test. Its reliability was .70 for the total group and is acceptable.

There is a definite relationship between the shuttle race and the 30-yard dash. The correlation coefficient was .84. Since there is a good degree of relationship between the two items, the shuttle race, which is a more reliable and practical test item should be substituted for the 30-yard dash.

The sit-up item is a reliable, valid, and discriminating measure of physical fitness achievement for primary grade children. Its reliability coefficient for the total group of boys and girls was .84.

CONCLUSIONS

These test items measuring physical fitness achievement show evidence that the primary grade child is quite capable of taking such tests. Planned and organized administration will enable this sort of

testing to be quickly and easily done. The test items which seem to be the best ones to give to a group of primary grade children are the standing broad jump, the shuttle race, the seal crawl test, and the sit-ups. These four reliable and valid test items measure factors of physical fitness which have been stated in this study: strength of the arms, legs, and abdominal muscles, endurance, speed, power. Therefore, items such as these could be developed very easily into a fitness battery for boys and girls of the first, second, and third grades.

CHAPTER VII

CRITIQUE AND SUGGESTIONS FOR FURTHER STUDY

The author hopes that this study will encourage further development in an area of measurement which is relatively untouched. Some suggestions which would perhaps make the test items more reliable, valid, and discriminating are as follow:

1. The distance for performing the seal crawl test might be shortened from twenty yards to fifteen yards.
2. Another manner of performing the modified pull-ups should be devised, and the test results of this method compared with the test results of the seal crawl test.

Suggestions which would enable further study in this area are as follow:

1. A battery of the four reliable, valid, and discriminating fitness items should be devised and administered to a very large sample in order to develop percentile norms.
2. A study should be made of primary grade children to compare the measurement of their physical fitness using some motor performance test, such as these, and some physiological tests.

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74. Lowman, Charles L., in a letter to Dr. Harold M. Barrow concerning the Squat Thrust; February 8, 1962.
75. Lundegren, Herberta, "A Measurement of Motor Ability for Fourth, Fifth, and Sixth Grade Boys and Girls" (unpublished Master's thesis, Woman's College of the University of North Carolina, Greensboro, 1955), 68 pp.
76. Means, Louis E., "Are We Over the Hill?" (Washington, D. C.: American Association for Health, Physical Education, and Recreation, June, 1948), pp. 370-381. (Mimeographed from a reprint from Phi Delta Kappan.)
77. Seils, LeRoy G., "The Relationship Between Measures of Physical Growth and Gross Motor Performance of Primary School Children" (unpublished Doctoral dissertation, Boston University, Boston, June, 1948), 130 pp.
78. Sparks, Nellie Elizabeth, "A Study of the Effectiveness of Practice in the Development of Certain Motor Skills in the First Grade Children" (unpublished Master's thesis, Illinois State Normal University, Normal, 1950), 47 pp.

CONFIDENTIAL

Dear Mr. Tolson: Enclosed are the following letters and the
their distribution of the last issue.

Mr. Tolson
Mr. Boardman
Mr. Nichols
Mr. Belmont
Mr. Mohr
Mr. Casper
Mr. Callahan
Mr. Conrad
Mr. DeLoach
Mr. Evans
Mr. Gale
Mr. Rosen
Mr. Sullivan
Mr. Tavel
Mr. Trotter
Mr. Tele. Room
Miss Gandy

March 10, 1954

The following is a copy of my letter to you regarding the
distribution of the above mentioned letters. I am sure you will
be interested in the results of the investigation. I am sure
you will be interested in the results of the investigation.
I am sure you will be interested in the results of the investigation.

APPENDIX

The following is a copy of my letter to you regarding the
distribution of the above mentioned letters. I am sure you will
be interested in the results of the investigation. I am sure
you will be interested in the results of the investigation.
I am sure you will be interested in the results of the investigation.

Please accept my sincere thanks for your cooperation in this study. I am
sure you will be interested in the results of the investigation. I am
sure you will be interested in the results of the investigation.

I am sure you will be interested in the results of the investigation. I am
sure you will be interested in the results of the investigation.

Sincerely,
Richard S. Glavin
Special Agent in Charge

CORRESPONDENCE

This Letter Sent to the Following Judges for the
First Evaluation of the Test Items

Mr. Jack T. Carter
Miss Doris Fondren
Miss Doris Hutchinson
Miss Ethel L. Martus
Dr. Roy M. Smith
Miss Ruth Steelman

March 19, 1962

Dear _____:

Your willingness to cooperate in my study to investigate the possibilities of measuring the physical fitness of primary grade children is very much appreciated. Our conversation gave you a general description of the project. There are two things I am hoping you will do in this connection: (1) evaluate a series of items and (2) react to the items as they are administered to a small group of children.

For the present, please review the enclosed tests as possible physical fitness items for boys and girls in the first, second, and third grades. Please select those test items which you think are most pertinent to this measurement and most appropriate for this age child; revise any test items which you would like to improve; and suggest complete removal of test items which you think fail to measure physical fitness of the first, second, and third grade boy and girl. Your reasons for the selection, the revision, or the removal of any test item would be helpful. Feel free to make notations on the test descriptions.

Please return the test descriptions as soon as you have completed the evaluations. If possible, I would appreciate receiving them by March 26th. Then you will be supplied with revised copies of the test items. I hope that you will be able to watch the administration of the test items to the children, and I shall contact you before that time.

I certainly appreciate your sincere interest in this study. Thank you very much for your help.

Sincerely yours,

Elizabeth G. Glover

Rosemary McGee, Advisor

CORRESPONDENCE (continued)

The Letter Sent to the Judges and the Following
Teachers for the Second Evaluation of the Test Items

Miss Elizabeth M. Avent
Miss Barbara C. Miller
Miss Lulu M. Gilbert

April 5, 1962

Dear _____:

Thank you for your helpful suggestions in evaluating some possible fitness items for boys and girls in the first, second, and third grades. Six of the eighteen items have been deleted, and the remaining twelve have been revised and are enclosed.

The children will take the test items on Thursday, April 12, at three o'clock at the Curry School Gymnasium. It would be most helpful if you could come and evaluate the test items as you observe the children perform. I am also enclosing a rating sheet which will be used at the same time. If you cannot possibly be present for this session, would you please return the rating sheet with your preferences indicated?

I sincerely appreciate your help with this study, and I look forward to seeing you Thursday, April 12, at three o'clock at the Curry School Gymnasium.

Sincerely yours,

Elizabeth G. Glover

Rosemary McGee, Advisor

CORRESPONDENCE (continued)

The Letter Sent to the Principal of Curry School,
Mr. Herbert E. Vaughan, Jr., Expressing Appreciation
for His Cooperation with the Study

May 4, 1962

Mr. Herbert E. Vaughan, Jr., Principal
Curry School
Spring Garden Street
Greensboro, North Carolina

Dear Mr. Vaughan:

I certainly appreciate your help and cooperation in providing the students and the facilities for my study of fitness for primary grade children. It was a pleasure to work with Miss Avent, Miss Miller, Miss Gilbert and the boys and girls of the first, second, and third grades. Thank you for making this exploratory project possible.

Sincerely yours,

Elizabeth G. Glover

Rosemary McGee, Advisor

A SAMPLE SCORE CARD FOR THE
PRELIMINARY TESTING SESSION

NAME	GRADE	GROUP
	<u>A</u>	<u>B</u>
1. Standing Broad Jump	_____	_____
	_____	_____
	_____	_____
2. 50-Foot Hop	_____	_____
3. Modified Pull-Up	_____	_____

SCORE CARD FOR THE SECOND TESTING SESSION

NAME _____	GRADE _____	AGE _____	SEX _____
	DATE _____	DATE _____	
BROAD JUMP	_____	IN. _____	
JUMP AND REACH	_____	IN. _____	
SHUTTLE RACE	_____	IN. _____	
SEAL CRAWL TEST	_____	SEC. _____	
MODIFIED PULL-UPS	_____	_____	
30-YARD DASH	_____	SEC. _____	
SIT-UPS	_____	_____	

GROUPS CONSISTING OF A FIRST, SECOND, AND THIRD
GRADER AND THOSE TEST ITEMS PERFORMED BY EACH
GROUP AT THE PRELIMINARY TESTING SESSION

GROUPS		ITEMS PERFORMED BY EACH GROUP
I		
Louise Guiney	1	Standing Broad Jump
Leslie Donahue	2	50-Foot Hop
Debra Aydelette	3	Modified Pull-Ups
II		
Derek Bowden	1	Jump and Reach
Norma Robinson	2	Three-Legged Walk
Andy Sykes	3	Sit-Ups
III		
Becky Taylor	1	Shuttle Race
Bob Overman	2	Seal Crawl Test
Wesley York	3	Modified Squat Thrust
IV		
Curtis Nelson	1	Jumping Race
Jane Davis	2	Hanging in Arm-Flexed Position
Steve Masten	3	30-Yard Dash

POSSIBLE PHYSICAL FITNESS TEST ITEMS FOR BOYS AND GIRLS
IN THE FIRST, SECOND, AND THIRD GRADES

ITEMS	STRENGTH			ENDUR- ANCE	POWER	SPEED	AGIL- ITY
	ARM MUSCLES	LEG MUSCLES	ABDO- MINAL MUSCLES				
Standing Broad Jump (66, 58, 45, 13, 77)		x			x		
Hurdle Jump (38, 45)		x			x		
Jump and Reach (45, 13, 77)		x			x		
30- Yard Dash (77)		x		x		x	
35- Yard Dash (45, 13, 77)		x		x		x	
40-Yard Dash (77)		x		x		x	
Shuttle Race (66)		x		x		x	x
Side Stepping (58, 63, 77)		x		x		x	x
Jumping Race		x		x		x	x

POSSIBLE PHYSICAL FITNESS TEST ITEMS (continued)

ITEM	STRENGTH			ENDUR- ANCE	POWER	SPEED	AGIL- ITY
	ARM MUSCLES	LEG MUSCLES	ABDO- MI NAL MUSCLES				
50- Foot Hop (74, 13)		x		x		x	x
Hanging in Arm- Flexed Position (66)	x			x			
Modified Pull-Ups (58, 57)		x		x		x	
Seal Crawl Test (11)	x			x		x	x
Bear Walk Test	x	x		x		x	x
Obstacle Race	x	x		x		x	x
Three- Legged Walk (11)	x	x		x		x	x
Modified Squat Thrust (74)				x		x	x
Sit- Ups (58)			x	x		x	

THE RATING CHART SENT TO THE JUDGES FOR THE
SECOND EVALUATION SESSION

POSSIBLE PHYSICAL FITNESS TEST ITEMS FOR BOYS AND GIRLS
IN THE FIRST, SECOND, AND THIRD GRADES

DIRECTIONS: In the first column indicate by rank order (1, 2, 3, 4, etc.) those test items which are your preferences within each area. In the second column place your overall selection of those 5 or 6 test items which you think should be included in a physical fitness battery for boys and girls in the first, second, and third grades.

FITNESS TEST ITEMS MEASURING:	COMMENTS	RANK RATING	BATTERY SELECTION
<u>Leg Strength</u>			
1. Standing Broad Jump		1.	
2. Jump and Reach		2.	
3. 30-Yard Dash		3.	
4. Shuttle Race		4.	
5. Jumping Race		5.	
6. 50-Foot Hop		6.	
7. Three-Legged Walk		7.	
<u>Arm and Shoulder Girdle Strength</u>			
1. Seal Crawl Test		1.	
2. Hanging in Arm-Flexed Position		2.	
3. Modified Pull-ups		3.	
4. Three-Legged Walk		4.	
<u>Abdominal Strength</u>			
1. Sit-Ups		1.	

RATING CHART (continued)

<u>FITNESS TEST ITEMS MEASURING:</u>	<u>COMMENTS</u>	<u>RANK RATING</u>	<u>BATTERY SELECTION</u>
<u>Agility, Endurance, and/or Speed</u>			
1. Modified Squat Thrust		1.	
2. 30-Yard Dash		2.	
3. Shuttle Race		3.	
4. Jumping Race		4.	
5. 50-Foot Hop		5.	
6. Three-Legged Walk		6.	
7. Seal Crawl Test		7.	
8. Hanging in Arm-Flexed Position		8.	
9. Modified Pull-Ups		9.	
10. Sit-Ups		10.	
<u>Power</u>			
1. Standing Broad Jump		1.	
2. Jump and Reach		2.	

DESCRIPTIONS OF THE SEVEN FITNESS TEST ITEMS ADMINISTERED TO
THE BOYS AND GIRLS IN THE FIRST, SECOND, AND THIRD GRADES

STANDING BROAD JUMP (66, 58, 45, 13, 77)

PURPOSE: To measure power and leg strength

EQUIPMENT:

1. Tape measure
2. Masking tape or chalk
3. Yardstick
4. Take-off mark (chalk or masking tape)
5. Mats (optional)

DESCRIPTION AND RULES:

1. The subject stands with his feet slightly apart and his toes just behind the take-off mark.
2. The subject may swing the arms and bend the knees.
3. The subject should take-off with both feet.
4. If the subject leaps or hops, the trial should be counted but no score is recorded.
5. If the subject's toes cross the take-off mark before jumping, the trial should be counted but no score is recorded.
6. Encourage the subject to fall forward rather than backward.

EXPLANATION AND DEMONSTRATION:

"Stand right behind this line. Are your toes touching the line? Good!

BROAD JUMP (continued)

I want to see how far you can jump. Let's see if you can be a big frog and jump right over the water! Ready... jump! That time you landed in the water ... let's see if you can jump over the water this time! Are your feet set? Ready...jump! One more time, let's see if you can really jump all the way over the water! Ready, jump!

SCORING:

Record inches from take-off line to the nearest point (heel, hand, etc.) where any part of the body touches the floor. Three trials are given and the best one is the recorded score.

30-YARD DASH (77)

PURPOSE: To measure leg strength, endurance, and speed

EQUIPMENT:

1. Two lines 30 yards apart, a starting line and a finish line marked with masking tape (indoors) or lime (outdoors)
2. A red ribbon held over the finish line by two helpers
3. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject stands with his feet behind the starting line.
2. When the subject hears the signal, "Ready, go", he runs to the finish line marked by a red ribbon.
3. The starter stands at the starting line and gives the signal "go" with the downward motion of the arm.
4. The timer stands at the finish line and times the subject from the moment the starter gives the downward arm signal until the subject crosses the finish line.

EXPLANATION AND DEMONSTRATION:

"Are your feet behind this white line? Fine! Do you see the red ribbon (Mary) and (Billy) are holding? Show me how fast you can run through that ribbon! Ready...go!"

SCORING:

There is one trial and it is scored in the seconds that it takes the subject to run from the starting line to the finish line.

MODIFIED PULL-UPS (58, 57)

PURPOSE: To measure arm and shoulder girdle strength, endurance, and speed

EQUIPMENT:

1. An adjustable gym bar which can be placed in the door at chest level
2. A helper who stands sideways at the bar with his foot on the floor parallel to the bar and about 18 inches in front of it
3. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject takes a standing position at the bar.
2. The subject grasps the bar with the palms of the hands facing his face and extends the arms which will place his body at a 45 degree angle between the floor and the bar.
3. The subject's heels should be against the foot of the helper.
4. The subject lifts his body up by bending his elbows and pulling his chest or chin up to the bar.
5. The subject must keep his body as straight as possible at the knees and the hips.
6. No resting is allowed between the pull-ups for the 30 seconds.

EXPLANATION AND DEMONSTRATION:

"Hold on to this bar. Are your heels against my feet? Good!

MODIFIED PULL-UPS (continued)

Lean back and keep yourself as straight as a stick! How many times do you think you can bring your chest up to this bar? Are you ready? ...

Go!"

SCORING:

The score is the number of times the chin or the chest touches the bar in 30 seconds. There is one trial.

SHUTTLE RACE (66)

PURPOSE: To measure leg strength, speed, endurance

EQUIPMENT:

1. Two lines 40 feet apart marked with masking tape or chalk (indoors) and lime (outdoors)
2. Two waste paper baskets placed on the floor - one inside and touching the starting line and the other inside and touching a line 40 feet away.
3. A stop watch or a watch with a second hand
4. Waste paper baskets should be weighted so that they will not tip over.

DESCRIPTION AND RULES:

1. The subject starts with his feet behind the starting line.
2. On "ready, go", the subject runs as fast as possible going around the baskets, making two round trips.
3. The timer should count aloud each trip as the subject completes it.

EXPLANATION AND RULES:

"Are your feet behind the line? Fine! Do you see the two baskets? Good! How fast do you think you can run around both of those baskets two times? Run to that one, come back to this one, run back to that one and come back to this one. Are you ready?...go!"

SHUTTLE RACE (continued)

SCORING:

The score is the time in seconds that it takes the subject to run around both baskets two times. One trial is given.

SIT-UPS (58)

PURPOSE: To measure abdominal strength, endurance, and speed

EQUIPMENT:

1. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject lies down on his back with his legs bent up and feet flat on the floor close to his body.
2. The subject's hands should be clasped behind his head.
3. On the signal, "Ready, go", the subject will sit-up to the knees and go back down to the floor to the starting position.
4. The subject should do as many sit-ups as possible without stopping in the 30 second period.
5. A helper should hold the subject's feet on the floor.

EXPLANATION AND DEMONSTRATION:

"Lie down on your back and bend your knees up. Good! Put your hands behind your head. Show me how many times you can roll up into a very tiny little ball. Ready...go!"

SCORING:

The score is the number of times the subject sit-ups in 30 seconds. There is one trial.

JUMP AND REACH (45,13,77)

PURPOSE: To measure power and leg strength

EQUIPMENT:

1. Two standards at least 6 feet high
2. Jump Bar
 - a. 70 inches long and 2 inches wide with at least 20 one inch blocks attached to it by hinges. The blocks should be in varying lengths from the longest one being 20 inches to the smallest one being one inch long.
3. The jump bar should be clamped to the standards at height between 60 inches to 84 inches.
4. This item can also be measured with a piece of chalk and a wall using the same procedures as below, but the area is marked with chalk.

DESCRIPTION AND RULES:

1. The subject stands under the jump bar.
2. The subject first places his hand over his head and touches the highest block he can reach (with his feet flat on the floor) from a standing position. This block should be marked with a piece of tape.
3. The subject then jumps to touch the third block above the one touched at a standing position. He continues to jump and touch each block above that one until he misses one.

JUMP AND REACH (continued)

4. When the subject fails to make a successful touch of the block, he has one more chance to jump and touch the same block.
5. Demonstrate to the subject the position for jumping. Stand directly under the block, crouch down and swing the arms up.

EXPLANATION AND DEMONSTRATION:

"Which of these blocks can you reach? Good! Now let's see if you can jump and touch this block (mark the third block from the one touched with a piece of colored tape). Fine! ... Do you think you can jump and touch this block (mark the next block)? Very good! etc."

SCORING:

The subject's score is recorded when he has failed to contact the next block after two successive tries. Record the distance jumped which is the distance between the block touched from a standing position and the highest block touched by jumping.

SEAL CRAWL TEST (11)

PURPOSE: To measure arm and shoulder girdle strength, endurance, and speed

EQUIPMENT:

1. A starting line and a finish line 20 feet apart marked with masking tape or chalk
2. A stop watch or a watch with a second hand
3. A red ribbon held by two helpers over the finish line

DESCRIPTION AND RULES:

1. The subject in a prone position raises and supports his chest and shoulders by placing his hands behind the starting line (finger tips facing backward and wrists facing forward) and keeping his elbows straight.
2. The subject should keep the ankles extended and move by pulling the body with the arms.
3. The subject will do the seal crawl for 20 feet.
4. If the subject falls, he should lift up his body again and continue to crawl.
5. The starter times the subject from the moment the signal "go" is given until the subject's hands cross the finish line.

EXPLANATION AND DEMONSTRATION:

"Do you know how a seal crawls? Get flat on the floor and hold yourself up with your arms. Good! Now see if you can move your hands

SEAL CRAWL TEST (continued)

and pull yourself! Very good! Are your hands behind the line? Show me how quickly you can crawl just like a seal all the way under that red ribbon. Ready...go!"

SCORING:

The score is the time in seconds that it takes the subject to perform the seal crawl from the starting line to the finish line. His time is completed when both of his hands cross the finish line. There is one trial.

DESCRIPTIONS OF THE ELEVEN TEST ITEMS DELETED BY THE JUDGES

HURDLE JUMP (38, 45)

PURPOSE: To measure power and leg strength

EQUIPMENT:

1. Two Standards - two posts 2x2 and 45 inches high with brackets on three sides
2. Bamboo stick - 3/4 inches in diameter and 4 feet long
3. 46 round metal pegs - 1/4 inches in diameter
4. The standards are three feet apart with the non-bracket sides facing each other. The pegs are in holes along the center of the back of each post and extend 1 1/2 inches (from center to center) apart and 3 1/2 inches from the floor.
5. The pegs are numbered from one to twenty-three.
6. A line is marked one foot in front of the two standards with masking tape.

DESCRIPTION AND RULES:

1. The subject stands with both feet in front of the pole and within one foot or less from the pole.
2. The pole is placed on the lowest peg and raised a peg after every successful jump. If the subject fails to make a successful jump, he has one more chance to make the jump.
3. Encourage the subject to bend the knees and to swing the arms

HURDLE JUMP (continued)

in order to jump higher.

4. The subject must jump over the pole with both feet, but he may stand anywhere within the one foot area.

EXPLANATION:

"Stand between the line and the pole, and jump over the pole with both feet. The pole will be raised after every good jump. If you fail to make a good jump, you will have one more chance at that jump."

SCORING:

After failures on two successive jumps, the scores for the previous jump is recorded in inches.

35-YARD DASH (13, 45, 77)

PURPOSE: To measure leg strength, endurance, and speed

EQUIPMENT:

1. Two lines 35 yards apart, a starting line and a finish line marked with lime
2. A red ribbon held over the finish line by two helpers
3. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject stands with his feet behind the starting line.
2. When the subject hears the signal, "Ready, go", he runs to the finish line marked by a red ribbon.
3. The starter stands at the starting line and gives the signal "go" with the downward motion of the arm.
4. The timer stands at the finish line and times the subject from the moment the starter gives the downward arm signal until the subject crosses the finish line.

EXPLANATION AND DEMONSTRATION:

"Are your feet behind this white line? Fine! Do you see the red ribbon (Mary) and (Billy) are holding? Show me how fast you can run through that ribbon! Ready...go!"

SCORING:

There is one trial and it is scored in the seconds that it takes the subject to run from the starting line to the finish line.

40-YARD DASH (77)

PURPOSE: To measure leg strength, endurance, and speed

EQUIPMENT:

1. Two lines 40 yards apart, a starting line and a finish line marked with lime
2. A red ribbon held over the finish line by two helpers
3. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject stands with his feet behind the starting line.
2. When the subject hears the signal, "Ready, go", he runs to the finish line marked by a red ribbon.
3. The starter stands at the starting line and gives the signal "go" with the downward motion of the arm.
4. The timer stands at the finish line and times the subject from the moment the starter gives the downward arm signal until the subject crosses the finish line.

EXPLANATIONS AND DEMONSTRATIONS:

"Are your feet behind this white line? Fine! Do you see the red ribbon (Mary) and (Billy) are holding? Show me how fast you can run through that ribbon! Ready...go!"

SCORING:

There is one trial and it is scored in the seconds that it takes the subject to run from the starting line to the finish line.

50-FOOT HOP (13,74)

PURPOSE: To measure leg strength, endurance, agility, and speed

EQUIPMENT:

1. Two lines 50 feet apart, a starting line and a finish line, marked with masking tape or chalk (indoors) or lime (outdoors)
2. A red ribbon held over the finish line by two helpers
3. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject stands with his toes behind the starting line.
2. On the signal, "Ready, go", the subject hops on one foot as fast as he can to the finish line marked by a red ribbon.
3. The starter stands at the starting line and gives the signal "go" with the downward motion of the arm.
4. The timer stands at the finish line and times the subject from the moment the starter gives the downward arm signal until the subject crosses the finish line.
5. If the subject falls or drops his foot, he should continue.
Encourage the subject to remain on one foot the entire time.

EXPLANATION AND DEMONSTRATION:

"Are your toes behind the starting line? Do you see that red ribbon that (Jane) and (Mary) are holding? Show me how fast you can hop without putting the other foot down through that red ribbon. Ready... go!"

50-FOOT HOP (continued)

SCORING:

The score is the time it takes the subject to hop 50 feet. The time is recorded in seconds.

DESCRIPTION AND RULES:

1. The subject stands across the middle line.
2. On the signal, "Ready, go", the subject will side step to the line on the left and side step back to the line on the right, and then right to left and left to right until he hears "Stop".
3. The movements are repeated as fast as possible right to left and left to right for 15 seconds.
4. Make certain the subject knows what side stepping is.
 - a. Stepping with one foot on the side and that foot up.
 - b. The other, always resting with the same foot.

EXPLANATION:

"Stand with your feet apart over the middle line. When the signal 'go' is given side step (commenced) to this line (line on the left) and step all the way back to this line (line on the right). Keep side stepping as fast as possible back forth between the two lines until I say 'stop'."

SCORING:

The score is the number of steps the subject crosses the center

SIDE STEPPING (58, 63, 77)

PURPOSE: To measure agility, endurance, leg strength, and speed

EQUIPMENT:

1. Three lines on the floor four feet apart, marked with masking tape or chalk (indoors) and lime (outdoors)
2. A stop watch or a watch with a second hand

DESCRIPTIONS AND RULES:

1. The subject stands astride the middle line.
2. On the signal, "Ready, go", the subject will side step to the line at the left and side step back to the line at the right, and then right to left and left to right until he hears "Stop".
3. The movements are repeated as fast as possible right to left and left to right for 15 seconds.
4. Make certain the subject knows what side stepping is.
 - a. Stepping with one foot to the side and then drawing up the other, always leading with the same foot.

EXPLANATION:

"Stand with your feet apart over the center line. When the signal 'go' is given side step (demonstrate) to this line (line on the left) and then all the way back to this line (line on the right). Keep side stepping as fast as possible back forth between the two far lines until I say 'stop'."

SCORING:

The score is the number of times the subject crosses the center

SIDE STEPPING (continued)

line in 15 seconds. There is one trial.

HANGING IN ARM-FLEXED POSITION (66)

PURPOSE: To measure arm and shoulder girdle strength, and endurance

EQUIPMENT:

1. An adjustable doorway gym bar at the subject's maximum reaching height (arms extended)
2. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject stands under the bar and he extends his arms overhead and places his hands with palms inward on the bar shoulder width apart.
2. The tester lifts the subject up to the bar so that his chin is at bar level and his elbows are bent.
3. The tester lets go of the subject and times him from that moment until his arms begin to extend and the chin goes below the bar.

EXPLANATION AND DEMONSTRATIONS:

"Stand under this bar and hold on to it very tightly. I am going to lift you up (lift the subject up) and when I let go, show me how long you can hold on to the bar this way! Ready...go! Let's see if you can stay up there longer this time! Ready...go! Once more, try to stay up there just a little longer! Ready...go! (Keep encouraging the subject to hang on, while he is holding on to the bar.)

HANGING IN ARM-FLEXED POSITION (continued)

SCORING:

The score is the time in seconds that the subject remains in the bent arm position with the chin at the level of the bar to the time the chin goes below the bar and the arms begin to extend. There are three trials.

DEFINITION AND RULES:

1. The subject takes a forward bent position with the chin at the starting line and the legs straight.
2. The knees and arms should remain as straight as possible throughout the walk. This position should be maintained until the finish.
3. On the signal, "Ready, go", the subject moves the arms and legs forward, keeping them straight, and moves until the finish line as fast as possible.
4. The starter is at the finish line with the watch to time the subject.

EXPLANATION:

Stand behind the starting line and push your hands on the starting line. Keep your arms and legs straight, and on the starter's signal, walk away your arms and legs, as fast as you can to the finish line.

BEAR WALK TEST

PURPOSE: To measure arm and leg strength, endurance, speed, and agility

EQUIPMENT:

1. Two lines 45 feet apart, starting line and a finish line, marked with masking tape or chalk
2. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject takes a forward bent position with the hands on the starting line and the legs straight.
2. The knees and arms should remain as straight as possible throughout the walk. This position should be maintained within reason.
3. On the signal, "Ready, go", the subject moves his arms and legs forward, keeping them straight, and tries to get to the finish line as fast as possible.
4. The starter is at the finish line with the watch to time the subject.

EXPLANATION:

"Stand behind the starting line and place your hands on the starting line. Keep your legs and arms straight, and on the signal 'go', walk using your arms and legs, as fast as you can to the finish line."

BEAR WALK TEST (continued)

SCORING:

The score is the time in seconds that the subject takes to walk from the starting line to the finish line. There is one trial.

1. Two lines 20 feet apart, a starting line and a finish line marked with masking tape or chalk.
2. A table or wooden box with a minimum height of 24 inches and two helpers holding the sides down, placed by one foot on the starting line.
3. A mat placed on the floor at the junction of one of the sides.
4. A rope between two supports 4 feet apart and placed 24 feet from the table. The center of the rope should be about 10 inches from the floor and should be about an inch or two from the table.
5. A weighted waist power belt placed 24 feet from the rope.
6. A finish line 20 feet from the waist rope marked with a strip of a watch with a second hand.

INSTRUCTIONS AND RULES:

1. The subject remains seated on the floor with the legs crossed at the starting line.
2. On the signal, "Ready, go", the subject
 - a. Stands up
 - b. Runs to the table (back)

OBSTACLE RACE

PURPOSE: To measure arm and leg strength, endurance, agility, and speed

EQUIPMENT:

1. Two lines 80 feet apart, a starting line and a finish line marked with masking tape or chalk
2. A table or wooden box with a minimum height of 24 inches and two helpers holding the table (box) placed 20 feet from the starting line.
3. A mat placed on the floor at the jumping off side of the table
4. A rope between two standards 4 feet apart and placed 20 feet from the table. The center of the rope should measure 18 inches from the floor and should be slack so that it measures 20 inches from the floor at the standards.
5. A weighted waste paper basket placed 20 feet from the rope
6. A finish line 20 feet from the waste paper basket
7. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject remains seated on the floor with the legs crossed at the starting line.
2. On the signal, "Ready, go", the subject:
 - a. Stands up
 - b. Runs to the table (box)

OBSTACLE RACE (continued)

- c. Climbs over the table (box)
- d. Runs to the rope
- e. Crawls under the rope
- f. Runs to the waste paper basket and around it once
- g. Runs to the finish line

EXPLANATION AND DEMONSTRATION:

"Sit down on the starting line and cross your legs. On the signal 'go' stand up and run to the table (box). Climb over the table (box). Run to the rope. Crawl under the rope. Run to the waste paper basket and run once around it. Then run to the finish line. Let me see how fast you can do this."

SCORING:

The score is the time in seconds it takes the subject to get to the finish line. There is one trial.

THREE-LEGGED WALK (11)

PURPOSE: To measure arm, shoulder girdle, and leg strength, endurance, speed, and agility

EQUIPMENT:

1. Two lines - a starting line and a finish line marked with masking tape or chalk
2. A stop watch or a watch with a second hand
3. A red ribbon held by two helpers over the finish line

DESCRIPTION AND RULES:

1. The subject takes a position with both hands on the floor behind the starting line and one foot on the floor.
2. The free foot is lifted behind the body.
3. The subject will do the three-legged walk by moving the hands and the foot for a distance of 30 feet.
4. The starter stands at the starting line and gives the signal "go" with the downward motion of the arm.
5. The timer stands at the finish line and times the subject from the moment the starter gives the downward arm signal until the subject's hands cross the finish line.

EXPLANATION AND DEMONSTRATION:

"Have you ever heard of a three-legged walk? Lean over and put your hands on the floor. Let's keep one foot high in the air. Now... try moving your hands just a little bit... Now move your foot a little bit..."

THREE-LEGGED WALK (continued)

that's it. Show me how quickly you can do this walk from here to under the red ribbon. Ready...go!"

SCORING:

The score is the time in seconds that it takes the subject to perform this walk from the starting line to the finish line. His time is completed when both of his hands cross the finish line.

MODIFIED SQUAT THRUST (74)

PURPOSE: To measure agility, endurance, and speed

EQUIPMENT:

1. A stop watch or a watch with a second hand
2. Mats

DESCRIPTION AND RULES:

1. The subject begins in a standing position.
2. On the signal, "Ready, go", the subject will
 - a. Drop to a squat position on the hands and the feet,
 - b. Thrust to the knees,
 - c. Return to the squat position,
 - d. Stand up.
3. He should perform this continuous motion as fast as possible for 30 seconds.
4. Make certain that the knees are straight when the subject stands.

EXPLANATION AND DEMONSTRATION:

"Let's stand up tall. Now squat down on your hands and feet. Spring to your knees. Come back to your feet and stand up. Try this again. Let's see how many times you can do these four steps. Ready... go!"

SCORING:

Count the number of times the subject comes to a good standing position in 30 seconds. There is one trial.

JUMPING RACE

PURPOSE: To measure leg strength, endurance, and speed

EQUIPMENT:

1. Two lines 50 feet apart, a starting line and a finish line, marked with masking tape or chalk (indoors) or lime (outdoors)
2. A red ribbon held by two helpers over the finish line
3. A stop watch or a watch with a second hand

DESCRIPTION AND RULES:

1. The subject stands with his toes behind the starting line.
2. On the signal, "Ready, go", the subject jumps on both feet to the finish line marked by a red ribbon.
3. The starter stands at the starting line and gives the signal "go" with the downward motion of the arm.
4. The timer stands at the finish line and times the subject from the moment the starter gives the downward arm signal until the subject crosses the finish line.
5. Encourage the subject to jump on both feet the entire time.

EXPLANATION AND DEMONSTRATION:

"Let's see how fast you can jump on both feet - just like a bunny rabbit - all the way through that red ribbon that (Mary) and (Susie) are holding. Are your feet behind the line? Good! Ready...go!"

SCORING:

The score is the time in seconds that it takes the subject to jump to the finish line.

TABLE IX

PERCENTILE NORMS ON EACH TEST ITEM FOR SIXTY-SIX
BOYS AND GIRLS AGE SIX, SEVEN, EIGHT AND NINE

Percentile	Broad Jump	Jump and Reach	Modified Pull-Ups	Seal Crawl Test	Shuttle Race	30- Yard Dash	Sit-Ups	Percentile
99	66	14	29	6.5	13.4	5.2	30	99
98	64		28	7.0	13.9	5.3	25	98
97	63			7.2	14.1	5.4		97
96	62	13	27	7.5	14.2	5.5	24	96
95	61			7.7	14.3	5.6	23	95
94				7.9	14.4			94
93	60	12	26	8.0			22	93
92				8.2	14.5			92
91	59			8.4				91
90			25	8.5	14.6			90
89	58			8.7		5.7	21	89
88				8.9	14.7			88
87				9.1				87

TABLE IX (continued)

Percentile	Broad Jump	Jump and Reach	Modified Pull-Ups	Seal Crawl Test	Shuttle Race	30-Yard Dash	Sit-Ups	Percentile
86	57	11	24	9.3			20	86
85				9.4	14.8			85
84				9.6				84
83	56			9.8	14.9			83
82				9.9		5.8		82
81			23	10.1				81
80	55			10.2	15.0			80
79				10.3			18	79
78				10.4	15.1			78
77	54			10.5	15.2	5.9		77
76				10.6				76
75			22	10.8	15.3			75
74				10.9	15.4	6.0	17	74
73	53			11.0				73

TABLE IX (continued)

Percentile	Broad Jump	Jump and Reach	Modified Pull-Ups	Seal Crawl Test	Shuttle Race	30- Yard Dash	Sit-Ups	Percentile
72				11.1	15.5			72
71				11.2	15.6			71
70		10		11.3			16	70
69				11.4	15.7	6.1		69
68	52		21	11.6				68
67				11.7				67
66				11.8	15.8		15	66
65				11.9				65
64				12.0				64
63				12.1	15.9		14	63
62	51			12.2		6.2		62
61				12.3	16.0			61
60			20	12.4				60

TABLE IX (continued)

Percentile	Broad Jump	Jump and Reach	Modified Pull-ups	Seal Crawl Test	Shuttle Race	30- Yard Dash	Sit-Ups	Percentile
59				12.5	16.1		13	59
58				12.6				58
57				12.7				57
56				12.8	16.2			56
55				12.9		6.3		55
54	50			13.0			12	54
53				13.1	16.3			53
52			19	13.2				52
51				13.3				51
50				13.4	16.4	6.4		50
49				13.6			11	49
48	49			13.8				48
47				14.0	16.5			47

TABLE IX (continued)

Percentile	Broad Jump	Jump and Reach	Modified Pull-Ups	Seal Crawl Test	Shuttle Race	30-Yard Dash	Sit-Ups	Percentile
46				14.1				46
45		9		14.3				45
44			18	14.4	16.6			44
43				14.6				43
42	48			14.8		6.5	10	42
41				15.0	16.7			41
40				15.1				40
39				15.3				39
38	47			15.4				38
37			17	15.6	16.8			37
36	46			15.8				36
35				16.0			9	35
34				16.2	16.9	6.6		34

TABLE IX (continued)

Percentile	Broad Jump	Jump and Reach	Modified Pull-Ups	Seal Crawl Test	Shuttle Race	30-Yard Dash	Sit-Ups	Percentile
33	45			16.4				33
32				16.6				32
31	44		16	16.8	17.0			31
30				17.0			8	30
29				17.2	17.1			29
28	43			17.6		6.7		28
27				17.9	17.2		7	27
26		8	15	18.2				26
25	42			18.6	17.3	6.8	6	25
24				19.0				24
23				19.4	17.4		5	23
22	41			19.8				22
21			14	20.2		6.9		21

TABLE IX (continued)

Percentile	Broad Jump	Jump and Reach	Modified Pull-Ups	Seal Crawl Test	Shuttle Race	30-Yard Dash	Sit-Ups	Percentile
20				20.7	17.5		4	20
19	40			22.0				19
18				23.2	17.6			18
17			13	24.6		7.0	3	17
16	39	7		25.8				16
15				27.2	17.7			15
14			12	28.4		7.1		14
13				29.8	17.8			13
12	38			31.0				12
11				32.4	17.9		2	11
10			11	33.5		7.2		10
9	37			35.2	18.0			9
8		6		37.0	18.1			8

TABLE IX (continued)

Percentile	Broad Jump	Jump and Reach	Modified Pull-Ups	Seal Crawl Test	Shuttle Race	30- Yard Dash	Sit-Ups	Percentile
7				38.8				7
6	36		10	40.4	18.2	7.3	1	6
5				42.1	18.3			5
4	35	5	9	46.2	18.6	7.4		4
3	34			48.2	19.0	7.6		3
2	32	4	8	50.4	19.5	7.8		2
1	30	3	6	51.0	20.0	8.0		1

Typed by
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