THE EFFECT OF SELECTED FITNESS COMPONENTS, ATTITUDES AND PERSONALITY VARIABLES ON SELECTION OF PHYSICAL EDUCATION ACTIVITIES

by

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ABSTRACT

Title of Thesis: The Effect of Selected Fitness Components, Attitudes and Personality Variables on Selection of Physical Education Activities

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This study attempted to determine relationships among selected physical fitness components, attitudes toward physical education as an activity course, and personality characteristics and the voluntary selection of required physical education activity classes at Appalachian State University. More specifically, the study was designed to unveil relationships of physical fitness, muscular endurance, and percent body fat; attitudes toward physical education as an activity course; and personality traits both among and between various groupings in the selection of archery and marksmanship; volleyball, basketball, and softball; racquetball and handball; beginning swimming, intermediate swimming, and advanced swimming; tennis and badminton; and weight training and physical fitness activity courses.

Subjects for the research were 60, 10 per physical education activity mentioned above, randomly selected non-physical education major, undergraduate males voluntarily enrolled in physical education activity classes during the spring quarter of 1974 at Appalachian State University. Tests administered were as follows: attitudes toward physical education as an activity course, Wear Attitude Inventory, Form A; personality, Edwards Personal Preference Schedule; percent body fat, skinfolds; muscular endurance, modified flexed-arm hang; and cardiovascular fitness, 12-minute run-walk. Interrelationships were calculated by application of the Pearson product-moment correlation formula, and significant differences among the means were determined by analysis of variance.

Analysis of the data revealed no significant effects of attitude toward physical education in the selection of physical education activity courses. In regard to personality, the racquetball/handball group exhibited a significantly more aggressive character than did any other group. Albeit significant correlations were established among the physical fitness components, only the tennis and badminton selection appeared to be effected by a fitness related component, cardiovascular fitness.

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by
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DEDICATION

This study is dedicated
to Dr. Jay T. Kearney

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INTRODUCTION AND STATEMENT OF THE PROBLEM

A. Introduction

Man has been making decisions from his genesis, and the underlying variables associated with his selection process have been under close scrutiny ever since. What convinces an indiviual to make a judgment favorable to one alternative and unfavorable to the remaining options? Does one consciously of his own free will rationalize among the competing choices in arriving at a decision, or does one traverse the days of his existence in response to discriminative stimuli?

Investigations into the effects of various components upon the preference of individuals have been conducted countless times by the scientific disciplines. These investigations extend into the realm of the physical educator, as he, too, attempts to unveil relationships between decisions made and those projecting volition. The physical educator is interested in discerning clues in solving the puzzle of why fastidious individuals select one activity, e.g., swimming.

Are there internal, cognitive differences in those aspiring with tennis as compared with those proclaiming swimming as their most acceptable physical education activity? Does one's physical structure and fitness level dictate his hierarchy of inclined activities? These are a couple of the questions the researcher attempted to provide insight into.

To pursue any endeavor of this characterization necessitates inspection into the area of personal attitudes. Whether one's attitudes are the resultant of his acting upon the environment or of his environment acting upon him is debatable. Yet one's attitudes dictate his desired maneuvers through life's challenges.

As there is diasgreement in the process of attitude development, so there are differing definitions of what attitudes are. Kenyon defines attitudes as "latent or nonobservable, complex, but relatively stable behavioral dispositions reflecting both direction and intensity of feeling toward a particular object, whether it be concrete or abstract."[1] Allport defines attitudes as the "mental and neural state of readiness, organized through experiences, which exerts a directive or dynamic influence upon the individual's response to all objectives and situations with which it is related."[2] Campbell regards attitudes as "emotionalized feelings that are characterized by a quality of intensity ranging in all degrees from 'strongly for' to 'strongly against.'"[3]

Each of these interpretations presents a potentiality for associating attitudes with the decision-making process. Logically deducing that if attitudes affect decision-making, one begins to

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[1]Gerald S. Kenyon, "Six Scales for Assessing Attitudes Toward Physical Activity," Research Quarterly, 39:566-574, October, 1968.

[2]G. W. Allport, Attitudes, a Handbook of Social Psychology (Worchester, Massachusetts: Clark University Press, 1935), p. 34.

[3]Donald E. Campbell, "Attitudes of Students Toward Physical Education," Research Quarterly, 39:456-462, October, 1968.

question the effects of attitudes toward physical education, more specifically toward the selection of physical education activity courses.

Are attitudes alone sufficient to ascertain which physical education activity course will be pursued, or are attitudes something less than the whole? An encompassing quality might be one's personality. Personality is an extremely complex phenomenon with many traits acting and re-acting in numerous ways and in many combinations.[4]

These ever-continuing reactions may prescribe to the individual which physical education activities to engage in on the basis of personal adaptability. Connotations consciously or unconsciously paired with specific physical education activity courses may relate more readily with personalities of one description while rejecting incompatible personality traits of another category. Surely personal expectations in participation experience would attract a portion of the population, while another would vehemently oppose the nature of the activity based on personality.

A somewhat difficult dilemma evolves when making effort to define the strutural limits aligned between personality and attitudes. Whether personality reigns over attitudes or vice versa is a question requiring considerable thought and insight.

Another variable that may affect one's selection of physical education activity courses is physical fitness. Are the more physically fit more discriminate with reference to selecting activities

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[4]H. Harrison Clarke, Application of Measurement of Health and Physical Education (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1959), p. 276.

courses than the less physically fit, and the less physically fit more commonly enrolled in contrasting physical education activities?

Consideration of the question becomes more difficult as one attempts to define exactly what physical fitness is. Physical fitness means many things to many people. To a physician the term may imply freedom from disease, while a laborious individual might accept a meaning relating to terms of energy efficiency to cope with daily stresses.

With that thought in mind, physical fitness may include or exclude any or all of the following general groupings: physique, or appearance; organic capacity; and motor capacity. Accordingly the methods of assessing physical fitness vary in relationship to the components included.

It is not uncommon that specific types of people are attracted to specific activities. Is the decision made due to poor physical fitness, personality traits, attitudes, or some conglomerate synergism?

B. Statement of the Problem

This study attempted to determine relationships among selected physical fitness components, attitudes toward physical education as an activity course, personality characteristics, and the voluntary selection of required physical education activity classes at Appalachian State University.

More specifically the study was designed to unveil relationships of physical fitness components of cardiovascular fitness, muscular endurance, and percent body fat; attitudes toward physical

education as an activity course; and personality traits both among and between various groupings in the selection of archery and marksmanship; volleyball, basketball, and softball; racquetball and handball; beginning swimming, intermediate swimming, and advanced swimming; tennis and badminton; and weight training and physical fitness activity courses.

1. Sub-problems

The sub-problems in this investigation were:

a. The selection and grouping of physical education activity courses to be used in the study.

b. The selection of a sample to be used.

c. The selection of appropriate tests for measurement of the three variables in the study.

d. The collection, organization, and analysis of the data.

2. Scope of the Study

The study involved 80 male non-physical education majors randomly selected from the required physical education activity courses at Appalachian State University during the spring quarter of 1974. No discrimination was used with regard to class level, as all undergraduate levels were eligible for representation from the twenty-six activity courses offered. The twenty-six activity courses were categorized into the following eleven groups based on similarity of activity:

Group I	Group II
Archery	Volleyball
Marksmanship	Basketball
	Softball

Group III

Racquetball
Handball

Group IV

Beginning Swimming
Intermediate Swimming
Advanced Swimming

Group V

Tennis & Badminton

Group VI

Weight Training
Physical Fitness

Group VII

Beginning Fencing
Intermediate Fencing

Group VIII

Modern Dance
Folk & Social Dance

Group IX

Bowling
Golf

Group X

Hiking & Camping

Group XI

LaCrosse
Soccer

Each subject was tested in three areas, physical fitness components, attitudes toward physical education as an activity course, and personality characteristics. Physical fitness components were tested by employment of the 12-minute run-walk (cardiovascular endurance), modified flexed-arm hang (muscular endurance), and skinfold measurements (percent body fat) taken at the chest, abdomen, and triceps.

Wear's Physical Education Attitude Inventory, Form A, was utilized in discriminating attitudes toward physical education as an activity course. Similarily, the Edwards Personal Preference Schedule was administered to deduce the various individual personality characteristics.

Due to limitations, the data from 60 subjects in the first six groups were used in the final analysis. Analysis of variance was calculated among the groups in each of the fifteen investigative areas

of personality as revealed by the Edwards Personal Preference Schedule. Likewise, ANOVA was computed for the Wear's Physical Education Attitude Inventory, Form A, and each of the three physical fitness components.

The Pearson product-moment correlation formula was used to correlate the various measures of physical fitness among and between the six physical education activity groups. Calculation of a fitness component composite score, with T-scores, facilitated the compilation of the relationships between fitness and attitude toward physical education and selected personality scores.

3. Limitations

The data collected during the course of this investigation may have been influenced by certain factors such as:

a. The motivation of each subject to perform maximally during the various physical fitness measurements was of importance and not completely controllable.

b. The motivation of each subject to perform honestly with respect to true attitudes and personality while responding to the two written inventories was of importance and not completely controllable.

c. The scheduling of subjects to fulfill requirements of the study was maintained over a three-week period. External events as well as intimate happenings could have affected test validity.

d. The process of subject recruitment was not explicitly random. Although all potential subjects were randomly selected, only those consenting to assist in the research were sources of data.

e. Physical fitness may be subdivided into an infinite number of components with comparable methods of measurement. Had other fitness components been selected, contrasting data may have been collected.

f. Scheduling of spring quarter classes may have necessitated individuals to enroll in physical education activity courses other than their primary choice. This would possibly invalidate the representation of the various groups.

g. Some subjects selected may have registered for instruction from a particular instructor rather than structuring priority to course topic paramount.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter presents a review of selected literature dealing with the relationships among personality traits, physical fitness, and attitudes toward physical education. The chapter is divided into four sections. The first reviews investigations dealing with the attitudes of certain groups toward physical education. Relationships between personality traits and involvement with various physical activities are included in the second portion. The third section is concerned with the interrelationships of various measures of physical fitness, attitudes toward physical education, and personality, while the fourth division is presented as a summary.

A. Attitudes of Certain Groups

Using the final grade as the success factor, Vincent administered the Wear Attitude Inventory to 188 college women in a variety of physical education activities. Attitudes toward physical education were favorable in all activities with the most favorable attitudes expressed by those subjects in the gymnastics class,

followed closely by tennis. Swimming and bowling students exhibited the least favorable attitude. There was also found to be a significant relationship between attitude and success.[1]

Campbell concluded that the Wear Attitude Inventory could be administered to junior high school boys with the expectation that results would be meaningful. Results suggested that the students in each grade responded in a similar or proportional manner in spite of possible environmental factors or possible teacher influence. Means for seventh, eighth, and ninth graders were 115.35, 120.25, and 115.06 with standard deviations of 16.06, 15.61, and 16.43, respectively.[2]

B. Selected Literature Concerning Personality

Significant personality trait differences in swimmers and nonswimmers were found by Behrman by administration of the Guilford-Zimmerman temperament survey, a standardized psychological instrument. Nonswimmers were portraited as overcautious, more submissive, and more shy and seclusive.[3]

Kroll and Carlson studied 71 amateur karate participants with the Cattell Sixteen Personality Factor Questionnaire and concluded

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[1]Marilyn F. Vincent, "Attitudes of College Women Toward Physical Education and Their Relationship to Success in Physical Education," Research Quarterly, 38:126-131, March, 1967.

[2]Donald E. Campbell, "Wear Attitude Inventory Applied to Junior High School Boys," Research Quarterly, 39:888-893, December, 1968.

[3]Robert M. Behrman, "Personality Differences Between Non-swimmers and Swimmers, " Research Quarterly, 38:163-178, May, 1967.

there were no significant profile differences between advanced (n=17), intermediate (n=25), or novice classifications (n=29). On the basis of the 16PF test, no profile components or patterns were found which differentiated between levels of karate participation and proficiency, or karate participants and the normal population.[4]

Employing the 16PF Peterson, Weber, and Trousdale found that women athletes who compete in individual sports rated higher on the personality factors of dominance, adventurousness, sensitivity, introversion, radicalism, and self-sufficiency and lower on the factor of sophistication when compared to women athletes who compete in team sports. No differences were found in the factors of socialibity, intelligence, stability, surgency, conscientiousness, suspecting, guilt-proneness, high self-sentiment, or high ergic tension.[5]

Utilizing the Edwards Personal Preference Schedule, Singer observed the varsity tennis and baseball players at Ohio State University during the 1965 season. The investigator reported that the tennis group scored statistically higher on the traits of achievement, intraception, dominance, and abasement.[6]

Pyecha reported that a judo experimental group became more warmhearted, easygoing, and participating than did control groups of

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[4]Walter Kroll and B. Robert Carlson, "Discriminant Function and Hierarchial Grouping Analysis of Karate Participants' Personality Profiles, "Research Quarterly, 38:405-411, October, 1967.

[5]Sheri L. Peterson, Jerome C. Weber, and William W. Trousdale, "Personality Traits of Women in Team Sports vs. Women in Individual Sports," Research Quarterly, 38:686-690, December, 1967.

[6]Robert N. Singer, "Personality Differences Between and Within Baseball and Tennis Players," Research Quarterly, 40:582-588, October, 1969.

handball and volleyball, or badminton and basketball. Personality trait measures on all 149 subjects were obtained through repeated administration of Cattell's Sixteen Personality Factor Questionnaire, i.e., pretreatment, 8-week, and 16-week measures.[7]

Kroll's investigation of 94 collegiate wrestlers, as determined by the Sixteen Personality Factor Questionnaire, demonstrated a significant departure from average on factor I, indicating tough-mindedness, self-reliance, and masculinity. No support was found for the suggestion that wrestlers may possess a neurotic profile.[8]

Brunner employed the Check List Test and revealed significant differences between two groups of 30 males on the basis of their participation in vigorous physical activity. Participants scored significantly higher on: intraception, number of favorable adjectives checked, defensiveness, achievement, dominance, and self-confidence, whereas nonparticipants were superior on succorance and counseling readiness. An examination of the personal descriptions relevant to these eight scales revealed more extroverted traits among the participants and more introverted traits among the nonparticipants.[9]

Flanagan assembled a personality inventory by selecting portions from the Guilford-Martin Inventory, Allport's Ascendance-Submission Scale, Guilford's Introversion-Extroversion Scale, and Smith's Human

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[7]John Pyecha, "Comparative Effects of Judo and Selected Physical Education Activities on Male University Freshman Personality Traits," Research Quarterly, 41:425-431, October, 1970.

[8]Walter Kroll, "Sixteen Personality Factor Profiles of Collegiate Wrestlers," Research Quarterly, 38:49-57, March, 1967.

[9]Burton C. Brunner, "Personality and Motivating Factors Influencing Adult Participation in Vigorous Physical Activity," Research Quarterly, 40:464-469, October, 1969.

Behavior Inventory, to measure personality traits of different physical activity groups. The investigator administered the inventory to 221 male college students enrolled in activity courses on a voluntary basis in fencing, badminton, basketball, volleyball, boxing, and swimming. Fencers were significantly more ascendant than participants in basketball, volleyball, and boxing; fencers were also significantly more feminine than basketball enrollees. Badminton players were significantly more extroverted than volleyball participants, and volleyball participants were significantly more emotionally unstable than basketball players.[10]

C. Relationship Between Fitness, Attitudes, and Personality Variables

Campbell's investigation of 240 randomly selected physical education classes of eighth-grade boys advanced the conclusion that no significant relationship existed between attitudes toward physical education as measured by an attitude inventory and the ability to perform selected physical fitness items. Form A of the Wear Attitude Inventory, the 50-yd. dash and the 600-yd. run-walk were the instruments of measurement.[11]

High-fit, compared to low-fit, adolescent boys conceived of themselves as more capable, and more attracted to, physical activities in a study directed by Neale and Sonstroem. The AAHPER Youth Fitness

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[10]Lance Flanagan, "A Study of Some Personality Traits of Different Physical Activity Groups," Research Quarterly, 22:312-323, May, 1951.

[11]Donald E. Campbell, "Relationship Between Scores on the Wear Attitude Inventory and Selected Physical Fitness Scores," Research Quarterly, 40:470-474, October, 1969.

Test was employed to measure physical fitness; a 10-item self-esteem scale, to measure self-esteem; and the Physical Activity Attitude Inventory, to measure attitudes.[12]

Berger and Layne revealed that attitudes toward physical education as an activity course for college freshmen and sophomores were related to muscular strength and motor ability. Although the authors reported a statistically satisfactory prediction equation, the predictive ability was very low. The researchers found the power component of motor ability, rather than the component of strength alone, to be of primary importance in predicting attitudes toward physical education. Tests utilized were the Wear Short Form Attitude Inventory (attitudes toward physical education), Berger's Predicted 1-RM Test (dynamic strength), and the Barrow Motor Ability Test (motor ability). From the 152 subjects, a significant correlation of .198 was found between strength and attitudes toward physical education.[13]

The domain of success in physical education activity courses with respect to attitude, strength, and efficiency was researched by Vincent. The finds substantiated the hypothesis that success in physical education activities were significantly related to attitude, strength, and efficiency. Attitudes were measured by the Wear Attitude Inventory,

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[12]Daniel C. Neale, Robert J. Sonstroem, and Kenneth F. Metz, "Physical Fitness, Self-Esteem, and Attitudes Toward Physical Activity," Research Quarterly, 40:743-749, December, 1969.

[13]Richard A. Berger and Robert A. Layne, "Strength and Motor Ability as Factors in Attitude Toward Physical Education," Research Quarterly, 40:635-637, October, 1969.

strength by dynamometers, and efficiency through calculation of net energy cost of an exercise bout, using an indirect, closed circuit respirometer.[14]

A statistically significant correlation of .209 was reported by Wessel and Nelson between strength and attitudes toward physical education among college women. Subjects were women enrolled in the basic physical education activity courses.[15]

Measuring 114 eleventh-grade girls representing three socioeconomic groups in areas of personality, attitudes, and physical fitness, Young found significant positive relationships between the following variables: physical fitness and attitudes, physical fitness and personal adjustment, and attitudes and personal-social adjustment. Instruments serving as measurement devices included the California Test of Personality, the Wear Attitude Inventory, and the AAHPER Youth Fitness Test.[16]

Tillman administered the AAHPER Youth Fitness Test and three personality tests to 386 high school junior and senior boys. Significant personality differences were found between those scoring in the upper 15 percent on the physical fitness test and those scoring in the lower 15 percent. The upper physical fitness group had a significantly higher

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[14]Marilyn F. Vincent, "Prediction of Success in Physical Education Activities From Attitude, Strength, and Efficiency Measurements," Research Quarterly, 38:502-506, October, 1967.

[15]Janet A. Wessel, and Richard Nelson, "Relationship Between Grip Strength and Achievement in Physical Education Among College Women," Research Quarterly, 32:244-248, May, 1961.

[16]Mary L. Young, "Personal-Social Adjustment, Physical Fitness, Attitudes Toward Physical Education of High School Girls by Socioeconomic Level," Research Quarterly, 41:593-599, December, 1970.

ascendance rating on the A-S Reaction Study while appearing more surgent on factor F (enthusiastic-serious) of Cattell's Sixteen Personality Factor Questionnaire. The upper group also exhibited greater social dependence on Q_2 (self-sufficient---group dependent), and the Q_4 (tense-composed) factor indicated they were more tense than the lower group.[17]

D. Summary

Although the literature reviewed generally indicated that some specific relationships exist, no pattern of organization or of association emerged. Rather the results tended to pertain more directly to an isolated area, thus making generalizations difficult.

While there does appear to be some general agreement in terms of relationships between attitudes toward physical education and various measures of physical fitness, these same components of fitness are not generally closely related to personality traits. The question remains in doubt as to the causal relationship between these variables.

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[17] Kenneth Tillman, "Relationship Between Physical Fitness and Selected Personality Traits," Research Quarterly, 36:483-489, December, 1965.

CHAPTER III

PROCEDURES

This chapter presents the research design used during the investigation of the effects of fitness components, attitudes, and personality variables on selection of physical education activities. Sub-divisions of the chapter are as follows: (a) selection and grouping physical education activity courses; (b) selection of subjects; (c) selection of appropriate tests for measurement; and (d) organization and analysis of gathered data.

A. Selection and Grouping of Physical Education Activity Courses

A total of 29 different physical education activity courses were scheduled during the spring quarter of 1974, at Appalachian State University. Each of these activity courses was co-educational with the exceptions of basketball and softball, for which men and women were instructed separately. This reduced the total number of potential physical education activity courses to 27.

Each physical education activity course offered was initially selected to serve as a potential source of subjects within the design of the problem. However, several of the offerings could not satisfy subject requirements and were therefore eliminated from the study.

Physical education activity courses deleted were ice skating, gymnastics, track & field, field hockey, and squash rackets. Gymnastics,

track & field, and field hockey were excluded due to the lack of adequate male enrollment in each course. Males enrolled in these activity courses totaled six, ten, and zero, respectively, which would not satisfy minimum requirements of a random sample of ten subjects per group. None of these groups was believed to be similar enough to be associated with any other activity course.

The ice skating activity course had sufficient male enrollment to withstand solitary investigation. However, complications with a sponsoring private busines agency could have biased the students' attitudes toward physical education. For this reason the researcher omitted the ice skating activity course.

Squash rackets could have been assigned with another activity course to a particular group if it had not been cancelled for reason of lack of student selection. It is, therefore, not found within this study.

The remaining 22 physical education activity courses were placed by similarity of physical activity into 11 groups. Group I consisted of archery and marksmanship. Their union was based on several factors; namely, both are precision activities of accuracy, neither requires special dress for vigorous activity, and each is an individual sport possessing similar connotations in relation to the outdoors.

Selected physical education activities within Group II were vol volleyball, basketball, and softball. Each of these team sports are played with a round ball of varying size in which either hand-eye coordination or foot-eye coordination is prominent. The physical demand on the body is somewhat greater within this group as compared with Group I; yet, the demand here is not the greatest.

Racquetball and handball were considered to be of likeness and were categorized together in synthesis of Group III. Their kinship is hardly debatable as the basic activities are identical. Each dual activity is played in an enclosed four-wall court and taxes one's cardiovascular system in response to stress.

Elements of Group IV include beginning swimming, intermediate swimming, and advanced swimming. The components directly involve one's association with water in the form of swimming. Only the proficiency levels prevent duplication of the same activity. No other physical education activity courses pertain to aquatics, thus resisting Group IV to swimming alone.

Tennis and badminton were presented as one activity course which relieved the task of combining the two in the study as Group V. Of the remaining physical education activity courses, none seemed to be appropriately combinable with tennis and badminton. This, in addition to the large number of potential tennis subjects (n=122) available, persuaded the investigator to construct Group V entirely of tennis and badminton subjects.

Group VI was comprised of weight training and physical fitness. Possibly no activity emphasizes the importance of body image in reference to structure and function collectively more than do weight training and physical fitness. An individual may expect to experience considerable stress placed upon the body in echo to the stimuli. Each activity is an individual activity and may require concentration of a contrasting degree in comparison with the individual, dual, and team sports, as the challenges appear to be variant.

The distinctive character of fencing obliged an exclusive grouping composed of beginning fencing and intermediate fencing. No other physical education activity portrayed comparable traits to justify its inclusion into Group VII. Fencing projects an atmosphere of mystery as it is not a major American sport, nor is competition readily secured when attempts are made.

Modern dance and folk & social dance were ascertained to serve as Group VIII due to their common relation with musical rhythm and expression through the stimuli of music. Of parallel affiliation are qualities of no physical education uniform requirement, indoor, co-educational partnership in execution of activity, and very little imposition of the body.

Group IX included bowling and golf due to their social connotations as well as specific physiological and activity structural similarities. Although bowling and golf possess qualities of accuracy as do archery and marksmanship, the researcher is of the opinion that the methods utilized are of basic difference. While archery and marksmanship require intense concentration and control of a static nature, bowling and golf are examples of ballistic precision. Another common characteristic of bowling and golf is the vigorousness level of the individual sports.

Hiking and camping physical education sections were classified as another divergent activity capable of singular investigation. No other courses could relate significantly with hiking and camping to warrant a union, although several advanced the outdoor image, roughed individualism, and equivalent energy cost output. Thus hiking and camping became Group X.

Lacrosse and soccer composed the final group, Group XI, for reason of similarity of activity. Each is an outdoor team game that is not a major American sport. Conditioning for participation appeared to be of equal standard, partially because of the pace and movement of the games. Traditionally in the United States, soccer and lacrosse players have not simultaneously played for the same team, and neither has been played with sexual integration.

B. Selection of Subjects

Each physical education activity instructor at Appalachian State University submitted a compilation of all males enrolled in his activity course for the spring quarter of 1974. Through a process of random sampling, twenty potential subjects were selected as representatives of each of the eleven groups. No discrimination was used with regard to class level, as all undergraduate levels were eligible for subject selection from the eleven groups used.

Five weeks before the completion of the spring quarter, the researcher commenced the recruitment of subjects campaign. The investigator personally went to each class in which a subject had been randomly selected and explained the purpose of the research, what physical requirements would be involved on the subject's part, and answered any question the subjects might have. To ensure standardized procedures in subject recruitment, a "solicitation of thesis subjects" information sheet was prepared and presented to each potential subject. The "solicitation of thesis subjects" information sheep appears in Appendix A.

Included within the "solicitation of thesis subjects" was the stipulation that only majors from disciplines other than physical education would be accepted as subjects. This ensured an investigation of non-physical education majors exlusively.

Eighty subjects satisfactorily completed the requirements of the investigation. However, only six of the eleven groups were represented by at least 10 subjects. Therefore, the primacy of this investigation was limited to Groups I, II, III, IV, V, and VI.

C. Selection of Appropriate Tests

1. Attitudes Toward Physical Education

The general idea behind attitude tests is that if you wish to receive a reaction from one about a particular matter simply ask him.[1] Personal interview is indeed an outstanding method of using trained professional judgment in rating attitudes. However, only those within the professions of guidance and counseling are capable of conducting such an interview. Aside from necessitating professional training, interviews are time-engulfing.

A less time-consuming procedure for measuring attitudes is the subjective response given by the subject upon receiving a stimulus, in the form of a statement or question, from the tester. While this form may be highly valid, it is also subjective, rather than objective, in evaluation.

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[1]Thomas J. Sheehan, An Introduction to the Evaluation of Measurement Data in Physical Education (Reading, Massachusette: Addison-Wesley Publishing Company, 1971). p. 202.

Wear suggests that it is possible to secure a reliable and valid evaluation of attitude toward physical education through responses to a relatively small number of statements related to the outcomes sought by means of physical education activity.[2] Wear has developed an Attitude Toward Physical Education Inventory which is highly reliable (r=.94, Form A; r=.96, Form B; with a product-moment correlation r=.96).[3] Face validity has been accepted for the two scales.

Another prerequisite which Wear seems to have accomplished is that proported by Likert, to state each proposition in such a way that persons of lesser understanding than any member of the group for which the test is being constructed will understand and be able to respond to the statement.[4] Inspection of the inventory reinforced the notion that Wear's instrument was acceptable as a written measure of college age students.

Wear's inventory has been widely acclaimed in numerous professional publications as being a valid, reliable, and objective measure of attitudes toward physical education. For these reasons, the Wear Attitude Toward Physical Education Inventory was selected as the most appropriate technique in assessing attitudes toward physical education as an activity.

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[2]Carlos L. Wear, "The Evaluation of Attitude Toward Physical Education as an Activity Course," Research Quarterly, 22:114-126, March, 1951.

[3]Carlos L. Wear, "Construction of Equivalent Forms of an Attitude Scale," Research Quarterly, 26:113-119, March, 1955.

[4]R. Likert, "A Technique For the Measurement of Attitudes," Archives of Psychology, 28:5-55, 1932, cited by Julie A. Simon and Frank L. Smoll, "An Instrument for Assessing Children's Attitudes Toward Physical Activity," Submitted in partial fulfillment of the requirements for the M.S. degree at the University of Washington, 1973.

2. Personality

Personality measurement presents a problem analogous to attitudes measurement in that judges' ratings dominate the methodology over psychiatric examinations. Judges' ratings are not highly reliable, even when the characteristic to be rated is well understood; when the trait is intangible and diffucult to grasp, still less confidence can be placed in the ratings.[5]

To compare the personality of one individual with that of another and in finding out about the way in which the two differ, a common basis for the descriptions obtained of each individual must be set.[6] The most common base appeared to be the short, alternative-selection, standard test.

However, there are problems aligned with an objective test of personality. Personality is an extremely complex phenomenon with many traits acting and re-acting in numerous ways and in many combinations. Yet testing procedures must necessarily sort out and identify single traits, attempting to withdraw each from the setting in which it naturally resides.[7]

As most personality tests depend upon answers given by the subjects, the ability to obtain frank responses becomes a major problem.

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[5] H. Harrison Clarke, Application of Measurement of Health and Physical Education (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1959), p. 275.

[6] Allen L. Edwards, The Measurement of Personality Traits by Scales and Inventories (New York: Holt, Rinehart, and Winston, Inc., 1970), p. 2.

[7] Clarke, op. cit., p. 276.

The desire for social acceptance results in a temptation for the subject to give answers which present him in a favorable light.[8]

The adequacy of any given set of statements for obtaining description of personality obviously depends both on the content of the statements and also on the number of statements in the set. With "k" statements, there are 2^k possible patterns of response, and this number becomes very, very large as "k" increases.[9]

Most written objective personality tests require the subject to indicate one of several responses, with each trait tally consisting of the number of responses within that trait. Making a final tally, then, is ipsative.[10] This means that scores on one of the, say 10 scales are determined by the scores on the other 9 scales.

While it is true that personality inventories do have legitimate shortcomings, it is also accepted to be the most reliable and objective measuring device aside from individual examination by professionals with psychiatric background. Lacking this psychiatric background, the investigator resorted to the written personality inventory in the collection and analysis of personality data.

Personality tests and inventories are in abundance and, depending on selection, can measure more than a dozen traits or one single trait. Specialization includes varying ages as well as normality and abnormality.

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[8] Ibid.

[9] Edwards, op. cit., p. 3.

[10] Ibid., p. 60.

For purposes of this study a personality test which was designed to measure a large number of personality traits in which normal individuals vary was desired. Among those possessing this capability was the Edwards Personal Preference Schedule (EPPS), an instrument designed primarily for research and counseling purposes, to provide quick and convenient measures of 15 relatively independent normal personality variables.[11]

As there is no pure criterion measure of validity among personality tests, face validity was accepted. However, a product-moment correlation coefficient of .87 was reported by Edwards on the relationship of a randomly selected response with its corresponding scale trait.[12]

The EPPS was not the only adequate personality scale obtainable. However, it was highly recommended by the Director of Psychological Testing and Counseling Center at Appalachian State University.[13] It was due to the previously mentioned characteristics of personality measurement and the qualitites ascribed to the EPPS that the EPPS was enlisted.

3. Physical Fitness

Probably nowhere in physical education is there greater controversy than in the area of fitness. Until the time comes when the description of fitness is agreed upon and we have the instruments for

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[11] Allen L. Edwards, "Edwards Personal Preference Schedule," Test Manual (New York: The Psychological Corporation, 1959), p. 5.

[12] Ibid.

[13] Statement by Judy Bailey, personal interview, April 4, 1974.

objectively measuring it, there will continue to be confusion as to what is the best evaluative approach to this problem.[14]

Karpovich has suggested that the majority of physical fitness tests fall into three groups: muscular performance, organic function, and a combination of the two.[15] These logically would serve as valid tests in conjunction with the definition forwarded by Morehouse and Miller, who maintain that "fitness implies a relation between the task to be performed and the individual's capability to perform it."[16]

For purposes of this investigation, the researcher has arrived at three areas of examination: cardiovascular fitness, muscular endurance, and fitness measured as percent body fat. The succeeding three sections deal more specifically with each of the three areas of fitness and the selection of appropriate tests for measurement in fitness evaluation.

a. Cardiovascular fitness. The most accurate measure of cardiovascular fitness is generally considered to be maximal oxygen uptake, which measures the amount of oxygen consumed per kilogram of body weight per minute of exercise.[17] To collect this measure requires the use of accurate and reliable techniques to analyze the composition of respiratory gases.

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[14] Donald K. Mathews, Measurement in Physical Education (Philadelphia: W. B. Saunders, 1968), p. 59.

[15] Peter V. Karpovich, Physiology of Muscular Activity, 4th ed., (Philadelphia: W. B. Saunders, 1953), p. 257.

[16] Laurence E. Morehouse and Augustus T. Miller, Physiology of Exercise (St. Louis: The C. V. Mosby Company, 1971), p. 275.

[17] Barry L. Johnson and Jack K. Nelson, Practical Measurements for Evaluation in Physical Education (Minneapolis, Minnesota: Burgess Publishing Company, 1969), p. 298.

Tests not requiring elaborate equipment and lengthy time have been devised with high correlation. For example, the Harvard Step Test was shown to be a valid measure of 2,200 male students at Harvard by Brouha.[18] Cotten found a test-retest reliability of .95 on the Modified Step Test and a reliability of .94 on the Balke Treadmill Test.[19]

Other measures of cardiovascular fitness calibrated with heart rate and blood pressure have been advanced by Billings, who proclaimed that a rise in heart rate with respect to time becomes linear and that further rises in heart rate are directly proportional to time. Findings suggested that the heart rate response during progressive submaximal exercise indicates accurately the subject's capacity for more strenuous work.[20]

Contrary to expressions of cardiac function tests validity, Tharp obtained results testifying that cardiac function tests do not offer a good substitute for the more strenuous tests of cardiovascular fitness.[21] Aside from the effects of physical strain, the cardiac system is also susceptible to emotional stimuli from tension or nervous pressure.

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[18] Lucian Brouha, "The Step Test: A Simple Method of Measuring Physical Fitness for Muscular Work in Young Men," Research Quarterly, 14:31-36, March, 1943.

[19] Doyice J. Cotten, "A Modified Step Test for Groups Cardiovascular Testing," Research Quarterly, 42:91-95, March, 1971.

[20] C. E. Billings, "Measurement of Human Capacity for Aerobic Muscular Work, " Journal of Applied Physiology, 15:1001, 1960.

[21] Gerald D. Tharp, "Cardiac Function Tests as Indexes of Fitness," Research Quarterly, 40:818-822, December, 1969.

Currently a popular measure disassociated with cardiac readings is the 12-minute walk-run test developed by Cooper.[22] Maksud and Coutts substantiated the administrative feasibility and reliability (r=.92) of a 12-minute run-walk test.[23] Doolittle and Bigbee listed a test-retest reliability coefficient of .94 and a validity coefficient of .90 when maximum oxygen intake was used as the criterion.[24]

Due to the reliability, validity, and objectivity of the 12-minute run-walk, the researcher consented to Cooper's test in measuring cardiovascular fitness. Each subject's involvement time was also taken into consideration.

b. Muscular endurance. Muscular endurance may be of two classifications, dynamic or static. Dynamic muscular endurance represents a continuum of ability, the ability to perform repetitive movements though the same range of motion, and static muscular endurance refers to the ability to maintain a certain level of contraction over a length of time.[25]

Recordings of static muscular endurance were collected rather than dynamic muscular endurance observations as the investigator was

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[22] Kenneth H. Cooper, Aerobics (New York: Bantam Books, Inc., 1968), p. 5.

[23] Michael G. Maksud and Kenneth D. Coutts, "Application of the Cooper Twelve-Minute Run-Walk Test to Young Males," Research Quarterly, 42:54-59, March, 1971.

[24] T. L. Doolittle and Rollin Bigbee, "The Twelve-Minute Run-Walk: A Test of Cardiorespiratory Fitness of Adolescent Boys," Research Quarterly, 39:491-496, October, 1968.

[25] Johnson and Nelson, op. cit., p. 298.

more concerned with each subject's ability to maintain a specified contraction over a period of time. These static contractions were performed by the subjects predominately with the arm and shoulder muscle groups in a modified flexed-arm hang.

The arm and shoulder muscle groups were adopted because of the ease of management and the amount of flexibility and because they have been the most frequently studied muscle groups in tests of muscular endurance.[26] Although these muscle groups may not exhibit the greatest amount of muscular endurance comparatively with other body muscle groups, they may be more functionally active and thus respond to stress more readily.

Cotten and Morwitz computed a .93 correlation with a modified flexed-arm hand and a criterion measure, the pull-up. This was found to be significantly better, than the correlation of .72 between pull-ups and the flexed-arm hang.[27]

Therefore, the modified flexed-arm hand was conceded as having a superior predicability rating with regard to reliability. Face validity was accepted, as has been the case in countless preceding studies.

c. Fitness measured as percent body fat. In recent years, there have been a number of new laboratory techniques proposed for the

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[26] David H. Clark and H. Harrison Clark, Research Processes in Physical Education, Recreation, and Health (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970), p. 270.

[27] Doyice J. Cotten and Bonnie Morwitz, "Relationship Between Two Flexed-Arm Hangs and Pull-ups for College Women," Research Quarterly, 40:415-416, May, 1969.

measurement of percent body fat, but the validity and practicality has not been established as yet. For example, the most accurate method of determining the composition of the body is by chemical analysis; however, not more than a half dozen human cadavers have been studied in this way.[28] Other contemporary ventures include estimating fat under the skin by ultrasonics; estimating body volume by air displacement, helium dilution, or photogrammetry; creatinine excretion; potassium content; or total body water.[29]

Of the more practical approaches, application of the Archimedean principle by which the individual is weighed in both water and air to obtain his specific gravity is a sound procedure.[30] Regretably because of obvious technical difficulties, the Archimedean principle method is not agreeable with many researchers.

The validity of skinfold readings has received acclaim from others as well. McCloy stated that the amount of fat just under the skin, especially in certain select body areas, such as the upper arm, chest, abdomen, back, and side, bears a high relationship to the total amount of fat of the body.[31]

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[28] Henry J. Montoye, ed., An Introduction to Measurement in Physical Education, Vol. 2 (Indianapolis, Indiana: Phi Epsilon Kappa Fraternity, 1970), p. 44.

[29] Ibid., p. 45.

[30] Mathews, op. cit., p. 233.

[31] Charles H. McCloy, "Anthropometry in the Service of the Individual," Journal of Health, Physical Education, Recreation, 7:7-13, September, 1934.

Of the procedures suggested within the professional literature, the skinfold technique was more corresponding to the investigation at hand. Therefore, the investigator elected the method of skinfold readings to satisfy the requirements for data leading to the percent of body fat.

D. Collection, Organization, and Analysis of the Data

1. Collection and Organization of the Data

Subjects were tested on the three variables of attitudes, personality, and fitness over a three-week period. As the investigator had previously commented during subject recruitment sessions, times would be flexible to allow each potential subject an opportunity to directly participate in the investigation.

Although the collection of data was rather lengthy and followed no specific time table for each subject, the sequence of tests were consistent. Each subject was measured on attitudes, personality, percent body fat, muscular endurance, and cardiovascular fitness, respectively.

Subjects volunteered for one of several evening examination periods setup, at which time all of the tests, with the exception of the 12-minute run-walk, were individually administered according to the prescribed sequence mentioned earlier. Upon completion of the four evening requirements, each subject selected one of several opportune offerings to schedule his measuring of cardiovascular fitness by means of the 12-minute run-walk.

A more explicit discussion of the process for collecing data, test by test follows:

a. Wear Attitude Inventory. After it was apparent that all subjects were present, the investigator again reminded the subjects that their responses would, in no way, effect their grade in their present physical education activity class. This policy was adopted to ensure honest responses, rather than reactions in a way which the subject thought the teacher wished him to react.

With a consistent rapport established, the researcher passed out a number two pencil, an answer sheet, and Form A of the Wear Attitude Toward Physical Education Inventory. Before subjects could commence, the investigator read the directions, found on the back side of the answer sheet, with standardized diction.

Subjects were instructed to read each of the 30 statements and to respond with an "X" in the appropriate box indicating one's attitude with regard to the statement and based on his experience with physical education as an activity course rather than athletics. Choices available to the subjects were "strongly agree," "agree," "undecided," "disagree," and "strongly disagree."

Scoring of the Wear Inventory was executed by tabulating points for each response. Point values ranged either 1-2-3-4-5 or 5-4-3-2-1, depending upon the manner in which the item was stated. Therefore, the highest score possible with a favorable attitude toward physical education would be 150 (30 X 5), and the lowest attainable score with an unfavorable attitude would be 30 (30 X 1).[32]

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[32] Carlos L. Wear, "Construction of Equivalent Forms of an Attitude Scale," Research Quarterly, 26:113-119, March, 1955.

b. Edwards Personal Preference Schedule. Upon completion of the Wear Attitude Inventory, each subject was given a copy of the EPPS and an answer sheet. Directions were read by the researcher according to the instructions described on the front cover of the 225-item inventory.

Subjects were directed to select the one alternative more characteristic of how they felt and circle the appropriate letter by the corresponding number. If neither statement accurately describes how they feel, they were asked to choose the one which they considered to be less inaccurate.[33] This process was to be employed for each of the 225 paired statements.

At this point, the investigator reinforced a previously stated guideline, that the inventory was not a test with specific right and wrong answers. Rather one's choice should be a description of his own personal likes and feelings. And regardless of how inaccurate a pair of statements might seem, a choice had to be made for each pair of statements.

An accompanying template was used in the scoring of each subject's answer sheet. By counting "A's" encircled in the rows and "B's" encircled in the columns, the examiner was able to record a raw score value for each of the 15 variables.[34]

A consistency score was made possible by a comparison of the number of identical choices made in two sets of the same 15 items.

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[33] Edwards, Test Manual, op. cit., p. 8.

[34] Ibid.

If the consistency score for a subject is 11 or higher, we may regard this as evidence that the subject is not making his choices on the basis of chance alone.[35]

c. Skinfold Measurements. Succeeding the EPPS was the measurement of each individual's skinfold. The researcher made three readings of three sites on each subject's body. The three locations were in agreement with Consolazio, et. al.; chest (at the level of the xiphoid in the midazillary line), abdomen (at the midclavicular line at umbilical level), and arm (at the midposterior midpoint between the tip of the acromion and the tip of the olecranon with the elbow in 90 degree flexion, and the extremity hanging straight in an extended position).[36]

All three readings for each subject at each site were recorded by one of three trained undergraduate physical education majors assisting the investigator. Three measures at each site were taken so that a mean might be computed, thus presenting a better representative reading than a single skinfold measurement.

Each subject was asked to remove his shirt and stand in an erect comfortable position while readings were being collected. Accepting the suggestion promoted by Consolazio, et. al., all skinfold measurements were made on the right side of the body.[37]

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[35] Ibid., p. 15.

[36] C. Frank Consolazio, Robert E. Johnson, and Louis J. Pecora, Physiological Measurements of Metabolic Functions in Man (New York: McGraw-Hill Book Company, Inc., 1963), p. 302.

[37] Ibid., p. 301.

The initial measurement procured was the triceps skinfold measurement. With the subject's elbow flexed to 90 degrees, the investigator grasped two thicknesses of skin and the subcutaneous fat, being careful not to include muscle or fascia. When there was a doubt as to whether the pinched matter contained muscle or fascia, the researcher instructed the subject to isometrically contract and relax the triceps and biceps.

Confident that no unsolicited substance was within the grip of the investigator, Lange skinfold calipers[38] were applied about 1 cm. from the fingers holding the skinfold and at a depth approximately equal to the thickness of the fold.[39] This process was repeated twice in the collection of three skinfold measures per specified location.

Similar care was taken in collecting chest and abdomen skinfold measures. Arm and chest readings were taken in the vertical plane while measurement was secured in the horizontal plane abdomen.

d. Muscular Endurance. A modified flexed-arm hang test was performed by each subject utilizing a chinning bar elevated nine feet off the floor. Measurement was taken with a stopwatch and was based on the time, to the nearest tenth of a second, that one could isometrically maintain a modified flexed-arm position.

With the support of a standard metal folding chair, each subject was directed to grasp the chinning bar with his palms facing

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[38] Manufactured by Cambridge Scientific Industries; Cambridge, Maryland.

[39] Consolazio, Johnson, and Pecora, op. cit.

toward him and his hands spaced shoulder width apart. Once the proper alignment was mastered, the subjects completed a grip simulation by wrapping the thumb around the bar in an effort to establish contact with the index finger.

Subjects then were informed, at their own discretion, to perform a standard chin-up, making certain that their chins broke the horizontal plane of the bar. No superfluous body movement was tolerated to ensure consistent lever summation among all subjects. While the subject was making his ascent, the supporting chair was removed as a safety precaution.

Once the horizontal plane of the bar had been negotiated, the subject was instructed to lower his body until a 90 degree angle was established at the elbows. At this point the investigator or an assistant activated a stopwatch using the first finger as the depressor. The stopwatch was allowed to continue its function until the subject could no longer sustain the 90 degree angle at the elbow. Upon greater elbow extension, the timer depressed the stopwatch stem and indicated to the subject that the test was terminated.

Consistent motivation was attempted with each subject. Once the stopwatch had began to time, every 15 seconds the researcher or assistant would say, "just hang as long as you can." At no time were threats for failure nor rewards for success mentioned as being a reality. Rather each subject was instructed to do his best and that the investigator expected wide variances among the subjects.

The subject then released his grip and safely dropped to the floor. The timer recorded the elapsed time while the subject

experienced the constant 90 degree angle at the elbow, and recordings were registered to the nearest tenth of a second.

e. Cardiovascular Fitness. The final requirement for each subject was the test of cardiovascular fitness, Cooper's 12-minute run-walk. Upon completion of the modified flexed-arm hang, each subject was asked to sign up for a time period in which he could perform the run-walk. Times ranged from 10:00 A.M. to 4:00 P.M.

To assure no handicap for any runner, no more than 11 volunteers were allowed to run simultaneously. At the other extreme, as few as 1 were permitted to perform. Singular measurement was necessary due to conflicting personal commitments.

Once subjects had arrived at the artifical surface track, they were instructed to warm up by either static or ballistic stretches if they desired. However, those not wishing to warm up were not forced to do so. After each runner had indicated his readiness, the investigator explained that the 12-minute walk-run was not a test with pass-fail grading. Each subject was instructed to cover as much ground as he could within the 12-minute period. Sprinting, jogging, pacing, striding, walking-all were acceptable methods of movement around the standard 440-yard track.

Subjects were also shown markings along the inside lane. These markings were positioned at equidistand intervals around the track and divided it into 16 equal segments. These markings enabled measurement of a fraction of a lap.

Affirming that directions were clear and that a level of readiness was achieved, subjects were started by the investigator's

command of "runners to your mark, now set, go." As each runner completed a 440-yd. lap, the investigator called-out the elapsed time to the runner. A tally mark was then made adjacent to the runner's name on a score card to indicate the number of laps completed.

At the termination of the 12-minute period, a whistle was blown by the investigator signaling the end of the testing period. Upon hearing the whistle, each subject stopped running, and began walking as he searched for the subsequent marking.

The subject, upon finding the following marking, reported back to the starting line and disclosed his fractional accomplishment. Each subject was credited with achievement of the marking immediately prior to the one reported by the subject, i.e., if the subject indicated that 5 was the subsequent marking after the whistle had blown, then he was acknowledged as having successfully completed 4/16 of a lap in addition to the number of complete laps traversed.

2. Analysis of the Data

Skinfold measurements, once a mean of three readings at each site had been determined, were converted to specific gravity indicators by the formula reported by Consolazio, et. al., for men aged 18 to 26:[40]

$$\text{Specific Gravity} = 1.1017 - 0.000282A - 0.000736B - 0.000883C$$

where A=abdominal skinfold, mm
B=chest skinfold, mm
C=arm skinfold, mm

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[40] Ibid., p. 305.

This specific gravity value was then substituted into the following formula for purposes of establishing one's percent body fat.[41]

$$\text{Percent Body Fat} = 100\left(\frac{4.201}{S.G.} - 3.813\right)$$

where S.G.=specific gravity

Descriptive statistics for each of the variables (attitudes, personality, percent body fat, muscular endurance, and cardiovascular fitness) were calculated using elementary statistical procedures in the determination of mean and variance. Range and standard deviation were also computed in a similar fashion.

An analysis of variance was computed among the groups in each of the fifteen areas of personality as revealed by the Edwards Personal Preference Schedule. Likewise, ANOVA was determined for the Wear Attitude Toward Physical Education Inventory and each of the three physical fitness components.

Physical fitness raw scores were converted to T-scores, and a physical fitness composite score was derived by utilization of the T-scores. Analysis of variance was then calculated, using the composite T-scores, for the six groups.

Correlation coefficients were computed with the application of the Pearson product-moment formula, between the physical fitness composite score and attitudes. Similarily interrelations were found between physical fitness composites and those traits revealing a significant difference on the personality inventory.

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[41] Ibid., p. 308.

Individual physical fitness components were correlated within each of the six groups as well as among the groups. Correlations included the following: skinfold-hang, skinfold-run, and hang-run. The procedure utilized was again the Pearson product-moment formula.

The .05 level of significance was employed throughout the statistical procedures. The researcher arrived at this conclusion as the .05 level is traditionally the level assumed when relating with human variations of difference.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter includes the presentation and discussion of the results. The pertinent information is arranged basically into two sections, namely, results and discussion. Within the results section are found descriptive statistics, analysis of variance and correlation coefficients disclosed during the research. The latter section discusses the results with comparison of similar studies as well as providing possible explanations for the existing results.

A. Results

1. Wear Attitude Inventory

The Wear Attitude Toward Physical Education Inventory, with a pro-physical education maximum score of 150, yielded scores ranging from 84-148. The descriptive statistics (mean, standard deviation, and range) are included in Table 1.

The means varied from a low of 118.1 (racketball/handball) to a high of 129.0 (tennis & badminton). However, application of analysis of variance did not reveal a significant difference among these means. A summary of this ANOVA is presented in Table 2.

Table 1

Descriptive Statistics for Wear's Attitude Inventory

	Group	$\bar{X}$	S.D.	Range
I	(Archery, Marksmanship)	122.9	13.99	93-143
II	(Volleyball, Basketball, Softball)	118.2	13.13	96-136
III	(Racquetball, Handball)	118.1	17.25	84-143
IV	(Swimming)	121.8	10.36	110-143
V	(Tennis & Badminton)	129.0	10.96	115-148
VI	(Weight Training, Physical Fitness)	124.2	9.35	104-134

Table 2

Summary Table for ANOVA for Wear's Attitude Inventory

Source	df	SS	MS	F
Among	5	835.23	167.05	1.02
Within	54	8824.60	163.42	
Total	59	9659.83		

F=2.40 required for .05 level of Significance with 5/54 df.

2. Edwards Personal Preference Schedule

Descriptive statistics, in the form of means and standard deviations, are presented in Appendix B for the 15 isolated personality traits measured by the Edwards Personal Preference Schedule. The analysis of variance revealed only 2 traits to be significantly different at the .05 level, order and aggression. A skeletal summary of these ANOVAs is presented in Table 3.

Table 3

Summary Table for ANOVA for 15 Traits Measured by EPPS and Consistency Score

Trait	Treatment MS	F
Achievement	16.42	0.97
Deference	5.04	0.51
Order	38.55	2.43[a]
Exhibition	4.31	0.35
Autonomy	11.39	0.82
Affiliation	6.75	0.45
Intraception	33.11	1.67
Succorance	16.50	0.82
Dominance	30.12	1.98
Abasement	21.66	1.53
Nurturance	21.34	0.90
Change	2.15	0.09
Endurance	22.35	1.44
Heterosexuality	11.43	0.61
Aggression	16.90	2.59[a]
Consistency Score	1.27	0.32

[a]Significant at .05

Tukey's tests were applied to determine the location of any significant differences between the means of order and aggression traits. The summary of this application to the order variable is included in Table 4, while Table 5 presents the analysis of aggression scores.

Group I (archery, marksmanship), IV (swimming), and V (tennis and badminton) were each significantly more orderly and organized than Groups II (volleyball, softball, basketball) and VI (weight training and physical fitness), while Group I was also revealed as being a significantly better planner than Group III (racquetball, handball).

Aggression traits were significantly greater within Group III than within Groups I, II, IV, and V. No other significance was found with respect to the aggression factor.

Table 4

Summary Table for Tukey's Test for EPPS Factor: Order

Groups	$\bar{X}_{II}$	$\bar{X}_{III}$	$\bar{X}_{IV}$	$\bar{X}_{V}$	$\bar{X}_{VI}$
$\bar{X}_{I}$ (archery, marksmanship)	4.3[a]	3.7[a]	1.2	1.0	4.6[a]
$\bar{X}_{II}$ (volleyball, softball, basketball)	-	0.6	3.1[a]	3.3[a]	0.3
$\bar{X}_{III}$ (racquetball, handball)	-	-	2.5	2.7	0.9
$\bar{X}_{IV}$ (swimming)	-	-	-	0.2	3.4[a]
$\bar{X}_{V}$ (tennis and badminton)	-	-	-	-	3.6[a]
$\bar{X}_{VI}$ (weight training, physical fitness)	-	-	-	-	-

[a]Significant at .05

3. Components for Physical Fitness

The descriptive statistics for the physical fitness components of percent body fat, muscular endurance, and cardiovascular endurance are contained within Table 6. To test for any significant differences, ANOVAs

were calculated for each of the physical fitness variables, and an ANOVA summary is available in Table 7.

Data in support of a significant difference between percent body fat and muscular endurance at the .05 level were lacking, as F's computed were 1.86 and 1.11, respectively. However, the 12-minute run-walk test yielded an F=2.64, which was adequate to satisfy an F value of greater than 2.40 for significance at the .05 level. Means for the 12-minute run-walk were as follows: Group I, 1.51 miles; Group II, 1.47; Group III, 1.55; Group IV, 1.55; Group V, 1.68; and, Group VI, 1.60 miles.

Table 5

Summary Table for Tukey's Test
for EPPS Factor: Aggression

Groups	$\bar{X}_{II}$	$\bar{X}_{III}$	$\bar{X}_{IV}$	$\bar{X}_{V}$	$\bar{X}_{VI}$
$\bar{X}_{I}$ (archery, marksmanship)	1.4	3.4[a]	2.6	0.1	1.3
$\bar{X}_{II}$ (volleyball, softball, basketball)	-	4.8[a]	1.2	1.3	2.7
$\bar{X}_{III}$ (racquetball, handball)	-	-	6.0[a]	3.5[a]	2.1
$\bar{X}_{IV}$ (swimming)	-	-	-	2.5	3.9
$\bar{X}_{V}$ (tennis and badminton)	-	-	-	-	1.4
$\bar{X}_{VI}$ (weight training, physical fitness)	-	-	-	-	-

[a]Significant at .05

Tukey's post hoc test was utilized in investigating the explicit mean differences. A summary of this procedure is presented in Table 8. Examination of this post hoc test indicates that subjects within the tennis and badminton classes ran significantly farther in the 12-minute testing period than did subjects from all the other groups except the ones of weight training and physical fitness. These weight trainers and physical fitness students negotiated a significantly greater distance than Group II members (team sports) did.

4. Selected Correlations

Within each of the six groups, T-scores were computed for each of the three physical fitness variables. These T-scores were then utilized in the formation of a composite of physical fitness components. Appendix C includes a group summary of the instructions of the construction of the T-score composites.

Employing the T-scores and the Pearson product-moment formula, correlation coefficients were calculated between the physical fitness components. Table 9 presents the correlation coefficients between the components for all six groups combined. Examination of this table confirms a significant relationship exists between skinfolds and the modified flexed-arm hang (r=-0.52), between skinfolds and the 12-minute run-walk (r=-0.29), and between the modified flexed-arm hang and the 12-minute run-walk (r=0.37).

Relationships among the fitness components within each of the six groups were also calculated by application of the Pearson product-moment correlation formula; and can be seen in Table 10, which presents a summary of coefficients.

Table 7

ANOVA Summary Table for Skinfold Measurements, Modified Flexed-Arm Hang, and 12-Minute Run-Walk

Variable	df	SS	MS	F
Skinfold Measurements				
Among	5	98.67	19.73	1.85
Within	54	573.93	10.63	
Total	59	672.60		
Modified Flexed-Arm Hang				
Among	5	747.55	149.51	1.11
Within	54	7251.56	134.29	
Total	59	7999.11		
12-Minute Run-Walk				
Among	5	0.27	0.05	2.64[a]
Within	54	1.11	0.02	
Total	59	1.38		

[a]Significant at .05

Table 8

Summary Table for Tukey's Test for 12-Minute Run-Walk

Groups	$\bar{X}_{II}$	$\bar{X}_{III}$	$\bar{X}_{IV}$	$\bar{X}_{V}$	$\bar{X}_{VI}$
$\bar{X}_{I}$ (Archery, Marksmanship)	0.04	0.04	0.04	0.17[a]	0.09
$\bar{X}_{II}$ (Volleyball, Basketball, Softball)	-	0.08	0.08	0.21[a]	0.13[a]
$\bar{X}_{III}$ (Racquetball, Handball)	-	-	0.00	0.13[a]	0.05
$\bar{X}_{IV}$ (Swimming)	-	-	-	0.13[a]	0.05
$\bar{X}_{V}$ (Tennis & Badminton)	-	-	-	-	0.08

[a]Significant at .05

Table 6

Descriptive Statistics for Physical Fitness Components

Group	X	S.D.	Range
Skinfold Measurement[a]			
I (Archery, Marksmanship)	7.00	3.34	3.62-13.79
II (Volleyball, Basketball, Softball)	6.08	3.67	3.76- 11.41
III (Racquetball, Handball)	7.79	3.74	3.60-16.56
IV (Swimming)	9.55	4.09	3.32-15.89
V (Tennis & Badminton)	6.00	1.60	3.50- 8.44
VI (Weight Training, Physical Fitness)	6.04	2.40	3.84-12.08
Modified Flexed-Arm Hang[b]			
I (Archery, Marksmanship)	39.36	9.05	25.5-52.8
II (Volleyball, Basketball, Softball)	47.89	11.68	31.3-75.4
III (Racquetball, Handball)	45.23	12.60	32.9-65.5
IV (Swimming)	40.01	15.18	15.3-58.4
V (Tennis & Badminton)	44.85	10.69	26.9-64.1
VI (Weight Training, Physical Fitness)	48.53	9.17	31.6-59.6
12-Minute Run-Walk[c]			
I (Archery, Marksmanship)	1.51	0.14	1.38-1.81
II (Volleyball, Basketball, Softball)	1.47	0.13	1.28-1.73
III (Racquetball, Handball)	1.55	0.15	1.34-1.78
IV (Swimming)	1.55	0.16	1.31-1.80
V (Tennis & Badminton)	1.68	0.14	1.44-1.81
VI (Weight Training, Physical Fitness)	1.60	0.14	1.38-1.88

[a]Figures in mm.

[b]Figures in seconds.

[c]Figures in miles.

The relationship between each set of fitness component variables ranged as follows: (1) skinfold and modified flexed-arm hang, r=-.37 to r=-.81; (2) skinfold and 12-minute run-walk, r=.26 to r=-.67. An r of ±.632 is required for significance at the .05 level in this study. Therefore, significant correlations were found with Group IV (swimming) between 12-minute run-walk and both skinfold and modified flexed-arm hang, Group II (team sports) between skinfold and modified flexed-arm hang, Group V (tennis and badminton) between 12-minute run-walk and modified flexed-arm hang, and the sixth group (weight trainers and physical fitness students) between skinfold and modified flexed-arm hang.

Table 9

Correlation Coefficients Between Physical Fitness Components for all Groups

Variable	Modified Flexed-Arm Hang	12-Minute R-W
Skinfold	-0.52[a]	-0.29[a]
Modified Flexed-Arm Hang		0.37[a]

[a]Significant at .05

The next major set of relationships to be investigated was the correlations between a composite of the fitness components and both attitude and personality characteristics. In the case of personality characteristics, this relationship was investigated only in the cases where it had been established that the six activity groups did in fact differ on the characteristics of order and aggression. A summary of the Pearson product-moment correlation of these is presented in Table 11. The fitness components composite related with r=.43, r=.0002, and r=-.25,

for attitudes toward physical education, order, and aggression, respectively. Both the attitudes and aggression correlations satisfied the requirements for significance at the .05 level.

Table 10

Correlation Coefficients on Physical Fitness Components Among the Groups

Group	Component	Arm Hang	12-Minute R-W
I (Archery)	Skinfold	-0.56	-0.46
	Arm Hang		0.25
II (Volleyball)	Skinfold	-0.81[a]	-0.26
	Arm Hang		0.27
III (Handball)	Skinfold	-0.47	0.26
	Arm Hang		0.16
IV (Swimming)	Skinfold	-0.41	-0.67[a]
	Arm Hang		0.69[a]
V (Tennis)	Skinfold	-0.37	-0.47
	Arm Hang		0.65[a]
VI (Fitness)	Skinfold	-0.69[a]	0.04
	Arm Hang		0.37

[a]Significant at .05

Table 11

Correlation Coefficients on Physical Fitness Composites with Attitudes Toward Physical Education, Order, and Aggression

	Attitude	Order	Aggression
Physical Fitness Composite	0.43[a]	0.0002	-0.25[a]

[a]Significant at .05

B. Discussion

The fact that the attitude scores were not significantly different suggests that, of the six groups investigated, no group possessed a more positive nor a more negative attitude toward physical education as an activity course than did any other group. One could, therefore, deduce from these data that attitude toward physical education activity did not markedly effect the students decision to select a particular activity course. However, a pre-enrollment attitude inventory was not administered, and one can only speculate as to the cause and effect of limitless variables upon the attitudinal fluctuations during the time period of half an academic quarter.

While the literature contains considerable research into the area of attitude, few have concerned themselves with comparisons of attitudes between various physical education activity classes. Although all activities were favorable, Vincent found the gymnastics class to advance the most favorable attitude followed closely by tennis, with swimming and bowling students exhibiting the least favorable attitudes. The mean of 188 subjects was 114.72 with a standard deviation of 14.82.[1]

In this study, each group scored higher than what Vincent found or Wear in constructing equivalent forms to the existing attitude inventory. Wear disclosed means of 114.59 and 114.45,[2] respectively, for Form A and Form B, while the least mean scored in this investigation was

[1]Marilyn F. Vincent, "Attitudes of College Women Toward Physical Education and Their Relationship to Success in Physical Education," Research Quarterly, 38:126-131, March, 1967.

[2]Carlos L. Wear, "Construction of Equivalent Forms of an Attitude Scale," Research Quarterly, 26:113-119, March, 1955.

118.1 by those participating in racquetball and handball. This seems to indicate that each of the groups in this investigation scored favorably in reference to attitudes.

Vincent, in another investigation of 37 college women, revealed a mean of 121.11 and a range of 88-147.[3] This range is quite similar to the range of this study, 84-148.

Of the 15 characteristics isolated by the EPPS, the six groups differed on only two, order and aggression. The people participating in Groups I (archery, marksmanship), IV (swimming), and V (tennis) were more orderly than the members of Groups II (volleyball, basketball, softball) and VI (weight training, physical fitness); and the archers also scored higher on the order character than did Group III (racquetball, handball).

A possible explanation for these dissimilarities might be the traditional image associated with each activity. Teaching approaches relevant to archery, marksmanship, swimming, tennis, and badminton are generally established and structured from precedence; physical fitness, weight training, and the team sports represented in Group II are more constantly changing. Physical fitness and weight training suggest an adaptation to individualized participation, and team sports are forever necessitating change as offenses and defenses require adjustment. This may infer an orderliness of activity as is differentiated by the scores. Orderliness may be lost with increases of avenues of departure. The added number of personnel required to participate in the team sports may simultaneously create an atmosphere with less organization.

[3]Marilyn F. Vincent, "Prediction of Success in Physical Education Activities From Attitude, Strength, and Efficiency Measurements," Research Quarterly, 38:502-506, October, 1967.

In terms of the aggressive characteristic of personality, the four-wall activities group was significantly higher than students in all the other groups with the exception of the physical fitness/weight training subjects. The compact, enclosed playing environment of a four-wall handball/racquetball court presents an opportunity to perform unlike those activities included in archery, marksmanship, volleyball, basketball, softball, swimming, and tennis and badminton. While elements of the latter mentioned physical education activities may lend themselves to direct individual or dual competition, none is quite as intimate by playing environment as handball or racquetball. By nature, compensation for stress requires a challenging, aggressive attitude. It might be noteworthy to focus attention on the reality that those individual elements within archery, marksmanship, and swimming can be participated in solitarily by the participant, while handball and racquetball are conventionally participated in against an opponent.

Personality instruments have been applied by numberous researchers to members of various activities in an endeavor to identify interrelationships between personality traits and physical education activity courses. Some have expressed findings associated with this study, and others have not.

Behrman has signified that nonswimmers are more submissive, more shy and seclusive, and more cautious than are swimmers.[4] Female athletes who compete in individual sports rated higher on the personality factors of dominance, adventurousness, sensitivity, introversion, radicalism, and self

[4]Robert M. Behrman, "Personality Differences Between Nonswimmers and Swimmers," Research Quarterly, 38:163-178, May, 1967.

and self-sufficiency as tested by Peterson, Weber, and Trousdale.[5] Varsity tennis players, reported by Singer, scored statistically higher than varsity baseball players on traits of achievement, intraception, and dominance, as well as abasement.[6]

Wrestlers demonstrated a significant departure, as measured by Kroll, indicating tough-mindedness, self-reliance, and masculinity.[7] Flanagan discerned that fencers were significantly more ascendant than participants in basketball, volleyball, and boxing; badminton players were more extroverted than volleyball participants; fencers were significantly more feminine than basketball players; and volleyball players were significantly more emotionally unstable than basketball players.[8]

The aforementioned interrelationships are a matter of professional record. However, within this study order and aggression were the only significantly different factors of personality.

[5]Sheri L. Peterson, Jerome C. Weber, and William W. Trousdale, "Personality Traits of Women in Team Sports vs. Women in Individual Sports," Research Quarterly, 38:686-690, December, 1967.

[6]Robert N. Singer, "Personality Differences Between and Within Baseball and Tennis Players," Research Quarterly, 40:582-588, October, 1969.

[7]Walter Kroll, "Sixteen Personality Factor Profiles of Collegiate Wrestlers," Research Quarterly, 38:49-57, March, 1967.

[8]Lance Flanagan, "A Study of Some Personality Traits of Different Physical Activity Groups," Research Quarterly, 22:312-323, May, 1951.

Comparisons of the six activity groups in terms of the fitness components revealed that the groups were not significantly different in regard to percent body fat or ability to perform the modified flexed-arm hang. However, analysis of the 12-minute run-walk scores indicated that the tennis and badminton participants ran significantly farther than did students enrolled in all the remaining groups excluding those in weight training and physical fitness. Additionally the members of the group containing weight training and physical fitness students covered significantly more distance than did the subjects from volleyball, softball, and basketball.

With a possible exception of the physical fitness aspect of Group VI (weight training/physical fitness), one could hypothesize that tennis and badminton subjects probably perform their class activity under conditions more closely relating to the cardiovascular measure employed in this investigation than do the other groups. Consideration also needs to be given to the possibility that the people initially selecting tennis are in superior cardiovascular condition.

Archery and marksmanship are not stressful activities, as most students possess the capacity to participate without significantly increasing the heart rate. The team sports tax the cardiovascular system more than does archery or marksmanship. Yet, the overload is not excessive, as the team sports provide for periodic recuperation while teammates directly engage contact with the ball.

Although racquetball and handball are stressful individual and dual sports, the confines of the court may prohibit a development level commensurate with the aerobic process developed through tennis involvement. However, the demand of frequent bursts of energy is somewhat stressful.

With the contemporary popularity of cardiovascular fitness, it is no surprise that Group VI, containing physical fitness and weight training subjects, ran significantly farther than did Group II, the representatives from the team sports activities. An emphasis on various components of total fitness, as well as cardiovascular fitness, may account for Group VI not prevailing as the group vanguard.

When all the activity groups were considered as a single group, significant relationships were found between each of the pairs of fitness components: percent body fat, time of modified flexed-arm hang, and distance covered in the 12-minute run-walk. These findings suggest an inference, that increases in percent body fat will significantly decrease one's performance on the modified flexed-arm hang and the 12-minute run-walk. Results of this nature were not unexpected but were reinforcing to preconceived notions. Obviously to increase percent body fat, with all other things being equal, would suggest a higher mass to strength ratio and require performance at an elevated level of relative endurance. If muscular and cardiac efficiency are not proportionally increased with percent body fat, then the maximal intensity of effect can not compensate for the additional stress levied upon it by excess fatty deposits. Analogously, to increase resistence while maintaining applied force dictates a regression in the achievement of performance.

Another generalization that may be made is that increases in muscular endurance are associated with cardiovascular endurance to a significant degree. While it is true that body development is specific with regard to the nature of the activity, it is also true that it is impossible to segregate the various body systems. The complex interrelationships of functions within the living human structure may not be

isolated as an interdependence exists among the systems in their cohabitat. Therefore, people who performed well in the modified flexed-arm hang also tended to perform well on the 12-minute run-walk test. Possibly local muscular endurance is evaluated to some extent in performance of the 12-minute run-walk.

In addition to considering the relationships between the fitness components for a composite of all groups, those relationships were investigated within each activity group. Within the group of archers and marksmen, there was a general negative correlation between skinfolds and the modified flexed-arm hang as well as between skinfolds and the 12-minute run-walk. Those that had a higher percent of body fat performed the tests of muscular endurance and cardiac condition with less success. Team sports participants experienced similar relationships, only to a more pronounced degree. Toward the reciprocal direction, racquetballers and handballers functioned with a slight positive correlation between skinfold measurements and the 12-minute run-walk.

Of primary concern within Group VI (weight training and physical fitness) is the development and maintenance of muscular strength and endurance while striving to reduce excessive adipose tissue. One can readily deduce that reduction of resistence will permit measures of greater muscular endurance if percent body fat is the single independent variable.

Perhaps characteristics of muscular strength, muscular endurance, and power are more profoundly exemplified by the team sports faction than the other groups with the exclusion of Group VI, weight training and physical fitness. This distinction, coupled with cooperative activity engagement associated with team sports, may have attracted

individuals possessing a significant diversity between percent body fat and muscular endurance.

Other significant correlations were found within Group IV, the swimmers, and Group V, the tennis and badminton subjects, between muscular endurance, as measured by the modified flexed-arm hang, and cardiovascular endurance, tested by the 12-minute run-walk. These positive relationships may be indicative of the time durations commonly aligned with activities of swimming and tennis and badminton. An endurance capacity is vital in optimum performance of either. There is possibly a greater need, within these two groups, to possess each quality of endurance while various other groups may require one endurance variable but not both.

An $r=-0.67$ was derived within Group IV (swimming) upon correlation of skinfold measurement by Lange calipers and cardiovascular endurance by the 12-minute run-walk. This inverse relationship could be rationalized on the basis of aquatic principles. Since floatation can be more easily achieved by persons constructed of greater portions of adipose tissue than by persons who outwardly are structured with gross musculature, a success factor may be of relevance. Of the six groups, the swimmers would be the most likely aggregate to experience success within the physical education activity class and simultaneously not to alter their body composition. Additionally mechanical principles of swimming and running differ, and the swimmer has a weaker frame of reference with running than do the other groups. Each of the remaining five groups accentuate a mobile gait during the activity, while the swimming group is buoyantly assisted while maneuvering.

The positive correlation between physical fitness composite and attitudes toward physical education as an activity course may seem obvious. To attain a moderate to high level of total fitness, one must consciously apply self-discipline and periodically engage in physical stress. It appears logical that those students with a high physical fitness composite must experience physical activity with greater regularity and/or greater vigor than do those students with a low physical fitness composite. Oftentimes the deciding variable in ascertaining a prescribed fitness level is whether one has the desire to expend time and energy for the rewards of arriving at a fitness level. Generally speaking, those with strong attitudes in favor of physical education did score significantly higher on the physical fitness variables collectively than did those students indicating an attitude unfavorable toward physical education as an activity course.

Another significant correlation was found between physical fitness composites and aggression scores from the EPPS. A correlation coefficient of $r=-0.25$ indicates a significant inverse relationship. One possible explanation for this result could be that those more physically fit utilize the medium of physical activity to function as an escape valve, an opportunity to release tension and flustration. Whereas the less physically fit, who do not partake of strenuous exercise, have no means for tension release. To compensate, the less physically fit display their emotional anguish through daily interactions of aggression with others.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

A. Summary

This study investigated the effects of attitudes toward physical education as an activity course, personality traits, and selected physical fitness components upon selection of physical education activity courses. More specifically, the study attempted to determine:

1. The correlations between cardiovascular fitness, muscular endurance, and percent body fat as physical fitness components.

2. The relationship of attitudes toward physical education as an activity course, personality traits and physical fitness components of cardiovascular fitness, muscular endurance, and percent body fat within the following groups: archery and marksmanship; volleyball, basketball, softball; racquetball and handball; beginning swimming, intermediate swimming, and advanced swimming; tennis and badminton; and weight training and physical fitness.

3. The trends among the aforementioned variables that would differentiate among subject groups in terms of voluntary physical education activity course selection.

The investigation involved 60 randomly selected, non-physical education major, undergraduate males voluntarily enrolled in a physical education activity course during the spring quarter of 1974 at

Appalachian State University. Physical education activity classes were grouped as follows: Group I, archery and marksmanship; Group II, volleyball, basketball, and softball; Group III, racquetball and handball; Group IV, swimming; Group V, tennis and badminton; and, Group VI, weight training and physical fitness. Each subject was tested in three areas: components of physical fitness, attitudes toward physical education as an activity course, and personality.

Physical fitness components included percent body fat (measured by Lange calipers), muscular endurance (tested by a modified flexed-arm hang), and cardiovascular fitness (measured by a 12-minute run-walk test). Wear's Attitude Inventory, Form A, was utilized in determining attitudes toward physical education as an activity course, and Edwards Personal Preference Schedule was administered to ascertain degrees of personality with regard to 15 test factors.

Means resulting from the Wear Attitude Inventory ranged from 118.1 to 129.0, however, no significant difference was found when analysis of variance was applied to the data. Analysis of variance for differences among the six activity groups on the data from the Edwards Personal Preference Schedule disclosed F's ranging from 0.09 (change) to 2.59 (aggression). However, only the characteristics aggression and order were shown to be statistically significant. Tukey's test revealed archers and swimmers and tennis players to be significantly more orderly than members from the team sports and weight training and physical fitness, while archers were also significantly more organized than handball and racquetball players. Tukey's test also isolated the significantly more aggressive trait of racquetball players to any other group with the exception of the students in weight training.

Analysis of variance disclosed a significant difference between the six groups on the 12-minute run-walk. Tennis and badminton students possessed a significantly greater cardiovascular capacity than any group exclusive of those in physical fitness and weight training.

Percent body fat was found to be inversely related to both muscular endurance and cardiovascular fitness while the latter two presented a significant positive correlation. The following within group relationships were significant: inverse relationship between percent body fat and muscular endurance,team sports; inverse relationship between percent body fat and cardiovascular endurance, and positive relationship between muscular endurance and cardiovascular endurance, swimming participant; positive correlation between muscular endurance and cardiovascular endurance, tennis and badminton; and, inverse relationship between percent body fat and muscular endurance, weight training and physical fitness.

The relationship between a composite of the fitness components and the attitude toward physical education was calculated to be significant (r=0.43). The correlation of the same composite to the EPPS characteristics was significant for the aggression factor but not significant for the order variable.

B. Conclusions

Within the limitations of this investigation, the following may be concluded:

1. Attitudes toward physical education as an activity course had no effect on the selection of the following physical education activity courses: archery, marksmanship, volleyball, softball, basketball, hand-

handball, racquetball, swimming, tennis and badminton, weight training, and physical fitness.

2. Significantly more aggressive individuals were enrolled in racquetball and handball physical education activity classes.

3. Generally, students possessing greater cardiovascular fitness were enrolled in tennis and badminton physical education activity classes.

4. Attitudes toward physical education as an activity course and physical fitness components had no correlation with the selection of the physical education activity courses related to this study.

C. Recommendations for Further Study

As a result of this research, the following recommendations for further study are advanced:

1. A similar investigation utilizing a larger sample and including more physical education activities should be conducted. A larger sample would tend to adhere to statistical probability with greater accuracy, and an inclusion of more physical education activites would enlighten the topic in breadth.

2. An investigation designed to test levels of attitude, personality, and fitness prior to any class activity and again at the conclusion of a term's activity, enabling a measure of development or change, should be conducted. Insight could be gained with regard to the effects of the variables upon the selection of the various physical education activities and the effects of the experience of the activity upon the individual.

3. A similar piece of research correlating physical education majors with non-majors may be of importance. Research of this dimension could reveal similarities and differences between physical education

majors and the majors from disciplines other than physical education. Increased knowledge of this sort could be of great benefit in the administration of physical education offerings.

4. Substantial findings could evolve from a related study assigned explicitly to the investigation of female attitudes, personality, and fitness components. With physical education objectives of equality paramount, discrimination on the basis of sex cannot be justified. Therefore, research is pragmatic with regard to either sex in the quest of extending the knowledge pertaining to physical education.

APPENDIXES

APPENDIX A

SOLICITATION OF THESIS SUBJECTS: J. LISK

My name is J. Lisk. I am a graduate assistant in the HPER department working toward my Master's degree.

I'd like to thank each of you for giving me this opportunity to speak with you. I am presently in the process of gathering a sample of subjects to serve in a study I've decided upon for research purposes.

If you are a P.E. major, you may not serve as a subject, as my research will deal strictly with non-majors. To be eligible as a potential subject, you must have voluntarily selected the activity class you are presently enrolled in. If you did not, please indicate so.

Each of you has been randomly selected from all the men enrolled in the Physical Education activity classes. You do not have to participate if you do not want; however, I would be indebted to you if you would. Your participation or non-participation will not in any way effect your grade in your present activity class. The need for a truly random sample is to reflect a true picture of all persons. Volunteers would give too positive results, and required persons would respond with disapproval. So please consider that a random sample would be a true representative of the persons enrolled in the activity classes.

To explain what the study is or will be is "The Effect of Selected Fitness Components, Attitudes Toward Physical Education, and Personality Variables on Selection of Physical Education Activity Classes." Now don't become upset by this detailed title. What I will be doing will be collecting data from 3 areas: attitudes toward Physical Education, personality, and physical fitness.

What you, as a subject, will be doing if you decide to participate will be: (1) take a written personality inventory; (2) take a written attitude toward Physical Education inventory; (3) allow me to measure the thickness of your skin at your arm, waist, and chest; (4) with your arms in a flexed position, hang on a chinning bar; and (5) see how far you can run in 12 minutes.

Both the personality inventory and the attitudes toward physical education inventory are not tests. They are designed to provide information about personality and attitudes toward physical education only. They do not test intelligence. Nor can they be passed or failed. The personality inventory will require no more than 1 hour to administer, while the attitude inventory will require no more than 30 minutes.

The skin measurements and flexed-arm hang will not take one more than 10 minutes and you and I can individually arrange to do this at a suitable time for you. The 12-minute run-walk will take 12 minutes and will be administered in Conrad Stadium in small groups as your schedule permits.

To satisfy the requirements of the study, you will invest 2 hours over the next 5 weeks. You will not be evaluated for any credit for or against you. I expect wide differences among the groups and would appreciate all of you voluntarily participating.

If you are not a P.E. Major and would be willing to help me in this study, please fill in the information requested on the attached sheet. It might also be mentioned that ALL FINDINGS WILL BE HELD IN THE UTMOST CONFIDENCE. ALL RESEARCH FINDINGS WILL BE MADE KNOWN ON A GROUP BASIS, NOT AN INDIVIDUAL BASIS.

APPENDIX B

Tables 12-27 are presented as descriptive statistics for the Edwards Personal Preference Schedule (EPPS) for each of the 15 traits measured as well as the consistency score. For each of the tables the following group analysis is correct:

Group I=Archery, Marksmanship

Group II=Volleyball, Softball, Basketball

Group III=Racquetball, Handball

Group IV=Swimming

Group V=Tennis and Badminton

Group VI=Weight Training, Physical Fitness

Table 12

Descriptive Statistics for EPPS
Factor: Achievement

Group	$\bar{X}$	S.D.	Range
I	12.2	3.55	6-18
II	13.3	4.52	7-21
III	14.1	3.18	9-17
IV	15.5	3.81	10-23
V	14.9	5.90	6-24
VI	15.3	3.06	11-21

Table 13

Descriptive Statistics for EPPS
Factor: Deference

Group	$\bar{X}$	S.D.	Range
I	9.1	2.18	6-12
II	10.3	3.20	5-15
III	8.6	3.92	5-18
IV	9.5	3.69	3-15
V	10.0	2.94	4-13
VI	10.9	2.56	7-15

Table 14

Descriptive Statistics for EPPS
Factor: Order

Group	$\bar{X}$	S.D.	Range
I	11.3	3.43	5-15
II	7.0	4.92	3-18
III	7.6	3.78	1-13
IV	10.1	3.21	6-16
V	10.3	3.77	4-14
VI	6.7	4.50	1-16

Table 15

Descriptive Statistics for EPPS
Factor: Exhibition

Group	$\bar{X}$	S.D.	Range
I	14.2	3.19	8-20
II	14.4	3.63	10-20
III	14.5	4.09	10-22
IV	15.2	2.70	10-19
V	14.0	3.74	8-19
VI	13.2	3.61	7-18

Table 16

Descriptive Statistics for EPPS
Factor: Autonomy

Group	$\bar{X}$	S.D.	Range
I	13.1	3.11	8-18
II	15.4	3.53	8-19
III	15.9	4.48	8-22
IV	14.1	4.38	8-22
V	14.6	3.57	10-21
VI	13.6	2.95	9-19

Table 17

Descriptive Statistics for EPPS
Factor: Affiliation

Group	$\bar{X}$	S.D.	Range
I	17.5	4.88	9-24
II	16.3	3.71	8-21
III	15.6	2.80	12-21
IV	16.0	3.77	12-22
V	15.3	3.68	10-22
VI	16.9	4.15	10-22

Table 18

Descriptive Statistics for EPPS
Factor: Intraception

Group	$\bar{X}$	S.D.	Range
I	16.5	5.95	6-26
II	16.5	2.76	11-21
III	12.5	4.22	6-21
IV	16.7	4.92	9-24
V	17.5	4.30	8-22
VI	14.8	3.94	10-21

Table 19

Descriptive Statistics for EPPS
Factor: Succorance

Group	$\bar{X}$	S.D.	Range
I	12.2	2.39	9-17
II	13.3	3.80	8-21
III	12.0	4.00	7-19
IV	9.8	3.74	2-16
V	10.4	5.66	3-20
VI	12.0	6.24	2-23

Table 20

Descriptive Statistics for EPPS
Factor: Dominance

Group	$\bar{X}$	S.D.	Range
I	12.9	4.79	5-21
II	13.2	3.85	8-21
III	17.2	4.44	10-22
IV	15.9	2.28	12-20
V	13.6	3.31	8-18
VI	13.6	4.20	7-18

Table 21

Descriptive Statistics for EPPS
Factor: Abasement

Group	$\bar{X}$	S.D.	Range
I	14.5	2.84	10-18
II	15.0	5.27	9-25
III	12.4	2.17	8-15
IV	13.5	3.66	7-17
V	16.5	4.28	11-26
VI	15.6	3.60	10-21

Table 22

Descriptive Statistics for EPPS
Factor: Nurturance

Group	$\bar{X}$	S.D.	Range
I	19.2	5.71	10-28
II	18.2	4.80	11-24
III	17.1	4.56	11-24
IV	14.9	2.08	11-17
V	17.1	5.22	10-24
VI	18.0	5.79	8-27

Table 23

Descriptive Statistics for EPPS
Factor: Change

Group	$\bar{X}$	S.D.	Range
I	16.1	4.33	13-26
II	16.1	5.32	9-25
III	15.9	4.53	10-23
IV	15.5	5.06	7-22
V	14.9	5.09	4-22
VI	15.9	4.09	10-22

Table 24

Descriptive Statistics for EPPS
Factor: Endurance

Group	$\bar{X}$	S.D.	Range
I	10.4	4.06	4.16
II	10.9	4.58	4-18
III	10.4	3.89	2-17
IV	14.2	4.18	6-21
V	11.3	3.43	5-16
VI	10.3	3.34	5-15

Table 25

Descriptive Statistics for EPPS
Factor: Heterosexuality

Group	$\bar{X}$	S.D.	Range
I	18.0	3.40	10-21
II	18.6	5.66	6-28
III	19.9	4.72	11-24
IV	17.8	3.79	11-24
V	16.8	3.91	10-25
VI	19.0	4.03	15-26

Table 26

Descriptive Statistics for EPPS
Factor: Aggression

Group	$\bar{X}$	S.D.	Range
I	12.9	4.82	5-23
II	11.5	3.75	3-18
III	16.3	3.62	12-22
IV	10.3	2.75	6-16
V	12.8	4.37	6-19
VI	14.2	4.94	6-20

Table 27

Descriptive Statistics for EPPS
Factor: Consistency Score

Group	$\bar{X}$	S.D.	Range
I	11.9	2.64	5-14
II	11.9	1.85	8-14
III	11.9	1.20	10-13
IV	11.0	2.11	7-14
V	11.7	1.64	9-14
VI	11.5	2.27	7-14

APPENDIX C

This section contains Tables 28-33, which present reviews of the construction of the T-score composites for each of the groups. Each table within this appendix conforms to the following group assignments:

Group I=Archery, Marksmanship

Group II=Volleyball, Softball, Basketball

Group III=Racquetball, Handball

Group IV=Swimming

Group V=Tennis and Badminton

Group VI=Weight Training, Physical Fitness

Table 28

Table of T-score Composite of Physical Fitness Variables for Group I

Subject	Skinfold	Arm-Hang	Run-Walk	Composite
A	53.4	43.2	43.0	46.53
B	48.5	49.9	43.0	47.13
C	56.0	37.0	58.3	50.43
D	58.7	54.5	71.4	61.53
E	55.2	61.5	40.8	52.50
F	39.2	46.7	44.1	43.33
G	54.1	58.1	58.3	56.83
H	60.1	64.9	50.7	58.56
I	29.7	34.7	40.8	35.07
J	35.4	49.5	49.6	44.83

Table 29

Table of T-score Composite of Physical Fitness Variables for Group II

Subject	Skinfold	Arm-Hang	Run-Walk	Composite
A	48.0	49.6	69.9	55.83
B	56.3	73.5	52.0	60.60
C	47.2	49.9	42.5	46.53
D	43.7	46.3	46.1	45.37
E	49.4	49.9	35.3	44.87
F	54.9	54.5	53.2	54.20
G	47.4	39.6	42.5	43.17
H	51.2	49.5	53.2	51.30
I	35.5	35.8	44.9	38.73
J	49.5	50.5	60.3	53.43

Table 30

Table of T-score Composite of Physical Fitness Variables for Group III

Subject	Skinfold	Arm-Hang	Run-Walk	Composite
A	55.7	66.1	45.6	55.80
B	26.6	43.1	49.8	39.83
C	53.3	41.6	65.5	53.47
D	54.4	51.7	47.7	51.27
E	55.5	65.1	63.4	61.33
F	42.1	43.3	40.8	42.07
G	55.7	41.9	36.2	44.60
H	61.2	58.9	46.6	55.57
I	51.6	40.2	37.2	43.00
J	29.2	48.1	49.2	42.17

Table 31

Table of T-score Composite of
Physical Fitness Variables
for Group IV

Subject	Skinfold	Arm-Hang	Run-Walk	Composite
A	52.7	62.1	45.8	53.53
B	63.0	46.4	58.8	56.06
C	51.1	60.9	55.8	55.93
D	37.6	53.9	51.8	47.76
E	34.5	36.4	34.8	35.23
F	65.2	59.0	65.8	63.33
G	46.7	56.1	56.8	53.20
H	42.8	33.7	37.8	38.10
I	52.7	46.6	51.8	50.36
J	54.2	45.0	40.8	46.66

Table 32

Table of T-score Composite of
Physical Fitness Variables
for Group V

Subject	Skinfold	Arm-Hang	Run-Walk	Composite
A	50.2	49.0	41.8	47.0
B	46.8	68.0	59.2	58.0
C	39.2	39.9	33.2	37.4
D	62.1	52.5	59.2	57.9
E	65.6	46.7	50.5	54.0
F	48.7	44.0	44.1	45.0
G	48.7	50.3	51.6	50.0
H	34.7	33.2	33.2	33.0
I	60.5	58.4	45.1	54.0
J	43.6	58.1	55.9	52.0

Table 33

Table of T-score Composite of
Physical Fitness Variables
for Group VI

Subject	Skinfold	Arm-Hang	Run-Walk	Composite
A	50.0	54.9	56.4	53.2
B	48.2	51.4	59.8	53.7
C	24.8	31.5	47.3	34.6
D	57.8	58.3	47.3	54.3
E	59.2	62.1	45.0	55.1
F	51.0	41.7	45.0	46.2
G	52.3	52.1	70.1	58.3
H	57.0	59.2	50.7	55.3
I	55.7	37.4	33.6	42.8
J	44.1	51.4	45.0	47.2

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