THE RELATIONSHIP OF SELECTED FACTORS AND PHYSICAL
FITNESS OF WHITE AND NEGRO STUDENTS
AT TWO DIFFERENT LEVELS

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THE RELATIONSHIP OF SELECTED FACTORS AND PHYSICAL
FITNESS OF WHITE AND NEGRO STUDENTS
AT TWO DIFFERENT LEVELS

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CHAPTER I

INTRODUCTION

Several investigators have compared Negro and white subjects on various scales such as intelligence, achievement, reaction time, and various psychological features. Recently, however, more interest has been directed toward differences in the physical fitness level and varying degrees of motor ability of Negro and white subjects. Although there have been variations in the types of skills studied as well as the types of instruments used to measure them, the results seem to indicate that the Negro youth has more highly developed motor skills through about the fifth and sixth-grade level. Previous studies have found Negro subjects to exceed white subjects on such measures of muscular and physical fitness as the Kraus-Weber test and the American Association of Health, Physical Education, and Recreation (AAHPER) Youth Fitness Test (1, 3, 7, 13). Negro boys have also been shown to surpass white boys on simple measures of speed.

There have been studies, however, that have not revealed significant differences on certain factors (8, 14). Comparisons
between Negro and white children on measures of motor ability have revealed negligible differences. Similar results have been obtained comparing the speed of simple reactions for Negro and white subjects.

Statement of the Problem

The problem of this study was the relationship of selected factors (attitudes toward physical education and academic achievement) and physical fitness of white and Negro students at two different age levels.

Purpose of the Study

The purpose of this investigation was to extend the study of possible differences between Negro and white boys on measures of physical fitness and to determine the relationship between certain variables and physical fitness for Negro and white boys.

More specifically it was the purpose of this study to

1. determine the relationship between each selected factor and physical fitness for Negro and white boys

2. determine the differences between Negro and white students on each of the following:
   a. selected measures of physical fitness
b. measures of physical fitness correlated with attitude toward physical education

c. measures of physical fitness correlated with academic achievement

3. compare the differences between Negro and white boys at the ninth and tenth-grades with differences between Negro and white boys at the fifth and sixth-grades for magnitude and direction.

Hypotheses

To carry out the purposes of this study, the following hypotheses were advanced:

1. Negro boys will score significantly higher than white boys on gross body coordination (softball throw).

2. Negro boys will score significantly higher than white boys on muscular explosiveness (standing broad jump).

3. There will be no significant difference between Negro and white boys on the test of circulorespiratory endurance (sit-ups).

4. Negro boys will score significantly higher than white boys on the overall test of physical fitness.

5. There will be a significantly higher positive correlation between attitudes toward physical education
and physical fitness scores for Negro boys than for white boys.

6. There will be a significantly higher positive correlation between composite achievement scores and physical fitness scores for white boys than for Negro boys.

Significance of the Study

Differences between Negro and white boys on measures of physical fitness have been demonstrated by several studies (1, 3, 7, 13). These studies have demonstrated that a difference can be found between performances of Negro and white boys on measures of physical fitness at the fourth-grade level through the seventh-grade level (1, 3, 7, 13).

A comparison between Negro and white subjects on measures of speed of simple manual movement revealed no significant differences. Much larger differences favoring the white subjects were found on more complex tasks. The conclusion was, however, that it would be misleading to speak of speed differences in general since the whites did not excel in speed in all assigned tasks (11).

Some studies in this area have not found differences favoring one race over the other. Studies of race differences
in performance of motor abilities have demonstrated little if any difference between Negroes and whites (8, 14).

Of the studies reviewed, those pertaining to differences between Negroes and whites on measures of physical fitness have obtained results favoring the Negro (3, 7, 10, 16). Other studies between the races on tests of motor ability and speed of reaction have not demonstrated differences of significance (8, 14). One purpose of the present study was to extend the work of previous researchers comparing Negro and white boys on measures of physical fitness. The present study included ninth and tenth-grade boys as differentiated from previous studies which included only fourth through seventh-grade boys as subjects. This extension was made to determine if the same results could be obtained from high school subjects as had been determined for subjects from lower grade levels.

Socio-economic status has been demonstrated to influence the difference between Negro and white boys on scores of physical fitness (1). Motivational differences and attitudes have been listed as other possible causes for the difference between races (3, p. 668). An important function of the present study was to determine the relationship of attitudes toward physical education and physical fitness scores.
Physical fitness has been found to be related to self-perceived attitudes of the individual regarding his own success in physical activities (12, p. 749). A close relationship between estimates of abilities in, and self-perceived attractions to, physical activities of a vigorous nature is indicated. A favorable attitude toward physical education is generally associated with successful physical accomplishment (2, p. 635).

The process of acquiring attitudes may not follow as consistent a pattern nor be as discernible as academic or motor learning. The suggestion has been made by psychologists that attitudes are acquired as a result of traumatic experiences involving pain or pleasure or as a result of long exposure to cumulative experience (5, p. 470). Psychologists have also suggested that success represents one of the primary forces influencing attitudes, as does personal satisfaction related to tasks performed (5, p. 470).

Several attempts have been made to relate performance of physical fitness scores to achievement in physical education classes as well as to academic achievement (5, 8, 11). During the last several years professional attention has been increasingly focused upon assessing the validity of non-intellectual traits (measures of interests, self-concepts,
achievement motivation, and personal adjustments) as predictors of school success (4, p. 253). The goal has been to find predictors more valid than attitude scores alone, or variables which when combined with aptitude scores will result in a better multiple predictor of classroom performance. Several studies suggest that success as indicated by scores on physical fitness measures is related highly enough to academic success to be considered as a necessary factor for the improvement of academic index in the general education of the college student (6, 9). Significant relationships between Physical Fitness Index and grade point averages and academic achievement tests have been found in several studies (6, p. 161; 9). The purpose for determining the relationship between physical fitness scores and academic achievement in the present study was to determine if the same relationship exists for Negro students as for white subjects.

Definitions

For the purpose of this study, the following definitions were formulated:

Physical Fitness—As used in this study, the term physical fitness represents the level of physical fitness
and motor skills achieved by the subjects on selected sub-tests from the American Association of Health, Physical Education, and Recreation Youth Fitness Test. The three sub-tests were: sit-ups, softball throw, and standing broad jump.

**Circulorespiratory Endurance**—The score obtained by the student on the sub-test, sit-ups (measured as the total number of sit-ups without resting), from the American Association of Health, Physical Education, and Recreation Youth Fitness Test.

**Gross Body Coordination**—The score obtained by the subject on the sub-test, softball throw (measured in feet), from the American Association of Health, Physical Education, and Recreation Youth Fitness Test.

**Muscular Explosiveness**—The score obtained by the subject on the sub-test, standing broad jump (measured in inches), from the American Association of Health, Physical Education, and Recreation Youth Fitness Test.

**Attitudes**—The factor score on the concept "Physical Education" measured by the Semantic Differential.

**Academic Achievement**—The composite score obtained by the subject on the Stanford Achievement Test.
Summary

The problem, purposes, and hypotheses for this study were stated in this chapter. The significance of the study was described in terms of the need to (1) extend the comparison of Negro and white boys on measures of physical fitness from the elementary school level to the high school level, (2) determine the relationship of attitudes toward physical education and physical fitness performance for both Negro and white boys, and (3) determine the relationship of academic achievement and physical fitness performance for both Negro and white boys.
CHAPTER BIBLIOGRAPHY


The stated purpose of this investigation was to extend the study of possible differences between Negro and white boys on measures of physical fitness and to determine the relationship of attitudes toward physical education and academic achievement and physical fitness for Negro and white boys. The purpose of this chapter was to synthesize the findings of previous investigations related to these variables.

Studies reviewed in this chapter will be divided into the following categories:

1. Studies comparing Negro and white subjects on various measures of physical ability, and studies that have contributed information pertinent to this relationship.

2. Studies relating the attitudes of students toward physical education with physical abilities, and studies pertaining to the development of attitude scales.

3. Studies comparing the results of physical fitness measures with measures of academic achievement as well as
studies relating physical fitness scores with other variables.

Race and Physical Fitness

During the past century there has been a great interest in racial differences. Much of this interest has been centered around mental ability while other aspects of racial differences have been somewhat neglected. Several studies conducted in the early 1920's through the 1930's (14, 26, 29, 36, 41, 42, 50, 51, 55, 69) compared the physical abilities, reaction times, and speed between Negro and white subjects.

Klineberg (36), after testing rural and urban groups of Indian, white and Negro children, maintained that racial differences on performance tests were purely speed differences. He attributed these differences in speed to environmental factors. Hutinger (30) examined the difference between Negro and white children at the fourth, fifth, and sixth-grade levels with the difference being significant for the fourth and fifth grade. He attributes this faster sprint time for Negroes to faster reflexes. This conclusion was based upon studies by Brown (14), Lautenbach and Tuttle (42), and Westerlund and Tuttle (69) who had all reported results indicating a high relationship between speed and reaction
or reflex time. Lambeth and Lanier (41) made an intensive study on racial differences in speed of reaction using thirty 12 year old whites and thirty 12 year old Negroes. Their results show no race differences in speed of simple manual movement, but as the performance becomes more complex the whites exceed the Negroes in proportion to the complexity. Catherine Harmon (29) used the Miles Reaction Time Board to obtain measurements with which to compare Negro and white pre-school children with respect to speed of simple reaction. She found that the two races did not differ significantly on this variable. Rhodes (55) found negligible differences between Negro and white children compared on the following motor ability tests: the walking path test, the needle throwing test, the three-hole test, and the stylus tapping test. Goodenough (26), in her study of pre-school children, shows a low positive correlation between scores on certain intelligence tests in which speed is a factor and simple reaction time.

Since World War II and especially since the Korean conflict, much more emphasis has been placed on the physical fitness of American youth (3). This emphasis was due partly to the high draftee rejection rate during the Korean conflict
and to the results of studies comparing American youth with youth of other countries (33, 37, 38, 39). These comparisons between scores of youngsters in other countries and those of American children showed that boys and girls from the United States were not as physically fit as those of some other lands in the qualities measured (4, p. 9). During this period of renewed emphasis on physical fitness, the integration of Negro and white students in American schools has become a reality. The result has been several recent studies comparing Negro and white subjects on measures of physical fitness. Hippie (31), for example, motivated improvement in speed of reaction and movement in thirty Negro and white boys (age 12-14 years) by a loud sound which signaled slow responses. There were no measurable differences before motivation. Improvement in Negro speed was extremely variable and not statistically significant; it was negatively correlated ($r = -.42$). Tension of whites increased under motivation.

Ponthieux and Barker (53) obtained statistically significant relationships between race and the measures of physical fitness included in the AAHPER Youth Fitness Test. The entire population, except for medical deferments and
absenteeism, of fifth and sixth-grade pupils in a Central Texas county were used as subjects. Statistically significant differences were found in five of the seven sub-tests favoring the Negro boys. The tests in which the Negro boys exceeded the white boys were pull-ups, standing broad jump, fifty-yard-dash, softball throw, and the 600-yard run-walk. The conclusion drawn from these findings was that among the upper elementary grade school children there are relationships between race and some measure of physical fitness. Results were reported by Espenschade (25) who found that significantly more Negro boys pass the Kraus-Weber test than do white boys.

Barker and Ponthieux (7) found that racial differences in physical fitness generally favored Negro pupils to a greater extent after partialing out the socioeconomic variable. Negro schoolboys exceeded white boys to a statistically significant extent in six of the seven fitness tests. In a similar study by Berger and Paradis (11), results supporting the findings of Barker and Ponthieux were reported. In this study, the means of Group A (Negro boys) indicated a higher fitness level than the means of Group B (white boys) on all test items and on the composite fitness score. The only means that were significant, however, were shuttle run,
50-yard dash, 600-yard run-walk, and the composite fitness score, all favoring the Negro boys (11, p. 668).

The studies reviewed indicate that a difference does exist between Negro and white subjects on measures of physical fitness. No studies were found, however, for subjects beyond the seventh grade level. An important part of the present investigation was to extend the study of differences between Negro and white boys on measures of physical fitness to include subjects at the high school level.

Attitudes

The attitudes possessed by an individual student may be attributed to several different factors. Ahmann and Glock (1, p. 42) suggest that "attitudes pertain to a pupil's predisposition to react in a particular manner to certain ideas, objects, people and events." Campbell defines attitudes as "generalized emotionalized feelings about anything" (18, p. 470). As emotionalized feelings they are characterized by a quality of intensity which ranges in all degrees from "strongly for" to "strongly against." He further states that the acquisition of attitudes themselves constitute a learning process which is similar to the attainment of motor skills or academic knowledge. Borg says, "The attitudes of
subjects often must be considered in the research design because this variable can have a significant effect upon the subject's performance on other measures" (12, p. 110).

Several attempts have been made to measure attitudes associated with physical education but research shows that very few reliable and valid attitude scales have been developed (2). In 1950, a review and analysis of various tests in the field of physical education, presented by the National Research Council of the American Association for Health, Physical Education, and Recreation did not list one attitude scale in physical education as meeting the established criteria (46).

The attitude scale encountered most often in recent research studies of physical education was developed by Wear (66) using the procedure described by Lickert (44). Prior to this time, most of the attitude studies in physical education had been of the questionnaire type concerning likes and dislikes, features of the program, or administrative practices (56, 66). The Thurstone (63) method of attitude scaling was used in several of the earlier studies. In 1930 and 1931, Stalnaker (59) studied the attitudes of college students toward intercollegiate athletics by the use of a list of
scaled statements. A Thurstone-type scale for testing the attitudes of college women toward physical activity as a means of recreation was used by Moore (45) in 1941. The Thurstone method of scaling was also used in 1945 by Carr (19) to study the relation between success in physical education and attitudes of high school girls.

The Wear Attitude Inventory (66) was developed using the Lickert method. The original test was made up of 120 items. The test is now available in Short Forms A and B made up of 40 items. This test was developed to study the attitudes of college students toward physical education.

A split-half reliability of .93 was found for the Short Form as well as a correlation of .81 when compared with graphic self-ratings from the same subjects. Wear concludes that, "Through responses to a relatively small number of statements related to the outcomes sought by means of physical education activities it is possible to secure a reliable and valid evaluation of attitude toward physical education" (66, p. 122).

The Wear Attitude Inventory is today used by many of the studies of attitudes related to college age students. Brumbach (15), using the Wear Attitude Inventory, Short Form
A, measured the attitude toward physical education of all male, lower division students entering the University of Oregon in September, 1960. The results indicated that, as a group, these students had a rather favorable attitude toward physical education. In comparing the mean score of this group with the means reported for two somewhat similar groups, the Oregon Students' scores were significantly higher. In comparing various subgroups, the following conclusions were made: Athletes have a better attitude than non-athletes, the more years of physical education a student has had in high school the better his attitude is likely to be, and students who attended smaller high schools (enrollment under 300) have better attitudes than those from larger high schools. Results similar to these were reported by Keough (35) who studied attitudes toward general benefits or values of physical education.

Vincent (64) using the Wear Attitude Inventory for physical education, compared 188 college women on attitude scores toward physical education and success in physical education courses as measured by the final grades achieved in activity courses. She found that, "There is a significant relationship between expressed attitudes and success in
physical education, with the higher significance accruing to those subjects expressing more favorable attitudes" (64, p. 130). No attempt was made in this study to draw conclusions as to the cause and effect relationship between attitude and success. Results of studies by Bell and Walters (8) and Broer, Fox, and Way (13) were similar to those reported by Vincent.

The Wear Attitude Inventory was again used by Vincent (65) as the measure of attitudes toward physical education in a study to compare attitudes and strength and efficiency with success in physical education. She found that among the variables studied as possible contributors to success in physical education activities, the attitude measures were of the highest significance, with strength showing a positive relationship, and efficiency a negative relationship (65, p. 505).

Berger and Layne (9) used the Wear Attitude Inventory in a study to determine if attitudes toward a college physical education class could be predicted from measures of strength and motor ability. The results of this study indicate that attitude toward physical education can be predicted from muscular strength and motor ability, although the predictive ability is low. The power component of motor ability, rather
than the component of strength alone, seems to be of primary importance for predicting attitude toward physical education.

Campbell (18) used the Wear Attitude Inventory as the instrument to measure attitudes toward physical education for junior high age boys. The instrument was administered to one randomly selected physical education class of seventh-grade boys, one class of eighth-grade boys, and one class of ninth-grade boys. The results of this study indicated that the Wear Attitude Inventory can be administered to junior high school boys with the expectation that the results will be meaningful. The mean Inventory score for each grade was found to be superior to or equal to the mean reported in Wear's (66) validation study. A significant chi-square was found for the distribution of Inventory scores of the three junior high school grades. A biserial coefficient of correlation item analysis which was computed for each of the three grades established that the 30 items correlated significantly with the total score and that the item score also had a significant correlation with the Inventory category score. On the basis of these results, the conclusion was advanced that the Wear Attitude Inventory was an appropriate instrument to measure attitudes of junior high school boys toward physical education (18, p. 893).
Form A of the Wear Attitude Inventory was used by Campbell (17) to measure the relationship between attitude scores and measures of physical fitness for eighth-grade boys. His conclusions suggest that no relationship exists between the ability to perform a fitness test and the attitude toward physical education as measured by scores on a standardized attitude inventory. To further clarify his results, the attitude inventory scores were divided into three groups, the top 25 per cent of the scores, the bottom 25 per cent, and the composite of the middle 50 per cent. A correlation analysis was then computed for each of the three groups of scores to determine the relationship of the grouped attitude scores to the fitness scores. The results of this computation reaffirmed the conclusion that no relationship existed between attitude scores and fitness scores (17, pp. 472-473).

Attitude scores were obtained from 165 high school boys using the Physical Activity Inventory developed by Sonstroem (48), in a study designed to test the relationship between physical fitness, self-esteem, and attitudes toward physical education. This inventory was designed to assess two aspects of a person's self-perceived relationship to physical activity; (1) an estimation of his capability in vigorous physical
activities and (2) his attraction to and liking for vigorous physical activities. This inventory yielded two sub-scores titled "Estimation" and "Attraction."

Results of this study provided evidence that physical fitness was related to self-perceived attitudes in relation to physical activities. The "high-fit" adolescent boys conceived of themselves as more capable at, and more attracted to, physical activities than did the "low-fit" boys. In addition, the Attraction sub-scale of the PAAI was found to be significantly correlated with the extent of participation in voluntary physical activities. The results of this study were supported in a study by Strong (60).

Edgington (24) used the Lickert method for developing an attitude scale to be used to measure the attitudes of high school freshmen boys toward physical education. The reliability of the final form of this scale was found to be .86. After the Spearman-Brown prophecy formula was applied to estimate the reliability for the full length of the test, the estimate of reliability of the final form was .92. The validity of the instrument was determined by comparing the results of 30 students taking the test with the subjective
judgments of a jury composed of instructors. The importance of this study is that it shows that the attitudes of the younger high school student toward physical education can be measured successfully. Drinkwater (23) also used the Lickert method for developing an attitude scale toward physical education for high school girls. The results obtained from this study paralleled those of Edgington (24) again showing that an attitude scale could be developed for successfully measuring attitudes toward physical education of younger high school subjects.

Although several studies have been reviewed showing a relationship between physical education and attitudes toward physical education (8, 13, 19, 47, 60, 64, 65), none were found for students at the elementary level. The Wear Attitude Inventory was found to be a valid and reliable instrument for students at the junior high school level through the college level, but had not been used successfully at a lower grade than this. For this reason, a search was made for an instrument that could be used successfully at the elementary level as well as the high school level.

The Semantic Differential developed by Osgood, Suci, and Tannenbaum (49) is an operational measure of theoretical
position on meaning. The attitudinal component is its evalu-
Uative dimension of semantic space. The Semantic Differential
is held to provide a representation of three major dimensions
of word meaning: activity, potency, and evaluation. Each
dimension has consistently appeared upon factor analysis of
the bipolar scales used in the instrument. The scales provide
a rating which includes direction and intensity so that any
given scale can be graphed to produce a point in space. This
point is regarded as defining the meaning of a concept, sign,
or symbol.

Differences in meaning between individuals become a
function of the differences in their personal allocation of
the linguistic sign to a point in space. The extent to which
a group has homogeneity of meaning for a concept is the extent
to which points in space tend to cluster, cloud, or scatter.
The Semantic Differential can thus be used to provide evidence
of the extent of homogeneity of the meaning of a concept.
The attitudes of the group toward the concept can also be
measured with the Semantic Differential.

Under factor analysis, the Semantic Differential provides
an evaluative factor which can be regarded as the attitudinal
dimension. To index an attitude, a set of scales which have
high loadings on the evaluative factor and low loadings on the other factors is required. If such a set is available it provides the basis upon which comparisons among groups and concepts can be made regarding direction and intensity of attitudes.

The Semantic Differential has been used to determine attitudes toward physical education using male subjects of six different groups (48). These groups were made up of eleventh-grade students, first-year physical education major students, third-year physical education major students, graduate students excluding physical education, academic staff excluding physical education, and junior and senior high school teachers excluding physical education majors. The results of this study indicate that physical education is considered an important part of the curriculum and that physical education as a profession was held in fairly high esteem.

Hallworth and Waite (28) have also used the Semantic Differential to study the value judgments of adolescents. Thirty-six concepts on scales taken from Osgood's three dimensions were given to 155 boys and 128 girls in the fourth year of secondary school. For each subject one
evaluative score was obtained on every concept and the scores were intercorrelated and factor analyzed for boys and girls separately. After preliminary factor analysis, the axes were rotated successively to the Varimax and Promax criteria. The results of the two analyses were generally of the kind that had been anticipated. The Promax factor showed boys to have more attitudinal associations with ambition and study, girls with self and home. Both analyses showed that for the boys, the most important cluster of concepts centers around success, ambition, reward and the future and includes both games and study. For the girls, the principal cluster is concerned with the feminine image and the future. This study indicated that the Semantic Differential can be used as a measure of value judgments held by adolescents toward such concepts as school, authority, money, and youth (28, p. 209).

Academic Achievement

Many attempts have been made to use different types of physical fitness measures to predict success in other areas such as performance on other measures of physical fitness, grade achievement in physical education, growth and development, personality, and academic achievement. Mohr (44) and
Ponthieux and Barker (52), for example, have studied the interrelationship between scores of the sub-tests of the American Association for Health, Physical Education, and Recreation (AAHPER) Youth Fitness Test. Results showed that relationships were low but were all positively related. Berger and Mabee (10) have demonstrated a highly significant relationship of .001 between the AAHPER Youth Fitness Test and measures of dynamic strength. Solley (57), in an attempt to relate the ratio of physical development with motor coordination, found no relationship between the size of the individual and his coordination.

Measures of grip strength were compared to physical education achievement grades for college men in a study by Tinkle (62). A positive significant relationship was found between these two variables. These findings were supported by Wessel (63) who found that grip strength among women was significantly related to achievement in physical education courses as measured by grades.

Several attempts have also been made to relate physical fitness scores to such indexes as height, weight, age, and sex. Gross and Cassiani (27) found the factors of age and height, singly or in combination to be of little value as
classifiers for senior high girls, junior high girls, senior high boys, or junior high boys in their ability to perform physical tasks. Bachman (6) obtained essentially the same results when attempting to relate motor learning and performance to age and sex. Similar results were also reported by Asmussen and Hieball (5) and by Dowell (22).

Scores of physical fitness measures have been used by various investigators to determine their usefulness in predicting success or failure in other areas as well as in physical education. Winter concludes that although many years of work have gone into refining intelligence and aptitude tests which would accurately predict academic achievement, we seem to have approached a practical limit to their predictive validity. Most good tests of this type generate correlations averaging about .50 with grades (70, p. 183). Interest has grown in determining the influence of nonintellectual factors such as values and motivation on achievement, and we have seen the recent development of paper and pencil personality inventories which predict high school and college grades, often as well or better than the usual aptitude test (16, p. 253). This idea has also spread to physical education.
The relationship between personality tests and physical fitness tests has also been studied in recent years. Ismael (34) found that personality was positively related to general motor ability. Studies by Sperling (58) and Tillman (61) also revealed a relationship between these variables. Weber (67), however, found no significant relationship between physical fitness scores and personality as measured by the Minnesota Multiphasic Personality Inventory.

Physical fitness tests are also being used as possible predictors of academic achievement. Hart and Shay (30) tested the relationship between scores on the Physical Fitness Index and academic achievement (grade point average) and Scholastic Aptitude. Relations between the Physical Fitness Index and SAT (Scholastic Aptitude Test) were not found to be significant. When the effects of the SAT test were deleted, the correlation between the Physical Fitness Index and Academic Achievement was significant at the .01 level. It was concluded that although physical fitness is not a general predictor of academic success, it is high enough to be considered as a necessary factor for the improvement of academic index in the general education of the college student (30, p. 445).

A relationship between the Physical Fitness Index and academic achievement test scores was found in a study by
Clark and Jarmon (20). Results showed a consistent tendency for high groups on the experimental strength and growth tests to have a higher mean on both the standardized academic achievement tests and in grade point averages. Of the various fitness tests used, the Physical Fitness Index was the only one to demonstrate significant differences between academic achievement and the high and low scores on the fitness index at the three different age levels.

Weber (67) studied the relationship between physical fitness scores and grade point averages for one academic year. His findings indicate that good physical fitness, as measured in this study, tended to accompany achievement of academic success during the year for which the subjects were studied. It was concluded that these results indicate that physical fitness should be given consideration when attempting to predict academic success for entering male freshmen.

In a study comparing intellectual and nonintellectual variables, Ismael, Kane, and Kirkendall (34) found positive correlations between the intellectual items and the coordination items. The conclusion was made that evidence points to a positive relationship between some motor aptitude items, especially coordination and balance, and well established measures of intelligence and scholastic ability (34, p. 91).
Physical ability was compared with I. Q. scores as predictors of academic standing by Ray (54). The results of this study show physical ability to be a more reliable predictor of academic standing than relative I. Q.

Summary

Differences between Negroes and whites have been studied by physical educators as well as by psychologists and sociologists. Several studies conducted in the early 1920's through 1930's compared Negro and white subjects on physical abilities, reaction time, and speed. These studies indicate that there are differences in the abilities of Negro and white subjects to perform simple physical tasks, especially those relating to speed. More recently, Negroes and whites have been compared on measures of physical fitness. Studies of subjects through the seventh-grade level have yielded results favoring the Negro subjects. No studies were found comparing Negroes and whites on measures of physical fitness at higher levels than the seventh grade. Pertinent to present investigation is the extension of this comparison to the high school level.

Several attempts have been made to measure attitudes toward physical education but research shows that few
reliable and valid attitude scales have been developed. The Wear Attitude Inventory has generally been considered to be the best attitude scale available for measuring attitudes toward physical education but has not been satisfactorily used for subjects below the junior high school level. For this reason the Wear Attitude Inventory was discarded in favor of the Semantic Differential which can be used at all levels.

Comparisons between physical fitness and academic achievement have been demonstrated to show a positive relationship. An important part of the present study was to determine if the relationship between academic achievement and physical fitness for Negro boys was comparable in direction and magnitude to the same relationship for white boys.
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CHAPTER III

PROCEDURES FOR GATHERING AND TREATING THE DATA

The purpose of this chapter is to describe the sample and the measurement instruments, explain the method of data collection, and to describe the treatment of the data.

Description of the Sample

The four hundred subjects of this study were comprised of one hundred Negro and one hundred white fifth and sixth-grade boys plus one hundred Negro and one hundred white ninth and tenth-grade boys. The high school sample was taken from a large, integrated, metropolitan school district in the North Central Texas Area. The sample for the elementary schools consisted of three schools from the same metropolitan area that provided the population of the high school sample. Subjects included only boys enrolled in the fifth, sixth, ninth, and tenth grades and who were presently participating in physical education class. Classes at the fifth and sixth-grade level were all at least 45 minutes in length. Ninth and tenth-grade classes were one hour in length. All classes were taught by a qualified physical education instructor.
Fifth and sixth-grade boys falling between the ages of ten and thirteen were selected for the study. Students who did not fall within this age limit, were absent on either of the two testing days, or had no recorded scores for the Stanford Achievement Test were excluded from the study.

The total enrollment of the white fifth and sixth-grade physical education classes tested was 118 boys. Of this total, sixteen boys were excluded from the study as follows: seven boys were overage; three boys had no recorded scores on the Stanford Achievement Test; five boys were absent during at least one testing period; and one student, who was otherwise qualified for testing, was of Latin-American origin rather than Negroid or Caucasian. The total enrollment of the Negro fifth and sixth-grade physical education classes tested was 137 boys. Of this total, thirty-four were excluded from the study as follows: three boys were overage; twenty-four boys had no recorded scores on the Stanford Achievement Test; and seven boys were absent during at least one testing period. The total available sample of fifth and sixth-grade boys was made up of 102 white boys and 103 Negro boys.

One hundred Negro boys were selected from the total available population by randomly eliminating three subjects.
Proportional numbers of white boys for each level were then randomly selected from the total available population. The age distribution of the fifth and sixth-grade sample is presented in Table I.

TABLE I

AGE DISTRIBUTION OF FIFTH AND SIXTH-GRADE SAMPLE

<table>
<thead>
<tr>
<th>Age</th>
<th>Negroes</th>
<th>Whites</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>11</td>
<td>50</td>
<td>48</td>
</tr>
<tr>
<td>12</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Two more subjects in the eleven year age level had to be used for the Negro sample than were available from the white sample. Two subjects, age twelve years and zero months, were selected from the white sample to equalize this imbalance.

Ninth and tenth-grade boys between the ages of fourteen and seventeen were also included in the study. Ninth and tenth-grade students, as with the fifth and sixth-grade sample, were excluded from the study who did not fall within the age
limit, were absent on either of the two testing days, or had no recorded scores for the Stanford Achievement Test.

The total enrollment of the white ninth and tenth-grade physical education classes tested was 121 boys. Of this total, eighteen boys were excluded from the study as follows: eight boys were overage; four boys had no recorded scores on the Stanford Achievement Test; five boys were absent during at least one testing period; and one student, who was otherwise qualified for testing, was of Latin-American origin rather than Negroid or Caucasian. The total enrollment of the Negro ninth and tenth-grade physical education classes tested was 195 boys. Of this total, seventy-one boys were excluded from the study as follows: three boys were overage; thirty-eight boys had no recorded scores on the Stanford Achievement Test; and thirty boys were absent during at least one testing period. The total available sample of ninth and tenth-grade boys was made up of 103 white boys and 124 Negro boys.

One hundred white boys were selected from the total available population by randomly eliminating three subjects. Proportional numbers of Negro boys were then randomly selected from the total available population.
The number of subjects from each age group who were selected for the study from each ethnic group are shown in Table II. Each age level was represented by the same number of subjects from each ethnic group.

**Instruments**

**Physical Fitness**

Physical fitness was measured by administering three sub-tests of the American Association of Health, Physical Education, and Recreation Youth Fitness Test. The three sub-tests used were sit-ups, broad jump, and softball throw. Selection of these three sub-tests was based on an analysis
of the AAHPER Youth Fitness Test by Ponthieux and Barker (13). By using factor analysis, it was determined that the results of the seven sub-tests of the battery represented three factors. Factor I was named "circulorespiratory endurance" from an earlier study by McCloy (7). Pull-ups, sit-ups, and 600-yard run-walk loaded high on this factor. The sub-test sit-ups was chosen to represent Factor I in this study.

Factor II was named "gross body coordination" from an earlier study by Larsen (6). This factor was well represented by a single high loading on the softball throw which was chosen to represent Factor II in this study.

Factor III was named "muscular explosiveness" and was represented by high loadings on broad jump, fifty yard dash, shuttle run, pull-ups, and 600-yard run-walk. The broad jump was chosen to represent Factor III in this study.

Attitudes

The instrument used to assess the student's attitude toward physical education was a form of the Semantic Differential (SD). The Semantic Differential was developed by Charles Osgood as an instrument to objectively measure the connotative meaning of concepts. In Osgood's design for measuring connotative meaning, the subject's ratings of
semantic scales (in terms of direction and intensity) are projected as points into what he calls "semantic space."

Each semantic scale is defined by a pair of polar adjectives or adjectives opposite in meaning. His scale is assumed to represent a straight line function that passes through the origin of this space. A sample of these spaces is assumed to represent a multi-dimensional space (12, p. 25).

No standard scales or concepts have been developed for the SD. Concepts and scales for a given study depend on the "purposes of the research" (12, p. 76). A SD instrument is a number of seven point bipolar adjective scales, selected for appropriateness, to rate concepts relevant to the particular research study. For these reasons, the SD is a technique of measurement rather than an actual test.

Although the SD is considered an experimental measuring instrument, its use has been widespread during the past ten years. Smith (14, pp. 209-213) compiled a bibliography of 113 investigations employing the SD as the measuring instrument. Kerlinger (5, p. 578) states, however, that the SD has been rarely used in educational research.

Osgood (12, p. 127) points out that the proper approach to reliability is based on the reproducibility of scores in a test-retest situation. Therefore, the concern is for
error of measurement rather than determination of a coefficient of reliability such as \( r \). Osgood's first factor analysis showed a mean average deviation of 1.20 scale units. Osgood (12, p. 131) reports a study by Luria in which reliabilities of 150 items were assessed over test-retest intervals of a few minutes, 6-8 weeks, and 12-15 weeks. For the three periods, average absolute deviations between .74 and .90 were obtained for all scales. Measurement error increased somewhat with time. In a study by Bopp, also reported by Osgood, average absolute differences of .25 were obtained for evaluative factors and .36 for potency and activity combined.

A pilot study was conducted using the Semantic Differential form used in this study (Appendix B). Subjects consisted of 36 fifth-grade students made up of 9 Negro boys and 27 white boys. The same test was administered two days later to the same subjects. The order of the concepts and the order and direction of the descriptive scales were randomly changed to reduce the possibility of ordering effects. A correlation of .89 was obtained for the two tests using the Pearson Product-Moment Correlation. Average differences between scale positions on the two tests were obtained for
each descriptive scale. The largest difference found was 1.22 scale units for the descriptive scale "important-unimportant" used in the evaluation of the concept "Sports." The descriptive scale "wise-foolish" as used to evaluate the concept "Skills" had the smallest average difference of .28 scale units.

No independent criterion of meaning is known, therefore, validity of the SD has to be based on face validity. In this case "face validity" is interpreted to mean that factors are represented by those concepts that people would probably cluster together upon administration of the instrument. Osgood states that "throughout our work with the semantic differential we have found no reasons to question the validity of the instrument on the basis of its correspondence with the results to be expected from common sense" (12, p. 141).

Reeves, in a study reported by Osgood, found the evaluative locations of TAT pictures judged by subjects against the differential to correlate significantly with clinical judgments of stories told about the pictures by the same subjects (12, pp. 142-143).

The validity of the dimensions of meaning originally identified by Osgood has been subjected to examination by
Staats and Staats (15). In a classical conditioning situation, they paired words with words that had been judged to load high on the evaluative factor such as "ugly and bitter" or "happy and sacred." These words paired with negative terms take on negative connotations and those paired with positive terms became positively oriented.

Moss, in a 1960 progress report of SD research, concluded that "the semantic differential is measuring 'something' consistently and in a meaningful fashion, and that, in this respect, it is already a useful instrument" (10, p. 53).

Osgood proposes two criteria to be met in the development of a Semantic Differential form. First he recommends selection of concepts that are relevant to and representative of the area of research interest. The concepts judged in this study were "Sports, Games, and Skills" as they are related to "Physical Education."

The second recommendation is that scales selected should be (a) composed of the three main factors isolated in Osgood's work—evaluation, potency, and activity, and (b), relevant to the concepts being judged.

In this study the format conforms to Osgood's Form II. Approximately 8 of the scales are evaluative, 2 potency and
All of the scales utilized in the present investigation with the factors around which the pairs tended to cluster in prior factor analyses are shown in Table III.

**TABLE III**

**FACTOR REPRESENTATION OF SCALES SELECTED FOR CONCEPT RATINGS**

<table>
<thead>
<tr>
<th>Adjective Scale</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wise--Foolish</td>
<td>Evaluative</td>
</tr>
<tr>
<td>Full--Empty</td>
<td>Activity</td>
</tr>
<tr>
<td>Strong--Weak</td>
<td>Potency</td>
</tr>
<tr>
<td>Pleasant--Unpleasant</td>
<td>Evaluative</td>
</tr>
<tr>
<td>Clean--Dirty</td>
<td>Evaluative</td>
</tr>
<tr>
<td>Active--Not Active</td>
<td>Activity</td>
</tr>
<tr>
<td>Important--Unimportant</td>
<td>Evaluative</td>
</tr>
<tr>
<td>Complete--Incomplete</td>
<td>Evaluative</td>
</tr>
<tr>
<td>Happy--Sad</td>
<td>Potency</td>
</tr>
<tr>
<td>Fair--Unfair</td>
<td>Evaluative</td>
</tr>
<tr>
<td>Useful--Useless</td>
<td>Evaluative</td>
</tr>
<tr>
<td>Good--Bad</td>
<td>Evaluative</td>
</tr>
</tbody>
</table>
These scales were taken from several sets of bipolar adjective pairs which had been factor analyzed in connection with a variety of research purposes. Five primary sources of the scales were Osgood (12), McCroskey (8), Husek and Wittrock (3), Smith (14), and Olson (11). The scales appear in random order and the polarity of the bipolar adjectives was established randomly. These procedures tend to counteract bias tendencies.

Attitude scores were determined from results of the Semantic Differential in the following manner:

1. Each scale position of the Semantic Differential form was given an assigned value. The unfavorable pole was arbitrarily assigned a value of "1". Values assigned to the succeeding positions were increased by a progression of "one" so that the most favorable of the seven positions had a value of "seven." A neutral attitude was represented by the middle scale position which had the assigned value of "4".

2. A Pearson product-moment correlation of raw scores was calculated yielding an intercorrelation matrix of every scale with every other scale.

3. The intercorrelation matrix was subjected to a principal axis factor analysis followed by a varimax rotation to produce a factor loading for each scale.
4. Scales with high loadings on the evaluative factor were recognized as measures of attitude.

5. The attitude score was derived by summing the raw scores of scales recognized as measures of attitude by their high loadings on the evaluative factor.

Academic Achievement

Achievement test scores for each subject were obtained from the cumulative records of the school. For the purposes of this study, only the composite score from the Stanford Achievement Test was used. All scores were recorded as grade equivalent scores.

Method of Data Collection

Students were tested during their regularly scheduled physical education classes on all measures except the Stanford Achievement Test. All test data were collected during January and February of the 1969-70 school year. Two days were required for each class with the following schedule:

1. Academic achievement test scores were obtained from the cumulative school record of each subject prior to the administration of further tests.

2. The Semantic Differential for determining attitudes toward physical education was administered prior to, but
during the same class period as tests of physical fitness.

3. Performance on the physical fitness sub-test, broad jump, was measured and recorded.

4. Performance on the physical fitness sub-test, sit-ups, was measured and recorded.

5. Performance on the physical fitness sub-test, softball throw, was measured and recorded.

The three sub-tests of the AAHPER Youth Fitness Test were administered according to the manual of instructions published by the American Association for Health, Physical Education, and Recreation (1) (Appendix A). These tests were administered by physical fitness examiners thoroughly trained in the testing procedure.

Treatment of the Data

In this study the .05 level of confidence was used to reject the null hypotheses. The following methods were used to analyze the data:

1. To test the difference between Negro and white subjects on measures of physical fitness (Hypotheses one, two, three, and four), Student's \( t \)--test for significant differences between means was used. The formula for this test is

\[
t = \frac{X_1 - X_2}{SDx}
\]

(2, p. 254)
2. The relationship of selected factors and physical fitness of white and Negro students (Hypotheses five and six) was determined in the following manner:

a. A Pearson product-moment correlation coefficient was calculated for the relationship between each selected factor and physical fitness. Correlations were calculated separately for Negro and white students.

b. The significance of the difference between Negro and white students on each measure was determined by using the \( z \) technique for finding the significance of the difference between correlations. McNemar (9) suggests that the \( r \)'s be changed into Fisher's \( Z \)-statistic by use of the appropriate table. The standard error of the difference between the two \( Z \)'s was determined by the following procedure:

\[
SD_z = \frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}
\]

The value of \( z \) was determined by the following procedure:

\[
z = \frac{Z_1 - Z_2}{SD_z}
\]

The significance of \( z \) was determined by consulting the appropriate table.

3. Differences obtained between Negro and white students at the fifth and sixth-grade level were compared with
differences found between Negro and white students at the
ninth and tenth-grade level for direction and magnitude.

Summary

The subjects used in this study, the measuring instru-
ments, the methods for collecting the data, and the statistical
procedures employed were explained in this chapter. The
subjects for this study consisted of two hundred Negro and
two hundred white boys. One hundred Negro and one hundred
white boys were sampled from each of two levels, the fifth
and sixth-grade level and the ninth and tenth-grade level. The
measuring instruments were described as a form of the Semantic
Differential for determining attitudes toward physical educa-
tion, the Stanford Achievement Test, and three sub-tests of
the AAHPER Youth Fitness Test. The sub-tests included were
sit-ups, broad jump, and softball throw.
CHAPTER BIBLIOGRAPHY


CHAPTER IV

PRESENTATION, ANALYSIS, AND DISCUSSION OF RESULTS

The purpose of this chapter was to analyze the collected data in order to determine if there was a difference between the performance of Negro and white boys on measures of physical fitness and to determine if this difference was related to attitudes toward physical education and academic achievement.

To accomplish this purpose, the chapter was divided into three parts:

1. A presentation and analysis of the results of the Semantic Differential.

2. A presentation and analysis of the findings associated with the statistical testing of the hypotheses.

3. A discussion of the findings with respect to the research hypotheses.

Differences between Negroes and whites on tests of physical fitness were determined with the use of Student's t. Relationships between physical fitness and two selected factors (academic achievement and attitude toward physical
education) were determined by using the Pearson product-moment correlation coefficient. The significance of the difference between Negro and white boys on each measure was determined by using the z technique for finding the significance of the difference between correlations.

Factor Analysis of Semantic Differential Data

Attitudes toward physical education were measured with a form of the Semantic Differential. The procedure used for determining an attitude score from the Semantic Differential data was as follows:

1. Means and standard deviations for each scale rating were determined for each concept.

2. Pearson product-moment coefficients of correlation were determined among the mean ratings of the twelve scales used in each concept.

3. Each 12 by 12 matrix of intercorrelations, one for each concept, was subjected to a principal axes factor analysis.

4. Each factor having an eigen value greater than 1.00 was orthogonally rotated according to the varimax technique.

5. The resulting factors were used to determine the value of each scale depending upon the amount of variance accounted for by each factor.
The steps outlined above are of little interpretable value when considered independently. The values obtained for each scale on each factor after varimax rotation indicates the amount of variance accounted for by each factor. A scale is considered to have a high loading on the factor which accounts for the greatest amount of variance.

The means and standard deviations for all the Semantic Differential scale ratings of the "Sports," "Skills," and "Games" concepts were computed (see Appendix C). The ratings were summed for all subjects involved in the study for each concept measured. Mean scale ratings ranged from a low of 5.16 for the scale dirty--clean on the "Sports" concept to a high of 6.75 on the scale useful--useless on the "Skills" concept. With a score of "7" being the highest possible rating and "1" the lowest possible rating, it is evident that the mean scale ratings were positive on all three scales.

Pearson product-moment coefficients of correlation were computed among the mean ratings of the twelve scales used in the evaluation of each of the three concepts: "Sports," "Skills," and "Games." The bipolar adjective scales appear in the same order as they did for the "Sports" concept on the measurement instrument. An intercorrelation matrix was constructed for each of the three concepts (see Appendix D).
Each 12 by 12 matrix of intercorrelations, one matrix for the "Sports" concept, one for the "Skills" concept, and one for the "Games" concept, was subjected to a principal axes factor analysis. With respect to the "Sports" concept, four factors emerged having eigen values greater than 1.00 and were subsequently orthogonally rotated according to the varimax technique. The rotated factor matrix of the scales for the "Sports" concept is presented in Table IV. The scales are listed according to the magnitude of loading on each successive factor.

Four of the twelve scales loaded on factor I. This factor is identifiable as evaluative by the semantic nature of the scales which have the highest loadings on it (most of the variance is accounted for by this factor): fair--unfair, good--bad, pleasant--unpleasant, and complete--incomplete. Factor II is also identifiable as evaluative by the semantic nature of the scales showing the highest loadings: useful--useless and wise--foolish. Happy--sad, not always considered evaluative, had a primary loading of .52 on factor II with a secondary loading of .49 on factor I. Having two or more factors of more or less equal evaluativeness has not been uncommon in Semantic Differential research.
### Table IV

**Rotated Factor Matrix of the Scales for the Sports Concept**

<table>
<thead>
<tr>
<th>Scale</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>$h^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fair—Unfair</td>
<td>.70</td>
<td>.24</td>
<td>-.01</td>
<td>-.01</td>
<td>.54</td>
</tr>
<tr>
<td>Good—Bad</td>
<td>.69</td>
<td>.19</td>
<td>.25</td>
<td>-.05</td>
<td>.58</td>
</tr>
<tr>
<td>Unpleasant—Pleasant</td>
<td>.66</td>
<td>.07</td>
<td>.18</td>
<td>.33</td>
<td>.58</td>
</tr>
<tr>
<td>Complete—Incomplete</td>
<td>.52</td>
<td>-.23</td>
<td>.40</td>
<td>.45</td>
<td>.70</td>
</tr>
<tr>
<td>Useful—Useless</td>
<td>.08</td>
<td>.76</td>
<td>.20</td>
<td>.21</td>
<td>.67</td>
</tr>
<tr>
<td>Foolish—Wise</td>
<td>.23</td>
<td>.72</td>
<td>.10</td>
<td>.03</td>
<td>.58</td>
</tr>
<tr>
<td>Sad—Happy</td>
<td>.49</td>
<td>.52</td>
<td>.17</td>
<td>-.03</td>
<td>.54</td>
</tr>
<tr>
<td>Strong—Weak</td>
<td>.14</td>
<td>.13</td>
<td>.75</td>
<td>.04</td>
<td>.61</td>
</tr>
<tr>
<td>Full—Empty</td>
<td>.16</td>
<td>.12</td>
<td>.71</td>
<td>-.12</td>
<td>.56</td>
</tr>
<tr>
<td>Unimportant—Important</td>
<td>.15</td>
<td>.11</td>
<td>.53</td>
<td>.42</td>
<td>.49</td>
</tr>
<tr>
<td>Not Active—Active</td>
<td>.05</td>
<td>.38</td>
<td>.48</td>
<td>.21</td>
<td>.42</td>
</tr>
<tr>
<td>Dirty—Clean</td>
<td>.05</td>
<td>.20</td>
<td>-.04</td>
<td>.84</td>
<td>.76</td>
</tr>
</tbody>
</table>

The semantic identity of factor III was unclear to the extent that high loadings were obtained for scales usually associated with both **potency** and **activity**. **Potency** was represented by high loadings on the scale **strong—weak**. **Activity** was represented by high loadings on the scales.
full-empty and active-not active. The important-unimportant scale, which usually loads high on the evaluative factor had primary loading on factor III.

The scale dirty-clean, which usually loads high on the evaluative factor was the single high loading on factor IV. This factor was not clearly identifiable as evaluative, potency, or activity.

After principal axes factor analysis, only two factors for each of the concepts of skills and games emerged with eigen values greater than 1.00.

The rotated factor matrix of scales for the "Skills" concept comprises Table V. Those scales having highest loading in the evaluative factor are listed first.

Eight of the twelve scales loaded on factor I. This factor is identifiable as evaluative by the nature of the scales which have the highest loading on it: useful-useless, good-bad, fair-unfair, wise-foolish, important-unimportant, and pleasant-unpleasant. Two scales, sad-happy and full-empty, are not usually considered evaluative, despite primary loading on that factor.

The semantic identity of factor II was unclear as evidenced by scales generally associated with both activity and potency. Active-not active, which usually loads on the
activity factor, had the highest loading on factor II.

Potency was also represented by a high loading on factor II by the scale strong—weak. Two scales, complete--incomplete
and clean--dirty, usually associated with the evaluative factor, also loaded high on factor II.

**TABLE V**

**ROTATED FACTOR MATRIX OF THE SCALES FOR THE SKILLS CONCEPT**

<table>
<thead>
<tr>
<th>Scale</th>
<th>I</th>
<th>II</th>
<th>$h^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful--Useless</td>
<td>.72</td>
<td>.01</td>
<td>.51</td>
</tr>
<tr>
<td>Good--Bad</td>
<td>.69</td>
<td>.12</td>
<td>.49</td>
</tr>
<tr>
<td>Fair--Unfair</td>
<td>.65</td>
<td>.37</td>
<td>.56</td>
</tr>
<tr>
<td>Wise--Foolish</td>
<td>.60</td>
<td>.27</td>
<td>.44</td>
</tr>
<tr>
<td>Important--Unimportant</td>
<td>.57</td>
<td>.22</td>
<td>.37</td>
</tr>
<tr>
<td>Sad--Happy</td>
<td>.54</td>
<td>.43</td>
<td>.48</td>
</tr>
<tr>
<td>Full--Empty</td>
<td>.53</td>
<td>.29</td>
<td>.37</td>
</tr>
<tr>
<td>Pleasant--Unpleasant</td>
<td>.51</td>
<td>.27</td>
<td>.33</td>
</tr>
<tr>
<td>Active--Not Active</td>
<td>.01</td>
<td>.83</td>
<td>.70</td>
</tr>
<tr>
<td>Complete--Incomplete</td>
<td>.31</td>
<td>.66</td>
<td>.53</td>
</tr>
<tr>
<td>Strong--Weak</td>
<td>.32</td>
<td>.57</td>
<td>.43</td>
</tr>
<tr>
<td>Clean--Dirty</td>
<td>.17</td>
<td>.43</td>
<td>.21</td>
</tr>
</tbody>
</table>
The rotated factor matrix of scales for the "Games" concept comprises Table VI. Those scales having highest loading in the evaluative factor are listed first. Factor II was identifiable as evaluative by the semantic nature of scales having the highest loadings.

**TABLE VI**

**ROTATED FACTOR MATRIX OF THE SCALES FOR THE GAMES CONCEPT**

<table>
<thead>
<tr>
<th>Scale</th>
<th>I</th>
<th>II</th>
<th>h²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fair—Unfair</td>
<td>.34</td>
<td>.65</td>
<td>.53</td>
</tr>
<tr>
<td>Sad—Happy</td>
<td>.20</td>
<td>.64</td>
<td>.45</td>
</tr>
<tr>
<td>Pleasant—Unpleasant</td>
<td>.21</td>
<td>.64</td>
<td>.46</td>
</tr>
<tr>
<td>Good—Bad</td>
<td>.29</td>
<td>.64</td>
<td>.59</td>
</tr>
<tr>
<td>Dirty—Clean</td>
<td>.03</td>
<td>.59</td>
<td>.35</td>
</tr>
<tr>
<td>Wise—Foolish</td>
<td>.79</td>
<td>.13</td>
<td>.64</td>
</tr>
<tr>
<td>Strong—Weak</td>
<td>.78</td>
<td>.15</td>
<td>.62</td>
</tr>
<tr>
<td>Active—Not Active</td>
<td>.68</td>
<td>.12</td>
<td>.48</td>
</tr>
<tr>
<td>Full—Empty</td>
<td>.58</td>
<td>.27</td>
<td>.42</td>
</tr>
<tr>
<td>Complete—Incomplete</td>
<td>.57</td>
<td>.25</td>
<td>.39</td>
</tr>
<tr>
<td>Important—Unimportant</td>
<td>.53</td>
<td>.38</td>
<td>.43</td>
</tr>
<tr>
<td>Useful—Useless</td>
<td>.50</td>
<td>.36</td>
<td>.37</td>
</tr>
</tbody>
</table>
Five of the twelve scales had high loadings on factor II. High loadings were obtained for fair--unfair, sad--happy, pleasant--unpleasant, good--bad, and clean--dirty.

Factor I was represented by strong--weak which is usually found to be potency and by active--not active and full--empty which are usually classed as activity. Four scales, useful--useless, wise--foolish, complete--incomplete, and important--unimportant, which usually load on the evaluative factor, had primary loading on factor I.

Scales that loaded primarily on the evaluative factor were of paramount concern since it is the evaluative dimension that is equated with attitude. Five adjective scales were selected on the basis of loadings on the evaluative factor extracted from the three concepts. These scales were useful--useless, happy--sad, fair--unfair, good--bad, and pleasant--unpleasant. The attitude score was derived by summing the raw scores of these five scales on the three concepts.

Inspection of Table IV (page 64) reveals that all five selected scales had primary loading on one of the evaluative factors for the "Sports" concept. All five selected scales also had primary loading on the evaluative scale for the "Skills" concept (Table V, page 66). For the "Games" concept,
however, one of the five scales did not load highest on the evaluative factor. **Useful—useless** was found to have a higher value on factor I (Table VI, page 67). Further examination revealed that the evaluative factor (factor II) claimed enough of the variance, .36 to .50, to include **useful—useless** as an evaluative scale since it loaded high on both of the other concepts.

**Statistical Tests of the Hypotheses**

The difference between Negro and white subjects on measures of physical fitness (Hypotheses one, two, three and four) was determined by using the Student's *t* test for significant difference between means. The formula for this test is

\[
t = \frac{X_1 - X_2}{SDx}
\]

The .05 level of confidence was used to reject the null hypotheses. The critical value needed to reject the hypotheses was 1.96.

**Hypothesis One**—Negro boys will score significantly higher than white boys on gross body coordination. The test used to determine gross body coordination was the soft-ball throw. Results of this test are shown in Table VII.
### TABLE VII

**SIGNIFICANCE OF DIFFERENCE BETWEEN MEAN GROSS BODY COORDINATION SCORES (SOFTBALL THROW IN FEET) OF NEGRO AND WHITE BOYS**

| Level       | White Boys | | | Negro Boys | | | | | | t  |
|-------------|------------|-----------------|-----------------|
|             |            | Mean            | Standard Deviation | Mean            | Standard Deviation | |
| Elementary  | 101.70     | 28.78           |                 | 108.90          | 23.85             | -1.92 |
| High School | 149.54     | 31.58           |                 | 180.29          | 33.02             | -6.70* |

*Indicates significant difference.

The results of the test for significance of the difference between mean scores of gross body coordination (softball throw in feet) for Negro and white boys at the elementary level, as recorded in Table VII, revealed a $t$ of -1.92 which was not significant at the .05 level of confidence. The null hypothesis of no significant difference could not be rejected and the research hypothesis was rejected.

At the high school level, a $t$ of -6.70 was obtained which was significant at beyond the .01 level of confidence. The null hypothesis was rejected and the research hypothesis accepted.
The findings seem to indicate that Negro and white boys at the elementary level are not significantly different although a $t$ of $-1.92$ closely approaches the critical value of $1.96$ needed for significance at the .05 level. The findings indicate that at the high school level, Negro boys perform at a significantly higher rate than do white boys on the test of gross body coordination. The observed difference between the mean scores of Negro and white boys on gross body coordination indicates that the difference is more significant at the ninth and tenth-grade level than at the fifth and sixth-grade level.

**Hypothesis Two**—Negro boys will score significantly higher than white boys on muscular explosiveness. The test used to determine muscular explosiveness was the standing broad jump. Results of this test are shown in Table VIII.

A $t$ of $-2.58$ was found at the elementary level which was significant at the .01 level of confidence. The null hypothesis was rejected and the research hypothesis accepted.

A $t$ of $-4.41$ was obtained at the high school level which was significant at beyond the .01 level of confidence. This led to the rejection of the null hypothesis and the acceptance of the research hypothesis.
TABLE VIII

SIGNIFICANCE OF DIFFERENCE BETWEEN MEAN MUSCULAR EXPLOSIVENESS SCORES (STANDING BROAD JUMP IN INCHES) OF NEGRO AND WHITE BOYS

<table>
<thead>
<tr>
<th>Level</th>
<th>White Boys</th>
<th></th>
<th>Negro Boys</th>
<th></th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>56.11</td>
<td>9.14</td>
<td>59.42</td>
<td>8.94</td>
<td>-2.58*</td>
</tr>
<tr>
<td>High School</td>
<td>68.58</td>
<td>9.96</td>
<td>74.73</td>
<td>9.65</td>
<td>-4.41*</td>
</tr>
</tbody>
</table>

*Indicates significant difference.

These findings seem to indicate that Negro boys perform at a higher level on muscular explosiveness (standing broad jump measured in inches) than do white boys at both the elementary level and the high school level. The observed difference between the mean scores of Negro and white boys on muscular explosiveness indicates that the difference is more significant at the ninth and tenth-grade level than at the fifth and sixth-grade level.

Hypothesis Three—There will be no significant difference between Negro and white boys on the test of circulorespiratory
endurance. The test used to determine circulorespiratory endurance was sit-ups. Results of this test are shown in Table IX.

**TABLE IX**

**SIGNIFICANCE OF DIFFERENCE BETWEEN MEAN CIRCULOESPIRATORY ENDURANCE SCORES (TOTAL NUMBER OF SIT-UPS WITHOUT RESTING) OF NEGRO AND WHITE BOYS**

<table>
<thead>
<tr>
<th>Level</th>
<th>White Boys</th>
<th>Negro Boys</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>Elementary</td>
<td>53.71</td>
<td>36.24</td>
<td>58.61</td>
</tr>
<tr>
<td>High School</td>
<td>78.00</td>
<td>23.12</td>
<td>79.83</td>
</tr>
</tbody>
</table>

A t of -1.08 was obtained at the elementary level, as shown in Table IX. Since this t was not large enough to be significant, the null hypothesis was retained that there was no significant difference between Negro and white boys on the test of circulorespiratory endurance (total number of sit-ups without resting).

The null hypothesis was also retained at the high school level that there was no significant difference between Negro
and white boys on the test of circulorespiratory endurance. At this level, a $t$ of -0.57 was obtained.

**Hypothesis Four**—Negro boys will score significantly higher than white boys on the overall test of physical fitness. The overall fitness score was obtained by converting the scores of the three physical fitness measures to standard scores and summing the standard scores. Fifth and sixth-grade scores were standardized separately from the ninth and tenth-grade scores. Results of overall physical fitness are shown in Table X.

**TABLE X**

SIGNIFICANCE OF DIFFERENCE BETWEEN MEAN OVERALL PHYSICAL FITNESS SCORES OF NEGRO AND WHITE BOYS

<table>
<thead>
<tr>
<th>Level</th>
<th>White Boys</th>
<th></th>
<th>Negro Boys</th>
<th></th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
<td>Standard Deviation</td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>-0.39</td>
<td>2.48</td>
<td>0.39</td>
<td>1.91</td>
<td>-2.61</td>
</tr>
<tr>
<td>High School</td>
<td>-0.77</td>
<td>2.00</td>
<td>0.77</td>
<td>2.01</td>
<td>-5.12</td>
</tr>
</tbody>
</table>

*Indicates significant difference.*
As shown in Table X, a $t$ of -2.61 was obtained at the elementary level which was significant at the .01 level. The null hypothesis was rejected and the research hypothesis was accepted.

A $t$ of -5.12 was obtained at the high school level which was significant at beyond the .01 level of confidence. The null hypothesis was rejected and the research hypothesis accepted.

The findings seem to indicate that Negro boys perform at a higher level than do white boys on overall physical fitness at both the high school and elementary school levels. The observed difference between the mean scores of Negro and white boys on overall physical fitness indicates that the difference is more significant at the ninth and tenth-grade level than at the fifth and sixth-grade level.

The relationship of selected factors and physical fitness of white and Negro students (Hypotheses five and six) was determined in the following manner:

a. A Pearson product-moment correlation coefficient was calculated for the relationship between each selected factor and physical fitness. Correlations were calculated separately for Negro and white students.
b. The significance of the difference between Negro and white students on each measure was determined by using the z technique for finding the significance of the difference between correlations.

The value of \( z \) was determined by the following equation:

\[
z = \frac{Z_1 - Z_2}{SDz}
\]

Because of the directional nature of the hypothesis, a one-tailed test at the 5 per cent level was used to test the hypothesis that there was no difference between the two correlation coefficients. Differences were significant if the \( z \) was as large as 1.65.

The overall physical fitness score was obtained by converting the scores of the three physical fitness measures to standard scores and summing the standard scores. Scores were standardized separately for each of the following four groups: fifth and sixth-grade white boys, fifth and sixth-grade Negro boys, ninth and tenth-grade white boys, and ninth and tenth-grade Negro boys.

Attitudes toward physical education were measured with a form of the Semantic Differential. The Semantic Differential included three concepts: "Sports," "Skills," and "Games." Each of these concepts was comprised of twelve
bipolar adjective scales. After principal axes factor analysis and varimax rotation, five adjective scales were selected on the basis of loadings on the evaluative factor extracted from the three concepts. Scales that loaded on the evaluative factor were of paramount concern since it is the evaluative dimension that is equated with attitude. The scales selected were useful--useless, happy--sad, fair--unfair, good--bad, and pleasant--unpleasant. The attitude score was derived by summing the raw scores of these five scales on the three concepts. The highest possible total score for the three concepts was 105.

As shown in Table XI, correlations were obtained between attitudes and physical fitness from each of the four sub-groups. These correlations were quite low with one sub-group, Negro elementary boys, achieving a correlation (.21) that was significantly different from zero.

The attitude scores were highly skewed to the right as indicated by a mean and standard deviation which would exceed the possible score. Studies have tested the effect on the results of using parametric statistics under non-parametric conditions with the finding that the results are still reasonably accurate, but this might account for the very low correlations.
**TABLE XI**

**CORRELATIONS BETWEEN ATTITUDE TOWARD PHYSICAL EDUCATION AND OVERALL PHYSICAL FITNESS**

<table>
<thead>
<tr>
<th>Group</th>
<th>Attitudes</th>
<th>Physical Fitness</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>White Elementary</td>
<td>96.76</td>
<td>10.66</td>
<td>0.00</td>
</tr>
<tr>
<td>Negro Elementary</td>
<td>98.25</td>
<td>10.07</td>
<td>0.00</td>
</tr>
<tr>
<td>White High School</td>
<td>90.27</td>
<td>10.65</td>
<td>0.00</td>
</tr>
<tr>
<td>Negro High School</td>
<td>97.10</td>
<td>9.81</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*Indicates significant correlation.

Correlations between achievement, as measured by the Stanford Achievement Test, and overall physical fitness are presented in Table XII. Scores of physical fitness are presented as standard scores.

The correlations found in Table XII were obtained for white elementary boys, Negro elementary boys, white high school boys, and Negro high school boys. The only correlation...
large enough to reach significance at the .05 level of confidence was for Negro high school boys.

**TABLE XII**

**CORRELATIONS BETWEEN ACADEMIC ACHIEVEMENT AND OVERALL PHYSICAL FITNESS**

<table>
<thead>
<tr>
<th>Group</th>
<th>Academic Achievement</th>
<th>Physical Fitness z scores</th>
<th>$z$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>White Elementary</td>
<td>54.52</td>
<td>12.14</td>
<td>0.00</td>
</tr>
<tr>
<td>Negro Elementary</td>
<td>46.40</td>
<td>5.77</td>
<td>0.00</td>
</tr>
<tr>
<td>White High School</td>
<td>57.41</td>
<td>16.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Negro High School</td>
<td>42.06</td>
<td>10.90</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*Indicates significant correlation.

**Hypothesis Five**—There will be a significantly higher positive correlation between attitudes toward physical education and physical fitness scores for Negro boys than for white boys.
The correlations between attitudes toward physical education and overall physical fitness for Negro boys was compared with the corresponding correlation for white boys at each level by using the \( z \) technique for testing the significance of the difference between correlations. The results of these comparisons are shown in Table XIII.

**TABLE XIII**

DIFFERENCES BETWEEN CORRELATION COEFFICIENTS OF NEGRO AND WHITE BOYS RELATING ATTITUDES TOWARD PHYSICAL EDUCATION TO PHYSICAL FITNESS

<table>
<thead>
<tr>
<th>Level</th>
<th>Correlations</th>
<th>Fisher's ( z )</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negroes</td>
<td>Whites</td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>.21</td>
<td>.02</td>
<td>1.34</td>
</tr>
<tr>
<td>High School</td>
<td>.03</td>
<td>.08</td>
<td>.35</td>
</tr>
</tbody>
</table>

A \( z \) of 1.34 was found at the elementary level which was not large enough to reach significance at the .05 level of confidence. This led to the rejection of the research hypothesis.

A \( z \) of 0.35 was obtained at the high school level which was not significant at the .05 level of confidence. The research hypothesis was rejected.
The findings indicate that attitudes toward physical education, as measured in this study, are not significantly related to scores of physical fitness. The largest difference occurred at the elementary level where the white boys achieved a correlation of .02 compared to a correlation of .21 for the Negro boys. This difference was not significant, however. Results of this study indicate that attitudes toward physical education would be a poor predictor of success on measures of physical fitness for both Negro and white boys.

**Hypothesis Six**—There will be a significantly higher positive correlation between composite academic achievement scores and physical fitness scores for white boys than for Negro boys.

The correlations between composite scores on the Stanford Achievement Test and overall physical fitness for Negro boys was compared with the corresponding correlation for white boys at each level. The results of these comparisons are shown in Table XIV.

A $z$ of 1.47 was found at the elementary level which was not significant at the .05 level of confidence. This led to the rejection of the research hypothesis.
TABLE XIV
DIFFERENCES BETWEEN CORRELATION COEFFICIENTS OF NEGRO AND WHITE BOYS RELATING ACADEMIC ACHIEVEMENT TO PHYSICAL FITNESS

<table>
<thead>
<tr>
<th>Level</th>
<th>Correlations</th>
<th>Fisher's z</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negroes</td>
<td>Whites</td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>-.18</td>
<td>.03</td>
<td>1.47</td>
</tr>
<tr>
<td>High School</td>
<td>.22</td>
<td>-.16</td>
<td>2.67</td>
</tr>
</tbody>
</table>

A z of 2.67 was obtained at the high school level which was significant at the .05 level of confidence. The results are in the opposite direction of the prediction made in the research hypothesis, thus both the null and the research hypotheses were rejected.

These findings seem to indicate that at the elementary level white boys show a higher positive relationship between academic achievement and physical fitness than do Negro boys. This relationship was reversed at the high school level with the Negro boys showing a higher positive relationship between academic achievement and physical fitness than did white boys.

Discussion of Results
Results of the tests of significance between Negro and white boys on measures of physical fitness were generally
compatible to the predictions made in the research hypotheses. Hypotheses one through four were directly related to the difference between Negro and white boys on measures of physical fitness.

**Hypothesis One**—Negro boys will score significantly higher than white boys on gross body coordination (softball throw measured in feet).

A comparison of Negro and white boys on gross body coordination revealed results favoring the Negro boys. Although results were in the direction hypothesized, the difference between Negro and white boys at the elementary level did not reach the .05 level of confidence. At the high school level the difference was significant at beyond the .01 level of confidence. A comparison of the observed difference between the mean scores of Negro and white boys on gross body coordination (Table VII, page 70) indicates that the difference is more significant at higher grade levels.

**Hypothesis Two**—Negro boys will score significantly higher than white boys on muscular explosiveness (standing broad jump in inches).

Negro boys scored significantly higher on muscular explosiveness at both the elementary and high school level.
A comparison of the observed difference between the mean scores of Negro and white boys on muscular explosiveness (Table VIII, page 72) indicates that the difference is more significant at higher grade levels.

Hypothesis Three—There will be no significant difference between Negro and white boys on the test of circulorespiratory endurance (total number of sit-ups without resting).

No significant difference between Negro and white boys was found at either the fifth and sixth-grade level or the ninth and tenth-grade level on the test of circulorespiratory endurance. The $t$ of -1.08 at the elementary level compared with the $t$ of -0.57 (Table IX, page 73) at the high school level represents the only test of physical fitness studied that did not show an increase in the size of the $t$ at higher grade levels favoring the Negro boys.

Hypothesis Four—Negro boys will score significantly higher than white boys on the overall test of physical fitness.

The test of overall physical fitness, which was the composite score of gross body coordination (softball throw), muscular explosiveness (standing broad jump), and
circulorespiratory endurance (sit-ups), shows Negro boys to score significantly higher at both levels. A comparison of the observed difference between the mean scores of Negro and white boys on overall physical fitness (Table X, page 74) indicates that the difference is more significant at higher grade levels.

**Hypothesis Five**—There will be a significantly higher positive correlation between attitudes toward physical education and physical fitness scores for Negro boys than for white boys.

Correlations between attitude toward physical education and physical fitness scores were found to be quite low. The highest correlation was obtained at the elementary level by Negro boys. The correlation of .21 was the only correlation reaching the magnitude necessary for significance at the .05 level of confidence. Correlations for white elementary boys, white high school boys, and Negro high school boys were all quite low. These results indicated that attitudes toward physical education have little relationship to scores of physical fitness.

The \( z \) test of significance between correlations for Negro and white boys at each level (Table XI, page 78) reveals
no significant difference. This indicates that the relationship between attitudes toward physical education would be a poor predictor of success on measures of physical fitness for both Negro and white boys. As a result of these findings, the research hypothesis was rejected.

**Hypothesis Six**—There will be a significantly higher positive correlation between composite academic achievement scores and physical fitness scores for white boys than for Negro boys.

A low positive correlation was found for white elementary boys and a low negative correlation for Negro elementary boys (Table XII, page 79). Neither of these correlations was found to be significantly different from zero. These correlations were also found to not be significantly different when compared using the $z$ technique for finding the difference between correlations. The research hypothesis was rejected as a result of these findings. Results do not indicate that composite academic achievement scores would be a useful predictor of performance on measures of physical fitness. The positive correlation of .03 for white elementary boys indicates a very low correlation. The correlation of -.18 obtained by Negro elementary boys indicates that high scores
on measures of physical fitness would be of little value as a predictor of academic success.

At the ninth and tenth-grade level the results were completely reversed from those at the elementary level. White boys at the high school level received a correlation of -.16 compared to .22 for Negro high school boys which was found to be significantly different. These results indicate that at the high school level, measures of physical fitness would be a better predictor of academic success for Negro boys than for white boys. However, predictions based on a correlation as low as .22 would be of little practical value. These results were found to be in opposition to the direction of the difference predicted in the hypothesis.

Summary

The major purpose of this chapter was to present, analyze, and discuss the data collected as prescribed in Chapter III. The aim was accomplished through a three-part division of the material:

1. Factor analyses of the Semantic Differential data.
2. Statistical tests of the hypotheses.
3. Discussion of the findings.
Results of the study show a difference favoring Negro boys over white boys at both the fifth and sixth-grade level and the ninth and tenth-grade level on measures of physical fitness.

Relationships between attitudes toward physical education and physical fitness were found to be positive but quite low at each level. No significant difference was found between correlations of Negro and white boys at either the fifth and sixth-grade level or the ninth and tenth-grade level.

Negro boys at the high school level obtained the only significant correlation between academic achievement and physical fitness. A significant difference was found between the correlations for Negro and white boys at the high school level. A low positive correlation was found at the fifth and sixth-grade level for white boys and a low negative correlation was found for Negro boys. The results were reversed at the high school level where a significant positive correlation was obtained by the Negro boys and a low negative correlation was obtained by the white boys.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study was designed with the intention of extending the study of possible differences between Negro and white boys on measures of physical fitness and to determine the relationship of attitudes toward physical education and academic achievement with physical fitness for Negro and white boys. Physical fitness was measured by administering three sub-tests of the American Association of Health, Physical Education, and Recreation Youth Fitness Test. The three sub-tests used were sit-ups (circulorespiratory endurance), standing broad jump (muscular explosiveness), and softball throw (gross body coordination). A Semantic Differential was constructed and modified for use as an attitude measurement instrument in order to determine the subjects' attitude toward physical education. Academic achievement was determined by the composite score on the Stanford Achievement Test. The sample consisted of boys from the fifth and sixth-grades and boys from the ninth and tenth-grades of the same Texas school district. Group
data constituted the basic unit of statistical treatment and analysis.

The subjects participating in this investigation consisted of one hundred Negro and one hundred white fifth and sixth-grade boys and one hundred Negro and one hundred white ninth and tenth-grade boys. The high school sample was taken from a large, integrated, metropolitan school district in the North Central Texas Area. The sample for the elementary schools consisted of three schools from the same metropolitan area that provided the population of the sample high school. Students were tested during their regularly scheduled physical education classes on all measures except the Stanford Achievement Test, the results of which were obtained from the schools' cumulative records. All test data were collected during the Spring semester of the 1969-70 school year.

The hypotheses of this study were tested at both the elementary and high school level. The six hypotheses tested were as follows:

1. That Negro boys would score significantly higher than white boys on gross body coordination (softball throw).

2. That Negro boys would score significantly higher than white boys on muscular explosiveness (standing broad jump).
3. That there would be no significant difference between Negro and white boys on the test of circulorespiratory endurance (sit-ups).

4. That Negro boys would score significantly higher than white boys on the overall test of physical fitness.

5. That there would be a significantly higher positive correlation between attitudes toward physical education and physical fitness scores for Negro boys than for white boys.

6. That there would be a significantly higher positive correlation between composite achievement scores and physical fitness scores for white boys than for Negro boys.

A *t* test for differences between means was used to test the difference between Negro and white boys on measures of physical fitness (Hypotheses one, two, three, and four). Correlations for each ethnic group at each level were obtained between physical fitness and attitudes toward physical education, and between physical fitness and academic achievement. The significance of difference between correlations was determined by the *z* technique. The .05 level of confidence was used to reject the null hypothesis.

Findings

An analysis of the data bearing on the hypotheses revealed the following:
**Hypothesis One:** A mean difference approaching significance was obtained at the fifth and sixth-grade level on measures of gross body coordination (softball throw). Although this difference was in the direction hypothesized, the level of significance was not reached and the research hypothesis was rejected. Negro boys were significantly higher than white boys on gross body coordination at the ninth and tenth-grade level.

**Hypothesis Two:** Negro boys were significantly higher than white boys on muscular explosiveness (standing broad jump) at both the fifth and sixth grade-level and the ninth and tenth-grade level. A larger difference was obtained for the ninth and tenth-grade level than at the fifth and sixth-grade level indicating that the difference favoring Negro boys on muscular explosiveness is greater at higher grade levels.

**Hypothesis Three:** No significant difference was found between Negro and white boys at either the fifth and sixth-grade level or the ninth and tenth-grade level on the test of circulorespiratory endurance (sit-ups). The size of the difference was less at the ninth and tenth-grade level than the difference at the fifth and sixth-grade level.
Hypothesis Four: Negro boys scored significantly higher than white boys on overall physical fitness at both the fifth and sixth-grade level and the ninth and tenth-grade level. The observed difference was greater at the ninth and tenth-grade level than at the fifth and sixth-grade level.

Hypothesis Five: Correlations between attitude toward physical education and physical fitness were found to be positive and quite low for each of the four groups. No significant differences between Negro and white boys were obtained at either level.

Hypothesis Six: White boys at the elementary level obtained a low positive correlation between academic achievement and physical fitness while Negro boys obtained a low negative correlation. These findings were reversed at the high school level with the Negro boys obtaining a low positive correlation and the white boys obtaining a low negative correlation. The correlations were found to be significantly different at the high school level.

Implications

An analysis of the findings revealed the following implications that seemed to have merit:
1. Performance on physical fitness skills has more relationship to the attainment of academic achievement for Negro boys than for white boys.

2. Little of the observed difference between Negroes and whites on measures of physical fitness may be accounted for by attitudes toward physical education and academic achievement.

3. Perhaps physical educators should consider differing activities for Negro and white boys dependent upon different needs in the area of physical fitness.

Conclusions

On the basis of the analysis of the results, the following conclusions are offered with reference to the population studied:

1. Negro and white boys at the fifth and sixth-grade level are not significantly different on measures of gross body coordination (softball throw).

2. Negro boys at the ninth and tenth-grade level score significantly higher on gross body coordination than do white boys.

3. Negro boys score significantly higher than white boys on muscular explosiveness (standing broad jump) at
both the fifth and sixth-grade level and ninth and tenth-grade level.

4. No significant difference exists between Negro and white boys on scores of circulorespiratory endurance (sit-ups) at either the fifth and sixth-grade level or the ninth and tenth-grade level.

5. Negro boys score significantly higher on overall physical fitness than white boys at both the fifth and sixth-grade level and the ninth and tenth-grade level.

6. Attitudes toward physical education are not a reliable predictor of success on measures of physical fitness for Negro or white boys.

Recommendations

Results of the present study indicate further research in several related areas is needed. Recommendations for further research are as follows:

1. Longitudinal studies of differences between Negroes and whites on measures of physical fitness need to be made in order to obtain statistical measures of differences between grade levels.

2. Comparisons of Negro and white subjects at different age levels (e.g., advanced high school level, college level,
post-college level) need to be made. Research of this nature would supply answers to questions such as: (1) does the difference between Negro and white subjects on measures of physical fitness increase at higher age levels; and (2) does the difference between Negro and white subjects reach a leveling off point or do white subjects begin to gain on Negro subjects on measures of physical fitness at a higher age level.

3. A comparison of Negro and white girls at the high school level on measures of physical fitness needs to be made to determine if the same results could be obtained for girls as for boys.

4. The effect of factors other than attitudes toward physical education and academic achievement on physical fitness needs to be studied in order to determine the underlying reasons for the difference between Negroes and whites on physical fitness measures.

Implications from the findings of the preceding recommended research contain potential theoretical as well as practical significance. Questions concerning differences between Negroes and whites may be answered as well as helpful information concerning physical education curricular structure may be procured.
APPENDIX A

DIRECTIONS FOR THE AAHPER YOUTH FITNESS TEST

Test 1 - Sit-Up

Equipment

Mat or floor

Description

The pupil lies on his back, either on the floor or on a mat, with legs extended and feet about two feet apart. His hands are placed on the back of the neck with the fingers interlaced. Elbows are retracted. A partner holds the ankles down, the heels being in contact with the mat or floor at all times. The pupil sits up, turning the trunk to the left and touching the right elbow to the left knee, returns to starting position, then sits up turning the trunk to the right and touching the left elbow to the right knee. The exercise is repeated, alternating sides.

Rules

1. The fingers must remain in contact behind the neck throughout the exercise.
2. The knees must be on the floor during the sit-up but may be slightly bent when touching elbow to knee.
3. The back should be rounded and the head and elbows brought forward when sitting up as a "curl" up.
4. When returning to starting position, elbows must be flat on the mat before sitting up again.

Scoring

One point is given for each complete movement of touching elbow to knee. No score should be counted if the
fingertips do not maintain contact behind the head, if knees are bent when the pupil lies on his back or when he begins to sit up, or if the pupil pushes up off the floor from an elbow. The maximum limit in terms of number of sit-ups shall be 100 sit-ups for boys.

Test 2 - Standing Broad Jump

Equipment

Mat, floor, or outdoor jumping pit, and tape measure.

Description

Pupil stands with his feet several inches apart and the toes just behind the take-off line. Preparatory to jumping, the pupil swings the arms backward and bends the knees. The jump is accomplished by simultaneously extending the knees and swinging forward the arms.

Rules

1. Allow three trials.
2. Measure from the take-off line to the heel or other part of the body that touches the floor nearest the take-off line.
3. When the test is given indoors, it is convenient to tape the tape measure to the floor at right angles to the take-off line and have the pupils jump along the tape. The scorer stands to the side and observes the mark to the nearest inch.

Scoring

Record the best of the three trials in feet and inches to the nearest inch.

Test 3 - Softball Throw for Distance

Equipment

Softball (12-inch), small metal or wooden stakes, and tape measure.
Description

A football field marked in conventional fashion (five-yard intervals) makes an ideal area for this test. If this is not available, it is suggested that lines be drawn parallel to the restraining line, five yards apart. The pupil throws the ball while remaining within two parallel lines, six feet apart. Mark the point of landing with one of the small stakes. If his second or third throw is farther, move the stake accordingly so that, after three throws, the stake is at the point of the pupil's best throw. It was found expedient to have the pupil jog out to his stake and stand there; and then, after five pupils have completed their throws, the measurements were taken. By having the pupil at his particular stake, there is little danger of recording the wrong score.

Rules

1. Only an overhand throw may be used.
2. Three throws are allowed.
3. The distance recorded is the distance measured at right angles from the point of landing to the restraining line.

Scoring

Record the best of the three trials to the nearest foot.
APPENDIX B

DIRECTIONS FOR THE SEMANTIC DIFFERENTIAL

The purpose of this study is to measure the meanings of certain things to various people by having them judge them against a series of descriptive scales. In taking this test, please make your judgments on the basis of what these things mean to you. On each page you will find a different concept to be judged and beneath it a set of scales. You are to rate the concept on each of these scales in order.

Here is how you are to use these scales:
If you feel that the concept at the top of the page is very closely related to one end of the scale, you should place your check-mark as follows:

fair X::::::::: unfair

or

fair :::::::: unequal

If you feel that the concept is quite closely related to one or the other end of the scale (but not extremely), you should place your check-mark as follows:

strong ::X:::::: weak

or

strong :::::::: unequal

If the concept seems only slightly related to one side as opposed to the other side (but is not really neutral), then you should check as follows:

dirty :::::X::: clean

or

dirty ::::::::X::: clean.
The direction toward which you check, of course depends upon which of the two ends of the scale seem most characteristic of the thing you are judging. If you consider the concept to be neutral on the scale, both sides of the scale equally associated with the concept, or if the scale is completely irrelevant, unrelated to the concept, then you should place your check-mark in the middle space:

safe ___:___:___:X:___:___:___ dangerous.

IMPORTANT: (1) Place your check-marks in the middle of spaces, not on the boundaries:

___:X:___:___:___: ___: ___:X:___: ___:

This Not This

(2) Be sure you check every scale—do not omit any.
(3) Never put more than one check-mark on a single scale.

Sometimes you may feel as though you have had the same item before on the test. This will not be the case, so do not look back and forth through the items. Do not try to remember how you checked similar items earlier in the test. Make each item a separate and independent judgment. Work at fairly high speed through this test. Do not worry or puzzle over individual items. It is your first impression, the immediate "feelings about the items," that we want. On the other hand, please do not be careless, because we want your true impressions.
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SKILLS

useful __________ useless
dirty __________ clean
pleasant __________ unpleasant
empty __________ full
wise __________ foolish
unfair __________ fair
not active __________ active
unimportant __________ important
complete __________ incomplete
weak __________ strong
good __________ bad
happy __________ sad
wise __________________________ foolish
weak __________________________ strong
complete _______________________ incomplete
dirty __________________________ clean
unpleasant ______________________ pleasant
unfair __________________________ fair
happy __________________________ sad
full ___________________________ empty
useful __________________________ useless
unimportant ______________________ important
not active _______________________ active
good __________________________ bad
### APPENDIX C

MEANS AND STANDARD DEVIATIONS OF SPORTS, SKILLS, AND GAMES CONCEPTS

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APPENDIX D—Continued

COEFFICIENTS OF CORRELATION AMONG MEAN SCALE RATINGS OF THE SKILLS CONCEPT

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107
### APPENDIX D—Continued

**COEFFICIENTS OF CORRELATION AMONG MEAN SCALE RATINGS OF THE GAMES CONCEPT**

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