The Relationship Between Perceived Physical Competence and the Physical Activity Patterns of Fifth and Seventh Grade Children

by

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THE RELATIONSHIP BETWEEN PERCEIVED PHYSICAL COMPETENCE AND THE PHYSICAL ACTIVITY PATTERNS OF 5TH AND 7TH GRADE CHILDREN

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(ABSTRACT)

This study examined the relationship between the perceptions of physical competence and patterns of physical activity of 83 5th and 7th grade children in one school in rural southwest Virginia. Gender and grade level differences in perceptions of competence and physical activity patterns were also investigated.

The Perceived Physical Competence Subscale for Children (PPCSC) (Harter, 1982) was modified to measure children's perceptions of physical competence (26 self-efficacy questions). Children's patterns of physical activity were measured by a modification to Sallis & McKenzie's Self Administered Physical Activity Checklist (SAPAC). Each item on the PPCSC was matched with an activity on the SAPAC scale. Modifications to both scales were made as a result of pilot testing performed with the sample population.

A significant positive linear relationship was found between children's perceptions of competence and their amount of physical activity. Significant positive correlations were also found for a number of self-efficacy measures and the amount of time children chose to engage in these specific activities.

Significant gender differences were found between boys and girls in overall perceptions of competence, as well as in a number of self-efficacy measures. Boys were typically higher is self-efficacy on most physical activities with the exception of gymnastics, dance, and jump rope. The 7th grade boys had the highest perceptions of competence, while 7th grade girls were the lowest of all four groups.

These perceptions of competence were reflected in whether children chose to participate in an activity or not. Children generally chose to engage in activities that they perceived themselves competent . There also appear to be very powerful socio-cultural influences on the types of activities that boys and girls choose (Lirgg, 1992). Girls were significantly more active in health enhancing lifetime physical activities such as walking, jogging, and bicycling, and chose activities of a lower intensity level than boys.

Contrary to the literature, this study found no significant differences in the total amount of physical activity between boys and girls. It was hypothesized that the rural setting in which this study was conducted may have influenced this outcome. No significant differences were found between grades in perceptions of competence or physical activity time.

DEDICATION

To my wife, Kim, and our three children, Sam, Corey, and Sierra. Without your unconditional love, enduring devotion, and tireless support I would not have been able to attain this accomplish. Kim, you have persevered through the long nights, and hard days with very little support from me, yet you were always there to keep me going. God has surely blessed me far more than I deserve. I love you.

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Finally I would like to thank my wife for enduring hardship without complaint. Your strength and endurance throughout all of our adventures continually amaze me. You complete me.

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Chapter 1

Introduction

One of the claims made by many physical educators is that the self-esteem of students is improved by participating in physical education classes. This claim was the catalyst for this inquiry. Thomas G. Moeller (1993) reports,

> The other day a group of elementary school teachers came to my office to inquire about methods of assessing children's self-esteem. They were, they explained, developing a program to enhance the self-esteem of educationally at-risk students and needed an instrument to measure the success of their program.
>
> That's a typical example of how pervasive the cultivation of children's self-esteem has become in US educational circles. In fact, author Rita Kramer recently argued that "self-esteem has replaced understanding as the goal of education." Nor is she alone in that belief. Many Americans place a higher priority on life adjustment and the enhancement of self-esteem than on academic learning, agreed Harold Stevenson and James Stigler, in summarizing their cross-cultural studies of schooling in the US and Asia (p. 7).

The education community has embraced the notion that one's perceptions of themselves may have either positive or negative effects upon performance. Thus, the focus of this study is upon the relationship between children's perceptions of their physical abilities (perceived competence), and their patterns of physical activity. To fully understand this relationship it is important to have a functional understanding of self-esteem, self-efficacy, perceived competence, and knowledge of children's patterns of physical activity.

Self-Esteem

Self esteem is, in fact, a central dimension of personality and one well worth our understanding further (Kawash, 1982, p.302). It doesn't take teams of researchers and a powerful computer to see that students feel better about themselves after completing a challenging task (Kolb, 1988). There are many programs that are used in the educational setting which claim to have a positive impact upon self-esteem of participants. A problem with these claims is that they fail to take into account the multi-dimensionality of the construct of self-esteem.

Researchers (Alderman, 1969; Ewy, 1993; Hawkins & Gruber, 1982; Kolb, 1988) have identified a variety of aspects which contribute to one's global self-esteem. They report that the multi-dimensionality of self-esteem can be broken down into the categories of: school, peer relationships, family relationships, emotional well-being, and physical self-perception. When teachers make the claim that physical education contributes to the improvement of self-esteem, they are either oversimplifying or ignoring the impact of the other experience categories on one's self-esteem, or are assuming a relationship between the two has been proven to exist.

Another concern of paramount importance in the research on self-esteem is its measurement. The complexity of the construct of self-esteem may provide a plausible reason for the inconsistency in the self-esteem research. Mendelson & White (1982) for example, found inconsistencies in the research on self-esteem as it relates to childhood obesity. They report, "The self-esteem of obese children is generally lower than that of the normal population, but this relationship does not always hold true (p. 899). Similar inconsistencies were found when studying anxiety and extraversion as agents in the development of self-esteem (Kawash, 1982).

The variables that influence self-esteem (peers, family relationships, school, emotional well-being, and physical self-perception), and the complexity of each variable help to explain why it appears difficult to find consistency in the self-esteem literature. Due to the complex nature of the construct of self-esteem, the research relies heavily on generalities such as: a person with high self-esteem is self-confident, approaches tasks with eagerness, and is generally extroverted (Coopersmith, 1967; Kawash, 1982; Kolb, 1988). It is apparent that conclusions about self-esteem will vary depending on the particular dimension of self-esteem being examined.

Perceived Competence and Self-Efficacy

The multi-dimensionality of self-esteem creates many difficulties in its measurement, therefore it is much more prudent to study the individual experience categories. The experience category which may hold the most promise for physical educators, and their claim to increased self-esteem, may lie within perceived physical competence.

Perceived physical competence is defined as one's overall perceptions of personal physical abilities. Important to note, is that one's perceived physical competence is a subjective view of physical abilities, and these perceptions may or may not coincide with actual ability. Perceived physical competence is considered to be the more global construct of physical self-efficacy, therefore it is considered to be people's overall perceptions of their general physical abilities on physical tasks.

Self-efficacy is defined in *Bandura's Social Cognitive Theory* as a situation specific self-confidence that indicates the strength and level at which one believes one can successfully perform a skill or task (Bandura, 1977). Therefore, one's self-efficacy toward a specific task is affected by the contextual variables surrounding the task, and that person’s perceptions of ability to cope

with these factors. Researchers have had moderate success measuring the strength and level of self-efficacy (Bandura, 1986; Clark & Nelson, 1990; McAuley & Gill, 1983).

The following quote by Albert Bandura (1982), lies at the heart of what the implications of self-efficacy are for physical educators, and for education in general.

> People avoid activities that they believe exceed their coping capabilities, but they undertake and perform assuredly those that they judge themselves capable of managing.
>
> Judgments of self-efficacy also determine how much effort people will expend and how long they will persist in the face of obstacles or aversive experiences. When beset with difficulties people who entertain doubts about their capabilities slacken their efforts or give up altogether, whereas those who have a strong sense of efficacy exert greater effort to master the challenges. High perseverance usually produces high performance attainments (p. 123).

Bandura's claims build a strong case for the understanding of such a construct, as its influence in education appears to be extremely salient. Efficacy expectations derived from past performance, vicarious experience, goal setting, positive effective communication, and anxiety influence one's behavior, thought patterns, emotional arousal and reactions (Bandura, 1977, 1982, 1989). These influences on self-efficacy are listed in order of their significant contributions to how people perceive their ability on physical tasks. Thus performance attainment is the single most powerful influence on one's perceived physical competence.

The variables that affect self-efficacy contribute to the complexity of utilizing efficacy judgments to motivate school-aged children. As detailed in the

‘Self-Efficacy’ section of Chapter 2, social cognitive theory posits that people are not driven by inner forces (autonomous), or controlled by external stimuli (mechanical), but are shaped by a model of triadic reciprocality in which behavior, cognitive factors, and the environment interact (emergent interactive agency), (Bandura, 1989, p. 1175). People's beliefs about their capability to exercise control over these factors determines their ‘self -efficacy’ toward a task. The issue then becomes how people judge their capabilities and how these efficacy judgments affect their motivation and behavior. Each person's model of triadic reciprocality is different, therefore the variables which affect one's self-efficacy may operate in a way that is not homogeneous in its effect.

Variables identified in the literature that have shown powerful effects upon self-efficacy are social and cultural influences. For example, gender may play a role in the development of perceptions of physical competence in American society (Lirgg, 1992; Whitehead & Corbin, 1991). the perceived physical competence of males is generally higher than that of females, and this difference may be attributed to social and cultural influences (Pate, Long, & Heath, 1994).

The issue of utilizing self percepts of efficacy to motivate school aged children is obviously very complex, but of what benefit, if any might further knowledge of self-efficacy and perceived competence be to educators? The impact of the research on self-efficacy for educators and specifically physical educators, would appear to center around what motivates one’s:

1. Choice of activity or task.
2. How much effort is put into a task.
3. How long one will persist in the face of failure.

Physical Activity

Physical education practitioners and researchers have long noted a sharp decline in children's motivation to participate in physical education in the upper elementary years, and in particular the middle school years and beyond. Adolescents and young adults, aged 12-21, are not vigorously active on a regular basis, and their level of physical activity decreases dramatically with age during adolescence (USDHHS, 1996). Harter states that perceived competence is directly related to participation motivation (Chambers, 1991, p. 415). Chambers is referring to one's motivation to participate in physical activity.

Robert Sonstroem (1974) developed the Physical Estimation and Attraction Scale (PEAS) to assess people's interest in vigorous physical activity, and their self-perceptions of physical fitness and athletic ability, which are hypothesized to be contributors to global self-esteem. A strong belief in personal physical competence (estimation), and an attraction to physical activity, lead to higher levels of participation and a subsequent increase in fitness and self-esteem (Fox, Corbin, and Couldry, 1985, p. 125). It is theorized then, that the opposite relationship exists, in that low perceptions of physical competence lead to physical inactivity, lower levels of fitness, and lower self-esteem.

As the literature reports a relationship between perceptions of physical competence and physical activity levels, one becomes increasingly aware of the importance of understanding this relationship, as physical inactivity has been noted as a risk factor for coronary heart disease, which is cited as the major cause of death in the US (Allensworth, 1996; USDHHS, 1996; Taubert, Moller, & Washington, 1996). Other health risks that have been associated with

physical inactivity are: increased rates of colon cancer, non-insulin-dependent diabetes mellitus, osteoarthritis, osteoporosis, depression, and anxiety.

With so many health risks associated with physical inactivity, why are 60% of American adults not physically active on a regular basis? In fact, 25% of all adults are not active at all (USDHHS, 1996, p.4). Many researchers (Allensworth, 1996; Hansen, Landsmann, & Monismith, 1996; Taubert, Moller, & Washington, 1996; Torabi & Nakornkhet, 1996) report that lifestyle choices such as physical inactivity begin with attitudes and perceptions formed during childhood and adolescence, and often these lifestyle choices are not actualized until adulthood.

Attitudes and perceptions of physical activity formed in childhood are reported to be influenced by social and cultural factors (Anderssen & Wold, 1992; Faucette, et al. 1995; Myers, et al. 1996). Mentioned previously, gender differences have been found in children's perceptions of physical competence, and these differences have also been identified in the literature on physical activity. Males tend to be more physically active than females, and they also prefer physical activity that is of greater intensity than females (Faucette, et al. 1995; McKenzie, et al. 1992).

Personal experience as a physical educator, numerous conversations with other physical educators, and the literature, lead this investigator to believe that there may be a correlation between children's perceived competence and their patterns of physical activity (types, duration, and intensity of physical activity engaged in). These sources of information validate the importance of this study on children's physical self-perceptions and the relationship to their patterns of physical activity.

Statement of Purpose

The purpose of this study was to determine the relationship between 5th and 7th grade children's perceived physical competence, and their patterns of physical activity.

Initial Guiding Questions

The following questions served as a guide for this study:

1. Are there gender differences in the perceived competence, self-efficacy, and patterns of physical activity of 5th and 7th grade children?
2. Are there grade level differences in the perceived competence, self-efficacy, and patterns of physical activity of 5th and 7th grade children?
3. Is there a correlation between 5th and 7th grade children's perceptions of physical competence and their patterns of physical activity?

Significance of This Study

This study was conducted to examine the relationship between 5th and 7th grade children and adolescents' perceptions of their physical abilities and their patterns of physical activity. Its intent was to provide insights into the role that gender and grade level may play in the possible relationship between children's perceived competence and its affect on their patterns of physical activity as they enter adolescence.

In theory there is a strong relationship between perceived competence and children's physical activity patterns. In actual fact there is no research to directly support these claims. The developmental nature and instability of self-efficacy, and its related constructs has caused researchers to avoid the upper elementary age group and instead research has focused on high school age and older populations. Unfortunately, this has contributed to a missing link in the research. Children become less physically active during the middle school years, yet there is little research that attempts to explain this phenomenon.

This study was significant in that it attempted to answer some of the questions which have been overlooked or avoided in the research literature regarding children's perceived competence and their patterns of physical activity. Previously mentioned, the physical activity patterns developed in childhood and adolescence have been theorized to carry over into adult lifestyle patterns of behavior. If in fact there is a relationship between children's perceived competence and their patterns of physical activity, and the effects of this relationship carry over into adult behaviors, this line of inquiry is of paramount importance. The results of this study might contribute to knowledge which can help to change the quality of life for many people.

Limitations of This Study

The following limitations restrict the generalizability of the results of this study:

1. The study was completed in one school in a rural setting of southwestern Virginia over the course of one year. Global generalizations to other schools and settings will be restricted.
2. Of the factors which may influence a child's physical activity patterns (health history, family attitudes toward physical activity, family patterns of physical activity, perceived competence, etc.), this study only investigated perceived competence and its relationship to patterns of physical activity.
3. This study relied on children's honest responses on two self-report measures.

Delimitations of This Study

1. The participants in the study were delimited to six classes (three 5th grade, and 3 7th grade) in Phase 3.
2. The selection of the participants was delimited to 5th and 7th grade students who volunteered to participate in the study from one school.
3. Data gathering was confined to self-report scales in Phase 3.

Basic Assumptions

1. It is assumed that children's responses reflected their true perceptions of physical ability.
2. It is assumed that children's responses reflected their true activity patterns.
3. It is assumed that students' responses during interviews and focus groups in Phase 2 were honest, and accurate.

Definition of Terms

The following terms and definitions are provided to clarify the constructs which may influence this study.

Self-concept: Self-concept is a dynamic system influenced by complex social and psychological interactions such as behavior, intellect, physical attributes, anxiety, popularity, satisfaction, and happiness (Harter, 1982; Martinek & Zaichkowsky, 1977; Piers, 1984). Self concept is how people view their personal attributes and characteristics.

Self-Esteem: the evaluative component of one's self-concept. This is the value that people place on their personal attributes and characteristics. Self-esteem is a global construct that encompasses the experience categories of academic or school self-esteem, social or peer relationships self-esteem, family relationship self-esteem, physical self-perception, and emotional well-being.

Perceived Physical Competence: refers to an individual's self-confidence

regarding successful performance of a skill (Poole, Mathias, & Stratton, 1996). Self-efficacy and perceived competence are often used inter-changeably, but for this study, a distinction is made between the two. Perceived physical competence is considered to be a more global perception of physical ability (Harter, 1982; McAuley & Gill, 1983).

Physical Self-efficacy: a situation and task specific perception of physical ability (Bandura, 1977). Self-efficacy is a person's perceptions of ability to exercise control over specific circumstances. These perceptions are considered to be mediators of a person's motivation toward a task, and affects actual performance success. Self-efficacy is shaped by a model of triadic reciprocality in which behavior, cognitive factors, and the environment interact (emergent interactive agency), (Bandura, 1989, p. 1175).

Physical Activity: Bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure (USDHHS, 1996).

Physical Activity Patterns: a comprehensive description of physical activity over a defined period of time, concerning the type, frequency, duration, and intensity of physical activity (Bouchard, et al., 1988).

Design of This Document

The first chapter serves as an introduction to this study. Chapter Two contributes a literature review which focuses on 'the self' and its related constructs, and physical activity patterns of children. Chapter Three focuses on the research methodology for this study. Chapter four reports the results and discussion of this study. Chapter five reports a summary of the entire study, with conclusions and implications for future research.

Summary

Physical self-efficacy is a task and context specific self-confidence in one's ability to perform a physical task (Bandura, 1977). Perceived physical competence is the more global construct of self-efficacy which determines one's overall confidence in their abilities on physical tasks (Harter, 1982). Both self-efficacy and perceived competence are mediators of one's motivation toward physical tasks. Therefore, these constructs are considered potent determinants of one's choice of physical task or activity, how much effort one puts forth, and how long one will persist in the face of failure (Bandura, 1977). There are also gender differences in levels of self-efficacy and perceived competence.

The literature on physical activity patterns reports that there is a marked decline in physical activity levels as children reach the upper elementary and middle school years, and that there are gender differences in children's patterns of physical activity (USDHHS, 1996). The Surgeon General's Report states that physical inactivity is a risk factor for heart disease, which is a leading cause of death in the US, and that the lifestyle choices adults make are attributed to attitudes and perceptions formed during early adolescence.

It is theorized that children's perceived physical competence may have a tremendous effect upon their patterns of physical activity. These perceptions of ability, and their effect on physical activity, may help in understanding adult patterns of physical activity. Therefore, it is important to investigate the relationship between perceived competence and patterns of physical activity in children and adolescents.

Chapter 2: Review of Literature

“There are two good ways to get to the top of an oak tree:
climb...or find a good acorn, sit on it, and wait.

This review of literature was an attempt to climb to the top of the tree. Getting there required considerable effort. The ascent required hugging, shimmying, stretching and diving for branches, and even a fall or two. This climb focused on the constructs of self-concept, self-esteem, perceived competence and self-efficacy, patterns of physical activity, as well as measurement considerations. It was found that the tree had grown during the climb, and will require a lifetime of climbing, alas, sitting on an acorn is not an option for those who want to make a difference in this lifetime.

Self-Concept and Self-Esteem

To fully understand the constructs of perceived competence and self-efficacy, we must first take a look at the larger picture. Researchers have identified self-efficacy as a sub-construct of self-esteem, along with peer self-esteem, school and academic self-esteem, family relationships, and emotional well-being (Ewy, 1993; Hawkins & Gruber, 1982; Kolb, 1988). Self-esteem is considered to be a component of one’s self-concept.

Moeller (1993) writes,

> Although most of us think we know intuitively what "self esteem" is, it can be a vague and difficult to define concept. For example, some authors refer to a child's "self-esteem," others to one's "self-concept." Some authors use these two terms as synonyms, whereas others distinguish between the two.
>
> The fact is that each of these terms can have multiple meanings. Each can be used to denote: (1) categorization, in which people assign themselves to a particular category (such as "good at math"); (2)

evaluation, by which people attach a social value to the label (such as, "Teachers value people who are good at math"); (3) comparison, by which people rank themselves with respect to others (such as, "I'm the best math student in the class"); and (4) affective attitude, which consists of the emotional feeling people have toward themselves regarding the category at hand (such as, "I feel good about myself because I am good at math"), (p. 8).

This review of the literature does not support the notion that self-concept and self-esteem are synonymous, as Moeller mentioned. The description people give themselves concerning their attributes, characteristics, or emotional qualities is their self-concept. Self-concept is a dynamic system influenced by complex social and psychological interactions such as behavior, intellect, physical attributes, anxiety, popularity, satisfaction, and happiness (Harter, 1982; Martinek & Zaichkowsky, 1977; Piers, 1984).

It is apparent that self-concept is a much broader and more global construct than self-esteem, or self-efficacy. Self-concept differs from self-efficacy in that self-efficacy is a context-specific assessment of competence to perform a specific task, or a judgment of one's capabilities to execute specific behaviors in specific situations (Pajares & Miller 1994). Self-concept is measured much more globally, and is not confined to the constraints of contexts and specific tasks.

Narrowing the scope somewhat, self-esteem is the evaluative component of the self-concept, or the value that we attach to our characteristics and attributes (Chiu, 1988; Ewy, 1993; Lirgg, 1992). For example, one of my characteristics is that I am an out-going person (part of my self-concept), the value that I attach to this characteristic (positive or negative) is part of my self-

esteem. I may see this characteristic as very positive and place a high positive value upon it, or I may feel that this quality is a source of embarrassment which may cause me to devalue my perception of my outgoing personality.

The previous example citing the value placed upon an outgoing personality, is considered a part of my global self-esteem, because it is how I value this characteristic. One's global self-esteem, or how someone values all of their self-concept attributes and characteristics collectively, is highly complex. A person's self-concept is the total appraisal of his or her appearance, background and origins, abilities and resources, attitudes and feelings which culminate as a directing force in behavior (Ewy, 1993, p. 17). The cumulative value that I place upon all of these qualities and characteristics is my global self-esteem.

Self-Esteem

Many aspects have been identified which contribute to one's global self-esteem (Alderman, 1969; Ewy, 1993; Hawkins & Gruber, 1982; Kolb, 1988). The multi-dimensionality of self-esteem can be broken down into the experience categories of: school, peer relationships, family relationships, emotional well-being, and physical self-perception.

In a path model diagram, Pajares & Miller (1994) show the complexity of self-esteem, illustrating the experience categories that influence self-esteem and their respective correlations. If one of these variables is changed or omitted, it affects the correlations of all other variables.

The complexity of the construct of self-esteem may provide plausible reasons for the inconsistency in the self-esteem research. Mendelson & White (1982), found inconsistencies in the research on self-esteem as it relates to childhood obesity. They report, The self-esteem of obese children is generally lower than that of the normal population, but this relationship does not always

hold true (p. 899). Similar inconsistencies were found when studying anxiety and extraversion as agents in the development of self-esteem (Kawash, 1982). The number of variables thought to influence self-esteem (peers, family relationships, school, emotional well-being, and physical self-perception), and the complexity of each variable would explain why it appears difficult to report consistent findings in the self-esteem research. There are too many variables to control for, which make the measurement of self-esteem a rather difficult task.

The complex nature of the construct of self-esteem, explains why the literature relies heavily on generalities such as: a person with high self-esteem is self-confident, approaches tasks with eagerness, and is generally extroverted (Coopersmith, 1967; Kawash, 1982; Kolb, 1988). Conclusions about self-esteem will vary depending on the particular dimension of self-esteem being examined.

According to Kawash (1982), Self esteem is, in fact, a central dimension of personality and one well worth our understanding further (p.302). It doesn't take teams of researchers and a powerful computer to see that students feel better about themselves after completing a challenging task (Kolb, 1988, p. 32). However, this type of observation has not been acceptable to the research community since it is not quantifiable nor does it meet criteria for valid research. Although there does seem be to a trend toward the acceptability of qualitative measures.

Moving in a quantitative direction, the self-esteem research did progress, however, many researchers became increasingly aware of the pitfalls of trying to investigate such a broad construct. The success in the self-esteem research has been in the study of its component parts (school, peer relationships, family relationships, emotional well-being, and physical self-perception).

The research on self-concept, self-esteem and self-efficacy has gone through an evolutionary process in which these constructs were first identified and observed on a global scale. The terms global self-concept, global self-esteem, and global self-efficacy have been used to identify the construct as a whole, and in earlier research it was assumed that these constructs were unitary in nature. As the knowledge base grew, researchers were able to identify indicators or components of these global constructs. Identifying the components of the global constructs has allowed a more sophisticated approach to understanding and measuring these constructs, and makes their digestion more palatable.

Social Cognitive Theory: A Theoretical Foundation

Social Cognitive Theory is the theoretical framework from which self-efficacy theory is grounded and ultimately helps to build a strong foundation for this study. Social cognitive theory posits that people are not driven by inner forces (autonomous), or controlled by external stimuli (mechanical), but are shaped by a model of triadic reciprocality in which behavior, cognitive factors, and the environment interact (emergent interactive agency), (Bandura, 1989, p. 1175). A person's beliefs about their capability to exercise control over these factors is called 'self -efficacy'.

Self-Efficacy

Simply stated, self -efficacy is a situation specific self-confidence that indicates the strength and level at which one believes one can successfully perform a skill. Self-efficacy is a judgment of how well one can execute courses of action required to deal with prospective situations (Bandura, 1982). These efficacy expectations can be thought of as both outcome and personal expectations (Bandura, 1977). The outcome efficacy expectations consist of the belief that certain behaviors will lead to certain outcomes. The personal efficacy

expectations consist of the belief that one can successfully perform those behaviors.

Human beings have the distinct capability to exercise control over their own thought processes, motivation, and actions. Because judgments and actions are partly self-determined, people can effect change in themselves and their situations through their own efforts (Bandura, 1989, p.1175). This is what Bandura refers to as *'Human Agency'*. Therefore, self-efficacy is considered a mediator of human action.

Human action is influenced by, personal qualities, social factors, and past experience, which all help determine one's self-efficacy (Schunk, 1995, p.114). An individual processes information and develops a level of self-efficacy specific to the task at hand. The personal qualities, social factors and past experience may all change with every task, thus the emphasis on the specificity of the task. The strength and level of self-efficacy then mediates a person's response to the task. For example, a 6th grade child may have a high perception of ability to perform a lay-up in a basketball game when guarded by a student of similar ability, but if guarded by a much larger, highly skilled individual, perceptions of ability to perform the lay-up may be diminished. Thus, performance may be reduced by the level of self-efficacy and not a decrease in actual ability on the task. Bandura (1986) found that self-efficacy is a robust predictor of future performance in studies on athletic and physical performance.

Self-efficacy is concerned with judgments of what people can do with their ability, and not simply their level of ability**.** Clark & Nelson (1990), in their work with dysphoric adolescents found that these individuals have a distorted view of personal performance, in that perceptions of ability were much lower than actual ability. Having the knowledge and skills needed to perform an act does not, in and of itself, guarantee that an actor will perform efficaciously

(Raudenbush et. al., 1992, p.150). Instead, effective action depends also upon the personal judgment that one can mobilize such knowledge and skills to perform an act successfully under varied and unpredictable circumstances.

Perceived Competence

Roberts, Kleiber, and Duda (1981) consider the terms self-efficacy, physical self-efficacy, perceived ability, perceived physical competence, and physical self-confidence as interchangeable, and all measure the same construct. Harter (1982), however, considers physical self-perception or perceived competence as a more global construct than physical self-efficacy.

For this study, Harter's frame of reference will be used when referring to perceived competence and self-efficacy. When perceived competence is used, this will signify to the reader that global perceptions of physical competence are being referred to. When self-efficacy is mentioned, task and situation specific perceptions are being referenced.

Feltz & Brown (1984) also used this frame of reference when testing the reliability of Harter's Perceived Competence Scale for Children (PCSC). They reported, the consistency with which items in each subscale measured each perceived competence dimension was assessed through the Cronbach alpha (p. 390). They refer to these measures as perceived competence because Harter's scale measures global perceptions of ability such as perception of ability in large group games. A self-efficacy measure, in contrast, isolates a specific task within a large group game such as the ability to dodge or kick. Also McAuley & Gill (1983), while reporting on the subscales of the Physical Self-efficacy Scale, noted that the subscales exhibit some criterion validity in measuring perceptions of general physical self-efficacy (or physical self-perception).

One's overall perceived physical competence, when compared to the self-efficacy measure on any physical task has been found to share only 10% of the variance (McAuley & Gill, 1983, p. 414). Therefore, one must consider the relationship between general self-efficacy and the task specific self-efficacy measures with caution.

McAuley & Gill (1983) suggest the construction of scales which narrow measurement to general areas of behavior is a more viable proposition than a measure of general physical self-perception. For example, instead of measuring overall perceptions of physical competence, measure competence in different realms, such as golf, ball games, etc. Thus limiting the measure of perceived competence to a specific arena, such as golf would make sense. Specific measures of self-efficacy would then be attained for various tasks such as putting, driving, etc., and a composite score of self-efficacy measures could then be computed and averaged to represent one's overall perception of ability in golf. My physical self-perception in golf may be very high, but my self-efficacy on a specific aspect of golf may not be high (hitting out of sand traps for instance). This is an important distinction to make, as it is important to understanding this study.

For this study, each physical activity a child does, has a self-efficacy measure. All of these self-efficacy measures will be summed to represent the child's global perception of competence on these physical activities. This narrows the focus of the measurement to the physical activities children engage in, and not one's overall perceptions of physical competence that McAuley & Gill referred to previously.

Sources of Self-Efficacy Information

There are five primary sources from which self-efficacy information has been derived. People use this information to a large extent to determine their level and strength of self-efficacy (Bandura, 1977, 1982). These sources are:

- Past mastery experiences
- Vicarious experiences (modeling)
- Goal setting
- Positive effective communication (verbal persuasion)
- Anxiety

Past Mastery Experiences

The first source of self-efficacy information is past mastery experience (enactive attainment). Self-efficacy research has found that past performance experience is the single most powerful predictor of future performance**,** because it can be based on authentic mastery experiences (Bandura, 1986; Chase et al., 1994; Feltz & Weiss, 1982; Horn & Hasbrook, 1987; Locke et al., 1984). Future performance outcomes are mediated by one's self-efficacy on that task either positively or negatively depending on prior successes or failures. There is a reciprocal relationship between self-efficacy and performance, but self-efficacy has proven to be a more potent predictor of future performance, even more so than past performance (Bandura, 1982; Feltz, 1984; Feltz & Weiss, 1982; Locke et al., 1984).

One's perceptions of past performance experiences is determined to a large extent by that person's locus of control. The developmental psychology literature indicates there is a developmental progression in the criteria or informational sources children use to evaluate their performance competencies (Horn & Hasbrook, 1987, p. 208). Locus of control is one of these developmental progressions, and it is apparent that a child's perceived locus of

control will greatly effect the development of their self-percepts of efficacy. To quote Horn & Hasbrook (1987),

> Children with external perceptions of performance control exhibited a greater preference for external information, while children with high perceived competence and internal perception of control exhibited greater reliance on self-determined standards of performance and comparison of own performance with that of relevant peers. These results suggest that children differ from each other not only in the magnitude of their perceptions of competence but also in the criteria they use to evaluate that competence (p.208).

Other researchers agree with Horn & Hasbrook regarding the development of internal and external locus of control in sport settings (Bandura, 1977; Harter, 1982; Lirgg, 1992; Moeller, 1993; Piers & Harris, 1984; Petrakis & Bahls, 1991).

An external locus of control is evident in young children, as they rely on positive reinforcement feedback received from parents and other adults for independent mastery attempts (Harter, 1978). This dependence on adult feedback is considered an external locus of control because children do not attribute their success or failure to their own performance, but to the feedback they receive from the adults. Thus, most successful performances are attributed to these external criteria.

As children age and mature, they develop an internal reward system, and also compare their performance to other children. At approximately five to seven years old children begin to show an increasing tendency to evaluate their own performance against the performance of their peers (Horn & Hasbrook, 1987). This social comparison of performance increases throughout childhood and peaks during late childhood and early adolescence. The cognitive maturation children experience through childhood results in an internalization

of achievement standards (Harter, 1982), and by later elementary years children are able to make more realistic appraisals of their competencies (Lirgg, 1992; Folsom-Meek, 1991).

As locus of control develops, some children start developing higher perceptions of ability based upon performance successes. As performance success continues, so too does the internalization process. Children begin attributing success to personal ability and effort. Children who do not perceive themselves as competent, continue to rely on external factors and attribute successes to adult feedback and luck (success and failure are not under their control). This is a self-protection mechanism to avoid attributing one's failures to personal inability (Fox & Biddle, 1988). These individuals eventually view themselves as lacking competence or having low self-efficacy.

Vicarious Experience / Modeling

The second source of self-efficacy information cited was vicarious experience or modeling. Models provide an important vicarious source of self-efficacy information (Bandura, 1986). Observing competent models successfully perform actions conveys information to observers about the sequence of actions they should use to succeed. A modeled display conveys to the observer that if they follow the same sequence of actions, they too can perform the task. Knowing what to do to perform a task raises self-efficacy, and this vicarious increase can motivate observers to perform a task (Schunk, 1995).

In a study of undergraduate gymnastics students it was found that modeling is important because seeing others perform in various situations conveys information about the observers own performance (McAuley ,1985). Groups which are afforded the vicarious experience of having a model perform the expected task consistently report significantly higher self-efficacy

expectations, and lower anxiety ratings than control groups which do not have a modeled performance (Bandura, 1982).

Participant modeling can effectively increase self-efficacy levels if the observer perceives personal ability as comparable to a successful model, however, identifying with an unsuccessful model can have detrimental effects on self-efficacy level (Schunk, 1995). Observing others perceived to be of similar competence fail, despite high effort lowers the observers perceptions of personal competence (Brown & Inouye, 1978). If a model is perceived as having greater ability, this can still enhance self-efficacy levels as observing the performance of the task gives valuable knowledge about the task (Schunk, 1995). Schunk also reports that the highest degree of model-observer similarity is attained from self-modeling. Observing a tape of oneself with an expert who provides corrective feedback has proven to raise efficacy levels.

Goal Setting

The third source of self-efficacy information bulleted on page eight is goal setting. Goal setting is an important variable which affects the achievement outcomes of self-efficacy, motivation, and performance (Schunk, 1995). The benefits of goals derive largely from the goal properties of proximity, specificity, and difficulty (Bandura, 1986; Schunk, 1995).

Proximal sub-goals provide immediate incentives and guides for action (Bandura, 1982, 1986; Schunk, 1995). Sub-goal attainments provide clear markers of progress along the way to verify a growing sense of self-efficacy. Sub-goals are effective because it is easier to assess progress toward goals that are closer at hand. Pursuing easier goals may enhance self-efficacy and motivation during the early stages of skill acquisition, but it is predicted that more challenging goals are more beneficial as skills develop, as they offer more information about capabilities (Bandura, 1989; Nicholls, 1984; Schunk, 1995).

Goal specificity is another goal property that helps to enhance performance through elevating self-percepts of efficacy, as it is easier to judge progress toward goals if the performance standards are specific (for example, “kick up with your legs straight”), versus general (“do your best”). In a study on fitness testing and goal setting, self-efficacy increased and performance improved when goals were specific and challenging (Fox & Biddle, 1988). It was concluded that process related goals such as effort, form, and strategy, and not outcome related goals such as win/loss, correct/incorrect, were more effective in raising levels of self-efficacy.

As children age and mature they compare their achievement to their peers, and are better able to assess their own competencies. In achievement situations, individuals desire success to demonstrate high ability, and to that same extent avoid failure so they will not demonstrate low ability (Nicholls, 1984). Therefore, in social comparison situations, individuals with low self-efficacy who are faced with a task they perceive as easy, may apply high effort, as failure to accomplish an easy task demonstrates low ability. Conversely, low or no effort may be applied on an easy task because high effort on an easy task demonstrates to others that you are of low ability. Individuals of low self-efficacy may attempt difficult tasks, as failing a task that is perceived to be difficult does not demonstrate low ability, but most often difficult tasks are avoided as they are perceived to be too difficult.

On the other end of the spectrum are individuals of high self-efficacy. These people are attracted to, and often attempt difficult tasks or set loftier goals. These people apply substantial effort on difficult tasks, as failing will not demonstrate low ability, but succeeding will most certainly demonstrate high ability (Nicholls, 1984). Individuals with high self-efficacy may attempt easy

tasks, but often times put forth minimal effort, as high effort on an easy task demonstrates low ability.

Levels of task difficulty, are associated with goal setting, and self-evaluative reactions are a form of self motivation. This involves internal comparison processes, and requires personal standards against which to evaluate performance (Horn & Hasbrook, 1987). The orientation of a goal or task may be either normative (more differentiated) or task oriented (less differentiated).

If a task or goal is normative, individuals routinely compare personal perceptions of success to others. This comparison may affect self- perception positively or negatively, depending upon how the person perceives they are performing in relation to others (Nicholls, 1984). In this more differentiated approach, perceptions of task difficulty and demonstration of high ability are contingent on succeeding at tasks where others fail (Nicholls, 1984). Therefore, task difficulty and demonstrating high or low ability are contingent upon the ability of members of the normative reference group (classmates, teammates, national standards). In this conception, learning is an insufficient basis for perception of competence (Nicholls, 1984). When teachers use norm-based evaluations and public assessments, students are more likely to compare themselves with others (Veal & Compagnone, 1995). Ability differences are more easily discernible when all students do the same work at the same time.

Task involved goal orientations are very different than normative goals, as they focus on individual goals and attainment . Self-efficacy levels are elevated in task involved goals, because the emphasis is on individual task attainment. Individuals focus more on personal performance, and compare less with others (Williams & Gill, 1995), therefore perceptions of competence focus on one's own progress and learning. Greater effort is seen as contributing to

one's learning, which indicates more ability, consequently, higher self-efficacy on future tasks is achieved if one applies more effort.

Young children conceive of ability in a self-referenced manner, and develop their self-efficacy by how much effort they apply to a task (Harter, 1978, p.39). As children grow older their task reference becomes more norm referenced because they do more social comparison as a natural part of their development. Social comparisons are accentuated in the middle school years, which may cause children to focus less on task mastery.

In a task referenced approach, an increase in mastery is an end in itself. When individuals are mastering a task, they feel they are doing what they want to do, and are more intrinsically motivated. On the contrary, the literature has shown that when a task is norm referenced, individuals lose interest in mastery of skills because more effort is perceived as less ability (Williams & Gill, 1995).

Effective Positive Communication & Feedback

The fourth source of self-efficacy information is effective positive communication or positive feedback.

According to Schunk (1995):

> Theory and research support the idea that feedback can affect self-efficacy, motivation, and performance. Attributional feedback links behavior outcomes with one or more attributions, or perceived causes of outcomes. Attributional feedback is a persuasive source of self-efficacy information. Assuming that individuals have to work hard to succeed, linking success with effort supports individuals' perceptions of their progress, increases self-efficacy, and sustains motivation. When people succeed with little effort, ability feedback may be seen as more credible (p. 122).

The type and timing of feedback have been found to be specific to the individual receiving the feedback. Some children may make virtually exclusive use of adult feedback in forming their own perceptions of competence whereas others may be more oriented to peer comparison in judging their own performance (Horn & Hasbrook, 1987). At the early stages of individual skill development feedback regarding ones effort often causes higher self-efficacy because individuals associate success with effort. When people perceive that it is their effort and skill, not luck that is causing them to be successful, it produces feelings of positive efficacy and promotes an internal locus of control (belief that they can control the outcome of performance). These positive self-percepts of efficacy cause individuals to exert more effort. Self-percepts of efficacy mediate behavior by motivating individuals to continue to work hard which produces a more skillful individual. When individuals become more skillful they need not apply as much effort, therefore it is recommended that the focus of verbal feedback shift to attributions that are geared toward one's ability (Schunk, 1995).

Verbal persuasion alone may be limited in its power to create enduring increases in self-efficacy, but can contribute to successful performance if the heightened appraisal is within the realistic bounds of the individual (Bandura, 1982, p.127). Persuasive efficacy influences, therefore, have their greatest impact on people who have some reason to believe that they can produce effects through their actions. When providing attributional feedback it becomes important to consider individual capabilities, to ensure the feedback is credible (Schunk, 1995).

Teachers do not provide credible feedback when they reinforce children whom they perceive are less competent with feedback more often than those they perceive as more competent (Bunker, 1991; Chambers, 1991). This

reinforcement strategy may create problems, as low expectations are conveyed by reinforcing children for success on easy tasks or for mediocre performance. This reinforcement strategy can also reduce the effort of those perceived as competent.

Specific, congruent feedback is recommended for all children to improve performance (Bunker, 1991; Graham, 1992, 1993). Adult praise can serve to facilitate children's motivation but only if such feedback is administered in a non-controlling, performance-contingent, and specific manner, thus providing the child with positive information concerning his or her competence (Chambers, 1991, p. 416).

The type of feedback influences perceptions of ability (Chambers, 1991). In studies using normative feedback, students who perceive that they have low ability often reduce their effort if the feedback they receive places their ability below others in the setting, but effort may increase for low ability students if feedback is considered high in relation to others. Students with high perceptions of ability often react positively to normative feedback that places their performance at or below others, as they are motivated to increase their effort to again be perceived as having high ability. High normative feedback to high ability students may elicit lower effort because they perceive low effort can allow the demonstration of high ability (Nicholls, 1984).

Anxiety

The last source of self-efficacy information mentioned on page eight is anxiety. People rely partly on information from their physiological states in judging their capabilities (Bandura, 1982). They read their visceral arousal in stressful and taxing situations as an ominous sign of vulnerability to dysfunction. Bandura acknowledges that reducing one's physical arousal may improve performance, but does so by raising efficacy expectations**.** Self percepts of

coping efficacy, or perceptions of ability to deal with stressful situations can reduce or heighten the level of arousal before, during, and after a trying experience.

Predictability and controllability reduce stress and increase preparedness in coping with stressful situations, therefore are conducive to the enhancement of self-percepts of efficacy (Miller, 1981). Vicarious experiences enhance predictability which allay feelings of stress and anxiety associated with specific tasks. Therefore, modeling can be considered a possible intervention strategy for individuals who have a distorted view of their ability (i.e. high ability, but low self-efficacy). If individuals feel they can predict the outcome of a performance or stressful situation, they can plan strategies which allow them to have some control over the circumstance. Controllability reduces anxiety, which produces more positive perceptions of performance competence.

Measurement of Self

The previous discourse regarding self-concept, self-esteem, perceived competence, self-efficacy, and the sources of self-efficacy, should raise some questions in the minds of educators. What is the importance of this information to educators? How can this knowledge help the teaching and learning process? What do we do with this information regarding children's self-perceptions? These questions lead naturally into a discussion of measurement. How do we know the impact of children's self-esteem or self-efficacy on learning if we cannot measure such things?

The quote by Moeller at the beginning of this chapter is the foundation of a discussion which relates to measurement of 'self'. He argues that the pursuit of self-esteem has replaced learning as the main goal in American educational systems. His point is extremely poignant if one ponders how such a broad construct as self-esteem or self-concept is measured. The following quote by

Harter (1982) draws attention to the complexity of measuring the constructs of self-concept and self-esteem.

> "However, there are serious problems with the instruments designed to tap these self-evaluative processes. Typically, constructs such as self-concept and self-esteem are vaguely defined at the conceptual level and therefore do not point to any clear operational definition. Nor is any rationale provided for the potpourri of empirical referents selected. Items on such popular scales as the Coopersmith Self-Esteem Inventory (1967) and the Piers-Harris Self-Concept Scale (Piers 1969; Piers & Harris 1984) tap a range of diverse content including cognitive competencies, physical skills, popularity, acceptance by parent, morality, personality traits, physical characteristics, and affective reactions. Responses to these heterogeneous items are then summed, and the total score is interpreted as an index of global self-regard. In employing such a procedure, Coopersmith has assumed that children do not make distinctions among the domains in their lives (p.87)."

A chronology of the measurement of 'self' from the mid-sixties onward is presented below. Included in this chronology are the landmark measurement instruments used in physical education research. This review then focuses on the measurement instrument utilized in this study, and the reasons for its selection.

A Chronology

Human behavior and ultimately the 'self' has been the focus of educational psychology research for some time. If one could understand the cognitive processes of people, their actions, and the factors that mediate those actions one could fully understand human behavior. Robert White's (1959)

classic paper, *Motivation Reconsidered: The Concept of Competence* was an attempt to orient our thinking to include the concept of intrinsically motivated behavior. White did not just urge us to find a niche for this construct, but to consider it as the very cornerstone of our theorizing about what motivated an organism to act.

As the knowledge base grew, researchers became aware of the multi-dimensionality and complexity of self-concept and self-esteem. Stanley Coopersmith was investigating the antecedents of self-esteem in the early to mid-sixties. His work led to the development of The Coopersmith Self-Esteem Inventory (Coopersmith, 1967) (CSEI). The CSEI was probably the most widely used and best known self-esteem / self-concept scale. The CSEI is a self-report scale designed to measure attitudes toward the self (Chiu, 1988). The CSEI's design is that of a two point Likert-type scale in which children choose "like me" or "unlike me" on 58 items. This scale yields a total score and separate scores for four subscales: General Self, Social Self-Peers, Home-Parents, and School-Academic.

Many of the instruments developed to measure self-esteem or self-concept during this time followed construction similar to the CSEI. Noteworthy scales are: The Culture-Free Self-Esteem Inventories (SEI) for Children and Adults, The Piers-Harris Children's Self-Concept Scale (CSCS), Rosenberg Self-Esteem Scale (RSE), Tennessee Self-Concept Scale, The Martinek-Zaichkowsky Self-concept Scale for Children.

All of the aforementioned scales report valid and reliable results, but as Harter mentions in the quote at the beginning of this section, these scales tap heterogeneous items and sum them. The problem with this measurement is that summing heterogeneous items can be somewhat risky. Is it possible that a child can have a strong sense of regard about personal physical ability, and

poor regard about academic ability? Summing heterogeneous items may give us some information about an individual, but is that information accurate? Will this information help us in the teaching and learning process of this person?

In defense of these scales and their developers, one must remember that most research performed prior to their development considered self-concept and self-esteem as a unitary construct. Coopersmith (1967) and Piers-Harris (1984) in particular acknowledged the multi-dimensionality of self-esteem as evidenced by the subscale scores.

The subscale scores of most scales was a cause for concern. As Chiu (1988) points out, self-report, self-concept scales had problems as many children were unwilling to document feelings about themselves. Children would often ignore the aspects of self-concept that they were either unwilling or unable to reveal. This problem was compounded by the “like me” or “unlike me” structure of the questions, which created either a favorable or unfavorable choice. These choices tend to draw socially desirable responses (Harter, 1982).

Measurement of the Physical Self

The self-concept and self-esteem scales had a stalwart influence on measurement of the ‘self’. As an evolutionary process, more precise measurement of the individual subscales emerged. In particular, the measurement of the ‘physical self’.

Robert Sonstroem developed the Physical Estimation and Attraction Scale (PEAS) in 1974 to assess self-perceptions of physical fitness and athletic ability thought to be a component of global self-esteem (estimation), and interest in vigorous physical activity (attraction). Sonstroem hypothesized a strong belief in personal physical competence (estimation), and an attraction to physical activity lead to higher levels of participation and a consequent increase

in fitness and self-esteem (Fox, Corbin, & Couldry, 1985). The PEAS true/false format was borrowed from *Kenyon's Attitudes Toward Physical Activity Scale* (Kenyon, 1968b).

Researchers (Dishman, 1980; Fox & Corbin, 1989; Fox, Corbin & Couldry 1985; Sonstroem, 1974) agreed that the PEAS instrument was valid and reliable for testing physical estimation, but fell short on the attraction scale. The reason being that the PEAS instrument was designed for adolescent males, and a female version was created by changing some of the gender pronouns. Many of the activities on the PEAS have a competitive sport orientation, and it has been suggested in the literature that females are not attracted to these kinds of activities (Sallis & McKenzie, 1996).

To optimally predict exercise involvement by means of attitude, the development of newer scales was recommended. Scale construction should strive to incorporate attitudes more congruent to desired and specified behaviors" (Fox, Corbin, & Couldry, 1985, p. 131).

The influence of Albert Bandura was evident in the comments of Fox, Corbin, & Couldry regarding the PEAS, as in 1977, Bandura's landmark article entitled, *Self-efficacy: Toward a Unifying Theory of Behavioral Change*, was published. In this article, he reported on a mediator of human agency which he called self-efficacy (reported previously in this chapter). Self-efficacy scales and scales to measure its related constructs such as perceived competence became the measurement instruments of choice**.**

Obviously, Bandura influenced Ryckman et al. (1982), as they developed the Physical Self-Efficacy Scale (PSE). The PSE was developed to measure individual differences in perceived physical ability and confidence in physical self-presentation in social situations (Ostrow, 1990). The PSE contains a 10 item Perceived Physical Ability (PPA) subscale and a 12 item Physical Self-

Presentation Confidence (PSPC) subscale. The PPA focused on perceptions of expectancies on physical skills, and the PSPC focused on levels of confidence in displaying and being evaluated by others on physical skills (McAuley & Gill, 1983; Gayton et. al, 1986).

The flurry of activity related to the measurement of self-efficacy and perceived competence continued, as noted by the development of Harter's Perceived Competence Scale for Children (PCSC) (Harter, 1982). The PCSC utilized subscales much like other scales of the time (PSE). Harter's PCSC assessed children's sense of competence across cognitive, social, and physical domains, with a fourth subscale for general self-worth (Ostrow, 1990).. This scale was designed for grades 3-8.

The physical subscale in Harter's PCSC was the Perceived Physical Competence Subscale for Children (PPCSC). The PPCSC contained seven items and utilized a format unique to Harter's scale, the 'structured alternative format' (shown in Figure 2.1). The structured alternate format was a result of Harter's recognition of a problem with typical response formats (true/false, like me / not like me). She contended that the two choice format draws socially desirable responses from children.

Harter's Structured Alternate Format

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often forget what they learn.	but	Other kids can remember things easily.	____	____

Figure 2.1. Harter's Structured Alternate Format. Children are first asked to indicate who he or she is most like, based on the two alternatives. The child is then asked whether the corresponding description selected is sort of true or really true of him or her. Each item is scored from 1 on the far left (low perceived competence) to 4 on the far right (high perceived competence).

Harter's structured alternate format addressed the problem of socially desirable responding, which is a weakness in the typical response format (mentioned previously) utilized in other scales. Harter's format allowed children the freedom to choose either side of the scale, as they did not have to admit incompetence or inability on either side, just some degree of difficulty. The PPCSC was developed to assess children's perceptions of physical competence in sports and outdoor games, therefore, honest self-report was crucial.

Theories supporting the PPCSC are *Harter's Perceived Motivation Theory* (Harter, 1978, 1981), and *Social Cognitive Theory* (Bandura, 1977). *Perceived Motivation Theory* attempts to describe, explain, and predict why people are motivated to participate in particular achievement areas (Klint & Weiss, 1987, p. 56). According to Harter, individuals are motivated to be competent in achievement areas such as sports, and in order to satisfy the urge toward competence, they attempt mastery. When these attempts result in competent or successful performance, the person experiences positive affect,

which in turn enhances competence motivation (Klint & Weiss, 1987). As mentioned earlier, performance attainment is the most powerful source of self-efficacy information (Bandura, 1977), therefore there is a strong connection between social cognitive and perceived motivation theories.

The PPCSC was considered reliable (ranging from .75 to .83) by employing coefficient alpha, which provides an index of internal consistency (Harter, 1982, p. 91). These same results were found across several samples in numerous studies (Duncan & Duncan, 1991; Feltz & Brown, 1984; Harter, 1982; Horn & Hasbrook, 1987). It has been reported by a number of researchers that the PPCSC is valid and reliable (Harter, 1982; Klint & Weiss, 1987, Williams & Gill, 1995).

Test-retest reliability was collected on 208 children in grades 3-6 after three months, and on 810 children after nine months. These correlations on the PPCSC subscale were .87 and .80 respectively. Based on these baseline correlations, the PPCSC is considered to have strong test-retest reliability

Concurrent validity of the PPCSC (.83) was supported in that 16 teachers' rating of children's actual physical performance in the gymnasium correlated positively with children's corresponding scores on the PPCSC (baseline study / 4 teachers per grade). Teachers were asked to rate children according to their actual physical performance competence on the tasks on the PPCSC, and these scores were correlated with children's actual scores on the PPCSC.

Self-Efficacy Measurement

The literature review of measurement thus far has focused on the CSEI (Coopersmith, 1967), and other scales of similar construction. These scales were reviewed as they were influential in the evolution of measurement of the 'self'. The PEAS (Sonstroem, 1974), CSCS (Piers-Harris, 1984), PSE

(Ryckman et al., 1982), and the PCSC and PPCSC (Harter, 1982) were reviewed as they also had an appreciable impact in the literature, on the direction of measurement of the 'physical self'.

The impact of the previously reviewed instruments, coupled with *Social Cognitive Theory* led to self-efficacy measurement. Notably, Harter's perceived competence subscale, Ryckman's perceived physical ability subscale (PPA), and Sonstroem's physical estimation subscale. All of these subscales were found to be valid and reliable in their respective research. Reported previously, numerous studies have mentioned explicitly or implicitly that in future research, parts of these measurement instruments should be considered as possibilities for self-efficacy research.

Historically, self-efficacy scales are developed by taking bits and pieces of other scales, and are fashioned to meet the needs of the study at hand. Self-efficacy scales typically use Likert-type or bi-polar response formats which ask children to rate their ability in various physical tasks. Self-efficacy scales are task and situation specific (nature of self-efficacy). Problems were previously reported with these formats as they have been shown to cause a ceiling effect by drawing socially desirable responses. Children would report high levels of self-efficacy to avoid being perceived in a negative light.

The following is an excerpt from Lockamy (1984): *The Relationship of Self-Efficacy To Motor Skill Level, Gender, Age, and Previous Experience*. Lockamy states, the Self-Efficacy Assessment Instrument (SEAI) used in this study was modeled after the Johnson Motor Performance Expectancy Scale (JMPES) (p. 10). This excerpt gives an illustration of how self-efficacy measures are typically developed. Lockamy describes how validity of the instrument was established using the opinions of experts in the areas of children's physical education and physical education test development. Often

self-efficacy measurement instruments are published only within the study they appear due to their task specificity. Thus, continued use of a specific scale is seldom seen in the literature. Self-efficacy measures with established reliability and validity would be extremely helpful to the integrity of the measurement in self-efficacy and perceived competence research.

Scales that have been developed similarly are the Gymnastics Efficacy Scale (McAuley & Gill, 1983), Gymnastics Efficacy Measure (McAuley, 1985), and the Diving Efficacy Scale (Ostrow, 1990), which utilized Bandura's methods of self-efficacy measurement. As an example, the Gymnastics Efficacy Scale would list six gymnastic activity items and list them in hierarchical order of difficulty, with the final item being the target task. Participants would rate themselves on a 100 point scale of confidence in ability to perform the designated tasks.

Keyser & Sweetland (1992), the authors of *Test Critiques Compendium* , mention that there are well over 400 tests and measures of self-concept, self-esteem, self-efficacy, and perceived competence in the social psychology literature. This chapter has reviewed the most influential measurement instruments, as most tests and measures are replications of them.

Measurement for This Study

The previous review of self-efficacy and perceived competence measurement, led to the selection of Harter's PPCSC subscale for use in this study. Modifications were made to the PPCSC for this study, as is common with most studies which utilized the PPCSC (Duncan & Duncan, 1991; Horn & Hasbrook, 1987; Kimiecik, Horn, & Shurin, 1996). These modifications will be described in Chapter Three. There were a number of factors which influenced the decision to use the PPCSC in this study.

One factor was that other researchers had used Harter's scales and reported their appropriateness (Feltz & Brown, 1984; Horn & Hasbrook, 1987; Lirgg, 1992; Williams & Gill, 1995). They reported that future research using these scales shows promise when looking at more sport-specific observations. Self-efficacy is a situation-specific construct, and measures which adequately assess self-efficacy for different behavioral domains is needed (McAuley & Gill, 1983, p.411). Measurement of specific physical tasks and activities was required for this study, and the literature suggests a refinement of Harter's PPCSC for research of this nature.

Additional support for the use of the PPCSC was provided by Friedman (1992), who after, the PCSC and its subscales were revised and labeled The Self-Perception Profile for Children (SPPC), remarked, the SPPC has proven useful for generating information about children's self perceptions and their correlates. Few instruments for children have undergone such careful and systematic development, and this one seems to provide more information about how children view themselves than do the more well-established measures of self-concept in children (p.478). Researchers who have used the PCSC and the PPCSC (previously mentioned), agree that Harter's PCSC and its subscales have undergone the most extensive research and development of scales of its type.

The strength of Harter's PPCSC is in the 'structured alternate format'. Harter's format may create more room for children to move within the confines of the scale and still respond in a way which allows them to see themselves as not exhibiting low ability (Harter, 1981; Nicholls, 1984). Children's fear or unwillingness to exhibit low ability has been a drawback in self-efficacy measurement, and the PPCSC addresses this problem directly.

Problems associated with reporting low ability stem from the use of, Likert-type, yes-no, “like me” and “not like me” scale construction (Harter, 1982). These scale formats draw socially desirable responses, which create a ceiling effect because children tend to move away from responses which would infer low ability (self protection mechanism previously cited). Poole (1988) alludes to this when reporting a ceiling effect after using the Lockamy Likert Scale. He suggests that this problem may be remedied by rescaling the instrument to provide greater variance between extreme skill groups (p. 57). Bandura (1977) states that this can be accomplished by offering a 100 point scale. This allows better differentiation between efficacy levels, but still does not address the problem of socially desirable responding, just a larger scale.

The structured alternate format creates a bi-polar response, but unlike other scales, does not ask children to admit inability to perform a task or activity. The format is designed so that children report degrees of difficulty in performing tasks, and not inability. This becomes a very important distinction to make in light of the motivation theories previously mentioned.

Another problem that has been found in the self-efficacy literature is that of children overestimating their ability (Lee, 1995). This phenomenon compounds the ceiling effect created by socially desirable responding. Moeller (1993), comments that we may be creating children with a false sense of high efficacy and low ability, all in the pursuit of promoting self-esteem in American school children. These factors contribute additional support for the use of the PPCSC and use of the ‘structured alternate format’ as its power appears to be in self-efficacy discrimination.

Other Measurement Considerations

Harter (1981) suggests that there are problems with the content of the items on many scales. It is common practice is to take a scale designed for adults, and refashion it for children, rather than taking a more child-centered approach (p. 222). She suggests that these changes amount to substituting words like “penny” for “dollar” or “Cub Scout Troop” for “Teamsters’ Union”. These substitutions assume that the items are comparable and that the same construct is being tapped. An adult’s reaction to the stock market plummeting is, in all probability, not analogous to the reaction of the 10 year old who gets grounded and loses a week’s allowance (Harter, 1981, p.223).

Harter also questions some of the reliability issues. Many of the scales reviewed point out that they have high reliability and validity. If children respond to 80 or 90 yes or no questions, there would be enough systematicity in the responses to guarantee a cumulative reliability of .70 or better (Harter, 1981). Harter’s subscales consist of six perceived competence questions in the physical setting.

Construct validity is another concern with the scales used in the research. Many of the scales have subscales designed to measure or tap discrete areas of a child’s life. Harter (1981) reports, “if we are going to slice the behavioral pie into domains that result in separate subscales, any meaningful interpretation of these subscales is contingent upon the demonstration that the child is utilizing the same frame of reference, and is segmenting his or her life in a similar fashion” (p. 223). Harter has effectively utilized the child development and psychology research in creating her scales. In some of the example cited previously, it is evident that this kind of thought did not go into the development of other such scales.

There is a great need for research on self-efficacy and perceived competence, as there are many unanswered questions regarding its effect on student motivation and achievement. Drawing considerable attention in physical education research is the effect of self-efficacy and perceived competence on patterns of physical activity.

Physical Activity Patterns in Children

The literature hypothesizes a positive correlation between perceived competence and physical activity patterns during middle childhood and older (Biddle & Armstrong, 1992; Biddle & Goudas, 1996; Bouchard, 1988; Dishman and Dunn, 1988; Kimiecik, Horn & Shurin, 1996; Reynolds, et al. 1990; Roberts, Kleiber, & Duda, 1981; USDHHS, 1996). Yet, there is no research which directly supports these claims.

In this review, there will be numerous examples which support the claims of a correlation between perceived competence and physical activity patterns. However, these examples are not direct inquiries of this relationship, but were found as a result of studies investigating other factors associated with physical activity. Most notable examples are those found in the literature on gender, and activity choice which will be reported later in this review.

This study was designed to investigate the relationship between perceived competence and the physical activity patterns of 5th and 7th grade children. This literature review focuses on physical activity patterns in general, and upper childhood and early adolescence in particular. Bouchard, et al. (1988) defines physical activity patterns as a comprehensive description of physical activity over a defined period of time, concerning the type, frequency, duration, and intensity of physical activity (p. 6).

Why Investigate Physical Activity Patterns in Children?

Why review the physical activity patterns of children? What is the importance investigating the relationship between the physical activity patterns of children and their perceived competence? These questions call to be answered at the outset of this review.

There are correlations between one's level of habitual physical activity, physical and physiological fitness, and health (Bouchard, et al. 1988, p. 4). Physical inactivity has been recently recognized as a risk factor for cardio-vascular disease, which accounts for more than half of the adult deaths in the United States each year (McKenzie & Sallis, 1996, p. 223). Physical inactivity has also been cited as a contributing factor to the development of non-insulin-dependent diabetes, osteoporosis, osteoarthritis, colon cancer, and anxiety and depression (Myers, et. al., 1996; USDHHS, 1996). Conversely, physical activity is said to have protective effects against the development of these diseases. *Healthy People 2000* reports that research increasingly suggests that even moderate physical activity can decrease the risk of coronary heart disease, especially among the sedentary (USDHHS, 1991).

There are a number of important reasons to investigate the physical activity patterns of children, and prevention of the insidious list of diseases and physical ailments mentioned previously would suffice. But why such an interest in the physical activity patterns of children, as all of the infirmities mentioned are diseases which inflict adults?

A greater understanding of the physical activity patterns of children is important because physical activity patterns established in childhood have a great likelihood of being carried over into adulthood (Gilmer et al., 1996; McKenzie & Sallis, 1996; Raitakari et al., 1994; Simons-Morton et al., 1987). The level of physical activity tracks significantly from adolescence to adulthood;

the habits of physical activity begun or maintained in childhood and adolescence may also carry over into adulthood (Raitakari et al., 1994, p. 852). If the patterns of physical activity that are established in childhood do carry over into adulthood, then it would appear to be extremely important to know as much about these patterns as possible, given the health implications associated with physical inactivity in adults.

It is suggested that there are too few studies available which examine childhood physical activity patterns (Bouchard, et al. 1988). In the absence of available research on children, past recommendations promoting physical activity for children and adolescents were based on adult research (Myers, et. al., 1996). Other than two nationally based surveys, there has been little research on the physical activity of children and adolescents in the United States.

One of these national surveys, *Physical Activity and Health: A Report of the Surgeon General* was conducted by The US Department of Health and Human Services (USDHHS, 1996). Chapter five of the Surgeon General's Report delivers information regarding patterns and trends in physical activity, and the absence of a section for children amplifies the need for research on children's physical activity patterns. Continuing, The Surgeon General's Report found the research on children's physical activity is more limited than the literature for adults. The limited research base may be attributed to the research paradigm that has been utilized to investigate physical activity patterns. This paradigm has been an epidemiological one, which has focused the research on exercise and fitness from a biological and physiological perspective. The focus has not been on physical activity patterns.

The physiology of exercise was predominant in the research literature in the 70’s and 80’s, and the focus of exercise science was primarily to enhance

athletic performance. Athletic performance has been ultimately concerned with increased aerobic capacity, or VO^2 max. Endurance training programs affect both boys and girls; however, the data suggests even intensive programs do little to change the maximal aerobic power of children under 10 years of age (McKenzie & Sallis, 1996, p. 226). As a result of this finding, research on exercise and physical activity has not focused on children. Instead the focus has been on age groups in the upper middle school and beyond, with a strong emphasis on college age students and older because accessibility to subjects on college campuses. Primarily, this research has tried to establish optimal training effects for cardio-respiratory fitness. Thus, much of the research has been on aerobic fitness, and not on physical activity.

The physical activity research has also focused on intervention strategies and programs for the physically inactive. Intervention strategies have proven to be highly ineffective at changing physical activity patterns of the inactive or sedentary. Thirty five studies cited in *The Surgeon General's Report* (USDHHS, 1996) have shown, educating people to the health and wellness benefits of regular physical activity is not effective in changing their physical activity patterns. Many of these studies investigated the effectiveness of programs designed as physical activity interventions for diverse groups in a variety of settings using a myriad of strategies (USDHHS, 1996).

Determinants of Physical Activity

Programs developed as intervention strategies have used the literature on the determinants of physical activity as a guide. These determinants are: (1) perceived competence and self-efficacy, (2) enjoyment, (3) socializing agents such as parents, significant others, and peers, (4) health status, (5) ethnicity, (6) socio-economic status, (7) accessibility and availability of facilities and equipment (8) gender, (9) age, and (10) physical education. Physical activity determinants fall within two categories, those that are fixed such as age, gender, and ethnicity, and those that are considered to be modifiable personal, interpersonal, and environmental factors (USDHHS, 1996). Determinants that are considered to be modifiable are perceived competence and self-efficacy, enjoyment, some socializing agents (teachers and peers), accessibility and availability, and physical education.

Enjoyment

Since the hypothesized correlation between perceived competence and physical activity patterns was previously addressed, attention will shift to other determinants of physical activity patterns in children, one of which is enjoyment Enjoyment has been positively associated with physical activity (Borra et al. 1995). If children experience performance success during a physical activity it often produces feelings of enjoyment. Bandura (1986) reports that performance success is a very strong determinant of self-efficacy, therefore there is again a connection between self-efficacy and physical activity patterns in children, although some children choose to perform an activity at which they are unsuccessful. When questioned about this, children often will respond, "I just like it.". This liking for an activity may be linked to other determinants of physical activity such as social influences which cause feelings of enjoyment.

Socializing Agents

Physical activity is not always associated with enjoyment. Social influences such as physically active role models and support for physical activity are also thought to be important in determining the physical activity patterns of children (Tinsley et al., 1995). Although, there are mixed reports in the literature on parental influences on the physical activity patterns of children (Anderssen & Wold, 1992; McMurray et al., 1993). Parental influences appear to be much stronger on the physical activity patterns of young children (pre-schoolers) than for elementary school children (USDHHS, 1996). These results suggest that factors other than parental attitudes and exercise habits are more influential in determining the fitness and activity levels of children, or that the instruments lack precision (McMurray et al., 1993, p. 249). It is thought that the socializing influence of parents on children's physical activity patterns is in the attitudes they possess toward physical activity.

A physically active parent role model may not play as significant a role in the physical activity levels of older children as with pre-schoolers, but there is a more significant role when it comes to support for physical activity. When parents organize physical activity or provide transportation to physical activity sessions there is a significant relationship to physical activity patterns of older children and adolescents (Sallis & Alcaraz, et al. 1992). Associated with transportation to physical activity events is accessibility to play spaces and facilities. It has been shown that when children have access to adequate play areas and equipment they are more physically active.

It is also found in the literature that the physical activity levels of friends and siblings will influence the physical activity patterns of children (Perusse et al., 1989). It is possible that the influence of friends may have a correlation to time spent playing together outside. This relationship may also help to explain

why most researchers report that time spent outdoors is a positive correlate of physical activity levels (Baranowski et al., 1993; Sallis et al. 1993; Taylor, et al., 1994).

Health Status

Health status is another determinant of physical activity patterns in children and adolescents. It has been theorized, and common sense would tell us, that disabilities or chronic health conditions (i.e. asthma, congenital heart conditions, etc.) would inhibit the physical activity of children, but the research on these subgroups is limited (USDHHS, 1996). The investigator has fifteen years of personal experience as a physical educator of children, and he would strongly support such claims.

Ethnicity

Health status of children has a strong connection with physical activity levels, but there are mixed reports regarding the influence of ethnicity on physical activity levels of children. Baranowski et al. (1993) found no differences across ethnic groups, yet, another study found African-American children to be more physically active than all ethnic groups in their study (Robinson & Killens, 1995). Conversely, Anglo-American children were more physically active than Mexican-American children or African-American children (McKenzie et al., 1992) and whites had a lower prevalence of leisure-time inactivity than blacks, and Hispanics (USDHHS, 1996).

Obviously, there are factors which are confounding research on ethnicity and physical activity patterns or there may be no relationship. Two factors which are thought to influence the relationship between these two variables are socioeconomic status and environmental conditions such as availability of adequate play space, facilities or equipment.

Socio-economic Status

Much of the research on physical activity patterns has been performed in urban settings, therefore there may be a link between ethnic differences and socioeconomic status, as there is a higher incidence of lower income minority families residing in urban than rural or sub-urban settings. Socioeconomic status has been found to be a contributor to the physical activity patterns in children. The prevalence of physical inactivity was greater among persons with lower levels of education and income (USDHHS, 1996).

Taylor et al. (1994), suggest there may be some differences in values about and perceptions of sports and physical activity among people of different socioeconomic status. As cited in Taylor et al., (1994), Watson (1977), states that middle-class parents evaluated Little League Baseball as training in cooperation, whereas working-class parents saw it as training in learning to respond to authority (p. 325). This research may also link back to the literature on parental attitudes toward physical activity, exercise, and sport.

Accessibility and Availability

The literature on ethnicity and socio-economic status may be dependent upon the availability and accessibility of play spaces, equipment, and facilities. Regardless of ethnicity and socio-economic status, it has been reported that if children do not have access to adequate play space, equipment or facilities, the physical activity patterns of children will be affected. Physical activity levels of children will suffer if accessibility and availability of resources within communities are scarce, also, if money is not available to afford membership in gyms and clubs (Taylor et al. 1994).

Only 15.7 percent of first through fourth graders in one study (NCYFS II) did not participate in the physical activity program of at least one community organization (Ross et al., 1987). Community recreation leagues and programs

account for much of the physical activity of many youth. If communities do not provide these programs, or have inadequate play space to operate in, this will affect physical activity levels. This also may link to the correlation between time spent outside and physical activity as availability to outside play space may be limited in urban settings. However, there may be more access to indoor play space during inclement weather in an urban setting. Questions such as these have yet to be investigated in the literature.

Gender and Physical Activity

There are a number of socio-cultural influences on physical activity such as friends and parents, but gender influences may be one of the most powerful. Gender differences have been noted when studying physical activity patterns in children and adolescents. Boys demonstrate higher amounts of daily physical activity time (Baranowski et al., 1993; Janz et al., 1995; Robinson & Killens, 1995; Ross & Pate, 1987; Sallis et al. 1993) . Boys also prefer higher intensity physical activity in general, and girls tend to prefer moderate to low intensity levels (Faucette et al., 1995; Janz et al. 1995; McKenzie et al., 1992; Pate, Long & Heath, 1994).

As with time and intensity of exercise, it has been shown that children's choices of physical activity are highly influenced by gender stereotypes (Janz et al., 1992). Boys prefer more competitive team sports and games, and girls prefer physical activity which is not as competitive, and focuses on small group, dual, and individual health enhancing activities (Faucette et al., 1995; McKenzie et al., 1992). The NCYFS II reported that twice as many boys are involved in sport teams and recreation leagues as girls (Ross & Pate, 1987). The types of lifetime physical activity that girls are reportedly attracted to are often times not offered in community recreation programs, which may suggest a socio-cultural influence or as suggested previously, a problem of availability or access.

Reported previously, peers play an important role in physical activity patterns of children, and this influence may be particularly strong for girls. There is a social communication component to girls physical activity choices, and have better success at staying physically active if a best friend is active (Anderssen & Wold, 1992).

Boys have been shown to have higher levels of self-efficacy than girls (Trost et al. 1996), and higher levels of perceived competence for physical activity (Tappe, Duda, Menges-Ehrnwald, 1995). Researchers contend that these differences are socio-cultural gender differences. A general consensus is that there are socio-cultural influences related to gender appropriateness which affect attitudes and beliefs regarding physical activity (Faucette et al., 1995; Lirgg, 1992). There also appears to be more support from within the home and communities at large for more vigorous physical activity for boys (Taylor et al., 1994). It is therefore more socially acceptable for boys to be more physically active than girls.

Social acceptance is clearly seen by the amount of time fathers spend playing with sons and daughters. Studies have shown that fathers spend more time in physical play with sons than with daughters (Anderssen & Wold, 1992), which sends a powerful message to girls regarding the value and perceptions of physical activity for them. Also boys have been reported to do more outdoor higher intensity chores like leave raking and mowing the lawn, and girls tend to be assigned indoor light duty chores such as sweeping and doing dishes (Myers et al., 1996).

Girls preference for health enhancing lifetime activity corroborates the suggestion of Corbin (1994), a proponent of lifelong health promoting activities. He has long encouraged physical educators to focus more on individual activities of moderate to vigorous intensity levels. Examples of these activities

are jogging, jumping rope, swimming, cycling, or aerobic dance. These activities have been encouraged by lifetime physical activity proponents because they can be done alone or in groups, but are not dependent upon others for participation.

Activities which are not dependent upon participation by others are more task oriented. There is considerable research on the influence of ego-involvement on physical activity patterns (refer to goal setting in self-efficacy literature). Mentioned previously, boys prefer competitive activities which call for an ego-centered approach. In an ego-centered approach more social comparisons of ability occur, and may have a stronger effect upon efficacy judgments relating to physical activity choices. Girls on the other hand prefer activities which have a more task-centered, less differentiated approach, which focuses on individual skill improvement and personal development (Nicholls, 1984).

Boys have higher self-efficacy and perceived competence levels than girls. If a less differentiated approach in physical education promotes higher levels of perceived competence (Williams & Gill, 1995), then to improve girls perceptions of physical competence this approach is advised**.** A correlation between perceived competence and physical activity in sport has been suggested (Weiss et al., 1990). Weiss et al. also found that children who seriously underestimated their perceived competence used peer comparisons while those who overestimated their perceived competence used more self-comparisons.

Most physical education curriculums in the US have and continue to be dominated by team sports (NCYFS II) (Ross & Pate, 1987). Therefore, the findings in the research regarding girls physical activity choices should be a cause of some concern to physical educators. Physical education curriculums

may be gender biased or perpetuate the socio-cultural norm regarding the status of girls involvement in vigorous physical activity.

The literature on the influence of gender on physical activity patterns strongly suggests more research is needed (Lirgg, 1992). What can physical educators, parents, and community do to offset some of the socio-cultural gender influences on women and girls in American society?

Age and Physical Activity in Children

Much of the literature regarding age as a determinant of physical activity patterns has already been presented within other sections of this document, but a brief summary is warranted. It is found that children are generally the most physically active group within American society. As children age, there are factors which influence their physical activity patterns. Developmental factors such as physical size, strength, and coordination play an important role. Also, there are socio-cultural influences such as gender, and appropriateness of types of play and activities for young versus older children.

It is reported quite often in the literature that children's physical activity levels start to decline in early adolescence and continue to decline throughout adolescence into young adulthood (USDHHS, 1996). There are a variety of reasons which are thought to be related to this decline, many of them socio-cultural influences. Another strong influence on physical activity patterns of children is thought to be the internalization of a child's locus of control which is extremely influential in the development of perceived competence and self-efficacy (previously reported). It has been found that perceived competence is a developmental construct, therefore is highly correlated with age.

Physical Education's Influence on Physical Activity

A review of the literature regarding the influence of physical education on children's physical activity patterns must be reported to answer some of the

questions above. Because most students have about nine years of required physical education, schools are the institutions with primary responsibility for physical activity promotion (Sallis & McKenzie, 1991).

Surprisingly, physical education's influence on the physical activity patterns of children is minimal. Children are relatively inactive for a majority of time in physical education classes (McKenzie et al., 1996; Simons-Morton et al., 1990; Sleap & Warburton, 1992). Reported in *Healthy People 2000* , in 1983, students spent an average of 27% of physical education class time involved in physical activity (USDHHS, 1991). These conclusions are supported by researchers on children's physical activity in physical education (Corbin, 1987; McKenzie et al. 1996; Simons-Morton et al. 1987).

Sadly, physical education often has a negative effect on the physical activity levels of many children. Physical activity levels are gradually eroded because of unpleasant experiences caused by embarrassment, pain, and failure associated with physical education (Sleap & Warburton, 1992). In one study, adult disinclination to exercise was linked to a lack of favorable physical activity during adolescence (Simons-Morton, 1987).

There can be positive effects of physical education on physical activity patterns in children. Programs that make attending physical education a pleasant experience and that can explain specific benefits of exercise can influence exercise intent and can enhance students' future exercise behavior (Ferguson et al., 1989). Sallis (1987) and others continue this line of thinking by reporting that school physical education programs must affect physical activity outside of class and over time if they are to be considered successful. Unfortunately, there is no evidence that even innovative physical education programs have been successful in improving long-term increases in physical activity.

The strongest reason for health related physical education, however, appears to be the prevention of CVD (McKenzie & Sallis, 1996, p.226). This statement makes a subtle yet important distinction between what is, and what ought to be. McKenzie & Sallis use the term 'health related physical education' to signify a departure from the traditional sports oriented approaches.

> The main goal of health related physical education is to prepare children and adolescents for a lifetime of physical activity. While this is not a new goal of physical education, reaching it will require the implementation of both curricular and instructional strategies that are substantially different from those in traditional fitness and sport-oriented programs. (McKenzie & Sallis, 1996, p. 224).

Perhaps physical education's influence on physical activity patterns can have a positive influence if some institutional changes are made, as McKenzie & Sallis suggest. It has been shown that children who receive physical education are more physically active than those who do not. The time children move and engage in aerobic activity during physical education class can be increased by organizing the class to maximize movement of children during class, selecting a high proportion of aerobic-type activities, and conducting learning activities to include all children in activity as much as possible (Parcel et al., 1987).

Measurement of Physical Activity

The variables which affect the physical activity patterns of children are important to know and understand, but without valid and reliable measurement instruments to investigate the effects and relationships of these determinants, this part of the review becomes a philosophical discussion. Hence, the following is a review of literature on measurement of physical activity patterns in children. The types of measurement instruments will be presented, highlighting

the strengths and weaknesses of each. Finally, the measurement instrument chosen for this study will be discussed, and the reasons for its selection.

There are many instruments which have been developed for measuring people's patterns of physical activity. These instruments fall under one or more of the three basic types of measurement: (1) direct observation, (2) self-report scales, and (3) technology.

Direct Observation

Direct or systematic observation of children's patterns of physical activity is a valid method for obtaining data from a physical activity from natural settings because it requires little inference (McKenzie, 1991). A strength of systematic observation is that it allows flexibility, and researchers can quantify diverse contextual variables. Children engage in physical activity in a variety of settings, facilities, availability of equipment, toys, etc. Direct observation allows the observer the flexibility to include these variables in his/her observations with limited interference or burden on the participants.

Any measurement technique or instrument carries various degrees of error or problems associated with it, and systematic observation is not immune to this. The drawbacks to the use of direct observation are many, the foremost being time and money (McKenzie, 1991). It is not cost effective to do direct observation of children as observers must spend considerable time to observe a limited number of participants. Other problems are that events must be observable and codable, and are thereby limited to events seen or heard. Observers and/or video-recorders are also in the environment with the children, and their presence may cause unreliable behaviors.

Inter-rater agreement has also been a problem with direct observation. Four people see a traffic accident from the same street corner, yet all have

different accounts of what happened. Therefore, extensive training is often required so that numerous observers can reliably record data homogeneously.

McKenzie (1991) critiqued eight of the most often used direct observation instruments (Table 2.1). All of these instruments use sampling procedures to estimate time children spent in various activity categories, and usually observation is of one or two children at a time. Sampling procedures require the observer to record the behaviors that a child does during a designated time period. For example, the observer records behavior every other minute on the sampling sheet for 30 seconds. Only behaviors which are listed may be recorded. This requires little inference on the part of the observer. Sallis reports that there were no instruments found that use duration recording (which would give more precise measures of time a child spent in specific categories).

Table 2.1. Eight direct observation instruments critiqued by McKenzie (1991).

Eight Direct Observation Instruments for Physical Activity

Name	Location Observed	Training Time	Subjects
MAL (Movement of Arms and Legs)	Diverse	Low	3rd-6th grade students.
APEE (Activity Patterns and Energy Expenditure)	Free Play	Low	Obese girls ages 5-8.
CPAF (Children's Physical Activity Form)	PE Classes	Moderate	3rd-5th grade students.
SOFIT (System for Observing Fitness Instruction Time	PE Classes	Moderate	3rd-5th grade students.
FATS (Fargo Activity Timesampling Survey	Home	High	Children ages 20-48 months.
CARS (Children's Activity Rating Scale)	Diverse	High	Children ages 3-6.
BEACHES (Behaviors of Eating and Physical Activity for Children's Health Evaluation System)	Diverse	High	Children ages 4-9.
SCAN-CATS (Studies of Children's Activity and Nutrition Children's Activity Timesampling Survey)	Diverse	High	Children ages 3-6.

Self-report Scales and Surveys

Direct observation has effectively measured the physical activity patterns of children, but another measurement type is self-report scales. Self-report scales are grouped into three categories: (1) Self-administered recall, (2) Interview-administered recall, and (3) Proxy reports.

Self-administered reports are probably the most commonly used type of measure of children's physical activity due to their convenience of administration, low cost, and ability to collect a variety of physical activity variables over time (Sallis, 1991, p. 215). Self-report scales ask the participants to report on their physical activity patterns over a given period of time. The time frames most often employed are 24 hour, and seven day recall. One 24 hour self-report is the Self Administered Physical Activity Checklist (SAPAC) developed by Sallis & McKenzie. The SAPAC, and scales like it, are often used because they can be administered to large groups at one time, by limited staff.

The Godin-Shephard Physical Activity Survey (Godin & Shephard, 1985) is another self-report scale used with children. This survey is a seven day recall in which participants reported the number of times in an average week that they spent more than 15 minutes in activities that are classified as mild, moderate, or strenuous. Examples of activities in each category are provided to the participants. This self-report survey was developed for adults, but limited testing with children shows that it may hold some promise with relatively young children.

Diaries are another form of self-report often used to collect information on children's physical activity patterns. The most effective method of diary data collection is for students to code physical activity throughout the day on a diary form (Sallis, 1991). This form of data collection is proven to be valid, as children are reporting what they have just done. The drawback to this method is that the

cost to the participants may be great as they must carry around their diary and record data often. The use of diaries may not be effective with young children.

Another type of physical activity self-report is the interviewer-administered scale, which are similar to the self-administered scales. The difference is that administration is by a trained interviewer to one person. One such scale is the Seven-day Physical Activity Recall (PAR) developed by James Sallis (Janz, Witt, & Mahoney, 1995; Sallis et al. 1993). The PAR instrument was initially developed for use with adults, but was also found to be reliable when used with children. The reliability of the PAR was significantly influenced by the delay of recall, but not by memory skills. Repeated 24 hour activity recalls may be more valid for children than seven day recalls (Sallis & Buono et al., 1993, p. 107).

Another interviewer-administered scale is the Physical Activity Checklist Interview (PACI) (Sallis et al., 1996). The PACI utilizes the same form as the SAPAC, but it administered by an interviewer to one person. Study participants are asked to recall the previous 24 hours. The interviewer provides context cues by asking about the participants physical activity in the morning, afternoon, and evening, and only records activities that total 5 minutes or more.

The final type of self-report scale is a proxy report. It is not a pure self-report as a parent or teacher reports the child's amount, time, and type of physical activity (Sallis, 1991). The strength of proxy reports is that activity can be recorded for children too young to report their own behaviors. It is found that teacher reports are more reliable than parent reports. The weakness of proxy reports is that they can be labor intensive for the observers, are not cost effective, and the recorder may be intrusive as they must be within sight of the child for the period of time reporting is to occur.

Sallis (1991) critiques 18 different self-report scales with time periods ranging from one day to three months. Age ranges for these scales between 2 1/2 years old to 18 years old. These scales follow the same formats as the examples described previously in this review. Physical activity recalls of children as young as fifth grade are of adequate reliability and validity to use in research on physical activity in children (Sallis & Buono et al., 1993, p. 99).

When relying on children to recall and make honest reports of their physical activity patterns there are bound to be questions regarding the accuracy of such measures (Baranowski, 1988). Baranowski states that to improve the validity and reliability of self-report scales, measures must be taken to improve the cognitive processing of such data in children. In other words, children need to be given skills for accurate recall of their physical activity. Self-reported physical activity correlated only moderately with objective activity measures, and rarely were correlations greater than r=.80 (Sallis, 1991).

The advantages of even moderate correlations on self-report scales seem to outweigh the disadvantages of direct observation in studies which require large samples. Studies which require large samples to be able to detect rare events, such as mortality, can afford to have less intensive and less precise measures which categorize people into groups of relatively more or less activity, while small sample, labor intensive studies, like those attempting to increase activity, require more precision because they need to reliably detect relatively small differences in changes in behavior (Baranowski, 1988, p. 315).

Technology

The use of technology such as accelerometers (monitor movement), and heart rate monitors is one of the more precise ways to measure physical activity patterns. Heart rate monitors are considered to be more reliable than accelerometers. These data collection tools are often used to validate the

information gathered on self-report scales and are seldom used as lone measurement instruments (Janz, Witt, and Mahoney, 1995; Sallis et al., 1996). Self-report information is compared with the data collected with the heart rate monitors to see how well they correlate. This method of checking the validity of self-report scales was effective on the PAR, PACI, SAPAC, and other self-report scales.

A drawback to the use of technology is the expense involved, and the time commitment for training in the proper use of the technology employed. Also, many of these technologies are somewhat intrusive to the participants, and may affect the physical activity patterns of children. Children may not stay within their normal habitual physical activity patterns as a result of wearing a piece of equipment.

SAPAC

The review of the literature on measurement of the physical activity patterns of children has led to the selection of the SAPAC scale for use in this study. The SAPAC Scale requires children to report the minutes during the previous day they spent in 21 common physical activities that represented a range of intensities, plus sedentary pursuits. Four spaces are provided on the SAPAC for children to list other activities, plus a section to report TV, and video game playing time. After receiving instruction and examples about time estimation, children report the minutes they spent performing each activity before, during, and after school on the previous day. Time is only recorded if it was more than 5 minutes (Sallis et al. 1996). The SAPAC Scale is shown in Appendix F.

Typically self-report measures are validated by using heart rate monitors and accelerometers. Heart rate monitors are found to be much more accurate

validation criterion for such measures (Sallis et al., 1996). Children are fitted with heart rate monitors during the school day and after school, and the heart rate information is downloaded directly to computers. Children were then asked to complete the SAPAC Scale, and a correlation is performed between children's heart rates and self-reported activity time and intensity. SAPAC correlations with heart rate monitors range from .50 to .60.

Many would consider .50 to .60 to be moderate correlations. However, these correlations were the highest recorded for any self-report scale validated in this manner. Based on this information, the SAPAC may be considered the most valid self-administered self-report scale available.

The aforementioned description of the SAPAC make it a good fit for this study. Sallis (1991) confirms, each researcher must consider what types of data are needed to answer the study questions, and a physical activity measure will be selected or developed based on these needs.

The investigator worked alone on an extremely limited budget, therefore direct observation was not an option. Direct observation was cost prohibitive and labor intensive. Also, it is recommended that self-report measures be used on correlational studies because of the sample size that is required (Baranowski, 1988). Of the three types of self-report scales described, only the self-administered format was acceptable due to limited resources, time, and money.

Based on the literature review, it was also decided that multiple administrations of a 24 hour recall was needed. This was decided because the habitual patterns of physical activity for young children (5th and 7th grade) were needed. The validity and reliability of recall is significantly influenced by the

delay of recall, but not by memory skills (Sallis, 1993). Therefore, Sallis recommends repeated 24 hour activity recalls as they may produce more valid and reliable results for children.

Previously reported, Sallis states that scale selection should be based upon its ability to answer the research questions. This study was designed to investigate the relationship between children's patterns of physical activity and their perceptions of physical competence. Gender and grade level differences were also investigated. As the SAPAC lists physical activities that children often participate in, it was thought that minor modifications to this scale could be performed to correspond with activities which children most often engage in southwest Virginia. Each activity on the SAPAC was then paired with a self-efficacy question on a perceived competence scale (Harter's PPCSC). The SAPAC provided the most parsimonious alignment to the PPCSC, therefore was thought to be a good match for this study. The next chapter will describe in detail how the SAPAC was modified for use in this study. The final modification to the SAPAC is in Appendix B.

It was mentioned at the outset of this review that this inquiry could be likened to climbing an oak tree, and that the tree seems to have grown during the climb. Continually looking up and climbing as fast as possible some great gains and insights have been made, but there is much of the tree still unexplored. Yet with each branch, the climb seems a little more predictable, the falls less often, and the landings not quite so hard.

Summary

This review of the literature has given an extensive report of the constructs of self-concept, self-esteem, self-efficacy, and perceived physical competence, but as previously mentioned, it will take a lifetime to climb the entire tree. Of course, a tree will continue growing, as long as it receives sunshine and nutrients. This results of this study will hopefully serve as fertilizer for this tree, as well as to help prune dead and dying branches in order to produce new life.

For this study, a distinction was made between perceived physical competence and self-efficacy. Self-efficacy is referred to in this study as perceptions of physical competence on specific tasks, and perceived physical competence is the cumulative effect of these self-efficacy measures. Perceived physical competence for this study is not considered one's overall perceptions of physical competence, but a global perception of the self-efficacy measures in this study. A perception of physical competence in the domain of children's physical activity.

Physical activity patterns of children were also reported as there is a hypothesized correlation between children's physical activity patterns and perceptions of physical competence. This hypothesized correlation is the basis for this study, no research has been found which investigates this relationship directly.

To investigate this relationship, measurement considerations were reviewed, and scales were selected for use in this study. A subscale of Harter's PCSC (1982) was found to be the most appropriate instrument for use in this

study. This subscale is the PPCSC, which measures perceptions of physical competence in large group games and physical activities. The PPCSC was modified for use in this study, to measure more task specific perceptions of competence.

The reasons for selecting the PPCSC have been elaborated on in this review. The most important reason was its psychometric qualities. Harter's PPCSC is used often in the literature because it offsets problems of a ceiling effect, and socially desirable responding.

To correlate perceptions of physical competence with physical activity patterns, measurement of physical activity was reviewed. Sallis & McKenzie's SAPAC Scale was selected to measure physical activity patterns in children. The SAPAC is a relatively new self-report scale, but has been shown to be the most valid and reliable of these types of instruments. The investigator found what he considered to be the best self-report scale available because of limited resources of time, manpower, cost, and sample size. These factors have proven to be powerful reasons why this type of scale is employed in the research.

It is hoped that the information in this chapter has provided a thorough understanding of the constructs under investigation, and the measurement for this study. This background should prove invaluable in understanding the methodology for this study, which is described in Chapter Three.

Chapter 3: Methodology

In Chapter Two, the literature theorizes a strong relationship between physical activity and perceived competence. The purpose of this study was to determine if, and to what extent this relationship exists between 5th and 7th grade children's perceived physical competence, and their patterns of physical activity. Gender and grade level differences in perceived physical competence and patterns of physical activity were also investigated. This study had four distinct parts (Table 3.1). The intention of this chapter is to describe each of these parts.

The following three questions guided this study:

Question 1: Are there gender differences in the physical activity patterns and perceptions of physical competence among 5th and 7th grade children?

Question 2: Are there grade level differences in the physical activity patterns and perceptions of physical competence among 5th and 7th grade children?

Question 3: Is there a correlation between the perceived physical competence of 5th and 7th grade children and their reported patterns of physical activity?

To answer these questions, valid and reliable measurement instruments were needed. In the literature review (Chapter Two) the measurement of perceived competence and patterns of physical activity were reviewed. From the literature, it was determined that Harter's Perceived Physical Competence Scale for Children (PPCSC) would be used to measure children's perceptions of physical competence, and Sallis & McKenzie's Self-Administered Physical Activity Checklist (SAPAC) would be used to measure children's physical activity patterns.

Table 3.1: Phases of this study.

Phase	Timeline	Purpose
1. Development, and modifications to Harter's PPCSC, and Sallis & McKenzie's SAPAC scale.	3 months	To develop scales for the purpose of measuring the construct of perceived competence and measuring children's physical activity patterns.
2. Pilot testing of the modified PPCSC and SAPAC. Continue modifications to scales and re-testing.	3 months	To investigate the effectiveness of the scales to discriminately measure the desired constructs, and to make modifications to these scales to increase their effectiveness.
3. Administration of the PPCSC and repeated administrations of the SAPAC.	3 weeks	Data collection.
4. Statistical analysis of the data, reporting of findings, conclusions, and recommendations for future research.	2 months	To report the findings of the study, conclusions, and recommendations for future research.

Phase 1

Phase one describes the development, and modifications to Harter's PPCSC, and Sallis & McKenzie's SAPAC scale for use in this study.

Harter's PPCSC

As described in the literature review, Harter's PPCSC was selected to measure perceptions of physical competence and self-efficacy. Harter's PPCSC needed modification for this study, as it focuses on children's perceptions of ability in large group games and recreational settings, as opposed to the more specific measurement of self-efficacy required for this study.

Utilizing the structured alternate format from the PPCSC (Table 3.2), ten self-efficacy questions were developed (Appendix C). These questions were selected because they were shown to have good discrimination between self-efficacy levels (gymnastics, dance), or were activities children perform on fitness tests in schools (mile run, pull-ups).

Table 3.2: Self-efficacy scoring utilizing the structured alternate format.

Self-efficacy Scoring Using the Structured Alternate Format

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty shooting a basketball and. making it.	but	Other kids can shoot a basketball and make it easily. ____	____
1----------	**2----------**			**-3--------**	**-4**

The SAPAC Scale

The original 10 self-efficacy questions were designed to measure items which also appeared on Sallis & McKenzie's Self Administered Physical Activity Checklist (SAPAC). The SAPAC was selected to measure children's patterns of physical activity as it is a self-report scale designed to gather information about student's physical activity patterns before, during, and after school, as well as information about television viewing and video game playing habits. It is important to remember that the SAPAC is administered the day after the physical activity occurred. Therefore, if children complete the SAPAC on Tuesday, they are reporting Monday's physical activity patterns. The SAPAC scale was administered in its original form utilizing the protocols developed by Sallis & McKenzie (Appendix G). Subsequent modifications to the SAPAC are described in Phase 2.

Phase 2

Phase 1 reported that during Phase 2, pilot testing and modifying the PPCSC and SAPAC scales was completed. Enlistment of participants was required before pilot testing began.

Participants

Perceived competence is developmental in nature (Horn & Hasbrook, 1987), and reliable perceptions of ability are forming between the 3rd and 4th grades. Sallis et al. (1993) report, physical activity recalls of children as young as the 5th grade are of adequate reliability and validity to use in research on physical activity in children (p.99). Fifth and 7th grade children were the participants in this study, as they have been found to have developed reliable conceptions of their abilities by these grades (Lirgg, 1992; Folsom-Meek, 1991),

therefore a measure of perceived competence can have high construct reliability. This age group may also provide information which might explain the reported decline in physical activity levels in adolescence and early adulthood. The Surgeon General's Report (USDHHS, 1996) states that adolescents and young adults aged 12-21 are not vigorously active on a regular basis, and their level of physical activity decreases drastically with age during adolescence (p. 4). Also, there are very few studies which have focused on the physical activity patterns of children in the upper elementary school years (Bouchard, 1990; USDHHS, 1996).

The participants of this study were selected according to availability and desire to participate. All participants in the pilot study (Phase 2), and Phases 3 and 4 were volunteers from 5th and 7th grade classes at a rural school in southwest Virginia. Most current census data shows that 100% of all children in this study live in an area classified as rural. The local census definition of rural is any area not located near an urbanized area of 2500 people or more. The Virginia Department of Transportation considers the county in which these children reside as the second least populated county in the state of Virginia, and report that 39% of all secondary roads are gravel or dirt. The majority of children in this study report having dirt driveways and access roads.

Informed Consent

A parent letter was sent home to the parents/guardians of all 5th and 7th grade children at the school informing them about the study (Appendix E). An informed consent form giving parental permission to be a participant in the study was attached to this letter (Appendix E). Children were informed by the investigator that they would receive a novelty pencil, and a chance in a drawing

for sport T-shirts if their parent consent form was signed and returned the next day. There was a 50% return on the first day (60 students). Every day for a week the investigator returned to the school and reminded students about the parent consent forms and to give novelty pencils to students returning signed forms. In all, 86 students returned signed parent consent forms after one week. All teachers of the 5th and 7th grades were required to sign informed consent forms. Students also signed informed consent before taking part in the study.

PPCSC Pilot Testing

The investigator was the lone administrator of the pilot test of the PPCSC. All 5th grade children have physical education together, as do 7th graders. Arrangements were made with the physical education teacher to pull out small groups of 5-6 study participants from physical education class to pilot test the PPCSC. Five to six study participants were randomly selected by the physical education teacher at the beginning of the class (approximate equal gender mix). This procedure was repeated each day pilot testing was performed. Different participants were chosen each day for pilot testing so as not to disrupt the children's daily participation in physical education classes. These participants walked with the investigator to a carpeted hallway adjacent to the gymnasium for pilot testing.

The purpose of the study was explained to the children during each pilot testing episode. Students were asked to sit a few feet from each other on the floor, and to keep responses private by covering their papers. It was explained to all participants that disruptive behavior (any behavior which would cause other participants to have difficulty concentrating) or talking during

administration of any scales in the study would be grounds for removal from the study.

Participants viewed an overhead of the PPCSC samples. These samples were read aloud while the children followed along and did the samples on their own sheets. When it was clear that the students understood and could fill out the scale properly, they were instructed to read carefully and respond to all 10 questions.

After all students had completed the scale, a focus group discussion was led by the investigator. Everyone sat in a circle on the carpet with the investigator who asked the following questions for each of the 10 items on the PPCSC:

- What did question one ask you?
- Was the question easy to read and understand?
- Did you understand how to fill out the scale?
- Any other questions or comments?

Focus group discussions usually stayed on task, but students would sometimes go off on a tangent. The investigator then focused the group on the question to bring them back on track.

Each pilot session took a half hour (length of their physical education class). Before students went back to physical education class, the investigator asked if anyone wanted to stay for a 5 minute individual interview. Typically, all students volunteered, and one student was selected to be interviewed (selection alternated by gender). After each focus group discussion, the investigator recorded questions, problems, or comments regarding the scale and its questions. Scales were collected and pilot data recorded at a later time.

Individual interviews were conducted on a bench in the school lobby in view of the school office. Classroom teachers were aware that one student would be 5 minutes late returning to class, and two students were assigned to remind the teacher. The same questions asked during the focus group discussion were asked during the individual interviews. Students were also asked if it was okay to look at their responses on the PPCSC. The investigator asked students about their responses on the PPCSC. It was clear that students understood what their responses meant. For example, low self-efficacy scores elicited a response such as, “I am not very good at that”. At the conclusion of individual interviews, students were thanked for their help and were walked back to class.

During individual interviews, it was found that students would ask important questions regarding what a question was actually asking. Often times these questions would not be raised in the group setting. It is thought that the students did not want to appear ignorant in front of their peers. For example, during an individual interview, one child asked what calisthenics were. This question was not asked during the focus group discussion, and it was later found out that many children in that focus group had the same question.

The investigator then recorded all data from the children’s PPCSC scales and tabulated the means. Questions which had high mean scores (greater than 3) were critically analyzed and were modified to increase their effectiveness in discrimination of self-efficacy. Questions were continually refined until children were choosing either side of the scale (high or low perceptions of ability). A ceiling effect has been reported on some self-efficacy scales, and has been explained by unwillingness of participants to admit that they were not competent

in some physical activity (Nicholls, 1984). This refining process was an attempt to minimize this confounding result.

Table 3.2 (page 69) gives an example of a self-efficacy question and the scoring. Each question was scored on a 4 point scale with a 1 representing the lowest self-efficacy, and 4 representing the highest self-efficacy score. Table 3.3 represents a small group of 5th grade students from the first pilot test of the PPCSC. Scores on the PPCSC range from 1 through 4 which illustrates that Harter's structured alternate format, and appropriate wording of questions, affords students the freedom to choose a response anywhere on the scale.

Given the data set presented in Table 3.3, some items were eliminated, and others were revised. These revisions were based on the outcome of focus group and individual interviews, as well as the scores on the PPCSC. Unclear questions were reworded or eliminated, and questions which did not discriminate self-efficacy levels (scores all congregating at the top or bottom of the scale) were reworded. Children were not expected to all have similar self-efficacy scores on the PPCSC items as determined by previous research utilizing these activities.

Revisions to self-efficacy questions were based upon the type of activity measured. Skill related activities required making the task more specific. Basketball for example, asked children about their perceptions of ability on shooting baskets. This question did not discriminate as most children reported high perceptions of ability in shooting baskets. This question was revised to make the task more specific by changing the wording to ‘shooting baskets and making it’ (a criterion for successful performance was added which increased the discriminating power of this question). Activities which did not have a skill component such as brisk walking or running were given a fitness or intensity

Table 3.3: Pilot data set on the modified PPCSC: 5th Grade

5 Children's Responses to the First 10 PPCSC Pilot Questions

Participant	1	2	3	4	5	
Question	**Male**	**Male**	**Female**	**Female**	**Female**	**Mean**
1	1.0	2.0	3.0	4.0	2.0	2.4
2	1.0	1.0	1.0	2.0	2.0	1.6
3	4.0	3.0	3.0	4.0	4.0	3.6
4	3.0	1.0	1.0	2.0	2.0	1.8
5	1.0	2.0	3.0	4.0	4.0	2.8
6	4.0	3.0	3.0	4.0	4.0	3.6
7	4.0	3.0	3.0	2.0	2.0	2.8
8	4.0	4.0	2.0	1.0	2.0	2.6
9	1.0	4.0	1.0	1.0	2.0	1.8
10	4.0	4.0	4.0	3.0	4.0	3.8
Mean	2.7	2.7	2.5	2.7	2.8	2.68

criterion. The question for brisk walking asked how the participants felt about their ability to brisk walk for 15 minutes or more.

Another example of the process of refining questions was the self-efficacy question relating to the mile run. In Table 3.4 the original wording for the mile run question is shown, along with its corresponding mean for all students. The mean for the mile run question was 3.7 out of a possible 4.0 on the scale. Conversations with many children, physical educators, and 15 years of personal teaching experience, led the investigator to believe that this question was not reporting how children truly felt about their abilities on the mile run. Some physical educators report that children perform poorly and perceive their ability as low on this task, yet students were reporting high perceptions of competence. Rewording to make the task more specific ('without walking' was added), and a subsequent administration reported a mean of 1.9 for all students on this scale item (Table 3.4).

Pilot testing with the PPCSC following the same procedure with 5th and 7th grade children once a week for 2 months. Self-efficacy items were gradually added to the PPCSC until it contained 26 self-efficacy questions to match the items on the SAPAC scale. Therefore, self-efficacy question number one on the PPCSC was perceptions of ability in gymnastics, and item number one on the SAPAC was gymnastics activity patterns.

SAPAC Pilot Testing

As reported earlier, it was decided that the SAPAC would be piloted in its original form (Appendix F) using the administration protocols established by the developers of the scale (Appendix F). A portion of the original SAPAC is shown in Figure 3.1 (p. 79). The SAPAC pilot testing procedure replicated that of the PPCSC. Small groups were taken from physical education classes to the hallway adjacent to the gymnasium for pilot testing.

Table 3.4: Modification to a PPCSC item that was not reporting valid discrimination of perceptions of competence on the mile run.

Modifying the Mile Run Self-Efficacy Question

Really true for me	Sort of true for me	Some kids often have difficulty doing the mile run.	but	Other kids can do the mile run easily.	Sort of true for me	Really true for me
____	____				____	____

Pilot data reported a mean of 3.7 on this question.

Really true for me	Sort of true for me	Some kids often have difficulty doing the mile without walking.	but	Other kids can easily do the mile run without walking.	Sort of true for me	Really true for me
____	____				____	____

Pilot data reported a mean of 1.9 on the re administration of this question.

A Segment of the Original SAPAC

Activity	Before School	N S M	During School	N S M	After School	N S M
1. Bicycling						
2. Swimming laps						
3. Gymnastics: bars, beam, tumbling, trampoline						
4. Exercise: push-ups, sit-ups, jumping rope						

Figure 3.1. This is a segment of the original SAPAC. Children report the number of minutes they engaged in every activity on the list, before, during and after school. Students also report the intensity level by recorded whether the activity made them breathe hard or get tired none (N), some (S), or most (M) of the time.

SAPAC protocols were followed exactly as prescribed by the developers (Appendix F). An overhead of the scale itself was used, as well as an overhead of a clock which is used to familiarize the children with time estimation. This instructional episode is in the SAPAC instruction protocols (Appendix F).

It was found that considerable time was required to administer the SAPAC. The first time it lasted 45 minutes. This was anticipated, and classroom teachers were alerted that 5-6 students would be returning to class 15 minutes late. It took a substantial amount of time to explain the definition of physical activity**,** describe what was considered before, during, and after school, estimate time from an overhead of a clock, etc. (SAPAC Protocols).

Small focus group discussions followed the SAPAC administration, as well as individual interviews (refer to PPCSC pilot testing procedures). The following were the focus group and individual interview questions:

• Are these the kinds of activities that children in this area often participate in for physical activity?

• Are there things that you do for physical activity that are not listed on this scale?

• Can you understand how to fill in this scale?

• Are there things that are confusing to you on this scale?

• Individual interview question: How do you know that you did an activity for that long?

The focus group discussions and individual interviews led to the following conclusions:

• Even though it was discussed in the instructions, there was multiple reporting of activity time. An example: students reported a half hour of running and a half hour of soccer. In individual interviews it was discovered that the running occurred during the soccer activity.

• Children drastically overestimate time spent in physical activity.

• Children often estimated time spent in physical activities on half hour television shows. An example: During an individual interview a child reported 2 hours of martial arts. This appeared unrealistic to the investigator, so he asked the student how he knew he had spent 2 hours. The child said that a certain TV show was on when he went out to do this activity, and proceeded to name every half hour show that was on while he was gone (a common occurrence with these children).

• Children could remember what they had done for physical activity in any time segment on the SAPAC (before, during, or after school).

• As children read the activities list on the SAPAC, it helped them to remember activities they had forgotten to record at the top of the scale.

• Children often reported physical activity in the wrong column. An example: walking, in the before school column, was mistakenly placed in the during school column.

• Some of the problems experienced during the pilot testing were related to the investigators inexperience with the SAPAC administration. There were many things to remember. Reminder lists were helpful.

Modifications to the SAPAC

Based on the pilot testing, the following modifications were made to the SAPAC scale:

• Separating before, during, and after school sections onto separate pages.

• At the beginning of each section (before, during, after), a place was provided for children to list all of the activities that they did during that section. Children were then instructed to go down the activity list and find the activities they listed. Any activities that were remembered by looking at the SAPAC list of activities were to be recorded in the space provided at the top of the page and on the SAPAC list. A sample segment of this modified SAPAC list is provided in Figure 3.2.

• Since so many children estimated time based on a half hour TV show, time increments of 15 minutes were used instead of estimating minutes. Children would record a '1' if they participated in an activity for 15 minutes of less, a '2' for 15 to 30 minutes, a '3' if 30 to 45 minutes, and a '4' if for 45 minutes or longer. It was found that very few children participated in any one physical activity for longer than 45 minutes to an hour, a '1' was the most commonly reported activity time . This change was also made as a result of children's inability to accurately estimate time.

Sample Segment of Modified SAPAC List

Modified version of Sallis & McKenzie's SAPAC
Before School SAPAC Worksheet

Think about yesterday from the minute you got up, until you got to school. What kinds of things did you do that we could call physical activity. Physical activity is exercise which causes you to move your arms and / or legs.
List them here:

Find your activities on the list and record how long you did the activity, and whether it made you breathe hard and/or made you tired none, some, or most of the time. If you can't find the activity on the list, write it in on the bottom where it says "other". As you read the list of activities, it may remind you that you did something else, so please list those activities also.

Activity	**Before School** **1 -Less than 15 mins.** **2 - 15 to 30 mins.** **3 - 30 to 45 mins** **4 - Greater than 45**	**How Hard?** **Breathed hard or got tired:** **N**one, **S**ome, or **M**ost of the time.
1. Gymnastics		
2. Running		
3. Pull-ups		
4. Dancing		
5. Sit-ups		
6. Basketball		

Figure 3.2. This figure is a segment of the 'Before School' page of the Modified SAPAC. Notice that this differs from the original SAPAC in that: 'Before School' is on a page by itself, time increments are used instead of minutes, and at the top of the page the individual is asked to list the activities that they recall before going down the SAPAC list of activities.

• Chores was eliminated from the original SAPAC because only physical activities that children chose to do was important for this study. There was a place for children to record chore time on the last page of the modified SAPAC. During school physical activity would be collected, but not used in the data analysis as children have very little choice over these activities (these children did not have recess time).

Pilot Administration of Both Scales

The modified PPCSC was matched item for item with activities on the modified SAPAC. A previous example of this item for item match was: self-efficacy question number one on the PPCSC was perceptions of ability in gymnastics, and item number one on the SAPAC was gymnastics activity patterns. A pilot test of both scales was administered to investigate: (a) the effectiveness of the new PPCSC items to discriminate student perceptions of ability, (b) the effectiveness of the revised version of the SAPAC to record accurate time and physical activity choices, and (c) if administering both scales at the same time would be parsimonious and effective.

Pilot administrations went very smoothly. Total administration time for both scales was approximately 45 minutes (10 minutes for the PPCSC and 35 minutes for the SAPAC). Students did not appear to have any difficulties completing both scales in one 45 minute session. This pilot testing was done with one group of 10 - 5th grade students in the cafeteria. It was found that students' familiarity with the scales increased valid reporting of perceptions of competence and physical activity patterns. This was evident in interviews with students who had completed the SAPAC once before during pilot testing. These children had significantly fewer errors in reporting of activities and activity times. The cafeteria setting also made it much easier to administer the scales as children were seated at tables with a seat separating them from one another.

Phase 3

Actual Administration of the Scales

Approximately one month after the pilot testing (Phase 2) was completed, Phase 3 began, which was the actual administration of both the modified version of the PPCSC (Appendix A) and six administrations of the SAPAC (Appendix B) to 86 - 5th and 7th grade study participants.

The first day of administration was postponed until daylight savings time had begun, to increase student opportunities for outdoor physical activity, as the literature reports a correlation between children's time outdoors and physical activity time (Sallis et al. 1995). The Surgeon General's Report (USDHHS, 1996) states that differences in physical activity patterns can be expected at different times of the year (p. 186). Children are less likely to go out and play in inclement weather. Waiting for daylight savings time also allowed a one month period of time for participants to be free from involvement in this study.

The first day of administration was a Tuesday as the SAPAC records physical activity patterns for the prior 24 hour period of time. If children complete the SAPAC on Tuesday, they are actually reporting their physical activity patterns from Monday. Both the SAPAC and the PPCSC were administered on the first day.

A practice administration of the SAPAC scale was performed on Monday (day before actual data collection commenced), as it was found that participants familiarity with the scale was very beneficial for valid reporting. Practice administration was completed utilizing the procedures already established in Phase 2 of this study. The investigator noted common errors in reporting on the SAPAC and mentioned these errors to the students when actual SAPAC administration commenced the next day.

Criteria for SAPAC Administration

The investigators criteria for administration of the SAPAC was that the 24 hour period prior to administration was over 60 degrees with little or no breeze. This is considered to be temperate weather for outdoor play in southwest Virginia in the Spring. Remember that a SAPAC administered on Tuesday, recorded activity patterns for Monday.

Administration Procedure

Administration of both scales was done by grade levels in the cafeteria (5th grade separate from 7th). Students not participating in the study remained in their regular classrooms. Team teaching was employed often at this school and this did not create a hardship for children or teachers. One teacher from each grade level helped with supervision and administration of the scales.

On the first day, each student received a number which appeared at the top of every scale he or she received on subsequent days. This helped to ensure anonymity, but a list of student names and numbers was kept by the investigator in case students forgot their number (which did happen). The PPCSC was administered, and the SAPAC immediately following. The procedures described in Phase Two were repeated for each scale administration.

After the first day, only the SAPAC was administered. SAPAC scales were laid out on tables in the cafeteria by number with at least one open seat between scales. Students would come in and sit down in front of their numbered form.

The following daily reminders were given to students before they started to fill out the SAPAC:

- There is no talking or disruptive behavior during scale completion.

• On the SAPAC you are reporting your physical activity for yesterday, page 1 is before school from the time you got up until you got to school, page 2 is during school from the time you get here until you get off of the bus, page 3 is after school from the time you get off the bus until you go to bed.

• Remember to list all activities you participated in at the top of the page in the space provided.

• If you remember an activity when you go down the list, go back to the top and write it down.

• If you did a physical activity that is not on the SAPAC, go to 'other activities' on the SAPAC and record the name of the activity and the time and intensity.

• When finished, bring the scale to the investigator who will quickly check for any errors on the SAPAC.

The modified SAPAC was administered 5 more times over a two week period of time (total of 6 times). Sallis et al. (1995) reports that because of the substantial short-term variability in children's physical activity, the behavior needs to be measured on multiple days to obtain reliable estimates of habitual physical activity (p.1047). It was hoped that two of these administrations would occur on Mondays to gather data on physical activity patterns during the weekend, but the weather did not meet administration criteria, therefore all SAPAC data collection occurred on school days.

On the last day both SAPAC and the PPCSC were administered. Students were thanked for their involvement in the study and were sent back to class. The investigator always walked the 5th grade children back to their classrooms.

Trouble Shooting

Problems were anticipated with the reading level of some 5th grade children who were in 'pull-out' programs for reading. There were three boys who needed help reading the scales. The classroom teacher provided that help. The teacher was informed that she could answer any questions relating to their understanding of the question as long as it would not influence their answers to the questions on the PPCSC or SAPAC. These three children sat in close proximity at the outer most table in the room to minimize disturbance to others. This was troublesome on the first day, but proved not to be a problem in future administrations of the SAPAC. The investigator continued to ask the boys if they needed any help, and monitored their scale completion closely.

Criterion for Removal from the Study

The investigator anticipated that there might be some disciplinary problems which might compromise the integrity of the study. Therefore, the following rules for removal were established with the children at the beginning of the study (students were reminded of these criterion every day during the study):

- There is no talking during actual scale completion.
- Disruptive students would be given a warning, and then removed from the study as their distraction may hurt other student's ability to concentrate and report valid data.

Two 5th grade boys were removed from the study on the second day for chronic talking and disruptive behavior, which included a physical altercation with each other in the hallway on the way back to the classroom. One 7th grade boy asked to be dropped from the study.

Phase 4

Data Analysis

After the children completed the PPCSC (pre and post), and the SAPAC (six times), the descriptive and statistical analysis of the data commenced. All research questions were answered utilizing the data from these two scales, and all subsequent analysis was performed utilizing Excel 4.0 and SPSS 6.1 for the Macintosh.

Descriptive statistics were performed on the SAPAC and PPCSC to determine means and standard deviations for: total physical activity time for each participant, total physical activity time by gender and grade, activity time for each activity choice, perceived competence for the total sample, perceived competence by gender and grade, self-efficacy for each activity, and self-efficacy by gender and grade. Activity time was coded as: 1 - Less than 15 minutes, 2 - 15 to 30 minutes, 3 - 30 to 45 minutes, and 4 - greater than 45 minutes. Boys were coded as: 1, and girls were coded as: 0.

All of the data was compiled onto Excel spreadsheets and imported onto SPSS 6.1 for the Macintosh. Only data for before and after school was utilized in this study. Missing data was noted as there were six administrations of the SAPAC and two administrations of the PPCSC.

Missing Data

There was missing data for a number of students. Students missing more than half of the days were to be eliminated from the study as it was not recommended that activity patterns be established on less than 50% of the days. All participants completed the scales for 50% or more of the days, therefore, no students were eliminated from the study for this reason.

The common statistical procedure of 'mean as missing data' technique was applied to missing data on the SAPAC. Thus, if a student missed one, two, or three days reporting on the SAPAC, a mean was calculated for activity time and filled in for the missing days. Activity choices were determined by seeing what activities were reported more than 50% of the days and the corresponding activity time was filled in for that activity. If an activity appeared on the SAPAC, but was not reported more than 50% of the days, it was not recorded on the missing days as probability of doing that activity had not been established. Therefore, it was observed that mean as missing data was most often an underestimation of activity time. This technique was considered an acceptable procedure by the developers of the SAPAC Scale (T. McKenzie, personal communication, April 24, 1997; J. Sallis, personal communication, April 25, 1997), and by others involved in research with the developers (P. Strikmiller, personal communication, April 30, 1997).

Validity and Reliability of the PPCSC and SAPAC

As was reported in Chapter 2 of this document, the two scales which were utilized in this study were Sallis & McKenzie's SAPAC Scale, and Harter's PPCSC. Modifications to these scales was described in this chapter. The SAPAC Scale has been utilized in a number of studies that have investigated the physical activity patterns of children and found to be a valid and reliable measure. Since minor modifications were made to this scale, the investigator relied upon previous reliability and validity reporting.

Most studies which investigate children's perceptions of physical competence (perceived competence and/or self-efficacy) utilize modified

versions of various scales which meet the needs of this type of research, and this study is no different.

Harter's PPCSC is reported to be a valid way to measure physical self perception and self-efficacy, but because of the modifications made to it for this study, test-retest reliability was performed to determine reliability.

Test-retest reliability was conducted using a Pearson correlation on the pre and post tests of the PPCSC for 5th grade, 7th grade, and for the total sample population. Test-retest correlation for 5th grade was .76, with a P value beyond .01, 7th grade correlation was .92 with a P value beyond .01, and the total test-retest reliability correlation coefficient was .85 with a P value beyond .01. A regression analysis of the total test re-test reliability revealed a .85 correlation with a P value beyond .01. The R square value of .73315 determined that 73% of the variability on the post-test can be predicted by the pre-test.

Data Trustworthiness

Steps were taken to guarantee data trustworthiness on the modified PPCSC and SAPAC. When the scales were administered, participants were:

- separated by an empty seat between participants.
- instructed not to talk during the administration of the scales, and to direct any questions to the person administering the scales.

These measures were taken to: allow students to respond honestly (minimize social comparison effects), and to eliminate the influence of others' comments on participant responses. If a participant was unruly or could not abide by these rules of administration, they were eliminated from the study (see Criteria for Removal from Study).

Role of the Investigator

Initially, the investigator reviewed the literature to locate existing scales that might be used for this study. During Phase 2 the investigator performed all pilot testing, student interviews, and lead all focus group discussions. All modifications to the PPCSC and SAPAC were done by the investigator alone. Continuing to be the lead administrator of the scales in Phase 3, the investigator had the assistance of a classroom teacher during each administration. On occasion, the school principal assisted with administration of the scales in Phase 3. During the statistical analysis and reporting in Phase 4 the investigator performed all statistical analysis, findings and conclusions. The findings are reported in a way that replicability of the study is possible.

Summary

This chapter described the four phases of this study. Phase 1 was the selection and initial modification to Harter's PPCSC scale to measure self-efficacy, and the selection of Sallis & McKenzie's SAPAC scale to measure children's patterns of physical activity. Phase 2 was the pilot testing and subsequent modifications and development of these scales based on the pilot testing. Phase 3 was the actual administration of the PPCSC and SAPAC to 86 5th and 7th grade children, and Phase 4 was the statistical analysis and reporting of the findings and conclusions.

The modified PPCSC was developed so that it had 26 self-efficacy questions. These questions were created to match the physical activities listed on the modified version of the SAPAC (an example: basketball self-efficacy on the PPCSC with basketball activity on the SAPAC). The modified PPCSC & SAPAC were found to be valid and reliable measures for this study.

Pilot testing proved to be productive, as numerous problems and weaknesses were identified on both scales through numerous administrations of both scales, and through focus groups and individual interviews with the children in the study. These problems and weaknesses were addressed, and this helped to strengthen this study. Administration of the PPCSC was performed on the first and last days of the study, and the SAPAC was administered 6 times to the same children. As children became more familiar with the scales the more valid and reliable became their reporting of perceptions of competence and physical activity patterns. The amount of time that was necessary to complete the SAPAC on repeated administrations started out at 35 minutes and declined rapidly to 5 minutes to complete.

Phase 4 was the statistical analysis and reporting of the results of this study. All data was recorded on EXCEL worksheets and were imported to SPSS 6.1 for the Macintosh. Analysis utilizing these procedures was efficient and accurate. Missing data was accounted for by utilizing a mean as missing data technique. The results of the analysis will be reported in detail in Chapter 4 of this document.

Chapter 4: Results & Discussion

This chapter reports the results of the statistical and descriptive analysis which were conducted for the purpose of answering the research questions for this study. Following the results will be a discussion of the findings.

This study was conducted in a rural elementary/middle school in southwest Virginia during the academic school year 1996/97. Of the 120 students enrolled in 5th and 7th grades, 86 returned informed consent forms. Two students were dropped from the study for behavioral reasons, and one dropped out voluntarily, which left 83 students as actual study participants. The makeup of the study participants is found in Table 4.1.

Table 4.1. Makeup of study participants.

Group	n	Male	Female
5th Grade	34	16	18
7th Grade	49	24	25

Results of the Study

The following section presents the results of this study as they pertain to each research question. Each research question will be stated, and the results of each statistical and descriptive analysis performed will immediately follow. Only the results of the various analyses will be presented in this section, discussion of these results is in the second part of this chapter.

This study is based upon the data which was collected using modified versions of Harter's PPCSC and Sallis & McKenzie's SAPAC scale. The modified PPCSC in this study consisted of self-efficacy questions which pertain to 26 physical activities, sports, fitness, and leisure time activities which children often engage in. Each question could elicit a score of 1 (lowest self-efficacy) to 4 (highest self-efficacy), and a composite perceived competence score was computed for each participant based upon all scores.

The modified SAPAC scale lists 28 physical activity categories, 26 of which match the questions on the PPCSC. Activities not listed on the SAPAC can be reported by children as 'other activities' (category 28). The SAPAC is a 24 hour recall of physical activity engaged in on the previous day. This scale was administered six times, and activities and the amount of time students engaged in them were recorded. From this data, total activity time, and amount of time spent in each of the activities was recorded. The information from the PPCSC and the SAPAC scales enabled the investigator to answer the research questions which follow.

Question 1

Are there gender differences in the physical activity patterns and perceptions of physical competence among 5th and 7th grade children?

This question was addressed in four parts which correspond to the questions below:

a. Are there gender differences in perceived competence (composite PPCSC score)?

b. Are there gender differences in self-efficacy by activity on the PPCSC?
c. Are there gender differences in choices of physical activity as reported on the SAPAC?
d. Are there gender differences in the amount of time spent in physical activity as reported on the SAPAC (total and by specific activity)?

Question 1a

Are there gender differences in perceived competence as reported by composite scores on the PPCSC?

This question was analyzed by using a number of independent t-tests for significance between means (means were composite scores for each participant on the PPCSC, and were compiled and separated by gender). A visual representation of the differences between genders and grade levels can be seen in Figure 4.1.

Table 4.2 and Figure 4.1 show that there were gender differences in perceived competence between boys and girls for the total population. There were also gender differences found between 7th grade boys and 7th grade girls (Table 4.2 and Figure 4.1). The overall difference between girls and boys was significant at the .10 level, while the difference between 7th boys and 7th girls was significant at the .05 level.

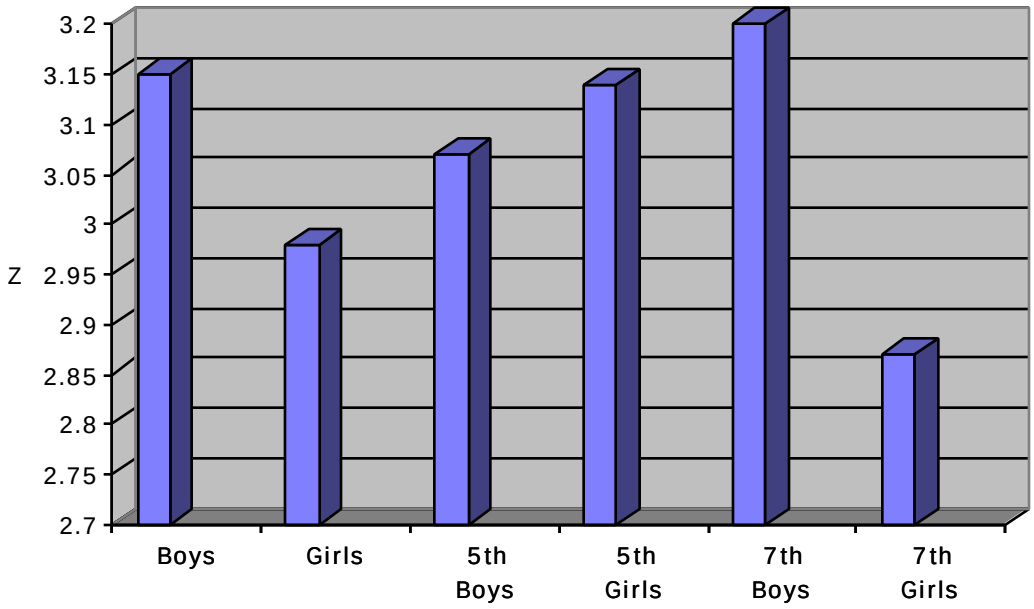

Figure 4.1. Global perceived competence scores for the various groups show a significant difference between boys and girls at the .10 level, between 7th boys and 7th girls at the .01 level, and between 5th grade and 7th grade girls at the .10 level.

Table 4.2. t-values for composite scores on the PPCSC between genders, and genders within grades.

Difference Between Boys and Girls in Global Perceptions of Competence

	Boys (n=40)		Girls (n=43)			
Grade	**Mean**	**st. dev.**	**Mean**	**st. dev.**	**t-value**	**Sig.**
Total [c]	3.1513	.408	2.9870	.457	1.72	.089
5th Grade	3.0769	.501	3.2008	.334	-.94	.353
7th Grade [b]	3.2008	.334	2.8748	.475	-2.77	.008

Note: Scores on each question on the PPCSC can range from 1 (low self-efficacy) to 4 (high self-efficacy). Perceived competence scores are a composite score of all questions on the PPCSC.

Question 1b

Are there gender differences in levels of self-efficacy by activity (as reported on the PPCSC)?

Table 4.3 shows that there were gender differences in self-efficacy levels (PPCSC) on various physical activities for the total population, for both 7th grade (Table 4.4), and 5th grade children (Table 4.5). Significant differences at the .05 level were found in self-efficacy for the entire sample population in gymnastics, basketball, baseball, jumping rope, exercise video, football, volleyball, and wrestling. Significant differences were also found at the .10 level in running, dance, martial arts, catching, and Frisbee. All differences indicate that boys had higher perceptions, with the exception of gymnastics, dance, and jump rope.

Table 4.3. Self-efficacy means by gender for all children, with significance levels for t-tests of each activity on the PPCSC.

Differences Between Self-efficacy Scores for All Boys and Girls by Activity

Activity	Means		Sig.	Activity	Means		Sig.
	Boy	Girl			Boy	Girl	
Gymnastics	2.10	2.72	**.023**	Football	3.32	2.18	**.000**
Running	2.80	2.34	**.060**	Volleyball	3.62	3.23	**.023**
Pull-ups	2.42	2.04	.112	Skating	3.12	3.09	.896
Dancing	2.97	3.34	**.070**	Tennis	3.10	2.97	.565
Sit-ups	3.42	3.23	.284	Catching	3.67	3.37	**.073**
Basketball	3.47	3.09	**.046**	Ball Games	3.70	3.60	.496
Soccer	2.75	2.53	.376	Tag Games	3.47	3.04	.213
Baseball	3.57	2.69	**.000**	Tree Climb	3.32	3.04	.213
Jump Rope	2.82	3.62	**.001**	Swimming	3.30	3.30	.992
Martial Arts	2.75	2.30	**.055**	Wrestling	3.10	2.60	**.024**
Biking	3.57	3.58	.969	Frisbee	3.30	2.97	**.086**
Calisthenics	3.52	3.41	.533	Skate Board	2.62	2.30	.181
Exer. Video	2.65	3.11	**.037**	Brisk Walk	3.70	3.58	.449

Note. Self-efficacy scores range from 1-4. Significant p-values at .10 or higher are denoted by bold-faced print.

Table 4.4. Self-efficacy means by gender for 7th grade, with significance levels for t-tests of each activity on the PPCSC.

Differences Between Self-efficacy Scores for 7th Grade Boys and Girls by Activity

Activity	Means		Sig.	Activity	Means		Sig.
	Boy	Girl			Boy	Girl	
Gymnastics	2.00	2.68	**.055**	Football	3.33	2.24	**.000**
Running	3.00	2.16	**.006**	Volleyball	3.66	3.08	**.010**
Pull-ups	2.54	2.04	**.092**	Skating	3.45	2.84	**.028**
Dancing	3.08	3.20	.651	Tennis	3.16	2.72	**.082**
Sit-ups	3.41	3.16	.244	Catching	3.75	3.28	**.037**
Basketball	3.54	2.88	**.006**	Ball Games	3.66	3.40	.192
Soccer	2.91	2.16	**.011**	TagGames	3.70	3.08	**.003**
Baseball	3.62	2.64	**.000**	Tree Climb	3.29	2.84	.133
Jump Rope	2.95	3.48	**.057**	Swimming	3.37	3.20	.546
Martial Arts	2.54	2.28	.332	Wrestling	3.04	2.68	.189
Biking	3.50	3.52	.919	Frisbee	3.16	2.80	.188
Calisthenics	3.58	3.44	.467	Skate Board	2.45	2.08	.233
Exer. Video	2.66	3.12	.115	Brisk Walk	3.75	3.72	.833

Note. Self-efficacy scores range from 1-4. Significant p-values at .10 or higher are denoted by bold-faced print.

Table 4.5. Self-efficacy means by gender for 5th grade, with significance levels for t-tests of each activity on the PPCSC.

Differences Between Self-efficacy Scores for 5th Grade Boys and Girls by Activity

Activity	Means		Sig.	Activity	Means		Sig.
	Boy	Girl			Boy	Girl	
Gymnastics	2.50	2.77	.238	Football [b]	3.31	2.11	**.003**
Running	2.50	2.61	.774	Volleyball	3.56	3.44	.670
Pull-ups	2.25	2.05	.624	Skating [c]	2.62	3.44	**.063**
Dancing	2.81	3.55	**.039**	Tennis	3.00	3.33	.380
Sit-ups	3.43	3.33	.739	Catching	3.56	3.50	.812
Basketball	3.37	3.38	.965	Ball Games	3.75	3.88	.386
Soccer	2.50	3.05	.163	Tag Games [c]	3.12	3.61	**.069**
Baseball	3.50	2.77	**.017**	Tree Climb	3.37	3.33	.901
Jump Rope	2.62	3.83	**.006**	Swimming	3.18	3.44	.491
Martial Arts	3.06	2.33	**.083**	Wrestling [c]	3.18	2.50	**.064**
Biking	3.68	3.66	.944	Frisbee	3.50	3.22	.180
Calisthenics	3.43	3.38	.878	Skate Board	2.87	2.61	.462
Exer. Video	2.62	3.11	.176	Brisk Walk	3.62	3.38	.468

Note. Self-efficacy scores range from 1-4. Significant p-values at .10 or higher are denoted by bold-faced print.

In the 7th grade (Table 4.4), there were significant differences in self-efficacy between genders at the .05 level in running, basketball, soccer, baseball, football, volleyball, skating, catching, and tag games. There were significant differences found at the .10 level in pull-ups, jumping rope, and tennis.

In the 5th grade (Table 4.5), there were significant differences in self-efficacy between genders at the .05 level in dance, baseball, jumping rope, and football. Significant differences were reported at the .10 level in martial arts, skating, tag games, and wrestling.

Question 1c

Are there gender differences in choices of physical activity (as reported on the SAPAC)?

This question was analyzed descriptively from data collected on the SAPAC. Table 4.6 lists the student's top ten activity choices in descending order by the amount of time students reported engaging in them. Table 4.6 shows few gender differences in physical activity choices. The following activities were listed for all groups: brisk walking was in the top two, running was in the top three, basketball was in the top four, and all groups listed biking, outdoor play, and walk/run (which is mixed walking and running). There were a few differences, however, they were: football for boys only, dance for girls only, and 'other activities' for boys only.

Table 4.6 Top 10 student activity choices by grade and gender. Columns list activity choices in descending order by time.

Top 10 Activity Choices By Grade and Gender

5th Grade				7th Grade			
Boys		Girls		Boys		Girls	
Activity	Mean	Activity	Mean	Activity	Mean	Activity	Mean
Running	6.43	Walking	8.72	Basketball	9.50	Walking	11.0
Walking	6.12	Running	7.88	Walking	8.12	Running	6.36
Basketball	6.00	Dancing	4.72	Running	5.45	Basketball	6.20
Walk/Run	5.37	Basketbal l	4.33	Walk/Run	4.12	Walk/ Run	3.08
Other	4.56	Soccer	3.77	Biking	1.91	Biking	2.88
Sit-ups	2.56	Gym- nastics	3.55	Baseball	1.79	Outdoor play	2.44
Soccer	2.06	Biking	3.05	Football	1.79	Dancing	2.20
Outdoor play	1.93	Walk/ Run	2.72	Other	1.50	Sit-ups	2.16
Biking	1.87	Wrestle	1.55	Outdoor play	1.33	Soccer	1.44
Football	1.62	Tag, Outdoor	1.05	PlayCatch	1.20	Volleyball	1.24

Note: Means represent the average number of 15 minute time increments that students reported being physically active over the 6 days of data collection.

Question 1d

Are there gender differences in the amount of time spent in physical activity as reported on the SAPAC (total and by specific activity)?

Table 4.7 shows no significant differences between genders in total activity time as reported on the SAPAC. Table 4.8 reports independent t-tests for each activity item listed on the SAPAC by gender. Significant differences were found in the amount of activity time that boys and girls participated in various activities. Girls were significantly more active than boys (.05 level) in: gymnastics, dance, and brisk walking; they were also more active than boys (.10 level) in volleyball. Boys were more active than girls (.05 level) in: baseball, football, and 'other activities.

Table 4.7. Overall difference between boys and girls in total activity time.

Differences Between Boys and Girls in Activity Time

	Boys (n=40)		Girls (n=43)			
Group	**Mean**	**st. dev.**	**Mean**	**st. dev.**	**t-value**	**Sig.**
Total Pop.	46.4250	22.659	47.1395	25.341	.14	.893

Note: Activity time is calculated by the number of 15 minutes time increments that students report being physically active during the 6 days of data collection.

Table 4.9 shows that 7th grade boys had significantly higher activity time than 7th girls in football (.05 level), and in baseball and wrestling at the .10 level of significance. 7th grade girls had significantly higher activity time than 7th boys in sit-ups (.05 level), and in dancing, calisthenics, and brisk walking at the .10 level of significance. Table 4.6 shows that 7th grade girls walked almost twice as much as any other activity they chose. Table 4.10 shows that 5th grade boys had significantly higher activity time for other activities (.05 level), and 5th grade girls were significantly more active in gymnastics and dance at the .05 level.

Table 4.8. Activity time means by gender for each activity on the SAPAC (28), with corresponding significance levels for t-tests between genders.

Differences in Activity Time for Boys and Girls in Each Activity

Activity	Means Boy/Girl		Sig.	Activity	Means Boy/Girl		Sig.
Gymnastics	0.35	2.32	**.016**	Volleyball	0.20	0.81	**.093**
Running	5.85	7.00	.311	Skating	0.45	0.56	.713
Pull-ups	0.63	0.39	.464	Tennis	0.15	0.07	.520
Dancing	0.65	3.25	**.004**	Catching	1.02	0.44	.150
Sit-ups	1.10	1.51	.585	Ball Games	5.85	7.00	.309
Basketball	8.10	5.41	.119	Tag Games	1.12	0.98	.726
Soccer	1.30	2.04	.400	Outdoor play Climb Trees	1.57	1.86	.654
Baseball	1.65	0.37	**.013**	Swimming	0.00	0.04	.338
Jump Rope	0.00	0.02	.338	Wrestling	1.00	0.79	.633
Martial Arts	0.40	0.12	.164	Frisbee	0.10	0.16	.612
Biking	1.90	2.95	.231	Skate Board	1.10	0.09	.134
Calisthenics	0.30	0.74	.300	Brisk Walk	7.32	10.0	**.037**
Exer. Video	0.18	0.28	.524	Walk/Run	4.62	2.93	.173
Football	1.72	0.40	**.032**	OtherActivities	2.72	0.91	**.013**

Note. The means listed are the average number of 15 minute time increments reported by students during the 6 days of data collection. Significant p-values at .10 or higher are denoted by bold-faced print.

Table 4.9. Activity time means by gender in the 7th grade for each activity on the SAPAC (28), with corresponding significance levels on t-tests between genders.

Differences Between 7th Grade Boys and Girls Activity Time in Each Activity

Activity	Means		Sig.	Activity	Means		Sig.
	Boy	Girl.			Boy	Girl	
Gymnastics	0.58	1.44	.167	Volleyball	0.33	1.24	.130
Running	5.45	6.36	.492	Skating	0.42	0.84	.345
Pull-ups	0.21	0.32	.598	Tennis	0.04	0.12	.547
Dancing	0.67	2.20	**.073**	Catching	1.20	0.40	.143
Sit-ups	0.13	2.16	**.022**	Ball Games	0.92	1.00	.917
Basketball	9.50	6.20	.175	Tag Games	0.96	0.92	.940
Soccer	0.79	0.80	.989	Outdoor play Climb Trees	1.33	2.44	.226
Baseball	1.79	0.44	**.054**	Swimming	0.00	0.08	.327
Jump Rope	0.00	0.04	.327	Wrestling	0.75	0.24	**.083**
Martial Arts	0.17	0.08	.496	Frisbee	0.17	0.04	.308
Biking	1.91	2.88	.399	Skate Board	0.92	0.12	.289
Calisthenic	0.00	0.84	**.081**	Brisk Walk	8.12	11.0	**.098**
Exer. Video	0.21	0.16	.782	Walk/Run	4.12	3.08	.413
Football	1.79	0.16	**.003**	Other Activities	1.50	0.80	.243

Note. The means listed are the average number of 15 minute time increments reported by students during the 6 days of data collection. Significant p-values at .10 or higher are denoted by bold-faced print.

Table 4.10. Activity time means by gender in the 5th grade for each activity on the SAPAC (28) with corresponding significance levels on t-tests between genders.

Differences Between 5th Grade Boys and Girls Activity Time in Each Activity

Activity	Means Boy/Girl		Sig.	Activity	Means Boy/Girl		Sig.
Gymnastics	0.00	3.55	**.048**	Volleyball	0.00	0.22	.354
Running	6.43	7.88	.482	Skating	0.50	0.17	.300
Pull-ups	1.25	0.50	.310	Tennis	0.31	0.00	.237
Dancing	0.63	4.72	**.023**	Catching	0.75	0.50	.673
Sit-ups	2.56	0.61	.165	Ball Games	0.88	0.06	.294
Basketball	6.00	4.33	.470	Tag Games	1.37	1.05	.669
Soccer	2.06	3.77	.379	Outdoorplay Climb Trees	1.93	1.05	.295
Baseball	1.43	0.28	.132	Swimming	0.00	0.00	1.000
Jump Rope	0.00	0.00	1.000	Wrestling	1.37	1.55	.852
Martial Arts	0.75	0.17	.220	Frisbee	0.00	0.33	.163
Biking	1.87	3.05	.411	Skate Board	1.37	0.06	.307
Calisthenics	0.75	0.17	.220	Brisk Walk	6.12	8.72	.187
Exer. Video	0.13	0.44	.295	Walk/Run	5.37	2.72	.295
Football	1.62	0.72	.485	OtherActivities	4.56	1.05	**.028**

Note. The means listed are the average number of 15 minute time increments reported by students during the 6 days of data collection. Significant p-values at .10 or higher are denoted by bold-faced print.

Question 2

Are there grade level differences in the physical activity patterns (SAPAC) and perceptions of physical competence (PPCSC) among 5th and 7th grade children?

This question was addressed in four parts which correspond to the questions below:

a. Are there grade level differences in global perceptions of competence (PPCSC)?
b. Are there grade level differences in self-efficacy by activity (PPCSC)?
c. Are there grade level differences in physical activity patterns of 5th and 7th grade children within genders (global and specific activity) (SAPAC)?
d. Are there grade level differences in the activities that children choose (SAPAC)?

Question 2a.

Are there grade level differences in global perceptions of competence?

Figure 4.1 illustrates the grade level differences in perceptions of competence on a bar graph. This figure shows that there were grade and gender differences in perceived competence among the study participants. Figure 4.1 also shows that 7th grade boys reported the highest score on the PPCSC, followed by 5th grade girls, 5th grade boys, and 7th grade girls reporting the lowest scores on the PPCSC. To find out whether these differences were statistically significant, independent t-tests for significance were performed. The results of the t-test for 5th and 7th grade (listed as total)

are reported in Table 4.11, which shows a P value of .434, indicating the children in this study showed no significant difference between grades five and seven in global perceptions of competence.

In looking at grade level differences in global perceptions of competence, it was also interesting to examine grade level differences within genders. Table 4.11 reports grade level differences within genders. T-tests comparing means within genders found a statistically significant difference (.10 level) between 5th and 7th grade girls. A t-test comparing means within genders for boys shows no significant difference.

Table 4.11. t-tests for grade level differences on the PPCSC, and grade level differences within genders on the PPCSC.

t-tests for Global Perceptions of Competence Between Grades and Within Genders

	5th Grade		7th Grade			
Gender	**5th Mean**	**st. dev.**	**7th Mean**	**st. dev.**	**t-value**	**Sig.**
Total	3.112	.440	3.035	.440	.79	.434
Boys	3.077	.501	3.201	.334	-.94	.353
Girls	3.143	.390	2.875	.475	1.96	.057

Note: Scores on the PPCSC can range from 1-4.

Question 2b.

Are there grade level differences in perceptions of competence by activity? The data to answer this question is in Table 4.12, which lists only the activities in which there was a significant difference between grades on the PPCSC. Ball Games and Frisbee were significant at the .05 level, and skate boarding was significant at the .10 level.

Table 4.12. Self-efficacy differences on t-tests between grades by activity.

Significant Self-Efficacy Differences Between Grades.

Activity	5th Grade (n=34) 5th Mean	st. dev.	7th Grade (n=49) 7th Mean	st. dev.	t-value	Sig.
Ball Games	3.82	.459	3.53	.710	2.28	.05
Frisbee	3.35	.597	2.97	.968	2.17	.05
Skate Board	2.73	1.024	2.26	1.095	1.97	.10

Note. Self-efficacy scores can range from 1-4. Activities not listed did not elicit significant t-test results.

Question 2c.

Are there grade level differences in physical activity patterns of 5th and 7th grade children within genders (global and specific activity) (SAPAC)?

Again, this question was analyzed using independent t-tests to compare the means of the groups in question. Table 4.13 shows there were no significant differences in the total amount of time spent being physically active between 5th and 7th grade boys and girls.

Table 4.13. Results of t-tests for total activity time within genders.

t-tests for Total Activity Time Within Genders

Gender	5th Grade 5th Mean	st. dev.	7th Grade 7th Mean	st. dev.	t-value	Sig.
Boys	50.0625	26.609	44.0000	19.836	.83	.414
Girls	48.1667	28.745	46.4000	23.177	.22	.825

Note. No significant differences were found within genders.
Mean activity times are the average number of 15 minute time increments children reported over a 6 day period of time.

Question 2d.

Are there grade level differences in the activities that children choose (SAPAC)?

There were no significant differences found between 5th and 7th grades in total activity time, with a t-value of .72; and a P-value = .476 (Table 4.14). The next question is whether there is a difference between the grades in the activities that they choose. This question was approached in two ways. First, t-tests were calculated for each activity on the SAPAC Scale to see if there were significant differences in the amount of time the children spent in certain activities. Only a few activities were found to be statistically significant (Table 4.15). Fifth graders were higher in activity time in soccer (.05), wrestling (.10), and other activities (.10), and 7th graders were higher in basketball (.10) and volleyball (.05).

Table 4.14. t-test to determine whether there is a significant difference in the total amount of physical activity time between 5th and 7th grade.

Differences Between 5th and 7th Grades in Activity Time

	5th Grade (n=34)		7th Grade (n=49)			
Group	**5th Mean**	**st. dev.**	**7th Mean**	**st. dev.**	**t-value**	**Sig.**
Total Pop.	49.0588	27.357	45.2245	21.415	.72	.476

Note: Activity time is calculated by the number of 15 minutes time increments that students report being physically active during the 6 days of data collection.

Table 4.15. t-tests for significance between means for 5th and 7th grade in the 28 activity choices listed on the SAPAC.

Activity Time Differences Between Grades by Activity

	Mean		Sig.			Mean		Sig.
	5th	7th				5th	7th	
Gymnastics	1.88	1.02	.382		Volleyball	.117	.795	**.039**
Running	7.20	5.91	.264		Skating	.323	.632	.255
Pull-ups	.852	.265	.109		Tennis	.147	.081	.606
Dancing	2.79	1.44	.196		Catching	.617	.795	.658
Sit-ups	1.52	1.16	.633		Ball Games	.441	.959	.354
Basketball	5.11	7.81	**.099**		Tag Games	1.20	.938	.535
Soccer	2.97	.795	**.036**		Outdoor play Climb Trees	1.47	1.89	.509
Baseball	.823	1.10	.585		Swimming	.000	.040	.408
Jump Rope	.000	.020	.408		Wrestling	1.47	.489	**.054**
Martial Arts	.441	.122	.172		Frisbee	.176	.102	.553
Biking	2.50	2.40	.919		Skate Board	.676	.510	.800
Calisthenics	.676	.428	.570		Brisk Walk	7.50	9.59	.117
Exer. Video	.294	.183	.761		Walk/Run	3.97	3.54	.759
Football	1.94	.959	.761		OtherActivities	2.70	1.14	**.059**

Note. Activity time is calculated by the number of 15 minutes time increments that students report being physically active during the 6 days of data collection. Significant p-values at .10 or higher are denoted by bold-faced print.

A brief summary of question two shows that there were no grade level differences in perceptions of competence in this study, with the exception of the within gender difference between fifth and seventh grade girls. Very few self-efficacy differences were found between grades on the various activities on the SAPAC as well. There were no grade level differences in activity time overall or within genders. The results of question two are supported by the literature.

Question 3

Is there a correlation between the perceived physical competence of 5th and 7th grade children and their reported patterns of physical activity?

This question was addressed in two parts which correspond to the questions below:

a. What is the correlation between students global perceptions of competence and their total reported activity time?
b. What is the correlation for each self-efficacy measure on the PPCSC and the corresponding activities on the SAPAC.

Question 3a.

What is the correlation between students global perceptions of competence and their total reported activity time?

This question was analyzed using a Pearson Correlation and regression analysis. The results of these tests are shown in Table 4.16. There was a significant linear relationship between student's global perceptions of competence and their total reported activity time. The regression analysis shows that approximately 8% of the variability in overall activity time was explained by the composite score on the PPCSC.

Question 3b.

What is the correlation for each self-efficacy measure on the PPCSC and the corresponding activities on the SAPAC. Pearson correlations were calculated for each activity, and these correlations can found in Table 4.17. Significant correlations were found for student's self-efficacy and the amount of time they were physically active in gymnastics, basketball, soccer, baseball, football, and skate boarding (.05 level), and for wrestling, skating, sit-ups, and dancing (.10 level). These significant correlation coefficients ranged from .36 for soccer, to .19 for sit-ups.

Table 4.16. Pearson correlation of composite scores on the PPCSC and total reported activity time, followed by a regression analysis for the same data.

Correlation Between Composite PPCSC and Total Activity Time

Pearson's Correlation Coefficient	P-value	N
.2777	.011	83

Regression Analysis for Composite PPCSC and Total Activity Time

Multiple R	R Square	Adj R Square	Standard Error
.27771	.07712	.06573	.42437

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	1.21901	1.21901
Residual	81	14.58756	.18009

F=6.76876 **Significant F**=.0110

Variables in the Equation

Variable	B	SE B	Beta	T	Sig. T
ACTCOMP	.005092	.001957	.277706	2.602	.0110
(Constant)	2.827841	.102760		27.519	.0000

Table 4.17. Correlations and levels of significance for each self-efficacy measure on the PPCSC with the corresponding activity time on the SAPAC (N=83).

Activity on the SAPAC	Corr. Coeff.	Sig.		Activity on the SAPAC	Corr. Coeff.	Sig.
Gymnastics[c]	.22	**.027**		Football[c]	.33	**.002**
Running	.14	.192		Volleyball	-.03	.800
Pull-ups	.06	.595		Skating[d]	.19	**.078**
Dancing[d]	.21	**.051**		Tennis	.17	.121
Sit-ups[d]	.19	**.090**		Catching	.09	.431
Basketball[c]	.24	**.027**		Ball Games	.17	.130
Soccer[a]	.36	**.001**		Tag Games	.08	.477
Baseball[c]	.33	**.003**		Climbing Trees	-.07	.503
Jump Rope	-.03	.822		Swimming	.08	.494
Martial Arts	.05	.635		Wrestling[d]	.21	**.062**
Biking	.10	.368		Frisbee	-.14	.207
Calisthenics	.15	.368		Skate boarding[c]	.26	**.018**
Exercise Video	.02	.177		Brisk walking	.00	.978

Note. Significant p-values at .10 or higher are denoted by bold-faced print.

Discussion

Introduction

The goal of this study was to gain understanding about the relationship between children's perceptions of physical competence and self-reported patterns of physical activity. Also investigated were gender and grade level differences that may exist between these two variables. Children's perceptions of competence and self-efficacy (task specific perceptions) are considered by many researchers to be strong determinants of physical activity among older children and adolescents (Biddle & Armstrong, 1992; Biddle & Goudas, 1996; Bouchard, 1988; Kimiecik, Horn & Shurin, 1996; Reynolds et al. 1990; Roberts, Kleiber, & Duda, 1981). Yet, little is known about the determinants or correlates of physical activity among children (Baranowski, et al. 1993).

The results of this study support the literature reporting a relationship between children's perceptions of competence and physical activity patterns. In general, boys perceptions of competence were higher than that of girls, and boys chose activities considered to be of higher intensity than those chosen by girls (Faucette et al., 1995; Janz et al. 1995; McKenzie et al., 1992; Pate et al., 1994). There were also socio-cultural gender differences noted in choices of physical activity (Lirgg, 1992). Boys and girls chose activities that society considers to be male or female types of activities. Overall, there was a significant linear relationship between children's perceptions of competence and their patterns of physical activity. The remainder of this discussion will focus on the results of the research questions starting with gender and grade

level differences, and finishing with a discussion of the relationship between patterns of physical activity and perceived competence.

Gender Differences in Perceptions of Physical Competence

The physical activity literature reports gender differences in the physical activity patterns of children, and in their perceived physical competence (Faucette, 1995; McKenzie, 1992). Boys in this study had higher perceptions of physical competence than girls overall, with 7th grade girls reporting the lowest perceptions of competence. There were also gender differences found on a number of self-efficacy measures.

In attempting to understand the results of boys and girls perceptions of competence, many plausible explanations might be offered. Seventh grade girls would be expected to have the lowest perceptions of physical competence of any group in this study, as it is well established that social comparisons are at their greatest level during the middle school years. Weiss et al. (1990), reports that children who seriously underestimate their competence used peer comparisons while those who overestimate their competence use self-comparisons (p. 32). Based on the literature, 7th grade girls can be expected to do more social comparisons than 5th grade girls, and it is hypothesized that these comparisons may be heightened during puberty when girls are increasing in body fat and boys are increasing in muscle mass.

Surprisingly, 5th grade girls had the second highest level of perceived physical competence. It has been noted in the research that younger children have less realistic appraisals of their physical abilities (Harter, 1978; Lirgg,

1992; Folsom-Meek, 1991), most would agree that these perceptions are becoming relatively stable by 5th grade. It may be hypothesized that the socio-cultural gender differences noted in other studies (Faucette, 1995; Anderssen & Wold, 1992) may not be as apparent to 5th grade girls as they are to 7th grade girls. This thought creates the following discussion regarding the role of socio-cultural gender influences on the development of perceptions of physical competence.

It is logical to assume that gender differences play an extremely important role in social cognitive theory. However, Bandura does not focus on socio-cultural differences in gender, but on the perceived ability in gender stereotyped activities, especially careers (Bandura, 1982). This causes one to ponder whether there has been an adequate focus on gender differences in social cognitive research. For example, do boys see themselves as less competent in gymnastics because they perceive they will not perform well, do not have appropriate models, do not receive positive effective feedback for participation in this activity, and have high anxiety for participation in this activity because of fear of failure or injury? Could it be that socio-cultural gender influences have a greater impact on self-efficacy?

It could be theorized that socio-cultural norms in a society may have a stronger influence on self-efficacy than performance attainment, although performance attainment has been determined to be the strongest determinant of self-efficacy (Bandura, 1986; Chase, 1994; Feltz & Weiss, 1982; Horn & Hasbrook, 1987; Locke & Bobko, 1984). Do boys avoid gymnastics because of

the gender stereotypes attached to the activity (social inefficacy), or is it that they have lower self-efficacy in this activity because of their perceptions of performance attainment?

The 26 questions on the modified PPCSC relate to competence in a variety of physical activities, because of the task specificity of these questions they are considered to be self-efficacy measures. Analysis of self-efficacy by specific activities shows the socio-cultural gender influences reported in other studies (Faucette, 1995; Anderssen & Wold, 1992; Lirgg, 1992) were present.

Self-efficacy differences for the overall group in this study support the notion of socio-cultural gender differences in self-efficacy (Williams & Gill, 1995). In the overall group, boys had significantly higher self-efficacy scores in basketball, baseball, football, volleyball, wrestling, running, martial arts, catching and Frisbee. Girls reported significantly higher self-efficacy scores in gymnastics, exercise video, jump rope, and dance. The research on gender-type of task suggests that differences should have been higher than the .10 level for dance, but it may be hypothesized that dance is becoming more gender-neutral with the popularity of dance on TV commercials and music videos.

Seventh grade gender differences in self-efficacy were more prevalent than for 5th grade. A greater difference in self-efficacy could also be predicted between genders as children develop from older childhood into early adolescence (Harter, 1978), as social comparisons are greater for 7th graders. In 7th grade, there were significant self-efficacy differences between boys and

girls for: running, basketball, soccer, baseball, football, volleyball, skating, catching, tag games, pull-ups, jumping rope, and tennis. From all of these differences, 7th grade girls reported higher self-efficacy in jump rope only. Contrary to the literature, boys reported higher self-efficacy in skating, which is often considered an activity for girls. A plausible explanation for this may be the advent of in-line skating, which has become very popular and a socially acceptable activity for boys.

Gender differences were not as noticeable for 5th graders. Significant 5th grade gender differences in self-efficacy were found for: dance, baseball, jumping rope, football, martial arts, skating, tag games, and wrestling. Girls reported higher self-efficacy in activities traditionally considered feminine such as: dance, jump rope, and skating. 5th grade girls also reported significantly higher self-efficacy scores on tag games, which do not have socio-cultural gender stereotypes attached to them, especially at this young age. It could be that the earlier onset of puberty for girls allows them to gain an advantage in running speed over boys.

Gender Differences in Physical Activity

Gender differences in physical activity were not as noticeable as for self-efficacy. On the SAPAC, all groups listed brisk walking, basketball, running, biking, mixed walking/running, and outdoor play/tree climbing. Many students reported running and playing in the yard with their dog. This activity was recorded by the students on the SAPAC as ‘other activities’. ‘Playing in the yard

with their dog' was so prevalent that it could have been its own category, but was recorded as outdoor play as this seemed a better fit for this activity.

The literature supports the notion that peers influence the physical activity patterns of children. Physical active levels of children are often a reflection of the company they keep. From the previous example of playing with a dog in the yard, one cannot help but think that in lieu of a peer, a dog or playful animal may be influential on a child's physical activity patterns. Children who live in rural settings do not have as many children in close proximity to play with, which could account for so many children playing with their dogs in the yard. It might be interesting to look at the physical activity levels of children who have an active pet versus no pet or a sedentary pet such as an older dog.

There were very few gender differences noted in students' choices of activity. Girls listed dancing in their top ten list of activities, and boys did not. Boys in both grades listed football in their top ten list of activities, and girls did not. Certain activities may be considered to be a 'gender-type of task' (Lirgg, 1992). In other words, society determines which activities are suitable for which genders. Activities such as gymnastics, dance, aerobic dance, and jump rope are examples of activities gender typed as female, and baseball, football, and running are examples of activities gender-typed as male (Ross et al., 1987) (NCYFS II), (USDHHS, 1996).

A significant difference was found between boys and girls in 'other activities'. Boys chose the category 'other activities' far more often than girls. For 'other activities', students were required to list what these activities were.

Most prevalent ‘other’ choices were: hunting, fishing, hiking, weight lifting, and working. Gender stereotypes often place hunting, fishing, hiking and weight lifting as activities which are considered to be predominantly male types of activities. In pilot testing and focus group discussions these activities did not surface, but in retrospect should have been anticipated and listed as a separate categories on the modified SAPAC.

The original SAPAC lists ‘chores’ as an activity choice. ‘Chores’ was removed from the modified SAPAC list of activities, as this study focused on activities children choose or want to do. Most often chores are assigned by parents and thereby are not a choice. As children turned in their daily SAPAC, they were asked if work or chores listed were something they chose to do. During these brief discussions, boys would often say that they wanted to work because they received pay, or wanted to spend time with their dads.

The literature has reported that girls are often relegated to light duty chores such as sweeping (McKenzie, et al., 1992). This may partially explain why girls are more attracted to lower intensity, health enhancing physical activities, and boys to team sports and higher intensity activities (Faucette, 1995; McKenzie, 1992). At first glance, activities listed for all groups would appear to refute these research findings, as many of the activities listed are the same for all groups. Upon closer examination of this data, however, differences emerged in the amount of time spent in different activities. Girls’ number one activity choice was walking, which is considered to be low to moderate intensity, while boys first choices were basketball and running which are considered to

be moderate to high intensity activities. Of the top ten activities reported by all groups, girls reported considerably more time spent in activities considered to be lifetime health enhancing activities (7th girls 25.52 time increments, and 5th girls 27.09 time increments), as compared to boys (7th boys 19.6 time increments, and 5th boys 19.79 time increments). Thus, this data does in fact support the notion of intensity and activity choice by gender (McKenzie, et al., 1992).

Basketball was chosen in the top four activities by all four groups. This was surprising, as the research reports that boys, in general, are more attracted to competitive team sports, and girls to health enhancing non-competitive individual or dual sports and activities. Seventh grade girls chose basketball 3rd on their list of activity choices by time. This could be explained by the fact that extramural girls basketball at the school had just finished. Many of the girls in this study were involved in this activity, but this does not explain 5th grade girls choice of basketball as number four on their top ten list. It could possibly be explained by role model identification in the self-efficacy research (Bandura, 1977; Feltz, 1982; Tinsley et al., 1995). Modeled displays convey that observers are capable of learning or accomplishing the task if they follow the same sequence of actions. The belief that one knows what to do to perform a task raises self-efficacy, and this vicarious increase can motivate observers to perform a task (Schunk, 1995). If 5th grade girls observe that 7th grade girls can be successful in an activity, they may develop higher perceptions of competence in that activity, which has been correlated with activity time in this

study. An activity traditionally considered to be masculine provided positive gender models for 5th grade girls (Perusse et al. 1989).

Contrary to the literature, no difference was found in total activity time between boys and girls in this population. Typically it is found that boys are more active than girls (Baranowski, et al. 1993; Faucette et al. 1995; McKenzie et al. 1992). There are two reasonable explanations for this contradictory finding, (1) sample size, and (2) there may be no significant difference between girls and boys activity levels in a rural setting. Most of the research on physical activity patterns has been performed using children from urban and sub-urban settings.

Although all groups reported similar top ten activity lists, there were significant differences found in the amount of time students were active in these activities. As could be predicted by the literature and self-efficacy scores for this study, girls spent significantly more time in gymnastics, dance, and walking than boys (.05 level), and also spent more time playing volleyball (.10 level). As was reported earlier, boys spent significantly more time in 'other activities' (.05 level).

Overall, the girls in this study, were somewhat more active than boys. This finding contradicts the literature in regards to the overall amount of physical activity time between genders. This difference may be explained by the rural setting in which these children live. It would seem logical to assume that rural children might be more physically active than children in sub-urban or urban settings. There is a correlation between the amount of time spent outdoors and

physical activity time (Baranowski, et al., 1993; Sallis et al., 1995; Taylor et al., 1994). Many of the children in this study reported doing many outdoor activities such as feeding livestock, hunting, fishing, hiking, gathering flowers, nuts, etc. Therefore, if the correlation between activity time and time spent outdoors is valid, there may be a correlation between rural living and activity time.

The notion of a correlation between rural living and activity time brings up several other questions. Are the parental influences associated with support for physical activity stronger or weaker in a rural setting, as parents may have to drive children farther and more often to physical activity events? Are children who live in a rural setting still performing many of the physical chores and activities which are not as prevalent in our society? Are children in rural settings more fit and healthy than children in urban settings? Many children in this study report having to haul and/or cut wood to heat their homes. Much of the walking that many of the children reported doing was to and from the bus stop. Are there differences between rural and non-rural school bus stop distances? Are there other inherent activity differences between different environments?

Another factor which may contribute to higher physical activity time by girls in this study is that the encouragement to be physically active may be different for girls in rural settings. Boys and girls typically receive different messages about how to be physically active (Taylor et al., 1994). It is often permissible for boys to go outside and play rougher or unattended than it is for girls (Taylor et al., 1994). Perhaps parents are not as worried about the safety

of their children playing outdoors in a rural setting (especially girls) as they are in urban or sub-urban settings (where most of the research on children's physical activity patterns has been conducted) (Faucette et al., 1995).

Grade Level Differences

Gender differences appear to be a much more significant determinant of physical activity in this study, as no significant differences were found between grades in perceptions of competence, but as previously reported, there was a significant difference between 5th girls and 7th girls perceived competence (.10 level). Differences were noted in ball games, Frisbee, and skate boarding, all of which were higher for 5th grade. The difference in ball games may be explained by the fact that games like four square, dodge ball, etc. are traditionally considered to be games for younger children (Sallis et al., 1996). Thus, socio-cultural age differences may have been the primary influence on this behavior.

These influences may also be evident in the differences found between 5th and 7th grade girls. Are socio-cultural age norms placed on young girls as they enter womanhood, thus a message is sent to young ladies that tells them that they do not play, participate in sports, sweat, or stay physically active like they were when they were younger? If we do not pay attention to the socio-cultural norms placed on physical activity and its determinants, are we contributors to placing restrictions on the health and well being of girls and women in our society?

Although 5th graders were somewhat more active than 7th graders, this difference was not significant. The slightly higher overall activity time reported for 5th grade children is corroborated in the literature, in that activity time begins declining between the ages of 12 and 21 (USDHHS, 1996). Since 7th grade children are 12-13 years old, it would be reasonable to expect that they would report less activity time, but would not be significantly different. If 6th graders were included in this study would there have been a steady but gradual decline from 5th through 7th grade in activity time?

There were some differences between grades in the amount of activity time reported for specific activities. Most of these differences might be explained by developmental or environmental differences between the two groups. Differences were found in soccer and volleyball (.05 level), and in basketball, wrestling and other activities (.10 level).

Differences in soccer may be explained by the psycho-social aspects of competitive youth sports. Attrition in the older children may be explained by an increasing level of competition as children grow older, which translates into less participation for the less skilled, thus children opt not to participate in these activities (Chambers, 1991; Fox & Biddle, 1988). At first it was suspected that fewer teams might explain the lower participation by 7th graders as this is often noted as a reason for fewer opportunities for sport involvement in many communities. This however, was not the situation in this community as there were more soccer teams in the 12-13 year age group than for 10-11 year old children.

It is also thought that as young children are trying out different activities, they discover activities they like for whatever reason, and may find other activities less enjoyable. Fifth grade children reported an average of three times more soccer activity than did 7th graders. Fifth grade children may also play more ball games which involve kicking which they may consider to be soccer.

Differences in basketball may be explained by children's opportunities for involvement. Basketball had just finished at the middle school, but was not offered to children below 7th grade. A Saturday morning basketball clinic was offered for younger children at this school, but availability to instruction and facilities was limited compared to that of 7th graders. 7th graders reported 50% more basketball time than did 5th graders.

Differences in volleyball and wrestling may be developmental in nature (7th higher in volleyball; 5th higher in wrestling). Older children are more successful in volleyball due to increased hand-eye coordination, ball tracking ability, and physical size. If equipment is not modified (net height, ball size and weight) to accommodate younger children they will experience greater difficulty hitting the ball (Chase et al., 1994). Wrestling differences may be explained between grades as younger children tend to wrestle and roll around in their play more than older children. There is no actual wrestling offering in this area to 5th and 7th grade children, so the children were told that wrestling meant any type of wrestling around that they did in their play.

Correlation Between Perceptions of Competence and Activity Time

The preceding discussion causes one to ponder the significance of children's perceptions of competence on their choices of activity. There was a significant linear relationship between overall perceptions of physical competence and activity time. These correlations may be considered low to moderate, but may be explained by the many determinants of physical activity patterns in children, ranging from biological and psycho-social, to environmental (Himberg, 1996; Taylor, Baranowski & Sallis, 1994). Regression analysis showed that approximately 8% of the variability in overall activity time can be explained by global perceptions of competence. When considering the number of determinants of physical activity in children, 8% of explained variance may be sizable. Further research using multiple determinants (SES, perceived competence, and ethnicity), and analysis of variance may be a way of better determining the actual strength of perceived competence on the physical activity patterns of children. Due to a limited amount of research of this kind with these two variables, the positive correlation of .28 may in fact be favorable (Singh, 1995, personal communication).

Influencing the overall correlation between the two variables was the power of the statistical analysis employed on the data. Regardless of self-efficacy rating, many children chose not to participate in some activities, thereby reducing the correlation between the two variables, as perceptions of competence were high for many activities. These participants pulled the line of relationship toward the X axis, which would explain the strong linear

relationship, but not extremely high correlation coefficients. An attempt was made to perform Pearson correlations with just those children who chose to do each activity, as it was found that more children who had high self-efficacy chose an activity than did those with low self-efficacy in that activity. This however, reduced the data set to such low numbers that the results were meaningless. It is suggested that a larger sample size may facilitate the use of this statistical procedure in the future.

Another factor which may lower the correlation coefficients for this relationship overall is availability and accessibility. The rural setting of this community may in some ways enhance children's physical activity (availability of open and safe spaces in which to move), but may also restrict many children's opportunities to do certain activities. Many children stated they had high ability in activities such as skate boarding and skating, yet found it difficult to do these activities on dirt driveways and roads where they live. Reported in Chapter 3, many children in this study reported living on dirt or gravel roads, or having dirt access roads and driveways. Also the opportunity to play group sports and activities may be limited as many children live in relative isolation from other children.

If a child lives isolated from other children will they do less social comparisons, thereby focus more on learning activities? Will they develop a task versus an ego involvement, and if they do, will they develop higher perceptions of physical competence? Social comparisons (more differentiated approach) are negatively associated the development of perceptions of

competence. Are social comparisons in community sports and activities amplified in a rural setting, thereby having a positive affect on highly skilled children? An example, a small fish may have the perception of being larger than he/she is in a small pond versus the ocean.

The effects of a rural setting are not known for self-efficacy development, but what was found in this study were significant correlations for 10 of the 26 self-efficacy measures and the corresponding activity times. They were: gymnastics, basketball, soccer, baseball, football, skate boarding, wrestling, skating, sit-ups, and dancing. Many activities which do not show correlations may be explained by a number of factors, including a lack of availability or space, and the weather (Taylor, Baranowski, & Sallis, 1994). For example, many children reported high self-efficacy in swimming, but there was almost no time reported for swimming, perhaps because of the time of year (early Spring), and the low availability of indoor pool use. Due to the rural nature of this community, other activities which may also be explained by a lack of availability are: martial arts, volleyball, and tennis (lack of available instruction and facilities).

There was certainly not a lack of available running space for children in this study. A lack of a significant correlation between self-efficacy in running and running activity time may be explained by a problem with the modified SAPAC. Self-efficacy was measured on running by students' perceptions of ability to perform the mile run without stopping, yet on the modified SAPAC there was no time or distance criterion. Therefore, children reported more

running than was anticipated, as short burst of running are much less intense and physically demanding as running a mile without stopping. To record activity time on the original SAPAC, an activity needs to be done continuously for 5 minutes or more. If children were asked to report only running that was performed for 5 minutes or more this would have aided in more valid reporting as the self-efficacy measure was of endurance running and children often times were reporting short bursts of running, which is a very different activity due to the intensity difference.

This study highlights limitations to research on the physical activity patterns of children and young adolescents. People tend to over-estimate their activity time (Sallis et al., 1996), and this study is most likely no exception. Fifteen minute time increments were utilized versus reporting exact numbers of minutes with the hope of alleviating some of the inaccuracy with estimation of time in children, and this may in fact have occurred. However, this created a new problem as it made it impossible to compare activity times to other studies which use a different time reporting. Future research will need to focus on continuing to refine the measurement instruments and techniques used to measure children's physical activity patterns.

Overall, this study supported the theories regarding children's perceptions of competence and physical activity patterns, which may be where the strength of this research lies. As reported earlier, there has been much theorizing about the correlation between children's perceptions of competence and their physical activity patterns, but in fact little research has been completed

to support these claims. This study provides additional support to many of the claims made in theory, with the exception of the amount of physical activity time reported between genders.

As our society continues to evolve, research such as this may help to shape the way we guide youngsters in the process of becoming physical activity for a lifetime. It may be wise to focus energy upon the determinants of physical activity that are modifiable such as perceived competence and self-efficacy, enjoyment, some socializing agents (teachers and peers), accessibility and availability, and physical education.

Girls and women have continued to strive for gender equality in many areas worldwide. One of those areas has been in physical activity and sport. This research lends support to the notion of equal access by all to a healthy and productive life, by highlighting gender differences in perceptions of competence and physical activity patterns.

The results of this study show that 7th grade girls had the lowest perceptions of physical competence of all groups. Is it possible that coeducational physical education may not be advantageous for middle school girls, as they often struggle with perception of their physical bodies caused by societal pressures, and physical changes caused by puberty? The big question is: Where do we go from here? This question will be addressed in chapter 5.

Chapter 5

Summary, Conclusions, Implications for Future Research

Introduction

This chapter begins with a summary of the study and describes how it relates to the existing literature on perceived physical competence and the physical activity patterns of children. Conclusions and implications for future research follow the summary.

Summary

This study was designed to determine if there was a relationship between how children perceive their physical abilities and their actual physical activity patterns. The following questions were the ones that this study attempted to answer:

- Is there a relationship between children's perceptions of their physical competence and their overall physical activity?
- Is there a relationship between children's perceptions of physical competence and the physical activities they choose?
- Are there differences between boys' and girls' perceptions of physical competence, physical activity levels and choices of physical activities?
- Are there differences between the perceptions of physical competence, physical activity levels and choices of physical activity in 5th and 7th grade children?

To answer these questions, two separate scales were completed by the 83 5th and 7th grade children in this study. Children's perceptions of competence (self-efficacy) were measured by a scale created by Susan Harter (1982) (PPCSC). The PPCSC was modified to measure children's self-efficacy on 26 specific physical activities, and provided insights into the children's perceptions of physical competence.

Much like the PPCSC, a modified version of Sallis & McKenzie's SAPAC Scale was used to measure children's physical activity patterns. The SAPAC scale asks children to recall the physical activities they engaged in during the previous 24 hours, for how long and how hard. The SAPAC scale listed the same activities which were listed on the PPCSC scale. The SAPAC scale was given to the children in this study 6 times to determine habitual physical activity patterns.

Children's responses on both scales were analyzed. There was a positive linear relationship between overall perceptions of physical competence and physical activity patterns for these children. As children's perceptions of physical competence score increased, so did physical activity time. This same positive linear relationship was found for children's self-efficacy on specific items, and activity time in gymnastics, dance, sit-ups, basketball, soccer, baseball, football, skating, wrestling, and skate boarding. As an example, as children's perceptions of physical competence scores increased in soccer (soccer self-efficacy), so did the amount of time they spent playing soccer.

This study also found differences between boys and girls in their perceptions of competence. Boys had higher overall perceived physical competence, and higher self-efficacy on many physical activities listed on the PPCSC scales. Seventh grade girls had the lowest overall perceived physical competence than any other group in this study. Contrary to the literature, there were no differences found between boys and girls in total physical activity time (SAPAC).

Much like gender differences in total activity time, there were no grade level differences in total activity time, although, 5th grade girls were significantly more physically active than 7th grade girls. Fifth grade girls also had significantly higher perceived physical competence than 7th grade girls.

Overall, the results of this study support the literature which reports a relationship between children's perceptions of physical competence and their patterns of physical activity (Biddle & Goudas, 1996; Bouchard, 1988; Reynolds et al., 1990; USDHHS, 1996; Taylor et al., 1994). This study concluded by recommending future research focus on the determinants of children's perceptions of competence, physical activity patterns, and the effects of different environmental settings on these two variables.

Conclusions

All conclusions are based on the results of this study with this population of children in this particular setting. It is not recommended that the conclusions be generalized beyond the population participating in this study. Conclusions which can be drawn are:

- There are gender differences in choices of physical activity, perceived competence and self-efficacy. Boys had significantly higher overall perceptions of physical competence than girls. There were also gender differences in self-efficacy on different physical activity tasks. Boys had higher self-efficacy in basketball, baseball, football, volleyball, running, martial arts, catching, Frisbee, and wrestling. Girls had higher self-efficacy in gymnastics, dance, and jump rope.

There were few gender differences in physical activity choices, with the exception of boys exclusive choice of football, and only girls chose dance. There were differences in the intensity of physical activity chosen. Girls spent more of their time in less vigorous types of physical activity than boys. An example, girls spent considerable time walking, while boys spent more time playing basketball.

- Contrary to the literature, there are no gender differences in total physical activity time. The literature reports that boys are more physically active than girls. This was not found in this study. Actually girls were slightly more active than boys, but this difference was not significant.

- There are no grade level differences between 5th and 7th grade children in self-reported physical activity time, perceptions of competence, or self-efficacy. No differences were found between grade levels overall on any of the variables investigated in this study. However, a grade level difference was found between 5th and 7th grade girls in overall perceived competence.
- There is a positive correlation between children's perceived physical competence, and self-reported physical activity time. Pearson correlations showed that there is a significant linear relationship between children's perceived competence and self-reported activity time. Regression analysis showed that 8% of the variability in activity time can be explained by perceived competence level. Significant correlations between children's self-efficacy levels and time spent in gymnastics, basketball, soccer, baseball, football, skate boarding, wrestling, skating, sit-ups, and dancing.

Recommendations for Future Research

The following recommendations for future research are based on the findings of this study, and a review of the literature on children's physical activity patterns and perceived physical competence.

Based on the results of this study, which found no significant difference in the physical activity time of girls and boys, it is recommended that future research investigate the effects of rural versus urban, and sub-urban settings. It was theorized in this study, that the setting may have been influential in this finding. There is no research which investigates the effects of these different environments on physical activity patterns in children.

A lack of research on the influence of different settings on physical activity patterns is contrasted by numerous studies which investigate the influence of parents on physical activity patterns of children. The literature presents varied accounts of the effects of parents on the physical activity patterns of children, therefore, continued research is needed on the relationship between children's physical activity patterns and those of adult role models, parents, and significant others.

It has been hypothesized by many that the physical activity patterns established in childhood and adolescence carry over into adult patterns of physical activity, yet there is no research which directly supports these claims. These questions may be addressed by longitudinal, or age stratified studies of specific populations in our society. Related to lifelong patterns of physical activity, is the need for more research on the causes of physical activity attrition, and on intervention strategies for an increasingly sedentary population.

Do people become more sedentary in a population because of socio-cultural influences or norms? It was noted that socio-cultural gender differences were extremely influential on the results of this study. This investigator mentioned that even Bandura may not focus enough attention on socio-cultural gender differences in social cognitive theory. Therefore, future research investigating the effects of socio-cultural gender differences on boys and girls perceptions of physical competence and their patterns of physical activity is strongly recommended, especially for girls and women throughout their lifetime.

The recommendation for future research on determinants of physical activity patterns may be accomplished by more research such as this study investigating the relationship between physical activity patterns and perceptions of physical competence. It was theorized in this study that socio-cultural gender influences may be as strong a determinant of perceptions of physical competence as is performance attainment, which is the number one source of self-efficacy information in *Social Cognitive Theory*.

Final thoughts on this study and the literature which supports it, draw attention to measurement considerations. The measurement of perceived physical competence and patterns of physical activity in this study were valid and reliable. However, the literature review reminds one that continual refinement of measurement instruments of all kinds is a continual process if research is to move in a forward direction. Physical activity and perceived physical competence measures are needed which can be used by physical education practitioners to track the physical activity patterns of their students.

In conclusion, research on the physical activity patterns of children is in its infancy. In fact, there is much to be learned about the physical activity patterns of all ages. With the recent acknowledgment of the Surgeon General's Report (USDHHS, 1996) that physical inactivity is considered to be a contributing factor to coronary heart disease, osteoporosis, osteoarthritis, non-insulin dependent diabetes, colon cancer, and the maladies associated with high stress levels, it is imperative that we continue to investigate any and all correlates, causes, or determinants of physical activity patterns of all people.

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Appendix A

Bell's Modified Version of Harter's Perceived Physical Competence Subscale for Children (PPCSC)

Directions: The following scale is to determine how you feel about your ability in a variety of different skills and activities that children often participate in for exercise, enjoyment, and during physical education classes.

The first thing you will do is choose which person you are most like for each activity. Once you have chosen who you are most like, then you will decide whether the statement is really true for you or sort of true for you.

Remember that this is not a test. Please answer all questions as honestly as possible. Nobody will see your answers, or know how you responded.

Circle one: Boy or Girl / Circle one: 5th grade or 7th grade

Sample

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty dribbling a basketball while not looking at it.	but	Other kids can dribble a basketball easily while not looking at it.	____	____

==========

1.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty performing cartwheels.	but	Other kids can perform cartwheels easily.	____	____

2.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty doing the mile run without walking.	but	Other kids can easily do the mile run without walking.	____	____

3.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty doing pull-ups.	but	Other kids can do pull-ups easily.	____	____

4.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty dancing.	but	Other kids can dance easily.	____	____

5.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty performing well on a sit-up test.	but	Other kids can easily perform well on a sit-up test.	____	____

6.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty shooting a basketball and. making it.	but	Other kids can shoot a basketball____ and make it easily.	____	

7.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty controlling a soccer ball while foot dribbling.	but	Other kids can control a soccer ball while foot dribbling easily.	____	____

8.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty batting a ball that is pitched to them.	but	Other kids can easily bat a ball that is pitched to them.	____	____

9.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty jumping rope. without missing.	but	Other kids can jump rope easily without missing. .	____	____

10.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty doing martial arts (karate, judo).	but	Other kids can do martial arts (karate, judo) easily.	____	____

11.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty riding a bike for a half hour or . more without getting tired.	but	Other kids can ride a bike easily for a half hour or more without getting tired.	____	____

12.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty doing jumping jacks and other calisthenics.	but	Other kids can do jumping jacks and other calisthenics easily.	____	____

13.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty exercising with an exercise video.	but Other kids can exercise with an exercise video easily.	____	____

14.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty throwing a football with a spiral.	but Other kids can throw a football with a spiral easily.	____	____

15.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty serving a volleyball over the net	but Other kids can serve a volleyball over the net easily.	____	____

16.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty keeping their balance on skates.	but Other kids can keep their balance on skates easily.	____	____

17.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty hitting a tennis ball over the net with a racket.	but Other kids can hit a tennis ball over the net with a racket easily.	____	____

18.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty catching a ball that is thrown to them.	but Other kids can easily catch a ball that is thrown to them.	____	____

19.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty playing games like four square and dodge ball.	but Other kids can easily play games like four square and dodge ball.	____	____

20.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty keeping from getting tagged during tag games and hide & go seek.	but Other kids can easily keep from getting tagged during tag games and hide and go seek.	____	____

21.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty climbing trees.	but Other kids can climb trees easily.	____	____

22.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty swimming the. length of a pool.	but Other kids can easily swim the length of a pool.	____	____

23.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty wrestling.	but Other kids can easily wrestle .	____	____

24.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty throwing and catching a Frisbee.	but Other kids can throw and catch a Frisbee easily.	____	____

25.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty riding a skate board.	but Other kids can ride a skate board easily.	____	____

26.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty walking briskly for 15 minutes or more.	but Other kids can walk briskly for 15 minutes or more easily.	____	____

Appendix B

Student #_____

Bell's Modified version of Sallis & McKenzie's SAPAC

Before School SAPAC Worksheet

Think about yesterday from the minute you got up, until you got to school. What kinds of things did you do that we could call physical activity. Physical activity is play, exercise, or movement which causes you to move your arms and / or legs.
List them here:

Find your activities on the list and record how long you did the activity, and whether it made you breathe hard and/or made you tired none, some, or most of the time. If you can't find the activity on the list, write it in on the bottom where it says "other". As you read the list of activities, it may remind you that you did something else, so please list those activities also.

Activity	**Before School** **1 - Less than 15 mins.** **2 - 15 to 30 mins.** **3 - 30 to 45 mins** **4 - Greater than 45**	**How Hard?** **Breathed hard or got tired: N**one, **S**ome, or **M**ost of the time.
1. Gymnastics		
2. Running		
3. Pull-ups		
4. Dancing		
5. Sit-ups		
6. Basketball		
7. Soccer		
8. Baseball/Softball		
9. Jumping Rope		
10. Combatives: karate, judo		
11. Bicycling		
12. Calisthenics: Push-ups, jumping jacks		
13. Exercise video or exercise on TV.		
14. Football		
15. Volleyball		
16. Skating, roller, ice, or roller blading		
17. Racket Sports: tennis, racquetball, badminton		
18. Having a catch with someone		
19. Ball playing: four square, dodge ball, kickball		
20. Chasing & tag games, hide & seek		
21. Outdoor play: climbing trees		
22. Swimming		
23. Wrestling		
24. Frisbee		
25. Skate boarding		
26. Walking		
27. Mixed walk & run		
28. Other activities?		

Student #_____

During School SAPAC Worksheet

Think about yesterday from the minute you got to school, until you left school. What kinds of things did you do that we could call physical activity. Physical activity is play, exercise, or movement which causes you to move your arms and / or legs.
List them here:

Find your activities on the list and record how long you did the activity, and whether it made you breathe hard and/or made you tired none, some, or most of the time. If you can't find the activity on the list, write it in on the bottom where it says "other". As you read the list of activities, it may remind you that you did something else, so please list those activities also.

Activity	**During School** **1 - Less than 15 mins.** **2 - 15 to 30 mins.** **3 - 30 to 45 mins** **4 - Greater than 45**	**How Hard?** **Breathed hard or got tired: N**one, **S**ome, or **M**ost of the time.
1. Gymnastics		
2. Running		
3. Pull-ups		
4. Dancing		
5. Sit-ups		
6. Basketball		
7. Soccer		
8. Baseball/Softball		
9. Jumping Rope		
10. Combatives: karate, judo		
11. Bicycling		
12. Calisthenics: Push-ups, jumping jacks		
13. Exercise video or exercise on TV.		
14. Football		
15. Volleyball		
16. Skating, roller, ice, or roller blading		
17. Racket Sports: tennis, racquetball, badminton		
18. Having a catch with someone		
19. Ball playing: four square, dodge ball, kickball		
20. Chasing & tag games, hide & seek		
21. Outdoor play: climbing trees		
22. Swimming		
23. Wrestling		
24. Frisbee		
25. Skate boarding		
26. Walking		
27. Mixed walk & run		
28. Other activities?		

Student #_____

After School SAPAC Worksheet

Think about yesterday from the minute you left school, until you went to bed. What kinds of things did you do that we could call physical activity. Physical activity is play, exercise, or movement which causes you to move your arms and / or legs.
List them here:

Find your activities on the list and record how long you did the activity, and whether it made you breathe hard and/or made you tired none, some, or most of the time. If you can't find the activity on the list, write it in on the bottom where it says "other". As you read the list of activities, it may remind you that you did something else, so please list those activities also.

Activity	**After School** **1 - Less than 15 mins.** **2 - 15 to 30 mins.** **3 - 30 to 45 mins** **4 - Greater than 45**	**How Hard?** **Breathed hard or got tired: N**one, **S**ome, or **M**ost of the time.
1. Gymnastics		
2. Running		
3. Pull-ups		
4. Dancing		
5. Sit-ups		
6. Basketball		
7. Soccer		
8. Baseball/Softball		
9. Jumping Rope		
10. Combatives: karate, judo		
11. Bicycling		
12. Calisthenics: Push-ups, jumping jacks		
13. Exercise video or exercise on TV.		
14. Football		
15. Volleyball		
16. Skating, roller, ice, or roller blading		
17. Racket Sports: tennis, racquetball, badminton		
18. Having a catch with someone		
19. Ball playing: four square, dodge ball, kickball		
20. Chasing & tag games, hide & seek		
21. Outdoor play: climbing trees		
22. Swimming		
23. Wrestling		
24. Frisbee		
25. Skate boarding		
26. Walking		
27. Mixed walk & run		
28. Other activities?		

Were you in school yesterday? Yes or No

Were you sick yesterday? Yes or No

Sport Teams (Only fill in this section on the first day): Please list any after school sports and activities that you have played in the last year. An example might be: I played little league baseball last Spring, or soccer team last Fall, or I take dance or gymnastics lessons after school all year long. Please list here:

This section is to determine your TV., video viewing time, and computer game playing time. Please fill in the hours and minutes as honestly as possible. If none, put zeros in the blanks.

Before School Yesterday	After School Yesterday
TV./Video _____hours_____minutes	TV./Video _____hours_____minutes
Video and computer games _____hours _____minutes	Video and computer games _____hours _____minutes

This section is to determine how long you do chores before or after school. Please fill in the hours and minutes as honestly as possible. If none, put zeros in the blanks.

Before School Yesterday	After School Yesterday
Chores _____hours _____minutes	Chores _____hours _____minutes

Appendix C

Initial Modification to Harter's PPCSC

Physical Education Efficacy Scale

Directions: The following scale is to determine how you feel about your ability in a variety of different skills and activities that children often participate in during physical education classes.

The first thing you will do is choose which person you are most like for each activity. Once you have chosen who you are most like, then you will decide whether the statement is really true for you or sort of true for you.

Remember that this is not a test. Please answer all questions as honestly as possible. Nobody will see your answers, or know how you responded.

Sample #1

Really true for me	Sort of true for me				Sort of true for me	Really true for me
____	____	Some kids often have difficulty batting a pitched ball.	but	Other kids can bat a pitched ball easily.	____	____

Sample #2

Really true for me	Sort of true for me				Sort of true for me	Really true for me
____	____	Some kids often have difficulty dribbling a basketball while not looking at it.	but	Other kids can dribble a basketball while not looking at it easily.	____	____

Physical Education Efficacy Scale

Circle one: Boy or Girl

1.

Really true for me	Sort of true for me				Sort of true for me	Really true for me
____	____	Some kids often have difficulty performing cartwheels	but	Other kids can perform cartwheels easily	____	____

2.

Really true for me	Sort of true for me				Sort of true for me	Really true for me
____	____	Some kids often have difficulty performing gymnastics.	but	Other kids can perform gymnastics easily.	____	____

3.

Really true for me	Sort of true for me				Sort of true for me	Really true for me
____	____	Some kids often have difficulty doing the mile run.	but	Other kids can do the mile run easily.	____	____

4.

Really true for me	Sort of true for me				Sort of true for me	Really true for me
____	____	Some kids often have difficulty doing pull-ups.	but	Other kids can do pull-ups easily.	____	____

5.

Really true for me	Sort of true for me				Sort of true for me	Really true for me
____	____	Some kids often have difficulty dancing.	but	Other kids can dance easily	____	____

6.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty performing sit-ups.	but	Other kids can perform sit-ups easily.	____	____

_____

7.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty shooting a basketball.	but	Other kids can shoot a basketball____ easily.	____	

_____

8.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty shooting baskets from the free-throw line.	but	Other kids can shoot baskets from the free-throw line easily.	____	____

_____

9.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty foot dribbling a soccer ball.	but	Other kids can foot dribble a soccer ball easily.	____	____

_____

10.

Really true for me	Sort of true for me			Sort of true for me	Really true for me
____	____	Some kids often have difficulty playing tag games.	but	Other kids can play tag games easily.	____	____

Appendix D

VIRGINIA POLYTECHNIC AND STATE UNIVERSITY

Informed Consent for Student Participants of Investigative Projects

Title of Project: The Relationship Between Perceived Physical Competence and the Physical Activity Patterns of 5th and 7th Grade Children.

Investigator: Ken Bell

I. The Purpose of the Research Project

This research project is designed to investigate the relationship between how 5th and 7th grade children feel about their abilities in various physical activities, and the types of physical activity they like to do for enjoyment, exercise, and play, and for how long and how hard they participate in them.

II. Procedures

You will be asked to fill out two separate questionnaires. One questionnaire will ask questions about how you think you can perform on a number of physical activities that children your age often participate in for enjoyment, exercise, and play. The second questionnaire will ask you to remember the physical activities that you participated in the day before.

You will be asked to fill out the questionnaire about how you feel about your physical ability one time at the beginning of this study. This will be done during your regular core class, and should take about 10 minutes.

The second questionnaire that you will be asked to fill out in this study is to see what kinds of physical activity you do for enjoyment, exercise and play. You will be asked to remember what kinds of physical activity you did before, during, and after school on the previous day. You will also be asked how long, and how hard you participated in these activities. The second questionnaire will also ask some questions about how long you watch television, play video games, and do chores each day. Finally, there will be a question about whether or not you belong to any sport or extracurricular activities or teams. You will be

asked to fill out this questionnaire six times during a two week period of time (about every other day). It should take 20 minutes to fill out this questionnaire the first time, and about 10 minutes every time after that.

III. Risks

There are no known risks to you in this study.

IV. Benefits of the Project

This project is designed to help people understand how children feel about their physical abilities, and how these feelings relate to the kinds of physical activity they do, and for how long they do them. However, no promise of any reward has been made to encourage you to participate.

V. Extent of Anonymity and Confidentiality

Each participant in this study will be assigned a number, so nobody, not even your teachers will know how you answered on any of the questionnaires. You will be asked to fill out the questionnaire about how you feel about your physical abilities once at the beginning of the study, and to fill out the physical activity questionnaire six times during this study. Each time you receive a questionnaire it will have your number on it. The researcher will keep all of the questionnaires and no one else will get to see them. The only reason why the researcher would let anybody know how someone answered on the questionnaires is if I find out that you could hurt yourself or someone else. In this case, the school administration would have to be notified.

VI. Compensation

You will not get any extra credit or reward for participating in this study.

VII. Freedom to Withdraw

You are free to stop participating in this study at any time. You just need to let your parents or your teacher know, and they can let the researcher know.

There will be no questions as to why you have decided to stop participating in this study.

VIII. Approval of Research

This research project has been allowed by a committee at Virginia Tech called the Institutional Review Board for Research Involving Human Subjects, and your school district.

IX. Subject's Responsibility

I volunteered to be a part of this study. To be a part of this study I need to do the following things: 1) fill out the questionnaire about how I feel about my physical abilities one time at the beginning of this study; 2) fill out the physical activity questionnaire six times during a two week period of time when it is given to me by the researcher

X. Subject's Permission

If I have any questions about this research or how it is being done, your parents have a copy of the names and numbers below, and you may contact:

Ken Bell (Investigator)	Phone: 544-7268
George Graham (Faculty Advisor)	Phone: 231-7545
Tom Hurd (Chair Institutional Review Board)	Phone: 231-5281

I have read and understand this form and what is going to happen in this research project, and I have had all my questions answered. I understand all of the information on this letter and give my voluntary permission to participate in this project.

If I participate, I may stop participating at any time without penalty. I agree to follow the rules of this project.

_____

Signature of Student Participant Date

VIRGINIA POLYTECHNIC AND STATE UNIVERSITY

Informed Consent for Teacher Participants of Investigative Projects

Title of Project The Relationship Between Perceived Physical Competence and the Physical Activity Patterns of 5th and 7th Grade Children.

Investigator Ken Bell

I. The Purpose of the Research Project

This research project is designed to investigate the relationship between 5th and 7th grade children's perceived physical competence (perceptions of their physical abilities) and their patterns of physical activity (types, duration, frequency, and intensity of physical activity).

II. Procedures

The data collection for this study will occur during your regular core class. You will be asked to allow the investigator to administer two questionnaires to your students. One questionnaire is to see how they perceive their abilities on a variety of physical activities that children their age most often participate in for enjoyment and exercise, and the second questionnaire is to see what they did for physical activity on the previous day.

Your students will be asked to fill out the questionnaire about their perceptions of physical ability one time at the beginning of this study. This will be completed during your regular core class, and should take about 10 minutes. The second questionnaire regarding your students' patterns of physical activity will be administered immediately after the first questionnaire and should take approximately 20 minutes. Your students will be asked to remember what kinds of physical activity they did before, during, and after school on the previous day, and also how long, and how hard they participated in these activities. Also included in the second questionnaire will be questions regarding how long they watch television, play video games, and how long they do chores each day. There will also be a question about whether or not they belong to any sport or extracurricular activities or teams. Your students will be asked to fill out this questionnaire six times during a two week period of time (about every other day). It should take 20 minutes to fill out this questionnaire the first time, and approximately 10 minutes every time thereafter.

III. Risks

There are no known risks to you in this study.

IV. Benefits of the Project

This project is designed to better understand how children perceive their physical abilities, and how these perceptions relate to their patterns of physical activity. However, no promise or guarantee of any benefits have been made to encourage you to participate in this study.

V. Extent of Anonymity and Confidentiality

Each participant in this study will be assigned a number, therefore, you the teacher will not know how they responded on any of the questionnaires. Your students will be asked to fill out the questionnaire about their perceptions of their physical abilities once at the beginning of the study, and to fill out the physical activity questionnaire six times during this study. Each time your students receive a questionnaire it will have their number on it. The researcher will keep all of the questionnaires and no one else will get to see them. The only reason why the researcher would disclose any information is if the participant is believed to be a threat to himself/herself. In this case, the school administration would be notified.

VI. Compensation

You will not receive any compensation or reward for participating in this study.

VII. Freedom to Withdraw

You are free to stop participating in this study at any time. You only need to notify the investigator. There will be no questions asked as to why you have decided to stop participating in this study.

VIII. Approval of Research

This research project has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic and State University, the Department of Teaching and Learning, and your local school district.

IX. Subject's Responsibility

I voluntarily agree to participate in this study. I have the following responsibilities: 1) help with the distribution and collection of student and parent consent forms, 2) allow the investigator to administer the questionnaires to my students during their regular core class time, 3) help supervise during the administration of the questionnaires, 4) provide a lesson activity for all non-participating students.

Should I have any questions about this research or its conduct, I may contact:

Ken Bell (Investigator)	Phone: 544-7268
George Graham (Faculty Advisor)	Phone: 231-7545
Tom Hurd (Chair Institutional Review Board)	Phone: 231-5281

Please tear along the dotted line and return to the investigator

_ _

X. Subject's Permission

I have read and understand this form and what is going to happen during this research project. I have had all my questions answered. I hereby understand all of the above and give my voluntary permission to participate in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project. You may also retain copies of any and all informed consent forms for you or your students during this study.

_____

Signature of Participant Date

Appendix E

Parent Letter

March 18, 1997

Dear Parent or Guardian:

My name is Ken Bell, and I am a graduate student and teaching assistant in children's physical education at Virginia Tech. Prior to coming to Virginia Tech, I was an elementary and middle school physical education teacher for ten years in Weldon, California. Recently, I have become interested in children's perceptions of their physical abilities and how these perceptions may be related to their patterns of physical activity. This interest is based on the 1996 Surgeon General's Report that confirms that a child's perceptions of their physical abilities may be related to their patterns of physical activity. It is important to gain further insight into this possible relationship because it has been established that the physical activity patterns we establish as children carry over into our adult lives. As you are probably aware, coronary heart disease is the number one health risk for Americans today, and physical inactivity has been identified as a chief determinant of coronary heart disease. Research that may provide information to combat this deadly disease is greatly needed.

I have been given permission to study the relationship between perceptions of competence and physical activity patterns of 5th and 7th grade children, by Eastern Elementary and Virginia Tech. As a part of this study your child will be asked to complete two questionnaires. One questionnaire is to determine how your child feels about their physical ability on a variety of physical tasks. The second questionnaire will be to determine their patterns of physical activity, such as, how often they are physically active, what kinds of physical activity they do, and how hard they participate in these activities.

These questionnaires will be administered during your child's regular core classroom, and their teacher will be in attendance to help with the administration of the questionnaires. On the first day, the children will complete both questionnaires during their core class. This will take approximately 35-40 minutes. Every other school day after this initial administration your child will only complete the physical activity questionnaire, which will take approximately 10 minutes. This questionnaire will be completed a total of 6 times over a two week period of time. Time away from your child's regular class work will be minimal, and this should not affect their grades.

To ensure confidentiality, the name of the school, the name of your child, and their teacher's names, will all be assigned pseudonyms (false names such as school X and student Y). Your child will also be assigned a number that will correspond to a number on their questionnaires. This will ensure that no one will know how any of the children responded on any questions. Confidentiality will be maintained throughout, including use of the data and results for inclusion in any future publications or presentations. The only reason why the researcher would break this confidentiality is if the participant is believed to be a threat to himself/herself. In this case, the school administration would be notified. It is also important to mention that if your child wishes, he/she can stop participating

in this project at any time. You or your child just need to notify the classroom teacher of your desire to stop participation in the study. However, your child will still be expected to participate in his/her regular core class assignments. It is also important to remember that the time involvement in this study will be minimal and should not adversely affect your child's grades in school.

If you approve of your child's participation in this project, please fill out the attached form and return it to your child's teacher by **Wednesday, March 19th, 1997**. If you have further questions regarding this project, please feel free to contact your child's teacher, or myself at 544-7268. I'd like to thank the principal, physical education teacher, and classroom teachers for their support of this project.

I am looking forward to your child's participation, and thank you in advance for your cooperation in this project.

Sincerely,

Ken Bell

Please retain this part of the paper for any future needs.

Should I have any questions about this research or its conduct, I may contact:

Ken Bell (Investigator)	Phone: 544-7268
George Graham (Faculty Advisor)	Phone: 231-7545
Tom Hurd (Chair Institutional Review Board)	Phone: 231-5281

Please tear along the dotted line below and return the signed permission slip as soon as possible. Thank you very much.

_ _

Parent or guardian informed consent form for investigative project.
If you agree that your child can participate in this project, please have your child return this portion of this page to his/her teacher.

I hereby grant permission for my child to be a participant in the research project described above.

____

(Child's name) (Classroom Teacher's name)

____

(Parent/Guardian Signature) (Date)

Appendix F

CHILD AND ADOLESCENT TRIAL FOR CARDIOVASCULAR HEALTH

SELF-ADMINISTERED PHYSICAL ACTIVITY CHECKLIST (SAPAC)

PROTOCOL

I. PURPOSE

The purpose of the self administered physical activity interview checklist (SAPAC) is to collect information from students about their physical activities and selected sedentary activities occurring during the previous school day.

II. STUDY SAMPLE AND ADMINISTRATION

The SAPAC should be administered to CATCH cohort children defined at baseline, Fall 1991. The SAPAC will be administered first when administered along with the Health Behavior Survey (HBS). The day before administration of the SAPAC should have been a normal (no other CATCH measurements) school day.

III. ADMINISTRATION PROTOCOL

A. STAFFING NEEDS

1. Two CATCH measurement staff (one to serve as administrator, the other to assist) must be present when administering the SAPAC to more than 5 students. In larger groups, the ratio should be one staff member for every 15 students. Forty-five students at one time should be the upper limit for the administration of SAPAC.
2. If there are Spanish-only speaking students in the class, there must be a bilingual instructor present.

B. EQUIPMENT:

1. SAPAC Protocol
2. SAPAC forms
3. pencils (one per student plus extras)
4. overhead projector
5. transparencies (clock and 30, 15, 5 minute paper pieces, pages 1 & 2 of SAPAC)
6. pen for overhead projector
7. poster of N-S-M (None - Some - Most)

C. PREPARATION:

1. Contact school 1-2 days prior to administration to confirm schedule with office and teachers.
2. Check with school to determine availability of an overhead projector.
3. Check in at the school office and locate the classrooms.
4. Introduce yourself to the classroom teacher.
5. Get previous day's schedule from all teachers (school start, end, recess, PE, lunch).
6. Set up overhead project and poster of N-S-M.
7. Introduce yourself and other staff to students.
8. Make sure all students have pencils and are in a good position to see the overhead and hear instructions.
9. Tell students that you will be asking questions about things they did yesterday.
10. Distribute SAPAC forms to students.

NOTE: Instructions to be read aloud to the students are in **bold** type. Instructions for the CATCH staff administrators are in plain type.

IV. INSTRUCTIONS TO CLASS

Introductory Dialogue to Students:

GOOD MORNING (TEACHER'S NAME), BOYS AND GIRLS. MY NAME IS (NAME). I AM THE (JOB TITLE) OF THE CATCH PROJECT AND THE INSTRUCTOR OF TODAY'S CLASS. MY ASSISTANT'S NAME IS (NAME). THANK YOU FOR PARTICIPATING IN THIS PROJECT TODAY. WE'RE HERE TO HELP YOU FILL OUT A SPECIAL FORM.

TO TELL US ABOUT THE PHYSICAL ACTIVITY THAT YOU DID YESTERDAY, YOU HAVE A CHECKLIST OF ACTIVITIES TO HELP YOU REMEMBER. LET'S START BY COMPLETING PAGE ONE OF THE FORM.

A. COMPLETION OF PAGE 1 OF SAPAC FORM:

Section A, Items A1 - A5, should be completed by the CATCH Administrator prior to questionnaire administration.

Items A6 - A10 should be read aloud by the CATCH Administrator and completed by the students

(Use a blank form on an overhead projector to lead students.)

1. **DID YOU ATTEND SCHOOL YESTERDAY?** (If the student did not attend school yesterday, he/she answers "NO" and continues the form by answering "NO" to PE and recess.)

2. DID YOU PARTICIPATE IN PHYSICAL EDUCATION CLASS YESTERDAY? CIRCLE "1" FOR NO OR "2" FOR YES.
3. IF YOU CIRCLED YES, HOW MANY MINUTES LONG WAS PHYSICAL EDUCATION CLASS? (Use the schedule information obtained from the teacher to assist children in completing this question.)
4. DID YOU PARTICIPATE IN RECESS YESTERDAY? CIRCLE "1" FOR NO AND "2" FOR YES.
5. IF YOU CIRCLED YES HOW MANY MINUTES OF RECESS DID YOU HAVE? IF YOU HAD MORE THAN ONE RECESS PERIOD, LIST THEM SEPARATELY. (Use the schedule information obtained from the teacher to assist children in completing this question.

B. INSTRUCTIONS FOR PAGE 2 OF THE FORM; RECORDING PHYSICAL ACTIVITIES, DURATION AND INTENSITY

1. DEFINING PHYSICAL ACTIVITY

ONE THING WE WANT TO LEARN IN CATCH IS THE AMOUNT AND TYPE OF PHYSICAL ACTIVITY SIXTH GRADERS DO IN A DAY. TODAY WE'RE GOING TO TALK ABOUT THE PHYSICAL ACTIVITY THAT YOU DID YESTERDAY. WHAT DAY WAS YESTERDAY?

PHYSICAL ACTIVITY IS BODILY MOVEMENT SUCH AS WHEN YOU MOVE YOUR ARMS AND LEGS. YOU DO SOME PHYSICAL ACTIVITIES TO MOVE FROM PLACE TO PLACE, LIKE RUNNING OR WALKING. WHAT ARE SOME OTHER PHYSICAL ACTIVITIES LIKE THAT? SOME PHYSICAL ACTIVITIES YOU DO IN ONE PLACE, LIKE JUMPING JACKS OR SIT UPS. CAN YOU TELL ME ANY OTHER PHYSICAL ACTIVITIES THAT YOU CAN DO IN ONE PLACE?

2. TIME ESTIMATION (USE CLOCK TRANSPARENCY)

WE'RE GOING TO ASK YOU HOW LONG YOU DID PHYSICAL ACTIVITY YESTERDAY. THE CLOCK WILL HELP YOU TELL US. THIS WHOLE CLOCK IS 60 MINUTES. WHAT LASTS 60 MINUTES? THIS IS 30 MINUTES. WHAT LASTS 30 MINUTES? THIS IS 15 MINUTES. WHAT LASTS 15 MINUTES? THIS IS 5 MINUTES. WE WANT YOU TO TELL US THE PHYSICAL ACTIVITIES THAT YOU DID YESTERDAY FOR 5 MINUTES OR MORE. LET'S SEE IF WE HAVE AN IDEA OF WHAT LASTS FOR 5 MINUTES OR MORE.

COMMERCIAL (MORE OR LESS THAN 5 MINUTES?)
BRUSH TEETH (MORE OR LESS THAN 5 MINUTES?)
RECESS (MORE OR LESS THAN 5 MINUTES?)
EATING LUNCH (MORE OR LESS THAN 5 MINUTES?)

YOU MAY DO A PHYSICAL ACTIVITY FOR 5, 10, 20 OR MORE THAN 60 MINUTES.

3. ACTUAL TIME ACTIVE

SOMETIMES DURING GAMES OR PHYSICAL ACTIVITIES YOU MAY STOP AND DO SOMETHING ELSE, LIKE RESTING OR WAITING IN LINE. WE WANT TO KNOW ABOUT THE TIME YOU WERE ACTUALLY ACTIVE. WE WANT YOU TO WRITE DOWN HOW MUCH TIME YOU WERE ACTUALLY DOING AN ACTIVITY. SO, IF YOU PLAYED BASKETBALL FOR 60 MINUTES, BUT YOU RESTED FOR 10 MINUTES, HOW MANY MINUTES DID YOU ACTUALLY PLAY AND WHAT IS THE NUMBER YOU WILL WRITE DOWN? (Answer is 50 minutes.)

4. CHECKLIST OF ACTIVITIES

NOW TURN TO THE SECOND PAGE, <u>BUT DO NOT WRITE ANYTHING YET</u>. THIS IS A LIST OF DIFFERENT TYPES OF PHYSICAL ACTIVITY, AND I AM GOING TO ASK YOU ABOUT WHETHER YOU DID ANY OF THEM BEFORE SCHOOL, DURING SCHOOL, AND AFTER SCHOOL YESTERDAY.

FOR EACH ACTIVITY, YOU WILL WRITE THE NUMBER OF MINUTES YOU WERE ACTUALLY DOING THE ACTIVITY, BUT ONLY IF YOU DID THE ACTIVITY FOR 5 MINUTES OR MORE. (Demonstrate on the overhead recording 10 minutes of bicycling before school.)

NONE - SOME - MOST (N-S-M)

IN ADDITION, FOR EACH ACTIVITY YOU DID YESTERDAY, WE WANT TO KNOW WHETHER IT MADE YOU BREATHE HARD OR FEEL TIRED, NONE, SOME, OR MOST OF THE TIME. YOU WILL PUT AN "N" FOR NONE, "S" FOR SOME , OR "M" FOR MOST OF THE TIME IN THE BOX NEXT TO THE NUMBER OF MINUTES. (Demonstrate putting "S" next to the 10 minutes of bicycling.)

PROBABLY NO ONE DID ALL THESE ACTIVITIES YESTERDAY, AND IT'S O.K. IF YOU DID NOT DO ANY OF THEM. FOR EVERY ACTIVITY YOU DO NOT DO YESTERDAY, OR DID FOR LESS THAN 5 MINUTES, PUT A ZERO IN THE BOX. (Demonstrate putting a zero for swimming laps before school.)

DO NOT COUNT THE SAME ACTIVITY IN TWO DIFFERENT PLACES. FOR EXAMPLE, IF YOU WERE RUNNING WHILE PLAYING SOCCER FOR 20 MINUTES, YOU WOULD PUT 20 NEXT TO SOCCER. <u>DO NOT LIST THAT SAME 20 MINUTES AGAIN</u> NEXT TO RUNNING.

REMEMBER, THERE ARE NO RIGHT OR WRONG ANSWERS. WE JUST WANT TO KNOW WHAT PHYSICAL ACTIVITIES YOU ACTUALLY DID <u>YESTERDAY</u>. IT IS IMPORTANT TO BE VERY HONEST.
DO NOT LOOK AT THE PAPERS OF PEOPLE SITTING AROUND YOU. DO

NOT WORRY IF SOMEONE LOOKS AT YOUR PAPER.

IF YOU HAVE A QUESTION, IF YOU NEED HELP, OR IF YOU GET BEHIND, DO NOT SAY ANYTHING. RAISE YOUR HAND AND SOMEONE WILL HELP YOU.

DO YOU HAVE ANY QUESTIONS?

PICK UP YOUR PENCILS AND GET READY TO START.

5. COMPLETING THE SAPAC FORM

WE'RE GOING TO GO THROUGH THIS LIST OF ACTIVITIES THREE DIFFERENT TIMES. WE WANT YOU TO THINK ABOUT WHAT YOU DID YESTERDAY. WE'LL DIVIDE THE DAY INTO THREE PARTS; BEFORE SCHOOL, DURING SCHOOL AND AFTER SCHOOL. PLEASE LISTEN TO INSTRUCTIONS AND DO NOT WORK AHEAD.

a. BEFORE SCHOOL

THINK ABOUT BEFORE SCHOOL YESTERDAY. THIS IS THE TIME FROM WHEN YOU WOKE UP UNTIL THE BELL RANG FOR SCHOOL TO START. IT INCLUDES ANY BEFORE SCHOOL PROGRAM IN WHICH YOU PARTICIPATE. WHAT DID YOU DO BEFORE SCHOOL? DID YOU DO ANYTHING SPECIAL? HOW DID YOU GET TO SCHOOL? THINK ABOUT THE PHYSICAL ACTIVITIES YOU DID FOR 5 MINUTES OR MORE YESTERDAY BEFORE SCHOOL. NOW WE WILL GO DOWN THE LIST OF ACTIVITIES FOR BEFORE SCHOOL TOGETHER.

Go through the checklist from top to bottom. Read the number of each activity to help students follow along. Periodically remind them to put a zero if they did not do the activity. For the first couple of activities and the first activity in each block, use the complete prompts:

1) DID YOU DO _____ FOR 5 MINUTES OR MORE YESTERDAY BEFORE SCHOOL?

2) IF YOU DID, WRITE THE NUMBER OF MINUTES AND A LETTER (N, S OR M), IF YOU WERE BREATHING HARD OR FELT TIRED FOR NONE, SOME OR MOST OF THE TIME.

3) After a couple of activities , just say "DID YOU _____?"

Before asking about "mixed walking and running", explain the following:

WE WALK AND RUN MANY TIMES DURING THE DAY. YOU MIGHT DO THIS IN A GAME OR TO GET SOMEWHERE. MOST OF THOSE TIMES ARE LESS THAN 5 MINUTES, SO YOU WILL NOT WRITE THOSE DOWN.

SOMETIMES WE DO A MIXTURE OF WALKING AND RUNNING, SO WE WALK A LITTLE AND RUN A LITTLE. LET'S SAY YOU WENT TO THE STORE IN A HURRY. YOU TAKE OFF RUNNING, BUT AFTER AWHILE GET OUT OF BREATH AND WALK. YOU CONTINUE TO COMBINE WALKING AND RUNNING UNTIL YOU GET THERE.

DID YOU DO 5 MINUTES OR MORE OF MIXED WALKING AND RUNNING BEFORE SCHOOL YESTERDAY?

IF YOU DID, WRITE THE NUMBER OF MINUTES AND WHETHER YOU BREATHED HARD OR FELT TIRED NONE, SOME, OR MOST OF THE TIME.

Before asking about "walking", explain the following:

THINK ABOUT TIMES WHEN YOU MIGHT HAVE WALKED 5 MINUTES OR MORE AT ONE TIME BEFORE SCHOOL YESTERDAY. DID YOU TAKE A WALK, WALK TO SCHOOL, OR WALK YOUR DOG?

Before asking about "Running", explain the following:

DID YOU RUN 5 MINUTES OR MORE AT ONE TIME YESTERDAY BEFORE SCHOOL STARTED?

Explain about "Other":

Ask about physical activity classes, lessons, teams before school. Ask if they did any other physical activities before school yesterday that were not on the list. Ask them to write the name of the class or lesson, the number of minutes, and none, some or most.

Demonstrate with overhead how to list something in "other". Include **name of activity, number of minutes, and the letter N, S or M.**

b. **DURING SCHOOL**

NOW WE ARE GOING TO TALK ABOUT PHYSICAL ACTIVITIES YOU DID DURING SCHOOL YESTERDAY. DURING SCHOOL MEANS BETWEEN THE MORNING BELL AND THE LAST AFTERNOON BELL. THINK ABOUT WHAT YOU DID IN SCHOOL YESTERDAY. DID YOU DO ANY SPECIAL ACTIVITIES? THINK ABOUT PE, RECESS, AND AFTER LUNCH. IF YOU PLAYED SOCCER FOR 5 MINUTES AT FIRST RECESS AND FOR 10 MINUTES AT SECOND RECESS, ADD THE TIMES TOGETHER AND PUT THAT NUMBER

NEXT TO "SOCCER." WHAT WOULD I PUT NEXT TO "SOCCER" IN THIS EXAMPLE? (Answer is 15 minutes.) NOW WE WILL GO DOWN THE LIST OF ACTIVITIES FOR DURING SCHOOL TOGETHER.

Go through the checklist from top to bottom. Read the number of each activity to help them follow along. Periodically remind them to put a zero if they did not do the activity. For the first couple of activities use the complete prompts:

1) DID YOU DO _____ FOR 5 MINUTES OR MORE YESTERDAY DURING SCHOOL?

2) IF YOU DID, WRITE THE NUMBER OF MINUTES AND A LETTER (N-S-M) IF YOU WERE BREATHING HARD OR FELT TIRED FOR NONE, SOME OR MOST OF THE TIME.

3) After a couple of activities , just say "DID YOU _____?"

At the end of the list of activities done during school, ask students if they put down what they did during recess, PE or after lunch. This is very important. Give them time to think and answer.

IF YOUR PHYSICAL ACTIVITY IS NOT ON THE LIST, PUT THE NAME OF YOUR ACTIVITY UNDER "OTHER" AND INCLUDE NUMBER OF MINUTES AND THE LETTER N, S OR M.

c. AFTER SCHOOL

AFTER SCHOOL COVERS THE WHOLE TIME FROM WHEN THE LAST BELL RINGS AT THE END OF THE SCHOOL DAY AND ALL THE TIME RIGHT UP UNTIL YOU GO TO SLEEP. THIS INCLUDES AFTER SCHOOL ACTIVITIES. THINK ABOUT ALL THE PLACES YOU WENT YESTERDAY AND ALL THE THINGS YOU DID. WHAT DID YOU DO AFTER SCHOOL? DID YOU HAVE A TEAM PRACTICE? HOW DID YOU GET HOME? WHEN WAS YOUR DINNER TIME? WHEN WAS YOUR BED TIME? DID YOU PLAY OUTDOORS? NOW WE WILL GO DOWN THE LIST OF ACTIVITIES FOR AFTER SCHOOL TOGETHER.

Go through the checklist from top to bottom. Read the number of each activity to help students follow along. Periodically remind them to put a zero if they did not do the activity. For the first couple of activities use the complete prompts:

1) DID YOU DO _____ FOR 5 MINUTES OR MORE YESTERDAY AFTER SCHOOL?

2) IF YOU DID, WRITE THE NUMBER OF MINUTES AND A LETTER (N-S-M) IF YOU WERE BREATHING HARD OR FELT TIRED FOR NONE, SOME OR MOST OF THE TIME.

3) After a couple of activities , just say "DID YOU _____?"

IF YOUR PHYSICAL ACTIVITY IS NOT IN THE LIST, PUT THE NAME OF YOUR ACTIVITY UNDER "OTHER". INCLUDE THE NUMBER OF MINUTES AND THE LETTER N, S OR M.

d. TV AND VIDEO; VIDEO AND COMPUTER GAMES BEFORE SCHOOL:

NOW I'M GOING TO ASK YOU ABOUT TV WATCHING, VIDEO GAMES AND COMPUTER GAMES BEFORE SCHOOL YESTERDAY. LOOK AT THE BOX AT THE BOTTOM OF THE PAGE.

1) TV and Video

THINK ABOUT WHETHER YOU WATCHED ANY TV OR VIDEOS BEFORE SCHOOL <u>YESTERDAY</u>. YOU CAN RECORD THIS AS HOURS, MINUTES, OR BOTH. LET ME SHOW YOU AN EXAMPLE. LET'S SAY I WOKE UP EARLY AND WATCHED CARTOON SHOWS BEFORE COMING TO SCHOOL. I WATCHED TWO WHOLE SHOWS, SO THAT WOULD BE ONE HOUR. THEN, I WATCHED ABOUT HALF OF ANOTHER SHOW, SO THAT WOULD BE ANOTHER 15 MINUTES. SO THE TOTAL I WOULD WRITE DOWN WOULD BE 1 HOUR, 15 MINUTES. Write these on the overhead.

IF YOU WATCHED 5 MINUTES OR MORE OF TV BEFORE SCHOOL <u>YESTERDAY</u>, WRITE THE HOURS OR MINUTES. IF YOU WATCHED LESS THAN 5 MINUTES, WRITE ZERO.

2) Video/Computer Games

NOW THINK IF YOU PLAYED ANY VIDEO OR COMPUTER GAMES BEFORE SCHOOL YESTERDAY. WHAT ARE SOME EXAMPLES OF VIDEO OR COMPUTER GAMES? (Answer: Nintendo, Game Boy, Wheel of Fortune, etc.) WRITE THE HOURS OR MINUTES YOU PLAYED VIDEO GAMES OR COMPUTER GAMES BEFORE SCHOOL YESTERDAY.

IF YOU PLAYED 5 MINUTES OR MORE OF VIDEO OR COMPUTER GAMES BEFORE SCHOOL <u>YESTERDAY</u>, WRITE THE HOURS OR MINUTES. IF YOU PLAYED LESS THAN 5 MINUTES, WRITE ZERO.

e. TV, VIDEO GAMES, COMPUTER GAMES AFTER SCHOOL:

1) TV

THINK ABOUT THE SHOWS YOU WATCHED AFTER SCHOOL, INCLUDING THE TIME BEFORE DINNER, DURING DINNER OR AFTER DINNER. IF YOU WATCHED THREE 1/2 HOUR SHOWS, WHAT WOULD YOU WRITE? IF YOU WATCHED 3 MINUTES OF TV, WHAT WOULD YOU WRITE? NOW WRITE THE HOURS OR MINUTES OF TV YOU WATCHED YESTERDAY AFTER SCHOOL. IF YOU NEED TO ADD SEVERAL DIFFERENT TIMES YOU WATCHED TV FOR MORE THAN 5 MINUTES, PLEASE USE THE BACK OF THE PAGE. TO HELP YOU REMEMBER, YOU MAY LIST THE NAME OF THE SHOWS WATCHED OUT TO THE SIDE.

IF YOU WATCHED 5 MINUTES OR MORE OF TV AFTER SCHOOL YESTERDAY, WRITE THE HOURS OR MINUTES. IF YOU WATCHED LESS THAN 5 MINUTES, WRITE ZERO.

2) Video /Computer Games

DID YOU PLAY ANY VIDEO OR COMPUTER GAMES AFTER SCHOOL YESTERDAY? WRITE THE HOURS OR MINUTES YOU PLAYED THESE GAMES YESTERDAY AFTER SCHOOL.

IF YOU PLAYED 5 MINUTES OR MORE OF VIDEO OR COMPUTER GAMES AFTER SCHOOL YESTERDAY, WRITE THE HOURS OR MINUTES. IF YOU PLAYED LESS THAN 5 MINUTES, WRITE ZERO.

END OF CHECKLIST: NOW YOU ARE FINISHED WITH THIS FORM. TURN BACK TO THE FIRST PAGE AND MAKE SURE YOUR NAME IS ON IT. THANK YOU VERY MUCH.

TIPS FOR SAPAC ADMINISTRATION: ASSISTANTS
(See Tips for SAPAC Administrators on following page.)

As an assistant, your role is crucial to the study because you can ensure that the correct data makes it onto the students' checklists. Below is a list of the key responsibilities of the assistant.

1. Make sure students have forms with labels on them.

2. If student answers, "No, I did not attend school yesterday," the answers to Items A7 and A9 should be "NO." The student should wait for the group to move to Section B.

3. Make sure PE/Recess questions are answered consistently, e.g., if a student answers "No, I did not participate in recess yesterday," the answer to the next question (How many minutes of PE class did you have yesterday?) should be "Zero."

4. Make sure answers are legible. If any are unreadable, feel free to ask students to erase and rewrite.

5. Do not allow students to work ahead. Make sure they work in the correct column.

6. Make sure students are writing "**N, S, or M**" next to each answer of minutes.

7. Ask students *not* to write "**N, S, or M**" next to an answer of "Zero."

8. Check for answers being written in <u>hours</u>. Ask students to convert them into minutes.

9. Assist any students who arrive late while the rest of the class is still on the first page.

10. No activity spaces should be left blank. Remind students to place a "Zero" next to an activity if they did not do it.

11. Help students list their TV shows in the margins of their forms, add the total minutes together, and convert to hours and minutes.

12. If you spot an outrageous answer, prompt student by saying, "***How*** long did you play football yesterday?," or, "Are you ***sure*** you played football for 14 ***hours*** yesterday?"

TIPS FOR SAPAC ADMINISTRATION: ADMINISTRATOR

(See Tips for SAPAC Assistants on previous page.)

1. Remind students to answer questions based on their personal experience. If a student was absent the day before administration, remind him/her that a lot of his/her answers will be zeroes.

2. Walk around the classroom as you read through the activity checklist. Check students' forms for errors as you circulate.

3. For "**During School**" activities: Remind students to combine number of minutes for an activity that they did during two different recess periods or during both recess and PE class.

4. Prompt students frequently about being "**actually active**."

5. Ask students to put their fingers on the top of each column before you begin each one.

6. Confirm recess schedule with classroom teachers.

7. Remind students to **PRINT** their answers clearly.

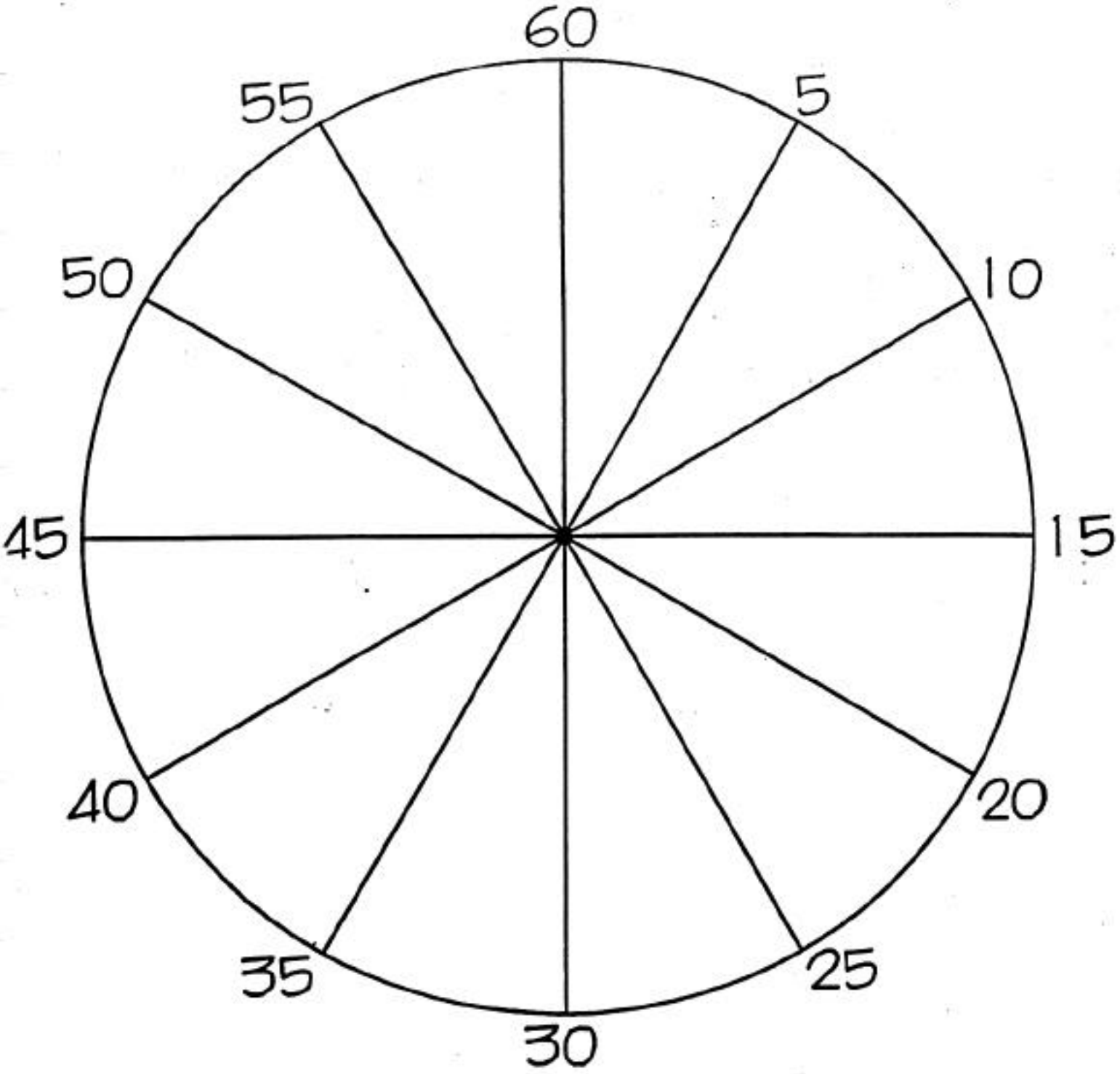
Name _____

Site _____

Date _____

SAPAC CHECKLIST

	YES	NO
1. SAPAC administered the day after a normal (no other CATCH measurements) school day.	____	____
2. Two CATCH staff present at classroom administration.	____	____
3. SAPAC forms and pencils distributed to each student in class.	____	____
4. Instructions given to students on completion of Section I	____	____
5. Physical Activity is defined.	____	____
6. Time estimation is discussed.	____	____
7. Actual time of activity is discussed	____	____
8. None, Some, Most (N-S-M) discussed.	____	____
9. CATCH staff stress that students should refer only to activities done yesterday.	____	____
10. Discusses division of day into Before School, During School and After School.	____	____
11. Asked about TV, Video and Computer Games.	____	____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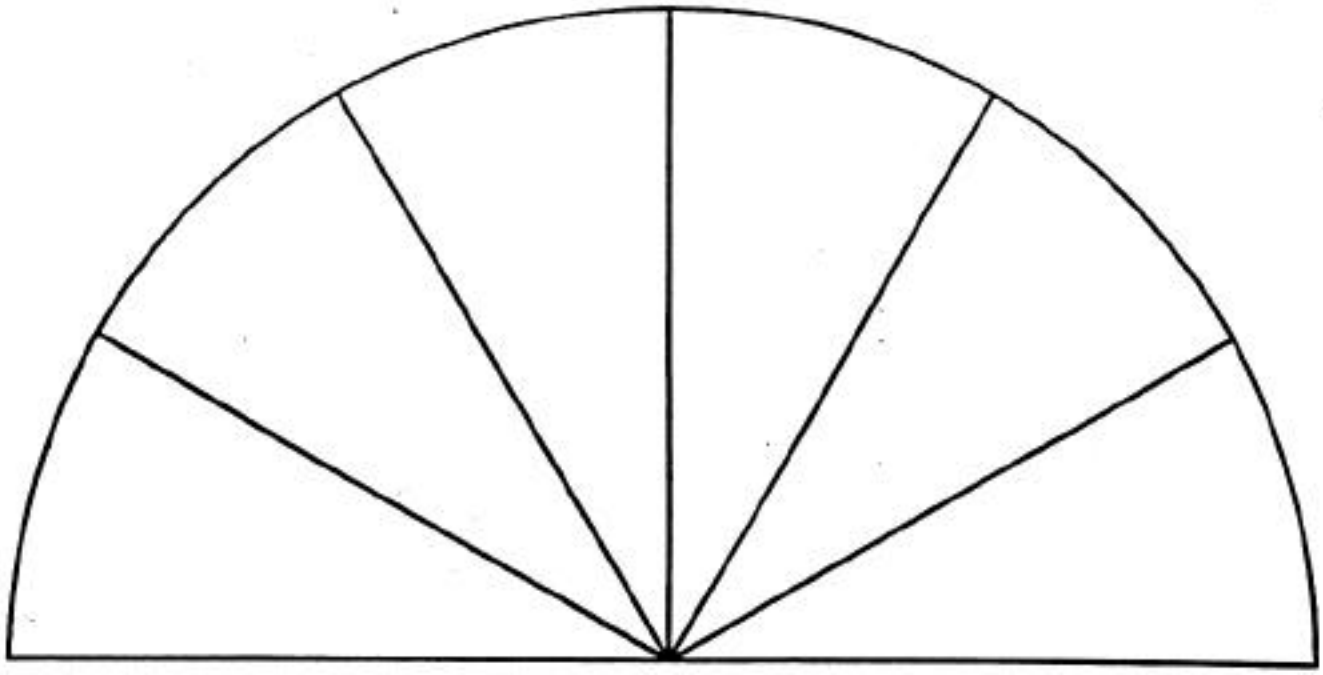
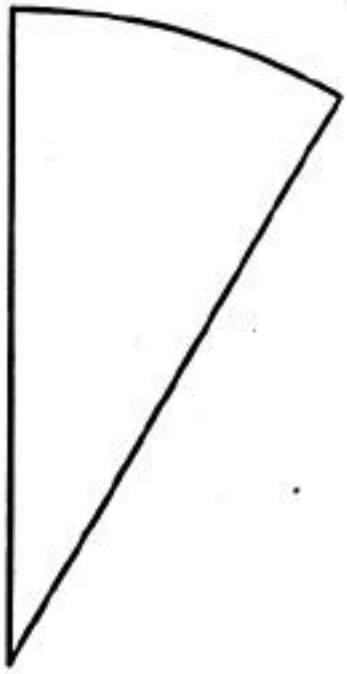
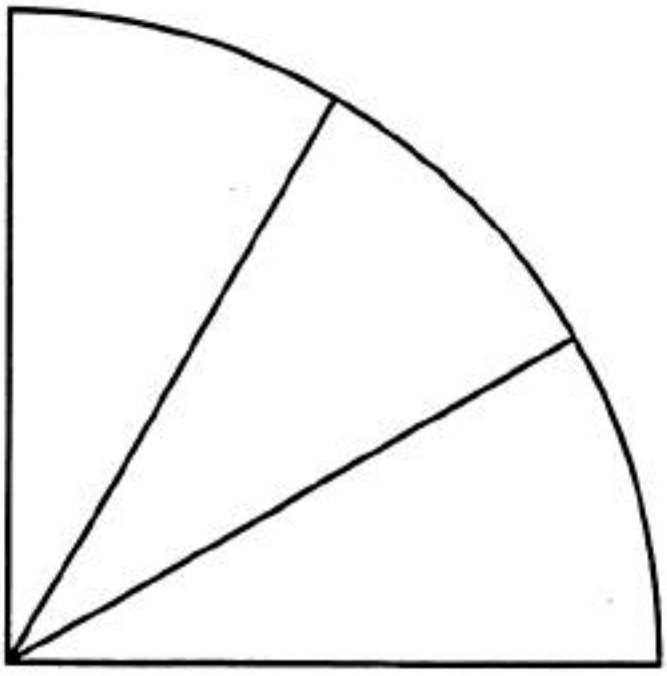






CHILD AND ADOLESCENT TRIAL FOR CARDIOVASCULAR HEALTH
SELF-ADMINISTERED PHYSICAL ACTIVITY CHECKLIST (SAPAC)

AFFIX ID LABEL HERE --->

SECTION A. GENERAL INFORMATION

(CATCH STAFF USE ONLY)

A1. FORM VERSION: 0 2 / 2 4 / 9 5 (M / D / Y)

A2. TODAY'S DATE: ___ / ___ / ___ (M / D / Y)

A3. ADMINISTRATOR'S INITIALS _____

A4. SCHOOL STARTING TIME: ___ ___ : ___ ___

A5. SCHOOL ENDING TIME: ___ ___ : ___ ___

A6. DID YOU ATTEND SCHOOL YESTERDAY?

NO 1
YES 2

A7. DID YOU PARTICIPATE IN PHYSICAL EDUCATION CLASS YESTERDAY?

NO 1
YES 2

A8. IF YES, HOW MANY MINUTES LONG WAS PHYSICAL EDUCATION CLASS?

|__|__|__| Minutes

A9. DID YOU PARTICIPATE IN RECESS YESTERDAY?

NO 1
YES 2

A10. IF YES, HOW MANY MINUTES OF RECESS DID YOU HAVE?

|__|__|__| Minutes First Recess |__|__|__| Minutes Second Recess

Section B. Activities

	A. Activity	C. None, Some, Most B. Before School	N S M	E. None, Some, Most D. During School	N S M	G. None, Some, Most F. After School	N S M	
1	Bicycling							1
2	Swimming Laps							2
3	Gymnastics: bars , beam, tumbling, trampoline							3
4	Exercise: push-ups, sit-ups, jumping rope							4
5	Weight lifting							5
6	Basketball							6
7	Baseball/Softball							7
8	Football							8
9	Soccer							9
10	Volleyball							10
11	Skating: ice, roller, rollerblade							11
12	Hockey: ice, floor, field							12
13	Racket Sports: badminton , tennis, paddleball							13
14	Ball Playing: Four Square, dodge ball, kickball							14
15	Active Games: chase, tag, hopscotch							15
16	Outdoor Play: climbing trees, hide and seek							16
17	Water Play: (in pool, ocean or lake)							17
18	Combatives: judo, karate, competitive wrestling							18
19	Dance							19
20	Outdoor Chores: mowing, raking, gardening							20
21	Indoor Chores: mopping, vacuuming, sweeping							21
22	Mixed Walking/ Running							22
23	Walking							23
24	Running							24
25	Other (physical activity classes, lessons or teams):							25
26	(Other)							26
27	(Other)							27

	Before School	After School
T.V./Video	H.1 ___ ___ hours ___ ___ minutes	H.2 ___ ___ hours ___ ___ minutes
Video Games & Computer Games	H.3 ___ ___ hours ___ ___ minutes	H.4 ___ ___ hours ___ ___ minutes

Key Areas in the SAPAC Protocol
CATCH III

1. Remind students we are talking about yesterday.

2. Be careful where the protocol says "sixth grade" when administering SAPAC to students who have been retained.

3. If possible, find out from a teacher if PE/Recess occurred yesterday and the duration. Use what actually happened yesterday, not what is scheduled for PE/Recess. Schedules and circumstances may vary among classes.

4. Three recess periods may exist: (1) morning (2)during lunch after eating, (3) afternoon recess. The SAPAC form has two recess periods. When this has occurred we have combined lunch and afternoon recess time and put that as second recess time.

5. Remind students to answer each question about PE or recess on their own experience.
   a. If a student was absent from school the day before - answer "no" for recess & PE.
   b. If a student was punished or missed recess - answer "no" for recess.

6. If a student answers "no" for recess or PE make sure they enter zero for "number of minutes". Some students will copy the transparency answer, even though it is not correct for their situation.

7. Student answers inconsistently ("yes" to PE or Recess, but leaves # of minutes blank and vice versa).
Data enter as "-9".

8. What if a student *double enters* his/her TV/Video time?

Example: 2 hours 120 minutes

a. If this is seen during administration, clarify with the student what they mean, Allow them to change answer.

b. If this is seen after administration is over, do not touch!

9. We ask students to list all of the TV shows they watched after school and then add up the number of minutes of each show. What if student enters a triple digit number next to minutes because they cannot convert this number into hours and minutes?

Example: __ hours 190 minutes

a. If this is seen during administration help the student convert the 190 minutes to hours and minutes: 3 hours 10 minutes

b. If this is seen after administration, convert the 190 minutes into hours and minutes on the form.

Looks like: __ hours 190 minutes

Convert to: 3 hours 10 minutes

10. Coding Physical Activity

a. Passing a volleyball in pairs (Ball Playing); Structured Volleyball Game (Volleyball)

b. Throwing a Football at recess (Ball Playing); Football Practice (Football)

11. If you are unsure if or where to put a physical activity, list it under "other".

12. Prompt for "Actually Active"

13. "During School", remind students about PE/Recess.

14. Student arrives late to SAPAC administration:

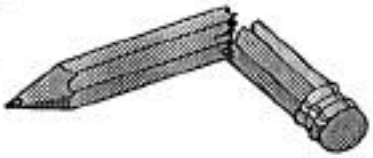
If the class is still on page one, allow the student to begin. If the class is on page two, the student should not attempt completing the form. If possible, have the student participate in another class's SAPAC administration.

15. Student leaves administration prematurely:
Assistant should write a note in the margin on student's form. Data enter missing information as "-9"

16. If absent the previous day from school, where should activities be listed?
Time periods similar to a school day: before 8, between 8-3, after 3.

17. How to administer SAPAC with only one student? ≤ 5
No overhead, one on one. Demonstrate on hard copy sample.

SAPAC Supplies



- ✓ SAPAC protocol
- ✓ Labeled SAPAC forms (extra)
- ✓ School roster of cohort
- ✓ Student assent
- ✓ Pencils for students
- ✓ Transparencies (clock, p1, p2)
- ✓ Transparency pen
- ✓ Poster of N-S-M
- ✓ Overhead projector
- ✓ Pieces to the clock (30-15-5)
- ✓ Extension cord, adapter
- ✓ Masking tape (to hang poster)
- ✓ School directions, phone #'s.

Kenneth W .Bell

Curriculum Vitae

PERSONAL DATA

Home Address: RR1 Box 146
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Work Address: Virginia Tech
Department of Teaching and Learning
202 War Memorial Hall
Blacksburg, VA 24061
(540) 231-7629

'Guiding youngsters in the process of becoming physically active for a lifetime.'

CAREER OBJECTIVES

To acquire a position as a professor of physical education pedagogy for the purpose of improving the quality of physical educators in the field, and improving the research base that will shape the future of physical education. The ultimate goal in these endeavors is to improve K-12 student learning experiences and attitudes toward physical education, activity and movement for a life time.

EDUCATIONAL BACKGROUND

Ph.D. Virginia Polytechnic Institute and State University: Physical Education Pedagogy, June 1997.
Major Professor: Dr. George Graham

M.A. California State University Bakersfield: Curriculum and Instruction in Education, August 1992.

B.S. Pennsylvania State University: Health, Physical Education, Recreation and Dance (Adapted Emphasis), May 1980.

PROFESSIONAL EXPERIENCE

August 1997 **Assistant Professor, Boise State University**

Teaching Responsibilities

EDPE 300: **Curriculum Design in Health, Physical Education and Recreation.** Teach undergraduate physical education majors how to plan and implement a K-12 physical education curriculum.

EDPE 361: **Elementary School Physical Education Methods.** Teach undergraduate physical education majors pedagogical methods and strategies for the implementation of a developmentally appropriate physical education curriculum at the elementary level.

EDPE 362: **Elementary School Health and Physical Education.** Teach undergraduate general education majors pedagogical methods and strategies for the implementation of a developmentally appropriate physical education curriculum at the elementary level.

EDPE 4754: **Student Teaching Supervisor**. Direct observation and supervision of pre-service teachers, and collaboration with school cooperating teachers.

Research & Development: Conduct scholarly activities in research and development of teaching and learning as they relate to children in K-12 education.

1994 - 1997 (May) **Graduate Teaching Assistant, Virginia Tech State University**

Teaching Responsibilities

EDPE 4734: **Secondary Physical Education Curriculum**, Spring 1996. Developed a new secondary physical education curriculum course. Teaching and administering this course for physical education majors. Supervising the secondary physical education teaching practicum experience.

EDPE 4724: **Elementary Physical Education Curriculum**, Spring 1995. Assisted in the teaching of this course.

EDPE 2314: **Foundations of Physical Education: Educational Gymnastics**, Spring 1995 - Present. Developed and taught this new course at Va. Tech. This course focuses on content development of developmentally appropriate practices for use in educational gymnastics, coupled with an exposure to Olympic gymnastics, and apparatus.

EDPE 2334: **Foundations of Physical Education: Partner and Group Physical Activity**, Fall 1995 - Present. Developed and taught

this class as a new course at Va. Tech. This course focuses on dual and group content development for secondary physical education.

EDPE 4754: **Student Teaching Supervisor**, Fall 1995 - Present. Direct observation and supervision of pre-service teachers, and collaboration with school cooperating teachers.

FCD: **Guest Lecturer**, Spring 1996. Served as a guest lecturer to a Family and Child Development Course. Topics include: Self-efficacy development in children in the physical education setting.

FCD: **Guest Lecturer**, Fall 1996/97. Served as a guest lecturer to a Family and Child Development Course. Topics include: Providing positive physical education experiences for children in middle childhood and adolescence.

1996 - Present **External Reviewer/Contributing Author for PE Central**

PE Central (http://www.chre.vt.edu/~/PE.Central/) is a Web site on the Internet which provides resources for K-12 physical educators. Responsibilities are to give the Senior Editors feedback regarding the appropriateness of the health and physical activities that are submitted for publication on the Web site. Several of my lesson ideas have been published on PE Central.

1984 - 1994 **Physical Education Specialist, South Fork Union School District**

Teaching Responsibilities

Physical Education Specialist: Teach daily physical education to 4th through 8th grade students. Varied teaching strategies and techniques such as cooperative learning, peer teaching, and guided discovery were employed to meet the lesson objectives, and to address the varied learning styles of students.

Physical Education Department Head: Develop and implement a district wide health and physical education curriculum that articulated with the local high school, was in alignment with the California State Physical Education Framework, and met the specific needs of students within this community. Additional responsibilities:

- Supervise and mentor other physical educators.
- Supervise and train K-3 classroom teachers in the proper implementation of the curriculum and instruction.
- Plan and conduct in-service training sessions and on-going support for other physical education teachers, and K-3 classroom teachers.
- Administer budget and all equipment acquisitions.
- Seek outside funding through grants and endowments.

Coach / Athletic Director: Planning seasons and schedules for all sports.

Procure all equipment and uniforms. Coach: girls volleyball, boys flag football, coed soccer, boys and girls basketball, boys and girls softball, wrestling, and boys and girls track and field.

Other responsibilities: Advise student council. Organize and implement intramural programs. Organize and implement fund raising efforts.

Highlights:
- Developed and implemented a nationally recognized outdoor education program for grades 6-8.
- Grants received by the U.S.D.A. Forest Service and Outdoor Adventures (a private corporation) to underwrite the outdoor education program.
- Grant received to finance a fitness facility on the South Fork School campus.
- Fund raising efforts responsible for over $200,000 toward the building of a gymnasium on the South Fork School campus. This was done by developing a $2,000 annual fund raiser into a $35,000 a year fund raising endeavor.
- Greater Bakersfield Chamber of Commerce Teacher of the Year (1994).

1990- Present **Educational Consultant**

Responsibilities

- Educational consultant to individual school districts, county offices of education, and colleges and universities. Conducted in-service training for physical education and classroom teachers on various aspects of physical education curriculum and instruction.
- Developed and taught one and two day workshops to teachers throughout California on how to implement the new California Physical Education Framework, and how to develop a curriculum which reflected the goals of this framework.
- Taught workshops on how to creatively deliver effective lessons , and how to assess the effectiveness of their lessons and instruction.
- Taught workshops in specialty areas such as: Cooperative Learning, Motivation and Fitness, Adventure Activities, and Teaching Strategies.
- Keynote speaker at elementary and middle school conferences

1991 - 1994 **California Academy for Physical Education**

Senior Associate: Selected as a Physical Education Mentor Teacher for the State of California to represent Kern Co. Responsibilities included: serving as a participant and instructor in The California Academy for Physical Education (C.A.P.E.), advisor to the committee writing the California State Framework, physical education mentor teacher for Kern Co., California. Served as a participant and instructor for C.A.P.E.. The academy was the pilot for the current subject matter project in physical education.

1981 - 1983 **Physical Director, Y.M.C.A. of Kern County**

Responsibilities

- To administrate the athletic facilities, adult fitness, youth programs, and $250,000 budget.
- Hiring, training, and supervising all employees.
- Teach adult fitness, wellness, and activity classes such as: Senior Fitness, Beginner, Intermediate, and Advanced Fitness, Healthy Back, Strength Training, Youth and Adult Swimming Classes, Youth Sports, and Gymnastics.

Highlights

- Developed and implemented a youth sports program which grew from 400 participants to 12,000 in two and one half years.
- Developed two satellite Y.M.C.A. programs in remote communities of Kern County.
- Raised funds for the entire renovation of gymnasium, pool and fitness facilities.

1980 - 1981 **Assistant Director to Intramural and Recreational Sports, Pennsylvania State University**

Responsibilities

Physical Education Instructor: Teach in the basic instructional program. Courses taught: gymnastics, fitness classes, tennis, strength training, and bowling.
Assistant Intramural and Recreational Sports Director: Hiring and supervising referees, development of tournaments, leagues, and their corresponding schedules and facilities.

PRESENTATIONS AT PROFESSIONAL MEETINGS

1996

Bell, K.W. (1996). Motivation in middle school physical education. California Middle School Physical Education Workshop: Northern Conference , Sacramento, CA. **Keynote Address.**

Bell, K.W. (1996). Motivation in middle school physical education. California Middle School Physical Education Workshop: Southern Conference, Fullerton, CA. **Keynote Address.**

Bell, K.W. (1996). The effects of self-efficacy and performance success on the motivation of elementary children. Cal Poly Elementary Physical Education Workshop, San Luis Obispo, CA. **Keynote Address.**

Bell, K.W. (1996). Creative ways to develop intrinsic motivation for fitness in elementary physical education. Petersburg School District Physical Education In-service, Petersburg, VA.

Bell, K.W. (1996). Motivation, self-efficacy & fitness. Prince George Co. Office of Education Physical Education Workshop, Prince George, VA.

Bell, K.W. (1996). Cooperative learning and group initiatives. Prince George Co. Office of Education Physical Education Workshop, Prince George, VA.

Bell, K. W. (1996). Developmentally appropriate and fun approach to fitness. Cal Poly Elementary Physical Education Workshop, San Luis Obispo, CA.

Bell, K.W. (1996). Educational gymnastics: An approach that can work for all students and their teachers. Cal Poly Elementary Physical Education Workshop, San Luis Obispo, CA.

Bell, K.W. (1996). Educational gymnastics: An approach that can work for all students and their teachers. California Middle School Physical Education Workshop: Southern Conference, Fullerton, CA.

Bell, K.W. (1996). Cooperative challenges. California Middle School Physical Education Workshop: Southern Conference, Fullerton, CA.

Bell, K.W. (1996). Motivation and fitness: The physical self-efficacy connection. California Middle School Physical Education Workshop: Southern Conference, Fullerton, CA.

Bell, K.W. (1996). Educational gymnastics: An approach that can work for all students and their teachers. California Middle School Physical Education Workshop: Northern Conference , Sacramento, CA.

Bell, K.W. (1996). Cooperative adventure. California Middle School Physical Education Workshop: Northern Conference , Sacramento, CA.

Bell, K.W. & Westfall, S. (1996). Teaching a team sport by incorporating the 8 sub-disciplines. California Middle School Physical Education Workshop: Northern Conference , Sacramento, CA.

Graham, G. , Bell, K.W., Elliot, E., Himberg, C., Oliver, K., Pennington, T., & Westfall, S. (1996). Teaching wellness concepts to children. Sharing the Wealth Physical Education Conference, Jekyll Island, GA.

Bell, K.W. (1996). Motivating the unmotivated: The implications of self-efficacy on activity choice and effort. Sharing the Wealth Physical Education Conference, Jekyll Island, GA.

1995

Bell, K.W. (1995). Self-efficacy development in middle school children. California Middle School Physical Education Workshop: Southern Conference, Fullerton, CA. **Keynote Address.**

Graham, G., Bell, K.W., Doering, N., McCrumb, D., McCollum, S., Oliver, K., & Westfall, S. (1995). Authentic assessment in physical education. Sharing the Wealth Physical Education Conference, Jekyll Island, GA.

Bell, K.W. (1995). Motivation and Fitness. California Middle School Physical Education Workshop: Southern Conference, Fullerton, CA.

Bell, K.W. (1995). Competition versus cooperation. California Middle School Physical Education Workshop: Southern Conference, Fullerton, CA.

Bell, K.W. (1995). Authentic assessment strategies. California Middle School Physical Education Workshop: Southern Conference, Fullerton, CA.

Westfall, S., Bell, K.W., Doering, N., McCollum, S. & Oliver, K. (1995). Authentic assessment strategies. United States Physical Education National Conference, Orlando, FL.

1994

Sargent, L. & Bell, K.W. (1994). What is the physical education framework, and how do I implement it? California Association of Health, Physical Education, Recreation & Dance State Conference (CAHPERD). San Diego, CA.

Bell, K.W. (1994). Creative implementation of The California Physical Education Framework. Kern County Office of Education Physical Education Workshop, Bakersfield, CA.

Bell, K.W. (1994). Motivation and Fitness. California Association of Health, Physical Education, Recreation & Dance (CAHPERD) Northern District Conference, Sacramento, CA.

Bell, K.W. (1994). Team Building Through Adventurous Group Initiatives. California Association of Health, Physical Education, Recreation & Dance (CAHPERD) Central District Conference, Fresno, CA.

Bell, K.W. (1994). Fitness success for all. California Association of Health, Physical Education, Recreation & Dance (CAHPERD) Central District Conference, Fresno, CA.

1993

Bell, K.W. (1993). How to implement the California Physical Education Framework. California Association of Health, Physical Education, Recreation & Dance (CAHPERD) State Conference, Monterey, CA.

Bell, K. W. (1993). Cooperative learning. California Middle School Physical Education Workshop, Fullerton, CA.

Bell, K. W. (1993). Motivation and fitness. California Middle School Physical Education Workshop, Fullerton, CA.

Bell, K. W. (1993). Innovative physical education. California Middle School Physical Education Workshop, Fullerton, CA.

Bell, K. W. (1993). Creative ways to implement the California Physical Education Framework. Butte County Office of Education Physical Education Conference, Chico, CA.

Bell, K. W. (1993). How to implement the California Physical Education Framework. Kern County Office of Education Physical Education Workshop, Bakersfield, CA.

Hawkes, D. & Bell, K.W. (1993). Teaching physical education by teaching concepts. California Academy for Physical Education (C.A.P.E.), Fullerton, CA.

1992

Bell, K.W. (1992). Team building through adventurous group initiatives. California Association of Health, Physical Education, Recreation & Dance (CAHPERD) State Conference, Anaheim, CA.

Bell, K.W. (1992). Team building through adventurous group initiatives. Cal Poly Elementary Physical Education Workshop, San Luis Obispo, CA.

Bell, K.W. (1992). Developing lesson plans for student learning. California Academy for Physical Education (C.A.P.E.), Fullerton, CA.

Bell, K.W. (1992). Teaching developmentally appropriate lessons in physical education. California Academy for Physical Education (C.A.P.E.), Fullerton, CA.

1991

Bell, K.W. (1991). Cooperative learning. Cal Poly Elementary Physical Education Workshop, San Luis Obispo, CA.

Bell, K.W. (1991). Innovative fitness. Cal Poly Elementary Physical Education Workshop, San Luis Obispo, CA.

AWARDS AND CERTIFICATIONS

1997 - Virginia Polytechnic & State University, HPER Doctoral Student of the Year
1995 - American Master Teacher Program - Master Teacher Certification
1994 - Greater Bakersfield Chamber of Commerce Teacher of The Year
1994 - South Fork Union School District Teacher of The Year
1991 - 1994 - Physical Education Mentor Teacher / Kern County
1991 - 1994 - Senior Associate - California Academy for Physical Education
1990 - 1992 - California Health Related Physical Fitness Test Trainer

RELATED EXPERIENCES & VOLUNTEER ACTIVITIES

1994-Present: Boys Brigade Activity Leader - Games leader for 5 and 6 year olds at Blacksburg Christian Church.
1995-Present: Sunday School Teacher - Teach 21/2 to 3 year old Sunday School at Blacksburg Christian Church.
1996: Worship leader - Lead worship during church services at Blacksburg Christian Church.
1996: Giles County Youth Soccer League Coach - Coach 6-8 yr. old team.
1997: Giles County Youth Soccer League Coach - Coach 6-8 yr. old team.
1989-1992: Youth Leader - Lead and teach middle and high school youth at Weldon United Methodist Church.
1989-1994: River Guide Instructor - Teach future white water river guides all aspects of guiding.
1985-1994: American Youth Soccer Organization coaching advisor.
1980-1982: Maria's Gymnastics Club - Teach all levels of Olympic gymnastics, and coach class III girls team.
1980-1982: S.W. Bakersfield Lions Club - Service Organization for the area of Bakersfield, CA.

REFERENCES

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