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Development and validation of a questionnaire for assessing habitual physical activity of sixth-grade students

Koehler, Karen Marie, Ed.D.

The University of North Carolina at Greensboro, 1988

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DEVELOPMENT AND VALIDATION OF A QUESTIONNAIRE FOR ASSESSING HABITUAL PHYSICAL ACTIVITY OF SIXTH-GRADE STUDENTS

by

Karen M. Koehler

A Dissertation Submitted to
the Faculty of the Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

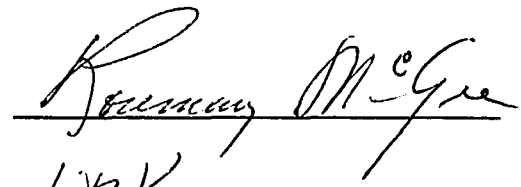
Greensboro
1988

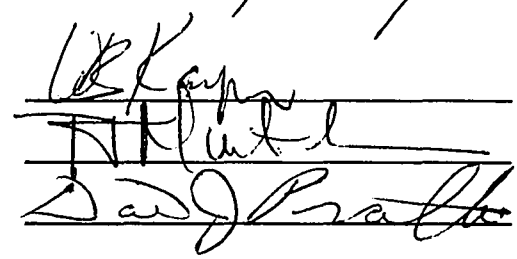
Approved by

Dissertation Adviser

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

Dissertation Adviser 

Committee Members 

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The purpose of this investigation was to develop and validate a questionnaire designed to assess habitual physical activity of sixth-grade children. Two preliminary surveys involving 104 sixth-graders were used to determine the content and format of the questionnaire. A pilot study (n = 72) was also conducted to check the administrative ease and reliability of the instrument. Finally, a sample of 235 sixth-grade students completed the Physical Activity Questionnaire (PAQ), the AAHPERD Health-Related Physical Fitness Test, and the revised Children's Attitude toward Physical Activity Inventory (CATPA). Two validation techniques were used to investigate the construct validity of the PAQ, including convergent validity and the group differences method. Pearson Product-Moment correlations were used to determine convergent validity, examining the relationships between the PAQ and health-related fitness and attitude toward physical activity. Independent t-tests were used to determine group differences for high and low activity groups on health-related fitness and attitude toward physical activity.

Results indicated that the PAQ had weak, but significant evidence of convergent validity. Significant

correlations ranging from .11 ($p < .05$) to .44 ($p < .001$) were observed between the PAQ and the four-item fitness test. Low, but significant correlations were also observed between the PAQ and CATPA Inventory, ranging from .11 ($p < .05$) to .37 ($P < .001$). No significant differences were observed between high and low activity groups on attitude. Activity groups were significantly different ($p < .05$) on sit-ups, but similar on all other fitness measures. Acceptable test-retest reliability was obtained for the PAQ ($r = .87$).

It was concluded that the PAQ had evidence of content validity, weak but significant evidence of convergent validity, and unacceptable construct validity using the group differences method. Reliability of the PAQ was acceptable.

DEDICATION

This dissertation is dedicated to my parents, Arlene and Ronald Koehler, and my maternal grandmother, Frances Keller, with great love and appreciation for their continual support.

ACKNOWLEDGEMENTS

Special thanks to my adviser, Dr. Rosemary McGee, for her encouragement, support, and advice throughout this endeavor. Thanks to Dr. Thomas Martinek for making it possible for me to do this project, and to my other committee members, Dr. William Karper and Dr. David Pratto.

I would like to thank the numerous individuals in Jackson Library and the Academic Computer Center who have assisted me throughout this project.

Sincere appreciation is extended to the volunteers and teachers who assisted with the physical fitness testing and to the students who participated in the study.

Finally, I want to express my deep gratitude to two special friends, Gaylor Callahan and Lingjiin Kang, who have suffered through every stage of this project with me.

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CHAPTER I

INTRODUCTION

Physical activity is a fundamental component of daily life for people of all ages. Numerous health disorders have been attributed, at least in part, to a lack of physical activity (Siscovick, LaPorte, & Newman, 1985). It has also been asserted that "children need several hours of vigorous physical activity per day in order to achieve optimal growth and physical development" (Williams, 1985, p. 288). At present, the relationship between inactivity and disease in children has not been well established. However, evidence is beginning to link coronary heart disease risk factors such as hypertension, obesity, and elevated blood lipids with inactivity in children as young as six and seven years old (Gillian, MacConnie, Geenen, Pels, & Freedson, 1982).

Research dealing with the lifestyle variable of physical activity has been seriously hampered by a wide range of methodological constraints, especially regarding assessment. As one examines the literature pertaining to assessment of physical activity, several key points are reiterated by numerous authors. First, measuring habitual physical activity is difficult since it cannot be

quantified through laboratory testing (Blair, 1984; LaPorte, et al., 1982; Saris, 1986). Second, criterion-referenced validation (concurrent validation) of assessment methods is not possible because of the lack of a valid criterion measure (Baecke, Burema, & Frijters, 1982; Blair, 1984; LaPorte, Montoye, & Caspersen, 1985). Third, most of the problems researchers encounter when assessing physical activity in adults are magnified when the target population is children (Saris, 1986). Finally, although assessment of habitual physical activity may not be as precise a measure as desired, reasonable estimates can be derived (LaPorte, Montoye, & Caspersen, 1985; Wallace, McKenzie, & Nader, 1985). Efforts must continue toward the development of valid instrumentation especially for sub-populations such as women, children, and the elderly (Blair, 1984; LaPorte, Montoye, & Caspersen, 1985; Washburn & Montoye, 1986). With mounting evidence of the relationship between physical activity and physical well-being (LaPorte, Montoye, & Caspersen, 1985; Saris, 1986; Siscovick, LaPorte, & Newman, 1985), a growing need for valid instrumentation designed to quantify habitual physical activity has developed. LaPorte and his colleagues (1985) reported that more than thirty methods have been employed to assess physical activity, but that "no single instrument fulfills the criteria of being valid" (p. 131).

Part of the challenge of assessing physical activity, as with other constructs, is related to the inability of the researcher to directly measure the trait. With the lack of a criterion measure, present attempts at validating methods of physical activity assessment have been primarily dependent upon "face validity and logical argument" (Blair, 1984, p. 426). Although this may be a good starting point for instrument validation, it offers little evidence to support the claim of a valid measure. The American Psychological Association clearly explains that "so-called 'face' validity, the mere appearance of validity, is not an acceptable basis for interpretive inferences from test scores" (1974, p. 26). The test developer, therefore, must begin to build evidence of content and/or construct validity. Unfortunately, "the number and type of items needed to represent adequately this [behavioral] domain is not immediately apparent. Assessment of the content validity...therefore, is usually a very subjective operation" (Crano & Brewer, 1977, p. 252). This leads to the logical conclusion that attempts to validate instruments designed to assess physical activity must focus on construct validity. Some strides have been made in this direction (Baecke, Burema, & Frijters, 1982; Blair, 1984; Montoye, 1975), but a great deal of additional work is still necessary. The purpose of this investigation was to

develop and begin to show evidence of validity for a questionnaire designed to measure habitual physical activity of sixth-grade children.

Statement of the Problem

In general, the purpose of this study was to develop and validate a questionnaire for assessing habitual physical activity of sixth-grade children. More specifically, this project was designed to answer the following questions:

1. What is the relationship between habitual physical activity and five measures of health-related physical fitness?

    a. Cardiovascular endurance
    b. Flexibility
    c. Muscular strength and endurance
    d. Skinfold thickness
    e. Composite score (T scores)

2. What is the relationship between habitual physical activity and seven subdomains of attitude toward physical activity?

    a. Social Growth
    b. Social Continuation
    c. Health and Fitness (Value and Enjoyment)
    d. Vertigo
    e. Aesthetic
    f. Catharsis
    g. Ascetic

3. Is there a significant difference between children scoring very high and very low on the Physical Activity Questionnaire for five measures of health-related physical fitness?

    a. Cardiovascular endurance
    b. Flexibility

c. Muscular strength and endurance
d. Skinfold thickness
e. Composite score (T scores)

4. Is there a significant difference between children scoring very high and very low on the Physical Activity Questionnaire for seven subdomains of attitude toward physical activity?

   a. Social Growth
   b. Social Continuation
   c. Health and Fitness (Value and Enjoyment)
   d. Vertigo
   e. Aesthetic
   f. Catharsis
   g. Ascetic

5. What is the test-retest reliability of the Physical Activity Questionnaire?

Definitions

For the purposes of this investigation, terms which may be ambiguous or unfamiliar have been defined:

1. Physical fitness: "Physical fitness is a multifaceted continuum extending from birth to death. Affected by physical activity it ranges from optimal abilities in all aspects of life through high and low levels of different physical fitness, to severely limited disease and dysfunction" (AAHPERD, 1980, p. 3).

2. Health-related physical fitness: "...physical fitness related primarily to functional health...and associated with the following areas of physiological function:

   1) cardiorespiratory function
   2) body composition (leaness/fatness)

3) abdominal and low back-hamstring musculoskeletal function." (AAHPERD, 1980, p.3-4).

3. Physical activity: refers to any bodily movement produced by skeletal muscle that results in energy expenditure (Caspersen, Powell, & Christenson, 1985, p. 126).

4. Habitual physical activity: the customary pattern of physical activity in which an individual engages.

5. Questionnaire: "...a device for securing answers to questions by using a form which the respondent fills in himself" (Goode & Hatt, 1962, p. 133). The Physical Activity Questionnaire is a self-report questionnaire for sixth-grade students, designed to estimate the number of hours of participation in physical activities, outside of physical education class, during a one-week time period.

Research Assumptions

To conduct this study, the investigator accepted the following assumptions:

1. The respondent was both able and willing to give truthful answers on the activity questionnaires and the attitude inventory.
2. Habitual physical activity is a construct which can be measured.

3. Physical activity and physical fitness are related constructs.
4. Physical activity and attitude toward physical activity are related constructs.

Human Subjects

All necessary papers were submitted to the Human Subjects Review Committee for the School of Health, Physical Education, Recreation, and Dance, the University of North Carolina at Greensboro (UNC-G) (Appendix A). This study was an extension of a large-scale middle school fitness project conducted by Dr. Thomas Martinek, UNC-G. Approval was given to collect the data necessary to conduct this investigation. The physical education teacher at each middle school had a list of students who did not have parental permission to participate in this study. These students did not participate on testing days.

Scope

Two hundred thirty five sixth-grade students voluntarily participated in this investigation. All subjects were enrolled in one of five Greensboro middle schools, Greensboro, North Carolina. The instrumentation used to conduct this study included the AAHPERD Health Related Physical Fitness Test (AAHPERD, 1980), the Revised

Children's Attitude Toward Physical Activity Inventory (CATPA) (Schutz, Smoll, & Wood, 1981), and the Physical Activity Questionnaire (PAQ). The PAQ is a self-report inventory of physical activity for children, outside of physical education class. The revised CATPA is a semantic differential scale with seven attitude subdomains. The health-related physical fitness test is a measure of "physical fitness related primarily to functional health" (AAHPERD, 1980, p.3). The four-item test includes the triceps skinfold, bent-knee sit-ups, sit-and-reach test, and the mile run/walk. All testing was completed during the spring semester of the 1986-87 academic year.

Significance of the Study

Several researchers (Edholm, 1966; LaPorte, Montoye, & Caspersen, 1985; Washburn & Montoye, 1986) have identified a growing need for valid assessment tools designed to measure physical activity. Although more than thirty methodologies are presently available to measure various aspects of physical activity, their validity has been seriously questioned (Blair, 1984; LaPorte, Montoye, & Caspersen, 1985). With rapidly expanding evidence of the relationship between physical activity and physical well-being, especially in children, the need for accurate assessment of physical activity has grown as well. Edholm

(1966) explains that:

> The role of muscular exercise, in the course of work or leisure activities, for the maintenance of health urgently requires objective assessment. The main difficulty is to devise means for measuring activity without interfering with or modifying the subject's normal life. Furthermore, to establish the correlation betweeen physical activity and the incidence of, eg., coronary heart disease requires data from many subjects, so a suitable method should be readily applied to a considerable population. (p. 187)

A popular method of obtaining physical activity information from subjects is by questionnaire, especially in studies with large sample sizes. Washburn and Montoye (1986) recently stated, "At present, useful information regarding physical activity can be obtained from questionnaires. It is important, however, that questionnaires be continually refined to provide more accurate physical activity information to allow for the testing of specific hypotheses regarding the relationship between physical activity and chronic disease" (p. 575). Validation of a questionnaire designed to assess physical activity, therefore, helps to meet a widespread need among researchers.

CHAPTER II

REVIEW OF THE LITERATURE

The success or failure of scientific inquiry is largely dependent upon the researcher's ability to measure accurately the variables under investigation. For many variables, this does not present a major difficulty, especially when they are directly observable and measurable. Unfortunately, the social scientist is often faced with the need to study variables which cannot be directly observed or measured. These variables, often referred to as constructs (Anastasi, 1982; Kerlinger, 1973; Safrit, 1986), present the researcher with a tremendous challenge. One such challenge has been undertaken by a vast array of researchers as they have attempted to assess habitual physical activity.

The increasing frequency of hypokinetic disease in the American population, in children as well as adults, has attracted the attention of professionals from a wide range of disciplines. The growing body of literature which examines the relationship between physical activity and physiological well-being has created widespread interest in the area of physical activity assessment. It has been reported that more than thirty different methodologies have

been used for this purpose (LaPorte, Montoye, & Caspersen, 1985). Of these diverse methodologies, only the questionnaire has been found to be practical for use with large sample sizes. Epidemiologists, for example, have almost exclusively used either interview or self-administration techniques. Washburn and Montoye (1986) stated that "Currently, the physical activity questionnaire is the most practical and widely used approach for the assessment of physical activity in epidemiologic research" (p. 563). Several researchers (Keyes, 1982; Montoye & Taylor, 1984; LaPorte, Montoye, & Caspersen, 1985; Washburn & Montoye, 1986) have identified other methodologies as burdensome to researchers and their subjects, in terms of both time and cost. It has also been noted that the questionnaire does not interfere with the normal daily routine of subjects (LaPorte et al., 1985; Washburn & Montoye, 1986) and it is the only methodology available for measuring past physical activity habits (Edholm, 1966).

Questionnaire Development

One of the most popular methods of data collection among researchers is the questionnaire. This is likely to stem from the fact that a "wide variety of data [can be] collected through the use of sample surveys [including] the following: demographic information, opinions, beliefs,

knowledge, feelings, and present and past behavior" (Daniel, 1979). McMillan and Schumacher (1984) suggested that the use of a questionnaire should reflect an informed decision that "... no other more reliable and valid technique could be used" (p. 140). After this decision is made, the researcher may be faced with the task of developing a questionnaire to meet the needs of the proposed investigation. If this is the case, as it was in this study, there are general guidelines which should be adhered to in the development of the instrument. As explained by Bork and Francis (1985), "A researcher's attention to several fundamental principles for developing a questionnaire greatly enhances the likelihood that valid and reliable data will be gathered" (p. 907). It should be noted, however, that questionnaire development is not a rote task and every investigation presents new and different challenges which the investigator must be prepared to face (Oppenheim, 1966).

There appears to be widespread agreement about the general guidelines of questionnaire development (Babbie, 1973; Berdie & Anderson, 1974; Bork & Francis, 1985; Koos, 1928; McMillan & Schumacher, 1984; Moser & Kalton, 1972; Oppenheim, 1966). The first essential step to be taken is planning. Jaeger (1984) made it clear that "Doing a good job of constructing [a questionnaire] requires careful

planning and meticulous attention to detail" (p. 7). Accomplishing this requires that specific objectives be defined at the outset. Once these goals have been specified and the researcher carefully determines exactly what information is needed, the task of writing questions begins.

From this point on, careful consideration must be given to the characteristics of the respondents. Their age, gender, access to information being sought, and the like must always be present in the investigator's mind. Simplicity should be sought whenever possible. The researcher now makes a decision about the format of the questionnaire and begins writing the individual items (McMillan & Schumacher, 1984). Every effort must be made to express clearly what is wanted. "Clarity is achieved when all respondents interpret the item in the same way" (McMillan & Schumacher, 1984, p. 141). "Because the purpose of a questionnaire is to elicit information from respondents in a consistent, and optimally, a standardized manner, the utmost care must be exercised when constructing each item" (Bork & Francis, 1985, p.909).

After the questionnaire is completed, it should be tested for adequacy. This can be accomplished through some form of pilot study. The success of the pilot study will depend largely on the participants. Every effort should be

made to employ respondents in the pilot who are as similar as possible to the target population (Bork & Francis, 1985; Oppenheim, 1966). Moser and Kalton (1972) explained that in the course of the pilot investigation, several things need to be observed carefully: (1) the ease of handling the questionnaire in the field, (2) the efficiency of its layout, (3) the clarity of instructions, (4) the adequacy of the actual questions, and (5) the probable cost and duration of the proposed project. A pilot study is extremely valuable in terms of identifying problems, many of which can then be avoided in the main investigation.

In summary, the development of a questionnaire involves meticulous planning, painstaking attention to detail, numerous revisions, and at least one pilot study. Once all of these steps have been completed, the investigator must focus on the credentials of the questionnaire. Is the instrument valid and reliable? Can the investigator have confidence that the instrument will successfully achieve the purpose for which it was developed? The following discussion will address these important measurement issues.

Measurement Theory

There are essential characteristics which a measurement tool must have before any significant degree of

confidence can be placed in its results. These characteristics are referred to as measurement theory (Baumgartner & Jackson, 1982). In-depth coverage of measurement theory is available in a wide range of easily obtained textbooks on measurement, psychometrics, and research; therefore, the ensuing discussion will merely highlight some of the more salient aspects of this topic.

One essential characteristic for any measurement instrument is its ability to measure a particular trait or quality consistently and objectively. This characteristic is called reliability. Objectivity, also called rater reliability, is defined as the degree of agreement between individuals when measuring the same thing (Barrow & McGee, 1979). Statistically, this refers to the correlation coefficient which is calculated using a set of matched scores from two different raters, and is refered to as the reliability coefficient.

In addition to objectivity, stability reliability is also quite important. This refers to how consistent or dependable a measure is. If a measurement instrument cannot produce similar results under like conditions, little confidence can be placed in its reliability. The test-retest method is used to check stability reliability. Statistically, a correlation coefficient is calculated from two sets of scores derived from two separate

administrations of the same test using the same subjects.

The reliability of any test may be influenced by a wide range of factors. These factors may be conditions associated with the test itself, the testing conditions, or the individual being tested. Variations in any or all of these conditions may result in measurement error, thereby influencing reliability. Test developers and test users must work to eliminate as many sources of measurement error as possible. A comprehensive list of factors which may introduce measurement error has been provided in Table 1.

In addition to reliability, the test developer must also be concerned with whether or not a measurement instrument actually measures what it is supposed to measure (Baumgartner & Jackson, 1982; Sheehan, 1971). This characteristic is referred to as validity. More specifically, validity has been defined as, "...the appropriateness, meaningfulness, and usefulness of the specific inferences made from test scores" (American Psychological Association [APA], 1985, p. 9). It is the responsibility of the test developer to begin gathering evidence to support the validity of a measurement tool. Three major types of validity may be sought, including content-related, criterion-related and construct-related.

Content-related validity is concerned with whether a test includes a representative sample of a universe of

Table 1

Sources of Measurement Error

Conditions of Test Administration and Construction
Changes in time limits
Changes in directions
Different scoring procedures
Interrupted testing session
Race of test administrator
Time the test is taken
Sampling of items
Ambiguity in wording
Misunderstood directions
Effect of heat, light, ventilation in testing situation
Differences in observers
Conditions Associated with the Person Taking the Test
Reactions to specific items
Health
Motivation
Mood
Fatigue
Luck
Fluctuation in memory or attention
Attitudes
Test-taking skills (test wiseness)
Ability to comprehend instructions
Anxiety

Note. Research in education: a conceptual approach (p. 127) by J.H. McMillan and S.Schumacher, 1984, Boston: Little, Brown and Company). Copyright 1984 by J.H. McMillan and S. Schumacher.

possible items, similar to the random sample of subjects often selected by a researcher from a previously defined population (APA, 1985; Bausell, 1986; Safrit, 1986). At times, this may be accomplished through simple random selection from an easily defined content universe, although this is not usually the case. Definition of the content universe and item selection are often accomplished through logic and expert opinion. Content validity, therefore, is frequently a very subjective type of validity.

Criterion-related validity is a statistically determined validity concerned with the relationship between scores on different tests (APA, 1985; Safrit, 1986). Field tests are often validated against laboratory tests or other direct measures of a given variable. If the correlation between both measures is strong, the field test is said to have concurrent validity, a major type of criterion-related validity. Another major type of criterion-related validity is predictive validity. A strong correlation between two or more tests may enable a researcher to predict future performance on the criterion variable from performance on the predictor variable(s). The process of establishing concurrent and predictive validity may be similar, but the application of the results tends to be very different.

Lastly, a validation technique which combines logical and statistical validity is construct-related validity. A

construct is a trait or characteristic which cannot be directly measured (Anastasi, 1982; Kerlinger, 1974; Safrit, 1986). How well a test appears to measure a given construct is refered to as construct validity. According to the American Psychological Association (1985) "the process of compiling construct-related evidence for test validity starts with test development and continues until the pattern of empirical relationships between tests scores and other variables clearly indicates the meaning of the test score" (p. 10). Two indicators of construct validity include convergent validity and group differences. Anastsai (1982) explains that "... in order to demonstrate construct validity we must show... that a test correlates highly with other variables with which it should theoretically correlate..." (p. 147). This is referred to as convergent validity. The group differences method involves comparing scores for two groups, e.g., high and low activity groups, who logically should differ on the construct under investigation, e.g., physical fitness. These two validation techniques were used to investigate the construct validity of the PAQ, although other procedures may also be used for this purpose.

Consideration of the different types of validity suggests that "validity is a relative, descriptive term, not an all-or-none property" (Crano & Brewer, 1973, p.

250). The strongest evidence of validity would include all three types. It is important to note, however, that one solid source of validity would be preferable to numerous questionable sources (APA, 1985).

Assessment of Habitual Physical Activity of Adults

Although the present investigation involved children exclusively, the majority of research pertaining to the assessment of habitual physical activity has been conducted using adults. Since valuable information can be extrapolated from findings with adults (Saris, 1986), this body of knowledge will be reviewed selectively.

Interest in the assessment of physical activity is not a recent development. The first systematic attempt to measure physical activity dates back to the early 1920's (Keyes, 1982). Raymond Pearl (1924) developed a five-point scale to classify occupational activity in an attempt to rank order over 130 occupations based on "expenditure of physical energy." No consideration was given to classifying leisure activities at that time.

Since Pearl conducted his research, more than thirty different methodologies have been used to measure physical activity (LaPorte, et al., 1985). LaPorte and his colleagues have grouped these methodologies into seven

categories including: calorimetry, job classification, behavioral observation, physiological markers, mechanical and electronic monitors, dietary measures, and survey procedures. A brief description of each major category has been provided below, but the major focus will be on survey procedures since they are directly applicable to the current investigation.

Calorimetry involves the measurement of heat produced as a result of metabolism (Brooks & Fahey, 1984). This methodology, more specifically called direct calorimetry, is very accurate, but is also very expensive. As a result, indirect calorimetry (measuring oxygen uptake) is often used. "Indirect calorimetry provides a highly reliable and valid substitute for the direct procedure, since oxygen uptake is linearly related to energy expenditure" (Blair, 1984, p. 436). Unfortunately, neither technique is appropriate for assessment of habitual physical activity since both methodologies "alter or inhibit normal physical activity patterns and are prohibitively costly for use with large populations" (LaPorte et al., 1985, p. 132). In addition, neither method provides any information about type of physical activity or activity patterns.

Job classification appears to be the oldest of all the techniques for measuring physical activity. Generally, it involves rating an individual's level of activity based on

the physical demands of the occupation. Although this method lends itself to use with large groups at a reasonable cost, it has several serious limitations. As LaPorte and others (1985) explained, "Limitations [of job classification methods] include within-job classification variability, job intensity, misclassification, secular changes in job requirements, seasonal changes in job requirements, possible selection bias, and omission of leisure and nonoccupational physical activity" (p. 132). In addition to these limitations, this method has been developed for use with adult populations and would be innappropriate for use with children.

Two procedures classified by LaPorte and his colleagues (1985) as "physiological markers" of physical activity include maximal oxygen consumption and the doubly labeled water technique, a technique which provides an estimate of total energy expenditure based on the metabolism of water containing isotopically labeled hydrogen and oxygen atoms. Maximal oxygen consumption has been found to have a weak relationship to physical activity level (DeBacker, et al., 1981), and the doubly labeled water technique fails to provide any information about types of physical activity or activity patterns, only total energy expenditure. In addition to these major limitations, both techniques are also very time-consuming

and expensive.

A fourth category of physical activity assessment procedures is mechanical and electronic monitoring. Mechanical monitoring devices include the pedometer, actometer, and LSI (large-scale integrated motor activity monitor). Electrical monitoring devices include the accelerometer, step counter, and the heart rate monitor. Each of these devices, whether mechanical or electrical, in some way attaches to the subject under investigation and monitors movement, except the heart rate monitor which monitors heart rate response to an individual's activity. Each of these devices has been found to have varying degrees of reliability and validity, depending on the type, length, and intensity of the activity. Overall, these devices are either unreliable or too costly for use in large population studies (Anderson, et al., 1978). It is worth noting, however, that some researchers believe these devices will become more useful in the future. "As technology improves and the costs decrease, these monitors may be made applicable to population studies of physical activity" (LaPorte, et al., 1985).

Behavioral observation has also been an appealing methodology for assessment of physical activity. Although it is impractical for large group study, some researchers believe this method may eventually provide a criterion

measure by which other methodologies could be validated (LaPorte, et al., 1985). Key problems associated with this technique include the selective volunteer group who would consent to constant monitoring by the researcher and the influence the observations may have on an individual's normal behavior patterns.

A sixth category for activity assessment procedures is dietary measures. Most dietary measures attempt to estimate energy expediture based on the caloric value of food intake. In addition to the burden of record keeping placed on subjects, dietary measures fail to account for variations in body weight among subjects and are unable to provide information pertaining to type, frequency, or duration of physical activities. According to LaPorte et al. (1985) "Dietary measures may have to improve considerably to be a useful and practical index of physical activity" (p. 141).

Survey procedures comprise the last major category of methodologies for assessing habitual physical activity. The two most freqently used survey procedures include the self-administered questionnaire and the interview (Blair, 1984; Washburn & Montoye, 1986). Many studies have incorporated both methodologies, some using the interview results as a criterion to validate the self-administered results (Reiff, et al., 1967). The typical physical

activity questionnaire requires the respondent either to recall specific physical activity in terms of mode, duration, intensity, and regularity or to provide a general overview of physical activity level. If recall is immediate it is usually in the form of an activity diary, consisting of detailed records of one's physical activity. This procedure has proven to provide acceptable results, but is seldom used due to time and cost restraints. In addition to burdening both the respondent and the researcher, it appears that the activity diary may interfere with normal activity patterns (LaPorte, et al., 1985; Washburn & Montoye, 1986). Due to these limitations, recall procedures have been favored. Delayed recall can range anywhere from one day (Baranowski, et al., 1984; Kannel & Sorlie, 1979) to a year (Baecke, et al., 1982; Taylor, et al., 1978), and in some cases a lifetime (Saltin & Grimby, 1968). The recall survey covering a year or more is referred to as a physical activity history or quantitative history survey (Blair, 1984; LaPorte, et al., 1985). The value of the physical activity history has been questioned "since relatively recent activity (the last several weeks) is more closely associated with health status than more distant activity..."(Blair, 1984, p. 430). Several authors (Blair, 1984; LaPorte, et al., 1985; Washburn & Montoye, 1986) also noted that the longer the

recall period, the greater the problem of forgetting. Conversely, LaPorte and his associates (1985) noted that short-term recall may not be representative of seasonal changes in physical activity. Although readministration of the survey to include each season may be possible, availability and willingness of subjects may present difficulty.

The questionnaire has been the most popular method of collecting physical activity data in large population studies, but this does not mean that the questionnaire is without its weaknesses. As noted above, memory and seasonality may present the researcher with some difficulties. Of major concern, however, is the limited information about the reliability and validity of physical activity questionnaires (Blair, 1984; Karvonen, 1967; LaPorte et al., 1985; Montoye & Taylor, 1984; Washburn & Montoye, 1986). LaPorte and others (1985) reported that "no single [questionnaire] fulfills the criteria of being valid, reliable and practical while not affecting behavior" (p. 131). This rather bleak remark is put into perspective as they explained further, "Despite the difficulty in measurement, relatively strong association has been found between physical activity and health, suggesting that, with improvements in assessment techniques, even stronger associations may be seen" (p. 131). Physical activity, as

measured by the questionnaire, has already been used to predict the development of coronary heart disease (Morris, Pollard, Everitt, & Chave, 1980; Paffenbarger, Wing & Hyde, 1978) and has been shown to be related to body composition and calorie intake (Buskirk, Harris, Mendez, & Skinner, 1971; Montoye, 1975). As with all questionnaires, the problems of sampling, respondent motivation, and inability to clarify or obtain incomplete or missing responses must be handled as efficiently as possible.

The popularity of the questionnaire among researchers is evidence of numerous strengths characteristic of this method. Time and cost efficiency are practical strengths which make it possible to collect and compile large amounts of data in a relatively short period of time. In addition, the content of the questionnaire can be easily designed for a specific purpose, making it a flexible methodology suitable to a wide range of situations. These appear to be among the primary reasons for the widespread use of physical activity questonnaires (Blair, 1984; LaPorte, et al., 1985; Washburn & Montoye, 1986). Other strengths of this methodology include the ability to reach subjects in distant locations, standardization of questions, and the ability to assure anonymity to subjects (McMillan & Schumacher, 1984).

Assessment of Habitual Physical Activity of Children

Literature addressing the issue of habitual activity assessment of children is limited. As noted above, the majority of work completed in this area has been with adult subjects. At present, there is a growing interest in physical activity of children and its relationship to disease and health. It has long been believed that children must be involved in vigorous physical activity to grow normally and remain healthy (Williams, 1985). Presently, researchers are beginning to document very early onset of coronary heart disease risk factors in physically inactive children (Gilliam, MacConnie, Greenen, Pels, & Freedson, 1982). Epidemiological research (Marmont, 1979) has shown that development of coronary heart disease may be more dependent on environment than age, suggesting that early intervention programs may help prevent coronary heart disease. Other researchers (Ross, Dotson, & Gilbert, 1985b) noted that "the roots of many degenerative diseases are embedded in patterns of behavior developed during childhood...", including the lack of appropriate physical activity (p. 40). Unfortunately, it appears that efforts to measure habitual physical activity of children have been hampered by the same methodological constraints which plague physical activity measurement in other populations,

including definition, reliability, validity, and practicality (Klesges & Klesges, 1987; LaPorte, Adams, Savage, Brenes, Dearwater, & Clark, 1984; Saris, 1986). In addition, obtaining physical activity information from young children is further hampered by their age, making it inappropriate to use some methodologies.

Since this project is primarily concerned with the measurement of sixth-grade students on a large scale basis, the focus of this section will be on survey procedures. Saris (1986) has explained that "in a large-scale population design, only survey procedures are currently applied" (p. 258). A wide range of methodologies used to measure habitual physical activity has been discussed in the previous section of this literature review. Since the strengths and weaknesses of these methods remain relatively unchanged with younger populations, that material will not be given further consideration.

The widespread popularity of recall questionnaires and quantitative histories with adults has not carried over into studies with child populations (Saris, 1986). Although these still remain highly desirable methods in large-scale studies, it has been found that recall is difficult for children under ten years of age. Saris (1986) reported on the reliability of physical activity information of children three to six years old, as reported

by parents, and children eight years and older, reporting for themselves. Reliability improved consistently as the age of the child increased; the reliability of the parents' estimates was quite low. This study further revealed that the most reliable values were for those which pertained to sports participation. It was suggested that this may be due to the regularity of participation in such activities.

In response to the limited number of reliability and validity reports on survey methods used in assessing physical activity, Baranowski, et al. (1984) conducted two studies on self-report measures of aerobic activity. The first study dealt with the reliability of daily and weekly self-reports of aerobic activity for adults and children. All subjects were participants in an intervention program for changing behavior associated with cardiovascular risk. The mean number of minutes spent daily in aerobic activity was calculated using daily and weekly self-reports. Mean scores for each method revealed significantly higher scores on the daily self-report for four of the five observations. Pearson correlations for the entire sample revealed no significant relationship between the two methods, but the adult experimental group was significantly correlated for four of the five observations. No significant correlations were obtained for the children. These results, and the large standard deviations derived for each observation,

indicate great variation among subjects. Although the authors could not determine which method may have been more accurate, they noted that "it is usual to assume that the daily self-monitoring data are more accurate, since they overcome many problems in memory" (Baranowski, et al., 1984, p. 311). Although this study indicated that children may have difficulty recording physical activity data, it should be noted that the ages of the children in this study were not clearly identified. It is inferred that at least some of them were enrolled in grades three through six.

The second study conducted by Baranowski, et al. (1984) included children enrolled in the third to sixth grades. This investigation examined the validity of a variety of self-report forms for aerobic activity against observational data. The self-report forms covered a full day of activity, but varied along the dimensions of time period and response format. Time period was varied to include reporting by segments of a day and the day as a whole, while response format was varied to include total number of minutes engaged in an activity, a dichotomous format (yes; no), and a trichotomous format (no; yes < 20 minutes; yes > 20 minutes). Findings indicated significantly higher agreement with observations when the segmented day format was utilized. The highest percent of agreement was achieved on the exact-minutes response format

for the segmented day. It is interesting to note that this response format also had the lowest percent agreement when reporting the day as a whole. The trichotomous response format yielded a high percent of agreement for both time periods, while the dichotomous format yielded intermediate agreement. Results from this project also revealed that percentage of agreement was generally better on the second day, suggesting that practice and awareness may also be keys to improving a child's ability to report physical activity data. Finally, the authors found that parental assistance did not improve the children's ability to report their aerobic behavior. This finding is consistent with similar work conducted by Saris (1986).

The validity of exercise recall for children was also studied by Wallace, McKenzie, and Nader (1985). The seven-day exercise recall of eleven boys (age = 12.5 $\pm$ 0.7 years) at a summer residential camp were compared to observed behavior as recorded by the child's counselor. The exercise recall was administered by an investigator, requiring the boys to recall the mode and duration of their activities for the seven previous days. Each day was segmented into morning, afternoon, and evening to encourage remembering. After calculating energy expenditure from the child's recall record and the counselor's observations, t-tests were used to compare the two. There were no

significant differences between the energy expenditures reported by the counselors and the children, using a .95 confidence limit. The authors concluded that the seven-day recall appears to be a useful summary tool for determination of the total energy expenditure of children.

Butcher (1979) compared physical activity participation of 661 adolescent girls in grades six through ten to determine if participation patterns changed with grade level. The questionnaire she developed to measure physical activity participation included six items:

1. number of interschool teams
2. number of intramural activities
3. number of community-organized activities
4. number of total recreational activites
5. average hours per day spent in physical activity
6. frequency of participation in 4 favourite activities (Butcher, 1979, p. 2).

Although Butcher reported that she pilot tested her questionnaire on a comparable sample to those in her study, no reliability or validity data were presented. She indicated, however, that it appears preferable to investigate activities on a more individual basis rather than globally. Findings indicate a steady decline in the average hours per day spent participating in physical activity as grade increased. The mean score for sixth-

graders was 4.26 hours, decreasing to 2.64 hours for tenth-graders.

One of the most ambitious physical activity assessment projects with children was undertaken recently as part of the National Children and Youth Fitness Study (NCYFS) (Ross, Dotson, & Gilbert, 1985b). "...NCYFS was the first fitness study of a national random sample of youth in nearly a decade and the first to ever view fitness from a health perspective. According to the Public Health Service, it was the most rigorous study of fitness ever conducted in the U.S." (p. 81). Each NCYFS participant completed five fitness tests (body composition, bent-knee sit-ups, sit-and-reach, chin-ups, and the mile walk/run)and the Physical Activities Survey, an eight page questionnaire designed to provide detailed information regarding physical activity patterns over the past year. Unfortunately, the validity and reliability of this questionnaire have not been investigated. Nonetheless, results from this project have been interesting, although not surprising. Major conclusions of this project included that (1) students obtain over 80 percent of their physical activity outside of physical education class, (2) boys engage in 10 percent more physical activity than girls, (3) only about 50 percent of youth get activity vigorous enough to promote cardiovascular health, (4) today's youth have significantly

more body fat than their 1960s counterparts, (5) the five most popular physical activities among boys and girls in grades five through twelve are baseball/softball, basketball, bicycle riding, jogging, and swimming, and (6) students who either spent more time in physical education, participated in a greater variety of activities, or were involved in more community-sponsored activities performed better on the physical fitness tests.

A final activity questionnaire of importance to this investigation was developed by R. Telema, University of Jyvaskyla, Finland. The simplicity and clarity of this questionnaire were striking, especially in comparison to the NCYFS Physical Activities Survey. The Physical Activity Questionnaire (PAQ), presently under investigation, is largely the result of combining what was believed to be the best of these two instruments, with additional modifications based on recommendations from other primary data sources and pilot testing. Telema (1970) reported reliability coefficients ranging from .72 to .93. Stratified sampling resulted in a sample of 4,271 Finnish high school students (grades II, IV, and VII) ranging from 10-20 years of age. The mean ages for grades II, IV, and VII were 13.1, 15.3, and 18.4 respectively. Findings about Finnish youth paralleled American youth in that boys spent more time involved in sports activities

than girls, but differed in that, with increasing age, physical activity decreased more for boys than girls. Finnish secondary students spent their least amount of time in physical activity during "slushy time", devoting most of their time to homework. In addition, socioeconomic status affected time spent in physical activity "...in that the highest social stratum spent more time than the lowest on other interests, and correspondingly the lowest stratum spent more time on physical activities" (Telema, 1970, p. II). Some urban and rural differences were also noted.

Summary

At present, survey procedures are the only methods used to assess habitual physical activity of children on a large-scale basis (Saris, 1986). The development and validation of questionnaires for this purpose has proven to be a difficult, yet necessary task (Blair, 1984; Edholm, 1966; LaPorte, Montoye, & Caspersen, 1985; Washburn & Montoye, 1986). Presently, a wide range of questionnaires has been employed by researchers, typically self-made instruments developed for a specific set of circumstances. Unfortunately, most of these instruments have not been subjected to necessary validation procedures to ensure that they measure what they are supposed to measure with an acceptable degree of consistency (Blair, 1984; Karvonen,

1967; LaPorte et al., 1985; Montoye & Taylor, 1984; Washburn & Montoye, 1986). Nonetheless, existing evidence (Butcher, 1979; Saris, 1986; Telema, 1970; Wallace, McKenzie, & Nader, 1985) suggests that sixth-grade children are capable of reporting their time spent in physical activity. Some investigators (Baranowski, et al., 1984; Saris, 1986) have attempted to improve the recall of child populations by allowing parental assistance, but concluded that the parents were not sufficiently aware of their children's physical activity to help. For child and adult populations alike, there is widespread agreement that more work needs to be done in the area of physical activity assessment.

CHAPTER III

PROCEDURES

The purpose of this study was to develop and validate a questionnaire for assessing habitual physical activity of sixth-grade children. This investigation was conducted in two phases; therefore, the procedures have been divided into two major corresponding sections. Section one deals primarily with the development of the Physical Activity Questionnaire (PAQ), including two preliminary surveys and a pilot study. Section two focuses on the construct validity of the PAQ, examining its relationship to other variables related to physical activity and its ability to discriminate between high and low fitness and attitude groups.

Development of the Physical Activity Questionnaire

The development phase of this investigation included two preliminary surveys and a pilot study. The preliminary surveys were designed to generate data which would guide the investigator in the selection of appropriate items for a physical activity assessment tool for sixth-grade students in Greensboro, NC. Once the content and format of the questionnaire were determined, a pilot study was

conducted to check the administrative ease and the reliability of the instrument. These steps were taken to refine the questionnaire as much as possible before beginning the validation phase. Detailed procedures for each step of the development phase will now be discussed.

The initial activity pool employed in the preliminary questionnaire (Appendix B) consisted of eighty-six activities. This list was compiled for the Physical Activities Survey developed for the National Children and Youth Fitness Study (Ross, Dotson, & Gilbert, 1985a; Ross, Dotson, & Gilbert, 1985b; Ross, Dotson, Gilbert, & Katz, 1985). Since the Physical Activities Survey was designed for students in grades five through twelve nationwide, the activities list was quite extensive. The preliminary survey was used to reduce the activity pool to forty-one items. To accomplish this, six sixth-grade classes from two different Greensboro middle schools completed the preliminary questionnaire during the week of September 15, 1986. The major objectives for using the preliminary questionnaire were (a) to determine what the most popular activities were for sixth-graders in Greensboro, outside of physical education class, (b) to determine what differences in activity selection existed, based on race and gender, and (c) to determine if students were capable of estimating the number of hours they spent engaged in a specified

activity over a one-week time period.

The data generated by the preliminary questionnaire suggested that, although some activities were popular among all groups, race and gender did appear to influence the selection of physical activities. Items which were selected most often among all subjects for all groups (n=104) included swimming, bicycling, kickball, jogging, and ping pong. Boys (n=57) favored football, baseball/softball, basketball, and wrestling, while girls (n=47) preferred rollerskating, relays, jumping/skipping rope, and tag. Black students (n=49) favored relays, wrestling, jumping/skipping rope, and dodgeball, while white students (n=49) preferred football, baseball/softball, basketball, and soccer.

It was also determined, based on student response while completing the preliminary questionnaire, that sixth-grade students were capable of estimating the number of hours they spent engaged in specified activities over a one-week time period. Student questions primarily focused on whether something they did qualified as time spent in a given activity or how to round off parts of an hour. No one said he/she could not do it or could not remember, and all questionnaires were returned completed. It appeared that an example directing students to consider time spent doing an activity during the week and weekend separately

was helpful. In addition, weekdays were broken down into before and after school activities, while weekends were considered on a morning, afternoon, and evening basis. Parts of an hour were rounded down if participation was less than 30 minutes and up for 30 minutes or more (see Instructions for Administration of the Preliminary Activity Questionnaire, Appendix C).

After careful consideration of the results of the Preliminary Questionnaire, it seemed prudent to go back to the children with a revised Questionnaire before making the final item selection. The Revised Preliminary Activity Questionnaire (Appendix D) consisted of the forty-one items of greatest interest to sixth-graders in Greensboro, as determined by the initial survey. Activities selected by fewer than five of the 104 students who completed the first questionnaire were eliminated from the initial item pool (e.g. boxing, fencing, hang gliding, lacrosse, and squash), while other related activities were collapsed into single items (e.g. tackle, touch, and flag football were all included under "football"). A sub-set (n=86) of the original 104 students completed the Revised Activity Questionnaire during the fourth week of October, 1986. The results of this survey were used to guide the development of the PAQ. To avoid race and gender bias, the final selection of physical activities included the top ten

activities for each subgroup: boys, girls, blacks, and whites (Table 2). The sixteen most popular activities among the entire group (Table 2) included all but two of these activities, ice skating (ranked 19) and fishing (ranked 23), so these were included in the PAQ. The final PAQ, therefore, contains a total of eighteen activities in addition to relevant demographic data. Important characteristics of the PAQ at its present stage of development include: (a) a short recall period (one week) which would still be representative of an individual's habits, (b) ease of adaptation for other age groups: e.g. a similar developmental process could easily be used to establish appropriate PAQ items for other age groups in other settings, (c) ease of administration and scoring: e.g. administration time is less than 30 minutes and scoring simply requires summing the hours of physical activity reported on Part II of the questionnaire, (d) appropriateness for use with large populations: e.g. the PAQ is both time and cost efficient, and (e) age group appropriateness and avoidance of race and gender bias: e.g. physical activity items were specific to the targeted age group with equal consideration of race and gender preferences.

Once developed, the PAQ was administered to another representative sample of sixth-grade students (n=72) who

Table 2

Activities Engaged in Most Frequently as Determined by the Revised Preliminary Questionnaire

	Boys (n=43)		Girls (n=43)
1.	Football	1.	Swimming
2.	Bicycling	2.	Bicycling
3.	Skateboarding	3.	Kickball
4.	Basketball	4.	Rollerskating
5.	Baseball/softball	5.	Dance
6.	Swimming	6.	Cheerleading
7.	Wrestling	7.	Gymnastics
8.	Soccer	8.	Ice skating
9.	Kickball	9.	Relays
10.	Jogging/running	10.	Soccer

	Black (n=34)		White (n=49)
1.	Football	1.	Swimming
2.	Swimming	2.	Bicycling
3.	Bicycling	3.	Football
4.	Rollerskating	4.	Soccer
5.	Kickball	5.	Basketball
6.	Cheerleading	6.	Baseball/softball
7.	Dance	7.	Kickball
8.	Basketball	8.	Skateboarding
9.	Relays	9.	Fishing
10.	Baseball/softball	10.	Jogging/running

Most Popular Activities

1.	Swimming	9.	Skateboarding
2.	Bicycling	10.	Dance
3.	Football	11.	Wrestling
4.	Kickball	12.	Cheerleading
5.	Basketball	13.	Jogging/running
6.	Baseball/softball	14.	Gymnastics
7.	Soccer	15.	Relays
8.	Rollerskating	16.	Tennis

would not be participating in the validation phase of this project. This pilot was conducted to identify weaknesses in the instrument which could be corrected prior to entering the next phase of this investigation. Any necessary administrative changes were noted at the time of administration. Test-retest reliability was also determined at this stage of the investigation. Students completed the PAQ on Monday, reporting their physical activity for the previous week, Monday through Sunday. Forty-eight hours later, the same students completed the PAQ for a second time, again recalling their physical activity for the same seven-day time period. These data were used to calculate reliability coefficients for each test item using Pearson Product-Moment correlations. In addition, a correlated t-test was conducted to determine if pre-test and post-test responses were significantly different.

Construct Validity

Two hundred thirty-five sixth-grade students (Table 3) enrolled in the Greensboro City Schools, Greensboro, North Carolina, participated in this phase of the investigation. This sample was composed of boys (n=114) and girls (n=121) ranging from 10 to 14 years of age, with 98.3% of the sample being in the 11 to 13 year age range. Black

Table 3

Summary of Demographic Data

Demographic Variable		Frequency	Percent
Age (Years)	10	1	.4
	11	102	43.4
	12	100	42.6
	13	29	12.3
	14	3	1.3
Gender	Boys	114	48.5
	Girls	121	51.5
Race	Black	110	46.8
	White	117	49.8
	Other	8	3.4
Transportation to School	Walk	23	9.8
	Bicycle	2	.9
	Auto/bus	210	89.4
Hours Viewing TV (Weekly)	10 or less	53	22.6
	11-20	64	27.2
	21-30	51	21.7
	30 or more	67	28.5
Hours Doing Homework (Weekly)	2 or less	89	37.9
	3-4	54	23.0
	5-6	48	20.4
	7 or more	44	18.7

students represented 46.8% of the sample, whites 49.8%, and "other" the remaining 3.4%. Almost 90% of the students traveled to and from school by motor vehicle. The greatest percentage of students reported watching 30 or more hours of television each week and engaging in only 2 hours or less of homework. During the Spring semester, 1987, these students completed the Physical Activity Questionnaire (PAQ)(Appendix E). In addition, they completed the AAHPERD Health Related Physical Fitness Test (Appendix F) and the revised Children's Attitude Toward Physical Activity inventory (CATPA)(Appendix G). The PAQ and the revised CATPA, both pencil and paper tests, were completed on the same day, requiring approximately 45 minutes of the students' time. Fitness testing was conducted on a separate day and also required about 45 minutes. All tests were administered during the children's physical education class. Physical fitness testing was conducted by a team of trained volunteers, except for the mile run, which was administered by the students' physical education teacher. Inter-rater reliability was calculated using Pearson Product-Moment correlations for the sit-and-reach test and the triceps skinfold, yielding coefficients of .98 and .99 respectively. The author administered all activity and attitude surveys to ensure standardization.

AAHPERD Health Related Physical Fitness Test

The philosophy underlying the development of the health-related physical fitness test was that "...physical fitness testing...should emphasize the relationship between health and physical activity" (AAHPERD, 1980, p. 3). AAHPERD (1980) designed the test to assess three major health-related components of fitness (a) cardiorespiratory function, (b) body composition, and (c) abdominal, low back and hamstring musculoskeletal function. The four-item test includes the mile run (or one of several other distance runs), triceps skinfold, modified sit-ups, and sit-and-reach. A brief description of each item has been provided in appendix G, but the reliability and validity of each item will be discussed below. Norms, based on a 1987 nationwide sample, are available in the test manual for ages 5 through 17.

The purpose of the mile run was to evaluate cardiovascular efficiency. According to AAHPERD (1980) "the one-mile...run is a valid field test of cardiorespiratory function and performance because it is related to maximum oxygen intake, along with other physiological parameters of cardiorespiratory function and provides an index of the participant's ability to run distances" (p. 11). Validity coefficients ranging from .65 to .90 have been reported for elementary school students,

using maximal oxygen uptake (ml/kg/min) as the criterion measure. Reliability coefficients have ranged from .75 to .94, with most estimates falling in the high end of the range (Safrit, 1986).

The purpose of the triceps skinfold was to measure the level of body fatness of an individual. Validity coefficients expressing the relationship "... between skinfolds and hydrostatically calculated body fatness, have consistently ranged from .70 to .90 in both children and adults" (AAHPERD, 1980, p. 16). Test-retest reliability and objectivity tend to be high (over .95) among experienced testers with like training (Safrit, 1986).

The purpose of the modified sit-ups was to assess abdominal strength and endurance. Logical validity was reported by AAHPERD (1980) since the abdominal muscles are being used to help perform this test. Test-retest reliability coefficients have been satisfactory, ranging from .68 to .94.

The final item on the physical fitness test was the sit-and-reach, which was used to evaluate flexibility of the lower back and posterior thighs. Validity coefficients, using various other flexibility tests as criterion measures, have ranged from .80 to .90. In addition, the test has logical validity since good lower back and hamstring extensibility is required to obtain a

good score. Reliability coefficients have been moderate to high, ranging above .70 (AAHPERD, 1980).

The relationship between health and physical activity was central to the development of the health-related physical fitness test, thereby making it the best available fitness test for the present investigation. Other available fitness tests tend to include motor skill items, which measure fitness components other than health-related components. The health-related physical fitness test manual explains that scientific findings support "... the separation of physical fitness and motor performance tests" (AAHPERD, 1980, p. 5). A motor performance test would not fit the assumptions of this project, whereas the health related fitness test does. In addition, the test was time and cost efficient, allowing large numbers of students to be tested in a relatively short time period.

Children's Attitude Toward Physical Activity (CATPA)

The revised CATPA inventory grew out of the Attitude Toward Physical Activity (ATPA) inventory developed by Kenyon (1968), based on his multidimensional model of physical activity. The original ATPA inventory consisted of six subdomains, each being quantified by eight bipolar adjectives using a seven point scale. The CATPA was

developed by Simon and Smoll (1974), who followed Kenyon's format closely, but made extensive changes in wording to make the instrument appropriate for use in grades four through six. A three part investigation by Schutz, Smoll, and Wood (1981), including extensive psychometric analyses of the CATPA, was conducted to further refine the instrument. Major revisions as a result of their work include: (a) eliminating three of the original eight bipolar adjectives which were not good discriminators, (b) adding one new subdomain to the original six (subdomain descriptions have been provided in Table 4), (c) dichotomizing the health/fitness subdomain into value and enjoyment factors, (d) reducing the seven-point scale to a five-point scale for each adjective pair, (e) adding a response of "I do not understand this idea" to each subdomain to reduce the ambiguity of the midpoint response, and (f) adding "Taking part in" to each subdomain description "... to increase the congruence between the attitude object (physical activity) and any behavioral measures which might be taken (e.g., degree of involvement in physical activities, fitness, and motor ability)" (Schutz, Smoll, Carre, & Mosher, 1985, p. 257). Schutz and his colleagues (1985) explain that these revisions "... resulted in a revised CATPA inventory which is both psychometrically sound and time efficient with respect to

Table 4

Revised CATPA Inventory: Subdomain Descriptions

1.	PHYSICAL ACTIVITY FOR SOCIAL GROWTH (Social Growth) Taking part in physical activities which give you a chance to meet new people.
2.	PHYSICAL ACTIVITY TO CONTINUE SOCIAL RELATIONS (Social Continuation) Taking part in physical activities which give you a chance to be with your friends.
3.	PHYSICAL ACTIVITY FOR HEALTH AND FITNESS (Health & Fitness) Taking part in physical activities to make your health better and to get your body in better condition.
4.	PHYSICAL ACTIVITY AS A THRILL BUT INVOLVING SOME RISK (Vertigo) Taking part in physical activities that could be dangerous because you move very fast and must change direction quickly.
5.	PHYSICAL ACTIVITY AS THE BEAUTY IN MOVEMENT (Aesthetic) Taking part in physical activities which have beautiful and graceful movements.
6.	PHYSICAL ACTIVITY FOR THE RELEASE OF TENSION (Catharsis) Taking part in physical activities to reduce stress or to get away from problems you might have.
7.	PHYSICAL ACTIVITY AS LONG AND HARD TRAINING (Ascetic) Taking part in physical activities that have long and hard practices. To spend time in practice you need to give up other things you like to do.

administration" (p. 258).

The validity of the Revised CATPA inventory, as with the ATPA and the original CATPA, rests partially upon the consistent results of factor analysis, which support the multidimensional model of physical activity proposed by Kenyon (1968). In addition, Schutz, et al. (1985) stated that "research with both the ATPA and the CATPA inventories has provided sufficient evidence of construct validity" (p. 258). They cite differences observed between sport groups, between sex and age groups, between athletes and nonathletes, and between delinquents and nondelinquents in support of this statement. Finally, some evidence of convergent validity has also been reported. For example, Smoll et al., (1976) reported a moderate relationship between CATPA and children's involvement in physical activities, and Carre et al., (1980) found several small, but significant correlations between CATPA and knowledge of sport and physical activity with boys in grades seven and eleven.

The internal consistency of the CATPA inventory has been well estabished, with Hoyt reliability coefficients for each subdomain ranging from .80 to .90 (Simon & Smoll, 1974; Schutz, Smoll, Carre, & Mosher, 1985). The test-retest reliability for fourth through sixth grade students ranged from .44 (health/fitness and catharsis) to .62

(aesthetic) with six weeks between administrations (Simon & Smoll, 1974). Simon and Smoll (1974) noted "because of the probability of attitude change over time, test-retest correlation coeffients are not accurately indicative of the true reliability of an attitude scale" (p. 413). They further note that, although the retest means were slightly higher than the initial test, the rankings of the subdomains were the same for both administrations. They concluded that the CATPA inventory should not be used for individual assessment, but that it was appropriate for group testing with fourth through sixth-grade students. The selection of the revised CATPA inventory for use in this investigation was based on its strong psychometric characteristics, the conceptually sound theoretical basis undergirding the inventory, and the ease of administration.

Data Analysis

Construct validity for the PAQ was determined by examining the relationship between PAQ scores and the fitness and attitude data. Individual PAQ items, in addition to total hours of physical activity, were correlated with each attitude and fitness variable. Total hours of physical activity was obtained by summing all responses to Part II of the questionnaire. Since it was assumed that habitual physical activity was related to

physical fitness and attitude toward physical activity, a significant relationship between these variables was accepted as evidence of convergent validity, a widely recognized dimension of construct validity. Correlation coefficients were calculated using Pearson Product-Moment correlations. As Glass and Hopkins (1984) explain, "Pearson's correlation coefficient summarizes the magnitude and direction of the relationship between two variables..." (p. 80).

Another dimension of construct validity is dependent upon the ability of a measurement tool to discriminate between groups (Baumgartner & Jackson, 1975; Safrit, 1986). In light of this, the group differences method was used to determine if high active and low active groups, as measured by the PAQ, were significantly different on health-related physical fitness and attitude toward physical activity. High and low activity groups were formed, consisting of students scoring more than one standard deviation above and below the mean on the PAQ. Mean scores for each activity group were calculated for the four items which comprise the fitness test, as well as a composite score, based on T-scores. Similarly, mean scores for the activity groups were calculated for each attitude dimension, although no composite attitude score was used. Independent t-tests were computed to determine if there was a significant

difference between high and low activity groups for each fitness and attitude variable. According to Glass and Hopkins (1984) "the t-test for means is mathematically equivalent to the analysis of variance when the number of groups equals 2" (p. 230). Significant differences between the groups were accepted as evidence of construct validity. All statistical computations were completed on the VAX mainframe, using the Statistical Package for the Social Sciences (SPSSx), at the Academic Computer Center, University of North Carolina at Greensboro.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to develop and validate a questionnaire for assessing habitual physical activity of sixth-grade children. The five research questions which outline the project have been answered and discussed below. Questions one and two focus on the convergent validity of the PAQ. Questions three and four address the construct validity of the PAQ using the group differences method, and the last question addresses the issue of test-retest reliability. It may be helpful to the reader to review the CATPA subdomain descriptions provided in Table 4, prior to reading this chapter.

Convergent Validity

Question 1: What is the relationship between habitual physical activity and five measures of health-related physical fitness?

The relationship between each PAQ item and the fitness measures was analyzed using Pearson Product-Moment correlations. Results of this analysis have been reported in Table 5. Since physical activity is theoretically accepted as being associated with health-related physical

Table 5

Relationship Between PAQ and Physical Fitness Data

PAQ Item	Skinfold (n=235)	Sit & Reach (n=235)	Sit-ups (n=234)	Mile (n=221)	Composite (n=221)
		Health-Related Fitness Items			
PART I					
Age	-.01	.11	-.03	.09	-.02
Sex	.09	.44***	-.26***	.31***	-.02
Race	.00	-.09	.00	-.21***	.08
Transp	.08	.03	-.06	.05	.00
TV	.08	-.05	.02	.09	-.03
Homewk	.01	.05	.02	-.07	.09
PART II					
Base	.02	.05	.04	.02	.04
Bball	.00	-.23***	.24***	-.28***	.18**
Bike	-.09	-.04	.10*	-.21***	.09
Cheer	.01	.09	-.24***	.17**	.18**
Dance	-.11*	.21***	.00	.13*	-.02
Fish	.00	-.04	.03	.06	-.04
Fball	-.11*	-.14*	.12*	-.17**	.03
Gymn	-.12*	.26***	.06	.01	.11*
Ice Ska	.02	.06	-.17**	.19**	-.14*
Jogging	-.12*	.05	.17**	-.22**	.18**
Kick	.16**	.12*	-.14**	.31***	-.10
Relay	-.11*	.14**	.07	.05	.03
Rskate	.04	.06	-.18**	.05	-.09
Sktbd	-.07	-.23***	.05	-.18**	.00
Soccer	-.03	-.06	.10	-.15*	.10
Swim	.18**	.00	-.11*	.11*	-.02
Tennis	.09	.05	-.08	.09	.02
Wrest	-.04	-.02	.02	.04	-.04
Total	-.08	-.01	.10	-.12*	.08

Note. The complete PAQ items can be found in appendix F.
* p <.05; ** p <.01; *** p <.001; one-tailed.

fitness (Gilliam, et al., 1982) significant correlations between these measures were considered evidence of convergent validity.

For Part I of the PAQ, significant correlations were obtained between sex and sit-and-reach, sit-ups, and the mile run. Girls had better flexibility (boys $\bar{x}$ = 25.7cm; girls $\bar{x}$ = 32.2cm) while boys were superior in abdominal strength/endurance (boys $\bar{x}$ = 40.5; girls $\bar{x}$ = 36.2) and circulorespiratory endurance (boys $\bar{x}$ = 9.3min; girls $\bar{x}$ = 10.9min). In addition, race correlated significantly with the mile run. White students tended to perform better on the mile run than blacks (white $\bar{x}$ = 9.4min; black $\bar{x}$ = 10.7min). No significant correlations were observed between physical fitness items and age, means of transportation to/from school, hours spent watching television, or hours spent doing homework.

For Part II of the PAQ, significant correlations were obtained between 14 of the 18 activity items and at least one of the physical fitness tests. The four items which showed no correlation to any of the health-related fitness tests were baseball, fishing, tennis, and wrestling. A composite fitness score also yielded a nonsignificant relationship with these items.

The PAQ items which correlated significantly with all four of the fitness tests were football and kickball.

These results indicated that students with more hours of participation in football tended to have better skinfold, sit-up, and mile-run scores, but worse sit-and-reach scores. Also, students with more hours of participation in kickball tended to have poorer skinfold, sit-up, and mile run scores, but better sit-and-reach scores. No significant relationship was observed between these items and the composite fitness score.

Basketball, dance, jogging, and swimming each correlated with three of the physical fitness items. Basketball appeared strongly related to better performance on the sit-ups and the mile run, but worse performance on the sit-and-reach. Dance was related to lower body fat, greater flexibility, and poorer circulorespiratory efficiency. Jogging was related to lower body fatness, greater abdominal strength/endurance and higher cardiovascular efficiency. Swimming was related to higher body fatness and poorer abdominal strength/endurance and cardiovascular efficiency. The composite fitness score correlated significantly with both basketball and jogging, but not with dance and swimming.

Bicycling, cheerleading, gymnastics, ice skating, relays, and skateboarding each correlated significantly with two of the fitness components. Bicycling, cheerleading, and ice skating were all correlated with sit-

ups and the mile run. Students with more hours of participation in bicycling tended to have better sit-up and mile run performances. Conversely, students with more hours of participation in cheerleading and ice skating tended to have poorer sit-up and mile run performances. In addition, cheerleading and ice skating were significantly related to the composite fitness score. Gymnastics and relays were both significantly correlated with skinfold thickness and sit-and-reach. Greater hours of participation in these activities was related to lower body fatness and greater flexibility. Finally, greater participation in skateboarding was associated with poorer flexibility but better cardiovascular endurance.

The final two PAQ items to be discussed are rollerskating and soccer, each of which correlated with only one fitness test. Rollerskating correlated negatively with sit-ups, suggesting that greater participation in rollerskating was associated with poorer abdominal strength/endurance. Soccer correlated negatively with the mile run, suggesting that greater soccer participation was associated with higher cardiovascular endurance.

Overall, the results of this analysis suggested that physical activity and health-related physical fitness are related constructs. Thirty-nine significant correlations ranging from .11 ($p < .05$) to .44 ($p < .001$) were observed

between the PAQ and the four-item fitness test. It should be noted that these correlations, although significant, were relatively weak. Two possible explanations for this may have been restricted variability and skewness in the PAQ scores (Glass & Hopkins, 1984). Up to 92% of the respondents reported zero hours of participation in some activities on Part II of the PAQ. Three of the four activities which did not correlate significantly with any of the fitness test items were not participated in by 86% to 92% of the respondents during the week under investigation. This suggests that it would be premature to eliminate these items from the questionnaire. Also, most of the observed significant correlations were logical associations, e.g., basketball, jogging, and soccer, all of which require a lot of running, had significant negative correlations with time to complete the mile run. It appears reasonable to conclude that physical activity, as measured by the PAQ, was associated with health-related physical fitness and that the strength of the observed relationships may have been deflated due to restricted variance and skewness in the physical activity data.

Question 2: What is the relationship between habitual physical activity and seven subdomains of attitude toward physical activity?

The relationship between each PAQ item and the CATPA

subdomains was analyzed using Pearson Product-Moment correlations. Results of this analysis have been reported in Table 6. Again, significant correlations between these variables were considered evidence of convergent validity.

No significant correlation was observed between the subdomain of social growth and the PAQ. This seemed to indicate that subjects in this study tended not to participate in physical activity for the purpose of meeting new people. Social continuation had a significant negative correlation with fishing ($r = -.11$) and soccer ($r = -.11$), indicating that participation in these activities was inversely associated with taking part in physical activity for the purpose of spending time with friends.

The "value" sub-factor of health and fitness correlated significantly with race ($r = .11$). White students perceived physical activity as being more valuable to their physical condition than blacks. Health and fitness ("value") also had a significant negative correlation with hours of watching television ($r = -.15$), baseball ($r = -.14$), fishing ($r = -.21$), swimming ($r = -.11$), and wrestling ($r = -.19$). Students spending more hours in these activities placed less value on physical activity as a means of getting one's body into better condition. The "enjoyment" sub-factor of health and fitness correlated negatively with fishing ($r = -.13$) and

Table 6

Relationship Between PAQ and Attitude Data

PAQ Item	Children's Attitude Toward Physical Activity							
	SG	SR	HFV	HFE	TR	BM	RT	IHT
PART I								
Age	.07	.01	.01	.10	.02	.00	-.10	.04
Sex	.05	.01	.10	-.01	-.18**	.37***	-.01	-.05
Race	-.06	.10	.11*	.07	.04	-.12*	.10	-.02
Transport	.04	.04	.03	-.04	-.03	-.02	.10	-.03
TV	-.01	-.01	-.15*	-.09	-.05	-.01	-.03	-.12*
Homework	-.03	-.06	.10	-.09	-.08	.00	.05	-.01
PART II								
Baseball	-.01	-.01	-.14*	-.05	-.02	-.06	-.05	.02
Basketball	.02	.03	-.02	-.02	.17**	-.32***	.08	.00
Bicycling	.05	.05	.09	.04	.04	-.15**	.07	-.08
Cheerleading	.04	.09	-.04	-.03	.05	.09	-.08	.07
Dance	-.02	-.02	.00	-.07	-.12*	.18**	-.03	.07
Fishing	.03	-.11*	-.21***	-.13*	.13*	-.04	.02	-.05
Football	.08	-.07	-.07	.01	.17**	-.14*	.04	.06
Gymnastics	.08	.03	.09	.00	.01	.24***	.03	.12*

Table 6 (Continued)

PAQ Item	Children's Attitude Toward Physical Activity							
	SG	SR	HFV	HFE	TR	EM	RT	LHT
Jogging	.00	-.04	.09	-.02	.01	-.14	-.03	-.07
Kickball	.05	-.02	.07	.08	.05	.20***	.02	.05
Relays	.02	-.05	-.02	-.05	.08	-.04	-.06	-.08
Rollerskating	.03	.00	-.05	-.02	-.07	.06	-.02	-.05
Skateboarding	.07	.03	-.02	.05	.19**	-.06	.07	.04
Soccer	.01	-.11*	-.06	-.12*	.10	-.13*	.03	-.02
Swimming	.01	-.05	-.11*	-.04	.01	.09	.05	-.03
Tennis	-.02	-.03	.01	-.01	.04	.03	-.03	.02
Wrestling	-.04	-.04	-.19**	-.05	.06	-.07	.02	-.05
Total	.07	-.04	-.08	-.06	.13*	-.10	.05	-.01

* $p < .05$; ** $p < .01$; *** $p < .001$; one-tailed.

Note. SG = Social Growth
SR = Social Continuation
HFV = Fitness: Value
HFE = Fitness: Enjoyment
TR = Vertigo
EM = Aesthetic
RT = Catharsis
LHT = Ascetic

soccer (r = -.12), indicating that participation in these sports may not have been for enjoyment.

Vertigo was negatively correlated with sex (r = -.18), indicating that boys were more likely to take part in physical activity for the thrill and risk involved than girls. Vertigo was also correlated with basketball (r = .17), fishing (r = .13), football (r = .17), skateboarding (r = .19), and total hours engaged in physical activity (r = .13). This indicated that participation in physical activity, especially those named, was significantly related to the thrill and possible risk involved. Dance was negatively correlated to vertigo (r = -.12), suggesting greater involvement in dance was related to less interest in physical activity for the thrill and possible risk involved.

Of all the CATPA dimensions, beauty in movement (aesthetic) was most strongly related to the PAQ. It not only had the highest correlation coefficients, but it was significantly correlated to more PAQ items than any other subdomain. Significant relationships to sex (r = .37) and race (r = -.12) indicated that girls and blacks were most likely to participate in activities which had beautiful and graceful movements. Beauty in movement correlated positively with dance (r = .18), gymnastics (r = .24), and kickball (r = .20), but negatively with basketball (r =

-.32), bicycling (r = -.15), football (r = -.14), and soccer (r = -.13). These results suggested that greater participation in dance, gymnastics, or kickball was related to their aesthetic character, whereas increased participation in basketball, bicycling, football, or soccer was for reasons other than aesthetics.

Catharsis, or physical activity for the release of tension, was unrelated to the PAQ except for ice skating. This item had a low, but significant correlation with catharsis (r = .11), indicating that ice skating may have been an activity students used to reduce stress or get away from their problems. Overall, it appears that subjects in this project did not participate in physical activity for the purpose of stress reduction.

Finally, physical activity as long and hard training (ascetic) correlated with two PAQ items: hours spent watching television (r = -.12) and gymnastics (r = .12). Students spending more time watching television were less likely to have a positive attitude toward physical activity as long and hard training. Conversely, as hours spent engaged in gymnastics increased, students were more likely to have a positive attitude toward physical activity as long and hard training.

Overall, the results of this analysis suggested there was some relationship between physical activity and

attitude toward physical activity. The CATPA subdomains of social growth, social continuation, catharsis, and ascetic were minimally related to physical activity, if at all. Collectively, these four subdomains only accounted for 17% of all the significant correlations observed, and only ranged from .11 ($p < .05$) to .12 ($p < .05$). The subdomains of health/fitness (value and enjoyment), vertigo, and aesthetics, however, were more strongly related to physical activity. The vertigo and aesthetic subdomains alone accounted for 55% of all the significant correlations, ranging from .11 ($p < .05$) to .37 ($p < .001$). Smoll and his colleagues (1976) also found a strong relationship between these two subdomains and involvement in physical activity for sixth-grade students. As noted earlier, the strength of these correlations may have been deflated due to restricted variance and skewness in the PAQ data.

Construct Validity: Group Differences

Question 3: Is there a significant difference between children scoring very high and very low on the PAQ for five measures of health-related physical fitness?

Independent t-tests were used to determine if high and low activity groups differed significantly on health-related fitness. The mean, standard deviation, t-value and one-tail probability for each fitness item has been reported in

Table 7. Overall, these results indicated that the PAQ did not discriminate well on health-related fitness. Of the five measures, only sit-ups were significantly different ($p = .05$) for the high ($\bar{x} = 38.2$) and low ($\bar{x} = 34.8$) activity groups, using a 95% confidence interval. Figure 1 illustrates the mean performance of the high and low activity groups on the fitness variables. It is interesting to note that for each variable, except the mile run, the high active group scored better than the low active group. As previously mentioned though, the only significant difference between the groups was for sit-ups. Examination of the composite PAQ scores (total hours of physical activity) upon which the activity groups were based, revealed a possible explanation for this poor discrimination. The score represents the sum of all hours of physical activity reported on Part II of the questionnaire. Since no distinction was made based on intensity, five hours of fishing and cheerleading would be treated the same as five hours of basketball and soccer. Perhaps a weighting system could be developed to offset the effects of intensity when computing the composite PAQ score and thereby improve discrimination on health-related physical fitness. Evidence of construct validity using the group differences method was unsatisfactory for the health-related physical fitness test items.

Table 7

t-test Between Activity Groups for Fitness Tests

Fitness Test	Group	n	Mean	SD	t-value	1-Tail Probability
Skinfold	1	39	14.5	7.7		
	2	38	12.9	6.0	1.00	.16
Sit/Reach	1	39	29.1	7.7		
	2	38	30.3	7.5	-0.71	.24
Sit-ups	1	39	34.8	7.7		
	2	38	38.2	10.3	-1.65*	.05
Mile Run	1	39	10.9	2.5		
	2	38	10.0	3.1	1.33	.09
Composite	1	39	193.9	17.9		
	2	38	200.8	20.4	1.55	.06

Note. 1 = Low Active, 2 = High Active
* $p < .05$

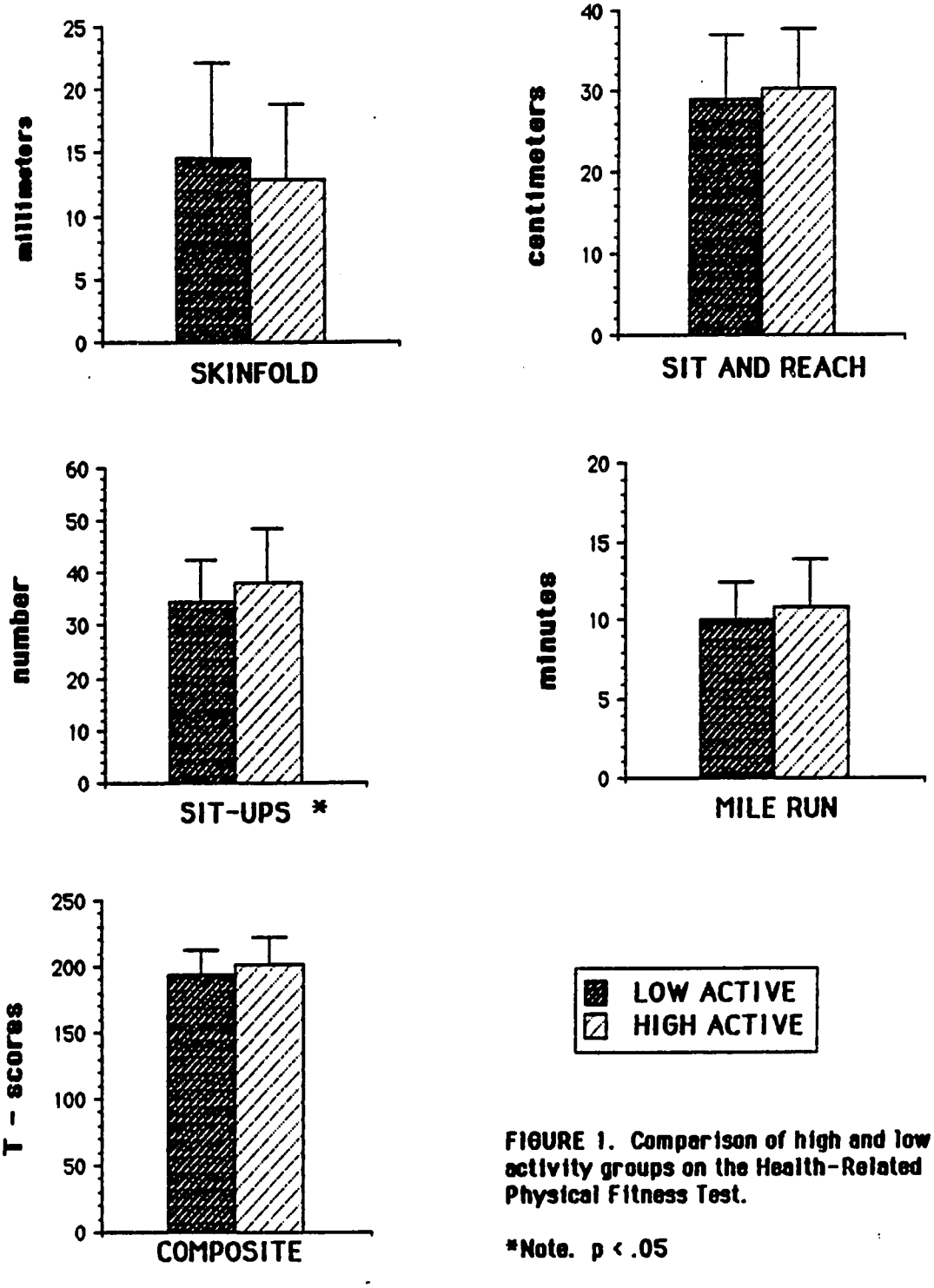


FIGURE 1. Comparison of high and low activity groups on the Health-Related Physical Fitness Test.

***Note. $p < .05$**

Question 4: Is there a significant difference between children scoring very high and very low on the PAQ for seven subdomains of attitude toward physical activity?

Independent t-tests were used to determine if high and low activity groups differed significantly on CATPA subdomains. The means, standard deviations, t-value and one-tail probability for each attitude dimension have been reported in Table 8. Results indicate that there were no significant differences between high and low activity groups on the CATPA subdomains, using a 95% confidence interval. Figure 2 illustrates the mean scores of the high and low activity groups for each attitude subdomain. The groups were very similar, scoring exactly the same on the social continuation and catharsis subdomains. The greatest difference, although nonsignificant, was observed on the vertigo subdomain. As previously discussed, the PAQ's inability to discriminate between groups may be related to the method used for computing the composite activity score and not the instrument itself.

Reliability

Question 5: What is the test-retest reliability of the PAQ?

The test-retest reliability of the PAQ was examined using Pearson correlations and dependent t-tests. Results of

Table 8

t-test Between Activity Groups for Attitude Subdomains

CATPA Dimension	Group	n	Mean	SD	t-value	1-Tail Probability
Social Growth	1	39	20.6	4.1		
	2	38	21.0	3.1	-0.53	.30
Social Continuation	1	39	22.7	3.7		
	2	38	22.7	3.2	0.08	.47
Fitness: Value	1	39	22.9	4.5		
	2	38	22.2	4.5	0.63	.27
Fitness: Enjoyment	1	39	21.1	4.5		
	2	38	20.1	4.6	0.39	.35
Vertigo	1	39	13.0	6.2		
	2	38	14.9	6.9	-1.30	.10
Aesthetic	1	39	18.4	5.3		
	2	38	17.4	7.3	0.68	.25
Catharsis	1	39	20.2	5.4		
	2	38	20.2	6.2	0.04	.49
Ascetic	1	39	14.1	6.7		
	2	38	14.9	6.4	-0.56	.29

Note. 1 = Low Active, 2 = High Active

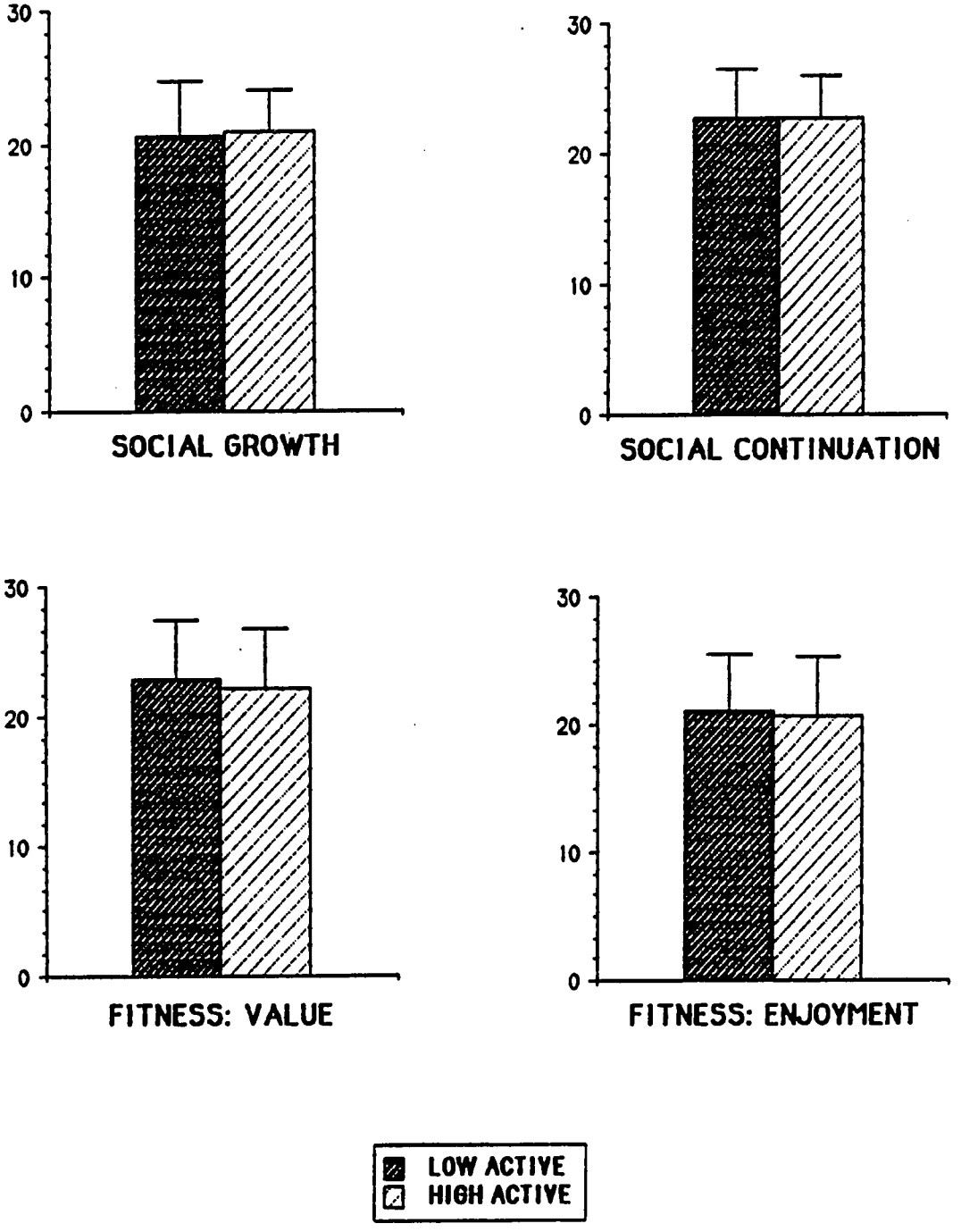
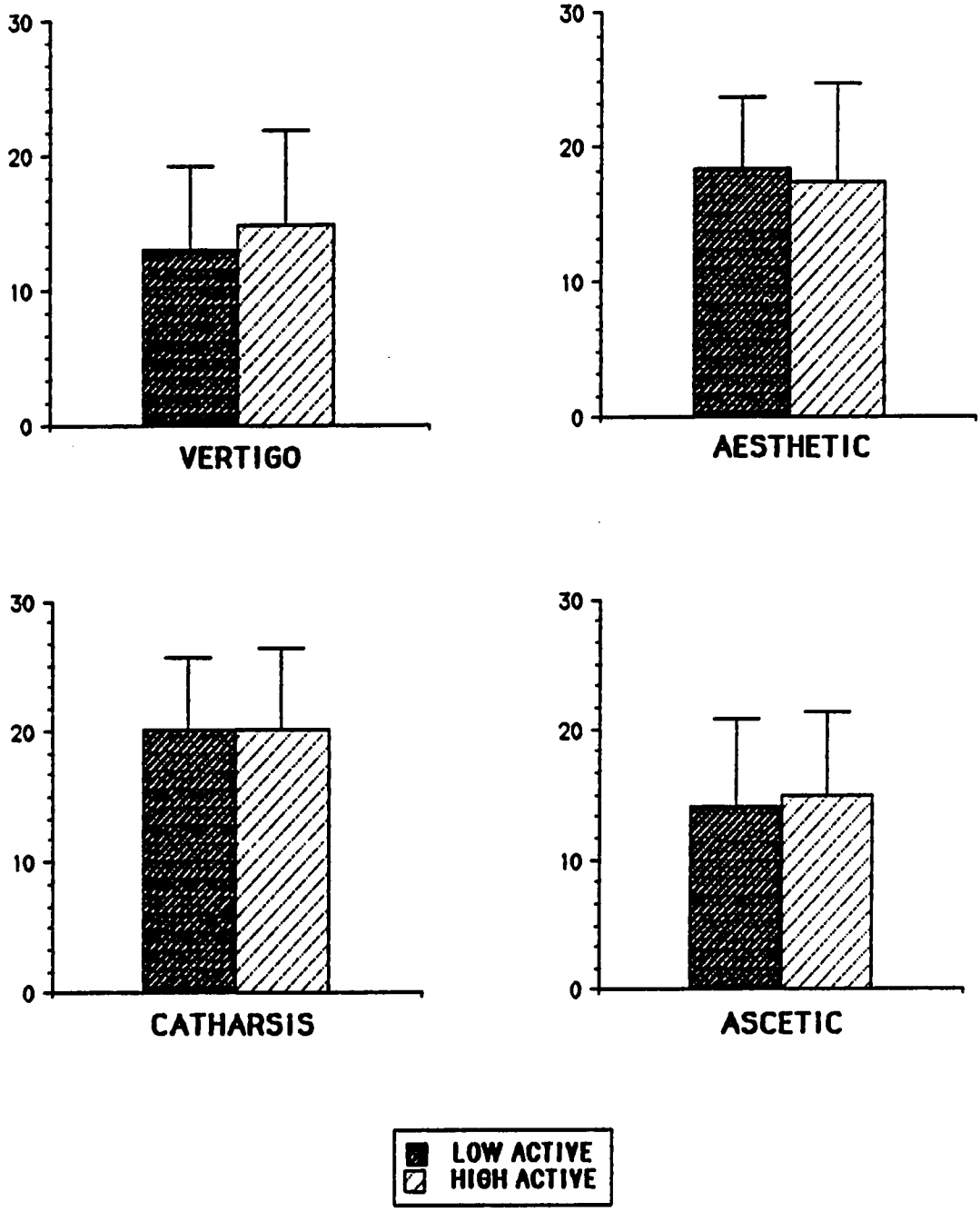


FIGURE 2. Comparison of high and low activity groups on the CATPA subdomains.

FIGURE 2. (Continued)



these analyses have been reported in Table 9. Reliability coefficients for each PAQ item ranged from .30 (kickball) to 1.00 (age and sex), with 84% of the items ranging above .70. In addition, the composite activity score (total hours of physical activity) yielded a strong reliability coefficient of .87. The correlated t-tests revealed gymnastics was significantly different on the pre- and post-tests with a t-value of 2.10 ($p < .05$). The evidence indicated that, with the exception of four items (homework, cheerleading, gymnastics, and kickball), the PAQ had an acceptable to high degree of reliability (.70 or better).

Additional Discussion: Scoring and Administration of the PAQ

The scoring and administration of a measurement tool may have a profound influence on the reliability and validity of the instrument. These test characteristics, therefore, are critical concerns for the test developer. The results of this study indicated that current scoring and administration techniques for the PAQ may have negatively influenced the validity of the instrument. The following discussion has been provided to give the reader additional insight into how the construct validity may have been influenced and speculate about possible solutions.

The primary administrative consideration which may

Table 9

Test-Retest Reliability Data for the PAQ (n=72)

Item	Pearson r*	t-value	2-Tail Probability
Age	1.00	0.00	1.00
Sex	1.00	0.00	1.00
Race	.96	1.00	.32
Transportation	.97	-1.00	.32
TV	.89	1.23	.22
Homework	.65	.69	.49
Baseball	.71	.54	.59
Basketball	.86	-1.13	.26
Bicycling	.86	.44	.66
Cheerleading	.54	.42	.67
Dancing	.89	1.38	.17
Fishing	.93	-0.81	.42
Football	.87	-1.03	.31
Gymnastics	.53	2.10	.04**
Ice Skating	.73	-1.00	.32
Jogging/Running	.77	0.22	.83
Kickball	.30	-0.41	.68
Relays	.72	0.93	.36
Rollerskating	.76	0.16	.87
Skateboarding	.93	-0.42	.67
Soccer	.90	0.11	.91
Swimming	.95	-0.18	.86
Tennis	.87	0.00	1.00
Wrestling	.81	-1.67	.10
Total	.87	0.21	.84

* $p < .000$, two-tailed (except kickball, $p < .01$)
** $p < .05$

have influenced validity was the use of only a single observation. Students reported their physical activity for a single week, only one time. Given the variable nature of physical activity habits, multiple observations may have provided a more accurate assessment of this construct. The observations could have been made during consecutive weeks or with several weeks or months between observations. Given the seasonal nature of many physical activities, one or more observations during each season may have provided the best overall assessment of the students' physical activity habits.

In addition to providing a more complete activity profile, multiple observations would have also provided another scoring option which may have enhanced the statistical analysis of the obtained data. If, for example, four observations were made, hours of participation in the activities listed in Part II could have been combined, thereby reducing the number of "0 hour" responses. This, in turn, may have produced a more normal distribution of scores, which would have been more likely to accurately reveal existing relationships between physical activity and the other constructs investigated.

One additional scoring consideration, which may have had a significant impact on the detection of group differences (high and low activity groups), was the

computation of the composite PAQ score. This score was obtained by summing all of the hours of participation in physical activity reported on Part II of the PAQ. This means all activities, regardless of intensity, were treated equally and may have obscured group differences by contaminating group selection. Two alternatives which may have been used to compute the composite PAQ score include: (1) a weighting system based on the intensity of the activity (e.g. high intensity activities would be weighted more heavily than low intensity activities), and (2) the use of two or three seperate composite scores, distinguishing hours of participation in high and low intensity activities, or high, moderate, and low intensity activities. The scores could remain independent, or again, could be weighted and combined into a single score. Consideration of intensity in some way, would probably have provided more discrete activity groups, which may have improved the PAQ's sensitivity to differences between the groups.

Summary

At present, the PAQ appears to have an acceptable degree of test-retest reliability, although it's validity remains open to question. Results of this investigation provided some evidence of convergent validity and, although

limited at present, it appears sufficient to warrant further investigation. Correlation coefficients between PAQ items and attitude and fitness variables, although low, yielded numerous significant relationships. It is probable that these correlations do not reflect the true strength of these relationships due to limited variance and skewness in the the activity data. The group differences approach to construct validity provided little evidence of construct validity. High and low activity groups were similar on all attitude dimensions and all fitness items, except sit-ups. It appeared that computation of the composite PAQ score by combining all hours of physical activity, regardless of intensity, may have contaminated group selection. In light of this, it appears that new scoring methods may be required to more accurately describe student activity levels.

CHAPTER V

SUMMARY AND CONCLUSIONS

This project was conducted to develop a questionnaire for assessing habitual physical activity of children and to investigate some of it's psychometric properties. In this chapter, the development of the PAQ, and its validity and reliability have been summarized. Also included in this section are suggestions for further study using the PAQ.

Summary

This project was conducted in two major phases. Phase one involved the development of the PAQ. Phase two involved an investigation of some of the psychometric properties of the PAQ. A summary of each phase has been provided below.

Development of the PAQ

Two preliminary surveys were used to generate data which revealed the physical activities participated in most frequently by sixth-grade students in Greensboro, NC. The initial activity pool for these surveys included 86 activities. These items were compiled for a national study of students in grades five through twelve; therefore, it contained numerous items which were not applicable to the

population under investigation. The first preliminary survey was used to reduce this item pool to 41 items. This was accomplished by eliminating all activities not participated in during the past year by at least five of the students surveyed (n=104). In addition, some related activities were combined into single items.

On the second preliminary questionnaire, students (n=86) were asked to identify the activities they participated in most frequently. These data were used to determine the most popular activites for boys, girls, blacks, and whites. The ten activities participated in most by each group (a total of 18 activities) were selected to be the activity items included on the PAQ.

These preliminary questionnaires enabled the investigator to reduce an unwieldy number of physical activities to a representative sample of the most widely participated in activites for the target population. The item selection process was based entirely on the data provided by the children themselves. This process provided evidence of content-validity, since by definition "content-related evidence demonstrates the degree to which the sample of items, tasks, or questions on a test are representative of some defined universe or domain of content" (APA, 1985, p. 10).

Following the development of the PAQ, a pilot study

was conducted. The major objectives of the pilot were to determine the administrative ease of the PAQ, to ensure that students were comfortable with its format, and to establish test-retest reliability. The pilot did not suggest that any changes were needed in the PAQ prior to entering the next phase of this project. Acceptable reliability (r=.87) was obtained and the students (n=72) all completed the questionnaire without undue difficulty.

Construct Validity

Physical activity is a construct which cannot be directly observed and measured. As a result of this, and the minimal attention which has been given to validation of physical activity assessment techniques, no criterion measure was available at the time of this investigation. It was necessary, therefore, to begin to examine the construct validity of the PAQ. Two methods were used to explore construct validity. First, convergent validity was determined, investigating the relationship between physical activity and two other constructs widely assumed to be related to physical activity: health-related physical fitness and attitude toward physical activity. Second, the group differneces method was used to determine if high active and low active groups, as measured by the PAQ, were significantly different on health-related physical fitness

and attitude toward physical activity. The instrumentation employed for these procedures included the AAHPERD Health Related Physical Fitness Test (AAHPERD, 1980) and the revised CATPA inventory (Schutz, Smoll, and Wood, 1981).

Results indicated some evidence of convergent validity, displaying numerous significant correlations between the PAQ and the fitness and attitude data. Although these correlations were low, the author noted that they may have been suppressed due to restricted variance and skewness in the PAQ data. Additional research will be necessary to more accurately establish the relationship between these constructs. The group differences method, comparing high and low activity groups, revealed no significant differences for the attitude subdomains. The high active group performed significantly better than the low active group on sit-ups. Overall, the PAQ did not appear to discriminate well between activity groups.

Conclusions

Given the limitations of this investigation, conclusions regarding the PAQ include:

1. The instrument had acceptable reliability.
2. The instrument had evidence of content validity.
3. The instrument had weak, but significant evidence of convergent validity.

4. The instrument had unacceptable evidence of construct validity using the group differences method.

Suggestions for Further Study

The PAQ has shown adeqaute statistical evidence to warrant further investigation into its psychometric qualities. Recomendations which may be helpful for future research have been provided below.

1. Investigate the validity of different scoring methods, especially those which may differenciate between activities of different intensities.

2. Investigate the validity of combining scores from multiple administrations of the PAQ to establish more accurate and normally distributed PAQ scores. A suggested method of doing this would include four administrations, one during each season of the year.

3. Investigate aspects of construct validity which were not included in the current project.

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APPENDIX A

Informed Consent

MEMORANDUM

TO: Dr. William B. Karper

FROM: Karen M. Koehler

RE: Human Subjects Review

DATE: September 15, 1986

The purpose of this memorandum is to formally request that the informed consent form for the Greensboro Middle School project have the following addition made to the purpose of the study:

-to collect data necessary to develop and validate the Physical Activity Questionnaire

This will require three additional visits to selected schools, and will involve the participation of approximately 150 students.

Thank you for your assistance.

THE UNIVERSITY OF NORTH CAROLINA AT GREENSBORO
SCHOOL OF HEALTH, PHYSICAL EDUCATION & RECREATION

SCHOOL REVIEW COMMITTEE

INFORMED CONSENT FORM*

I understand that the purpose of this study/project is

to study the effects of family health history and a specialized fitness and health program on specific fitness measures, daily activity patterns, anxiety, self-concept, diet and health knowledge.

I confirm that my participation is entirely voluntary. No coercion of any kind had been used to obtain my cooperation.

I understand that I may withdraw my consent and terminate my participation at any time during the project.

I have been informed of the procedures that will be used in the project and understand what will be required of me as a subject.

I understand that all of my responses, written/oral/task, will remain completely anonymous.

I understand that a summary of the results of the project will be made available to me at the completion of the study if I so request.

I wish to give my voluntary cooperation as a participant.

_____
Signature

_____
Address

_____

_____
Date

*Adopted from L.F. Locke and W.W. Spirduso. Proposals that work. New York: Teachers College, Columbia University, 1976, p. 237.

Approved 3/78

APPENDIX B

Preliminary Activitiy Questionnaire

PRELIMINARY ACTIVITY QUESTIONNAIRE

You have just been given a physical activities survey and will be asked to complete it in the next few moments. The information you provide will help us to learn about the physical activities which you participate in. It is very important for you to answer each question as completely and honestly as you can. This is NOT a test and there are no right and wrong answers.

Take your time answering these questions. I will read each question with you to be sure you understand what to do. Some questions will be very easy to answer, and some you will have to think about. Please, do not go ahead of me, and ask questions if there is something you do not understand.

Thank you very much for your help!

PRELIMINARY QUESTIONNAIRE

PART I

****

Please fill in the following information about yourself:

1. Birthdate
   _____ month
   _____ date
   _____ year

2. Race
   _____ black
   _____ white
   _____ other

3. Sex
   _____ boy
   _____ girl

4. How do you usually get to and from school?

   _____ walk
   _____ bicycle
   _____ motor vehicle (car, bus, etc.)

   If you walk, ride a bicycle, or walk to your bus stop, how many blocks do you walk/ride going to AND from school? _____ blocks

5. How many hours do you usually spend <u>each week</u> watching TV?

   _____ 0-5 hours
   _____ 6-10 hours
   _____ 11-15 hours
   _____ 16-20 hours
   _____ 21-25 hours
   _____ 26-30 hours
   _____ 31-35 hours
   _____ 36-40 hours
   _____ more than 40 hours

6. How many hours do you usually spend <u>each week</u> doing homework?

   _____ 1 hour or less
   _____ 2 hours
   _____ 3 hours
   _____ 4 hours
   _____ 5 hours
   _____ 6 hours
   _____ 7 hours
   _____ more than 7 hours

****

STOP!

PART II

On the next 2 pages you will find a long list of activities which boys and girls your age may participate in.

STEP 1. Read through the list and place an "x" next to the activities you have participated in during the last year, outside of physical education class.

STEP 2. Now that you have marked each activity you have participated in during the last year, identify the 10 activities which you participated in the MOST. Do this by PRINTING the name of the activity in the RIGHT hand column, as you see in the example below.

*Please feel free to ask questions!!

EXAMPLE:

Have you done the activity this past year?		Print the 10 activities you participated in MOST during the last year.
____	Archery	
__x__	Basketball	Basketball
__x__	Bicycling	Bicycling
____	Canoeing	
__x__	Diving	Diving
__x__	Football	
__x__	Golf	
____	Kickball	
____	Lacrosse	
____	Paddleball	
__x__	Ping pong (table tennis)	Ping pong
____	Racquetball	
__x__	Rollerskating	Rollerskating
____	Rugby	
__x__	Sailing	
__x__	Skateboarding	Skateboarding
____	Sledding	
__x__	Soccer	Soccer
__x__	Swimming	Swimming
__x__	Tag	
__x__	Tennis	Tennis
__x__	Volleyball	
____	Walking quickly	
__x__	Weightlifting	Weightlifting
____	Wrestling	
____	Yoga	

STOP!

Have you done the activity this past year?	Print the 10 activities you participated in MOST during the last year.

_____ARCHERY
_____BADMINTON
_____BASEBALL/SOFTBALL
_____BASKETBALL
_____BICYCLING
_____BOWLING/DUCKPINS
_____BOXING
_____CAGEBALL/CRAB SOCCER
_____CALISTHENICS/EXERCISES
_____CANOEING/KAYAKING
_____CHEERLEADING/POM POM SQUAD
_____CLIMBING ROPES/MONKEY BARS
_____CROQUET/MINIATURE GOLF

DANCE:
_____Aerobic dance
_____Ballet, jazz, or modern dance
_____Ballroom (cotillion) dance
_____Disco or popular dance
_____Folk or square dance
_____Other vigorous dance

_____DIVING
_____DODGE BALL/BOMBARDMENT
_____FENCING
_____FIELD HOCKEY/STREET HOCKEY
_____FISHING
_____FOOTBALL (TACKLE)
_____FOOTBALL (TOUCH OR FLAG)
_____FOUR-SQUARE
_____FRISBEE
_____GOLF

GYMNASTICS:
_____Apparatus (with equipment)
_____Free exercise
_____Rhythmic
_____Tumbling

_____HANDBALL
_____HANG GLIDING
_____HIKING/BACKPACKING
_____HOPSCOTCH
_____HORSEBACK RIDING
_____HORSESHOES
_____HUNTING
_____ICE HOCKEY
_____ICE SKATING
_____JOGGING (DISTANCE RUNNING)

Go on to next page

_____JUMPING OR SKIPPING ROPE
_____KARATE/JUDO/MARTIAL ARTS
_____KICKBALL
_____KING OF THE HILL/CAPTURE THE FLAG
_____LACROSSE
_____MARCHING/DRILLS/BAND
_____MARCO POLO/UNDERWATER GAMES
_____PADDLEBALL
_____PING PONG (TABLE TENNIS)
_____PUNCHBALL
_____RACQUETBALL
_____RED ROVER
_____RELAYS
_____RIFLERY/SHOOTING SPORTS
_____ROCK CLIMBING
_____ROLLERSKATING
_____ROWING/CREW
_____RUGBY
_____RUNNING SPRINTS
_____SAILING
_____SCUBA DIVING/SNORKELING
_____SKATEBOARDING
_____SKIING (CROSS-COUNTRY)
_____SKIING (DOWNHILL)
_____SLEDDING
_____SOCCER
_____SPUD
_____SQUASH
_____STICKBALL/WHIFFLEBALL
_____SURFING
_____SWIMMING
_____TAG
_____TENNIS
_____TETHERBALL
_____TRACK & FIELD (NOT RUNNING)
_____TUG-OF-WAR
_____VOLLEYBALL
_____WALKING QUICKLY
_____WATER POLO
_____WATERSKIING
_____WEIGHTLIFTING OR TRAINING
_____WRESTLING
_____YOGA

_____OTHER (SPECIFY)

_____
_____

STOP!

Part III

Which of the following organizations offered activities in which you participated?

_____YMCA

_____YWCA

_____Boy Scouts

_____Girl Scouts

_____City Recreation

_____Little League

_____Pop Warner Football

_____Youth Soccer

_____Private Lessons (Tennis, gymnastics, etc.)

_____Country Club Activities

_____Church/religious organizations

_____Other:_____

_____

_____

*** THANK YOU FOR YOUR HELP! ***

APPENDIX C

Instructions for Administration of the Preliminary Activity Questionnaire

PRELIMINARY ACTIVITY QUESTIONNAIRE

You have just been given a physical activities survey and will be asked to complete it in the next few moments. The information you provide will help us to learn about the physical activities which you participate in. It is very important for you to answer each question as completely and honestly as you can. This is NOT a test and there are no right and wrong answers.

Take your time answering these questions. I will read each question with you to be sure you understand what to do. Some questions will be very easy to answer, and some you will have to think about. Please, do not go ahead of me, and ask questions if there is something you do not understand.

Thank you very much for your help!

INSTRUCTIONS FOR ADMINISTRATION OF THE PRELIMINARY ACTIVITY QUESTIONNAIRE

[NOTE TO TEST ADMINISTRATOR: All instructions within brackets [] are for YOU and should NOT be read aloud!]

PART I

[Do not go on to subsequent questions until EVERYONE is finished with the one you are on.]

Please turn your survey to the next page. At the top it says "Preliminary Questionnaire, PART I". The directions say, "Please fill in the following information about yourself".

#1 is your birthdate. Fill in the month, date and year you were born. Please use numbers to identify the month, for example Jan. = 1; Feb. = 2; Mar. = 3; etc..

#2 asks for your race. Put an "x" in the appropriate space.

#3 asks for your sex. Again, put an "x" in the appropriate space.

#4. How do you usually get to and from school? Put an "x" by the choice you use MOST. [PAUSE until they do this part] If you walk, ride a bicycle, or walk to your bus stop, how many blocks do you walk/ride going to AND from school? For example, if you walk 4 blocks to school, fill in 8 blocks since you have to walk to and from school.

#5. How many hours do you usually spend <u>each week</u> watching TV? As you think about this question, think about the time you spend watching TV on weekdays and weekends seperately. For example, if you watch TV about 2 hours every day during the week, and about 3 hours Saturday and 3 hours Sunday, that adds up to about 16 hours, so you would put an "x" in the space next to 16-20 hours.

[If questions persist, write the example out on the board and explain as you go through it.]

#6. How many hours do you usually spend <u>each week</u> doing homework? Do NOT include the time you spend doing homework in school. For example, if you spend about 30 minutes every day during the week doing homework, and about one hour during the weekend, that adds up to about 3 1/2 hours. Since 3 1/2 hours is not one of the possible responses, in this case we would round UP, and put an "x" next to 4 hours. Round down for part of an hour less than 30 minutes.

[DO NOT go on to the next page until <u>everyone</u> is finished with Part I. Go around the room and check papers while you wait.]

PART II

Turn your survey to page 3. At the top it should read "Part II". Read the instructions for Part II to yourself while I read them out loud.

This part of the survey will be done in two steps. We will complete one step at a time.

STEP 1: On the next two pages you will find a long list of activities which boys and girls your age may participate in.

[Have students look at pages 4 and 5]

Read through the list and place an "x" next to ALL of the activities you have participated in during the last year, outside of physical education class.

STEP 2: Now that you have marked each activity you have participated in during the last year, identify the 10 activities which you have participated in the MOST. Do this by PRINTING the name of the activity in the right hand column, as you see in the example below.

[Test administrator should go over the example and answer questions as they come up. Walk around the room and check papers while the children work.]

[After the children finish, have them go back and actually number their activities #1 - #10 to be sure each child only recorded 10 activities.]

PART III

Please turn to the last page of your activity survey. It should say "Part III" at the top of the page.

The question you are asked is "Which of the following organizations offered activities in which you participated?" Just place an "x" in the space provided. If you do not see an organization that offered one of your activities, write it in one of the blank spaces provided next at the bottom of the page.

[When all the children are finished, collect all the survey booklets and thank the children for their cooperation.]

APPENDIX D

Revised Preliminary Activity Questionnaire

Revised Preliminary Questionnaire

Race: _____ Black
_____ White
_____ Other

Gender: _____ Boy
_____ Girl

Check the five activities you participated in the most during the past year, outside of physical education class.

_____ Archery
_____ Baseball/softball
_____ Basketball
_____ Bicycling
_____ Boating (canoeing, rowing, sailing, etc.)
_____ Bowling
_____ Calisthenics/exercise
_____ Cheerleading/pom pom squad
_____ Climbing ropes/monkey bars
_____ Croquet/miniature golf
_____ Dance (aerobic, ballet, folk, disco, jazz, etc.)
_____ Dodge ball/bombardment
_____ Fishing
_____ Football (tackle, touch, or flag)
_____ Frisbee
_____ Golf
_____ Gymnastics
_____ Hiking, backpacking,or rock climbing
_____ Hopscotch
_____ Horseback riding
_____ Ice skating
_____ Jogging/running
_____ Jumping/skipping rope
_____ Karate/Judo/Martial arts
_____ Kickball
_____ Marching/drills/band
_____ Ping pong (table tennis)
_____ Relays
_____ Rollerskating
_____ Shooting sports (hunting, riflery, etc.)
_____ Skateboarding
_____ Snow skiing (cross-country, downhill)
_____ Soccer
_____ Swimming (all water activities)
_____ Tag
_____ Tennis
_____ Track and field (not running)
_____ Tug-of-war
_____ Volleyball
_____ Weightlifting or training
_____ Wrestling

APPENDIX E

Physical Activity Questionnaire

NAME _____ ID# _____

DATE _____ SCHOOL _____

TEACHER _____ PERIOD _____

PHYSICAL ACTIVITY QUESTIONNAIRE
Part I

_____ 1. Age

_____ 2. Gender: (1) Boy
(2) Girl

_____ 3. Race: (1) Black
(2) White
(3) Other

_____ 4. Usual method of transportation to and from school:

(1) Walk
(2) Bicycle
(3) Motor vehicle (car, bus, etc.)

_____ 5. How many hours do you usually spend each week watching TV?

(1) 0-5 Hours
(2) 6-10 Hours
(3) 11-15 Hours
(4) 16-20 Hours
(5) 21-25 Hours
(6) 26-30 Hours
(7) 31-35 Hours
(8) 36-40 Hours
(9) More than 40 hours

_____ 6. How many hours do you usually spend each week doing homework?

(1) 1 hour or less
(2) 2 hours
(3) 3 Hours
(4) 4 Hours
(5) 5 Hours
(6) 6 Hours
(7) 7 Hours
(8) More than 7 hours

Part II

How many hours last week did you participate in the following activities, not including physical education class?

Select 0-9 for each activity listed below:

(0) 0 Hours	(5) 5 Hours
(1) 1 Hours	(6) 6 Hours
(2) 2 Hours	(7) 7 Hours
(3) 3 Hours	(8) 8 Hours
(4) 4 Hours	(9) 9 or more hours

_____ Baseball/softball

_____ Basketball

_____ Bicycling

_____ Cheerleading/pom pom squad

_____ Dance (aerobic, ballet, folk, disco, jazz, etc.)

_____ Fishing

_____ Football (tackle, touch, or flag)

_____ Gymnastics

_____ Ice Skating

_____ Jogging/running

_____ Kickball

_____ Relays

_____ Rollerskating

_____ Skateboarding

_____ Soccer

_____ Swimming (all water activities)

_____ Tennis

_____ Wrestling

APPENDIX F

Health Related Physical Fitness Test

AAHPERD Health-Related Physical Fitness Test

Item 1: Mile Run

Students were instructed to run one mile as rapidly as possible. Walking was permitted, but discouraged given the nature of the test. Scores were recorded to the nearest second. For purposes of statistical analysis, these scores were rounded off to the nearest quarter of a minute.

Item 2: Triceps Skinfold

The triceps skinfold was measured over the triceps muscle of the right arm using a Lange (Cambridge Scientific Industries, MD) skinfold caliper. Three consecutive measures were taken and the median score recorded to the nearest half-millimeter.

Item 3: Sit-ups

Each student was instructed to lie down on his back, knees bent and feet flat on the floor, heels approximately one to one and one-half feet from the buttocks. Arms were crossed on the chest with each hand placed on the opposite shoulder. Subjects curled-up to a sitting position while their feet were being held down by a partner. Curl-up continued until the elbows contacted the thighs and then the subject rolled back at least until the mid-back contacted the the mat. Arms were required to remain in contact with the chest throughout the test. The total

number of properly executed sit-ups in one minute was recorded. A trained tester counted sit-ups for each student.

Item 4: Sit-and-Reach

After removing their shoes, subjects sat with their feet flat against the sit-and-reach board, about shoulder distance apart. With knees fully extended and keeping palms down, hands overlapping evenly, the subject reached forward as far as possible. This was repeated four times with the maximum stretch being held for at least one second on the final trial. The score recorded was rounded to the nearest centimeter. If the test was not executed properly, it was repeated.

Fitness Score Card
AAHPERD Health Related Fitness

1st Administration

Student Name & ID: School:

Teacher: Sex:

Age (years): Race:

ITEMS

I. Blood Pressure

Systolic _____mm

Diastolic _____mm

II. Skinfold

_____mm

III. Sit & Reach

_____cm

IV. Sit-ups

_____

V. Mile Run _____ (min & sec)

APPENDIX G

Revised Children's Attitude Toward Physical Activity Inventory

CATPA Inventory

How do you feel about the idea in the box?

PHYSICAL ACTIVITY FOR SOCIAL GROWTH
Taking part in physical activities which give you a chance to meet new people.

Always think about the idea in the Box

If you do not understand this idea, mark this box ☐ and go to the next page.

1.	good	____:____:____:____:____:	bad
2.	of no use	____:____:____:____:____:	useful
3.	not pleasant	____:____:____:____:____:	pleasant
4.	nice	____:____:____:____:____:	awful
5.	happy	____:____:____:____:____:	sad

How do you feel about the idea in the box?

PHYSICAL ACTIVITY TO CONTINUE SOCIAL RELATIONS
Taking part in physical activities which give you a chance to be with your friends.

Always think about the idea in the Box

If you do not understand this idea, mark this box ☐ and go to the next page.

1.	good	____:____:____:____:____:	bad
2.	of no use	____:____:____:____:____:	useful
3.	not pleasant	____:____:____:____:____:	pleasant
4.	nice	____:____:____:____:____:	awful
5.	happy	____:____:____:____:____:	sad

How do you feel about the idea in the box?

PHYSICAL ACTIVITY FOR HEALTH AND FITNESS

Taking part in physical activities to make your health better and to get your body in better condition.

Always think about the idea in the Box

If you do not understand this idea, mark this box ☐ and go to the next page.

1.	good	_____:_____:_____:_____:_____:	bad
2.	of no use	_____:_____:_____:_____:_____:	useful
3.	not pleasant	_____:_____:_____:_____:_____:	pleasant
4.	nice	_____:_____:_____:_____:_____:	awful
5.	happy	_____:_____:_____:_____:_____:	sad

How do you feel about the idea in the box?

PHYSICAL ACTIVITY AS A THRILL BUT INVOLVING SOME RISK

Taking part in physical activities that could be dangerous because you move very fast and must change direction quickly.

Always think about the idea in the Box

If you do not understand this idea, mark this box ☐ and go to the next page.

1.	good	_____:_____:_____:_____:_____:	bad
2.	of no use	_____:_____:_____:_____:_____:	useful
3.	not pleasant	_____:_____:_____:_____:_____:	pleasant
4.	nice	_____:_____:_____:_____:_____:	awful
5.	happy	_____:_____:_____:_____:_____:	sad

How do you feel about the idea in the box?

PHYSICAL ACTIVITY AS THE BEAUTY IN MOVEMENT

Taking part in physical activities which have beautiful and graceful movements.

Always think about the idea in the Box

If you do not understand this idea, mark this box ☐ and go to the next page.

1.	good	_____:_____:_____:_____:_____:	bad
2.	of no use	_____:_____:_____:_____:_____:	useful
3.	not pleasant	_____:_____:_____:_____:_____:	pleasant
4.	nice	_____:_____:_____:_____:_____:	awful
5.	happy	_____:_____:_____:_____:_____:	sad

How do you feel about the idea in the box?

PHYSICAL ACTIVITY FOR THE RELEASE OF TENSION

Taking part in physical activities to reduce stress or to get away from problems you might have.

Always think about the idea in the Box

If you do not understand this idea, mark this box ☐ and go to the next page.

1.	good	_____:_____:_____:_____:_____:	bad
2.	of no use	_____:_____:_____:_____:_____:	useful
3.	not pleasant	_____:_____:_____:_____:_____:	pleasant
4.	nice	_____:_____:_____:_____:_____:	awful
5.	happy	_____:_____:_____:_____:_____:	sad

How do you feel about the idea in the box?

PHYSICAL ACTIVITY AS LONG AND HARD TRAINING
Taking part in physical activities that have long and hard practices. To spend time in practice you need to give up other things you like to do.

Always think about the idea in the Box

If you do not understand this idea, mark this box ☐ and go to the next page.

1.	good	____:____:____:____:____:	bad
2.	of no use	____:____:____:____:____:	useful
3.	not pleasant	____:____:____:____:____:	pleasant
4.	nice	____:____:____:____:____:	awful
5.	happy	____:____:____:____:____:	sad