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Five for Life: Evaluating the Effect of an Activity-Based Fitness and Health Curricula Program on Physical Fitness, Physical Activity, Health-Related Knowledge, and Attitudinal Outcomes

Kimberly Grimes Baskette
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Five for Life: **Evaluating the Effect of an Activity-Based Fitness and Health**

Curricula Program on Physical Fitness, Physical Activity, Health-related

Knowledge, and Attitudinal Outcomes

by

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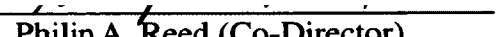
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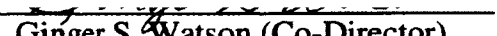Requirement for the Degree of

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Approved by:

Philip A. Reed (Co-Director)

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Robert Spina (Member)

ABSTRACT

FIVE FOR LIFE: EVALUATING THE EFFECTS OF AN ACTIVITY-BASED FITNESS AND HEALTH CURRICULA PROGRAM ON PHYSICAL FITNESS, HEALTH-RELATED KNOWLEDGE, AND ATTITUDINAL OUTCOMES

Kimberly G. Baskette
Old Dominion University 2013
Co-Directors: Dr. Philip Reed
Dr. Ginger Watson

Currently, childhood obesity is the largest health threat facing youth in the United States. The majority of youth fail to meet the minimum recommended daily physical activity requirements set forth by the Centers for Disease Control and Prevention (CDC). Poor physical fitness levels and nutritional habits are also prevalent in today's youth. Schools have been identified as playing a crucial role in providing students with the knowledge and skills needed to adopt and maintain healthy behaviors and attitudes. School-based Health and Physical Education (HPE) programs, focused on promoting physical activity, fitness, and nutrition, have been shown to be an effective environment for students to be physically active and to acquire the knowledge, skills, and attitudes needed to adopt and sustain a healthy lifestyle.

The purpose of this descriptive study was to investigate the extent to which supplementation of an elementary school Health and Physical Education program with the *Five for Life* activity-based curricula program affected students' health-related fitness levels, knowledge of fitness and nutrition concepts and attitudes towards physical education, and overall health and wellness. The *Five for Life* program was adopted in 2009 by a large, affluent, urban school district in the Southeastern U.S. as part of the Carol M. White Physical Education Program (PEP) grant. For the purposes of the

implementation across the school district, the elementary schools were clustered into three cohorts consisting of 18, 15, and 19 elementary schools, respectively.

This research study utilized post hoc *Five for Life* program data. The design of this study allowed the researcher to evaluate the effect of the program across four study variables. The Progressive Aerobic Cardiovascular Endurance Run (PACER) test, part of the statewide FITNESSGRAM testing, was used to assess cardiorespiratory endurance levels while three-day Physical Activity Recall (3DPAR) logs were utilized to evaluate physical activity levels at base, heart health, and maximum intensity levels. Pre/post assessments were employed to measure student knowledge of fitness and nutrition and an attitudinal survey assessed students' health-related attitudes as well as their attitudes towards their health and physical education (HPE) class. Data used in the analysis of cardiorespiratory endurance and knowledge was comprised of 4th grade students (n=1,179) enrolled in Cohort I schools. The survey data consisted of the same group of Cohort I 4th grade students (n=1,827). The physical activity data was collected from 5th grade students across all three cohorts during year one of program implementation; Cohort I (n=1,552) was collected during the 2009-10 academic year, Cohort II (n=1,621) during the 2010-11 academic year, and Cohort III (n=1,640) during the 2011-12 academic year.

The analysis utilized a three-level Hierarchical Linear model to estimate the effects of the *Five for Life* curricula program on student outcomes as well as the impact of student-level covariates (i.e. age and gender) and school-level covariates (i.e. school-SES) on student growth trajectories. Results from the study showed significant improvements in 4th grade students' cardiorespiratory endurance levels, when controlling

for gender, age, and school socioeconomic status (SES). Students were found to significantly improve their scores on both the "Five for Life 4-5" and "Food for Energy and Health K-5" assessments. Contrary to the literature, student physical activity levels were not found to be significantly increased in any of the three Cohorts during the first year of program implementation. While the results showed no significant changes in attitudes as a result of participating in the *Five for Life* program, the students' overall attitudes were observed to be highly positive prior to program implementation thus leaving little room for attitudinal change.

Gender was consistently found to be a significant predictor of student performance, primarily at pre-assessment, with females showing lower levels of performance across all variables with the exception of knowledge of fitness and nutrition. Improvements were observed at post-assessment thus providing evidence that the gap between females and males may have been mediated by participation in the program. While the analysis showed age and school-SES to be significant predictors of Cohort III students' physical activity, the influence was minimal. The results also showed school-SES to slightly predict students' knowledge of the five components of fitness and their attitudes towards learning in health and physical education. However, the observed change in both scores was miniscule and not considered meaningful.

DEDICATION

This dissertation is dedicated to my family and friends who have been there throughout this process offering their support, guidance, and steadfast words of encouragement. To my husband, Pete, thank you for your unwavering support over the past few years. I am truly grateful that you were always there pushing me to move forward even during the times when I pushed back. I could not have done this without you by my side. To my children, Brittany and Matthew, you are the light of my life and I will be forever grateful not only for your understanding during the many times when "mom was working" but also for always being there to encourage me as I slowly trudged through this process. I would like to thank the rest of my family for their support and for always believing I could get this done even during the times when my own beliefs wavered. To my "T-good" ladies, especially Jenna, Kathleen, and Maribeth, thank you for always being there; your friendships mean more to me than you will ever know.

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To my chair and advisor, Dr. Philip Reed, thank you for your guidance, and continued support throughout this process. This study would never have been completed without your words of encouragement and your patience with my countless questions. To Dr. Ginger Watson, thank you for your support and for the countless hours of helping me trudge through the methodology and data analysis. I could never have gotten through this without your assistance and encouragement and feel blessed that you agreed to serve on my committee. I would also like to thank both of you for being the voice of reason during the times when I was ready to throw in the towel. Dr. Watson, you were exactly right in saying it was all about perseverance. To Dr. Robert Spina, thank you for agreeing to be a part of my committee and for your guidance throughout the project. Lastly, to Dr. Jim Neff, thank you for your assistance, encouragement, and many words of advice.

I would also like to extend a huge thanks to Focused Fitness without whom this dissertation would ever have been possible. To Karen Cowan, I am extremely thankful to have "bumped" into you at the conference in 2010. I feel grateful that you have allowed me to represent, through this study, the advances Focused Fitness is making in the Health and Physical Education field. My thanks also go out to Dr. Randy Knuth for not only providing me with the data used in this study but also for the numerous phone conversations and emails. To Amy Lutz, thank you for responding to my many requests; I knew I could always count on you getting me the information I needed in a timely manner. Lastly to Dr. Bob Lutz, thank you for always being there to answer my questions, provide me with feedback, and assist me with whatever I needed. I truly appreciate all of the support you have provided over the last few years.

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Chapter 1. Introduction

The prevalence of childhood obesity in the U.S. has reached epidemic proportions and is currently the largest health threat facing youth today. In fact, "obesity is now the most prevalent nutritional disease of children and adolescents in the U.S." (Dietz, 1998, p. 518). The percentage of children aged 6-11 classified as obese (Body Mass Index (BMI)) score at or above the 95th percentile for age and gender) has nearly tripled increasing from 6.5% to 19.6% from 1980 to 2008 (Irwin, Irwin, Miller, Somes, & Richey, 2010; Ogden, & Carroll, 2010). The percentage of obese adolescents aged 12 to 19 has increased from 5.0% to 18.1% over the same time frame (Reed, Einstein, Hahn, Hooker, Gross, & Kravitz, 2010; Ogden, & Carroll, 2010). This translates to approximately 25 million young people in the U.S. being categorized as obese (Reed et. al, 2010). To compound this problem even further, an additional 16% of children and adolescents are classified as being at risk for becoming obese (BMI score between the 85th and 95th percentile for age and gender) (Powers, Bindler, Goetz, & Daratha, 2010).

School-based programs, focused on enhancing health-related knowledge and skills, are being touted as a viable way to combat the child and adolescent obesity problem as these programs have been found to be efficacious in evoking behavioral changes (Torre, Swiss, Akre', & Suris, 2010). According to Mhialic Fagan, & Argamaso (2008), many prevention programs designed and tested in school settings have "demonstrated evidence of positive outcomes for students" (p. 2). The school environment is an ideal channel through which behavioral change can occur due to the sheer number of youth that intervention programs reach (Gortmaker et al., 1999). According to the latest enrollment data, 62.4 million children were enrolled in elementary

and secondary public schools in the U.S. in 2010 (National Center for Education Statistics, 2010). Schools have onsite program facilitators, i.e. certified Physical Education (HPE) specialists, who have direct contact with program participants, i.e. students, on a regular basis (Mihalic et al, 2008). Programs also reach youth from all socioeconomic backgrounds thus allowing interventions to target populations most at risk. In addition, schools provide a means by which successful interventions can easily be disseminated throughout an entire school district allowing for a greater overall impact (Gibson et al., 2008; Pyle, Sharkey, Yetter, Felix, & Furlong, 2006).

While policy-based programs targeting the school environment, particularly health and physical education programs, may have the greatest impact on childhood obesity, few schools in the U.S. offer physical education on a daily basis and many do not meet the number of minutes required for physical education each week (Eyler et al., 2010). As a result, efforts have been put in place at the local, state and federal level to enhance the quality of health and physical education programs. One such program, the Carol M. White Physical Education Program (PEP) was established "to initiate, expand, or enhance physical education programs, including after-school programs, for students in kindergarten through 12th grade" (Lee, Burgeson, Fulton, & Spain, 2007, p. 437). Authorized by Congress in 2001 as part of the Elementary and Secondary Education Act of 1965 (currently referred to as No Child Left Behind (NCLB)), the PEP grant is a federally funded three-year grant awarded on a yearly basis to local educational agencies (LEA's) and community based-organizations (CBO's) (Lee, et. al, 2007; U.S. Department of Education, 2010). School-based programs utilizing PEP grant funding must assist students in meeting state Health and Physical Education (HPE) standards

(U.S. Department of Education, 2010). Funds may also be used by school districts to provide equipment and support to increase participation in physical education activities for all students as well as enhance training and education for health and physical education teachers (U.S. Department of Education, 2010). According to the School Health Policies and Program Study (SHHPS), conducted in 1994, 2000 and 2006, between 2000 and 2006, many positive changes were seen in health and physical education as a result of programs such as PEP (Lee et al., 2007). However, "while progress is being made, the need remains to implement stronger policies and programs from the state to the school level" (Lee et al., 2007, p. 459).

The *Five for Life Program,* "a research-based, K-12 fitness and health program that aligns with physical education and health standards" has been adopted by school districts across the U.S. as part of PEP grant funding (Focused Fitness, 2009a, para. 1). The program's curriculum was designed to teach health and fitness-related concepts through age-appropriate activity-based lessons. Each lesson was developed in alignment with standards for Health and Physical Education set forth by the National Association for Sport and Physical Education (NASPE) (National Association for Sport and Physical Education, 2004). The curriculum also meets NASPE's recommendation of being a "sound, sequential curricula that builds student knowledge and skills from year to year in developmentally appropriate ways" (NASPE, 2004; Taras, 2005, p. 214).

Five for Life lessons focus on teaching the five components of fitness: cardiorespiratory endurance, flexibility, muscular strength, muscular endurance, and body composition; lessons on nutrition are included as well. Through the program, students are given a solid foundation on improving and maintaining their health-related fitness and

selecting healthier and more nutritional foods. They also acquire an understanding on the relationship of fitness and nutrition to overall health and wellness. The focus of this research was to investigate the impact of the *Five for Life* program on elementary school students' fitness and physical activity levels, understanding of health-related fitness and nutrition, and health-related attitudes towards physical education, fitness, and nutrition.

Literature Review

Overview

This section provides an exploration into the literature that was reviewed and formed the basis for this study. The chapter begins with an overview of the current child and adolescent obesity epidemic. The relationship between physical fitness, physical activity and health and their role in combating childhood obesity is explored. A look into school-based interventions and their impact on fitness and health are provided. The remainder of the literature review focuses specifically on Health and Physical Education programs and the role they have in improving health-related fitness in youth. The literature review concludes with a detailed description of the *Five for Life* program.

Child and Adolescent Obesity

According to the Centers for Disease Control and Prevention (CDC) (2011), over the past 30 years child and adolescent obesity rates have nearly tripled in the United States (Figure 1). The first National Health and Nutrition Examination Survey (NHANES), conducted by the CDC in the early 1960's, reported only 4% and 5% of youth, aged 6-11 and 12-19 respectively, were classified as obese (CDC, 2010a; Ogden & Carroll, 2010). Results from the fourth National Examination Survey,

completed over a six-year span from 1988 to 1994, found the prevalence of obesity had

increased to approximately 11% in both age groups (CDC, 2010a; Ogden &

Carroll, 2010). By 2002, prevalence rates had risen to 16.5% of youth being obese

and an additional 31.5% at risk for becoming obese (Hedley et al., 2004). Figures

from the 2003-2006 NHANES indicated 17.0% and 17.6% of youth in the U.S. aged

6-11 and 12-19, respectively, had BMI levels at or above the 95th percentile while an

additional 33.3% and 34.1%, respectively, had BMI levels between the 85th and 95th

percentile (CDC, 2011; Ogden, Carroll, & Flegal, 2008). The most recent NHANES

survey, conducted in 2007-2008, reported increases in prevalence among both age

groups with 19.6% of youth aged 6-11 and 18.1% aged 12-19 having BMI

levels classifying them as obese (CDC, 2011). High prevalence rates of childhood obesity

are not limited to the U.S. Globally, 10% of school-aged children were classified as

overweight with average prevalence rates below 10% in Africa and Asia and over

20% in Europe and Canada (Lobstein, Baur, & Uauy, 2004; Sharma, 2006).
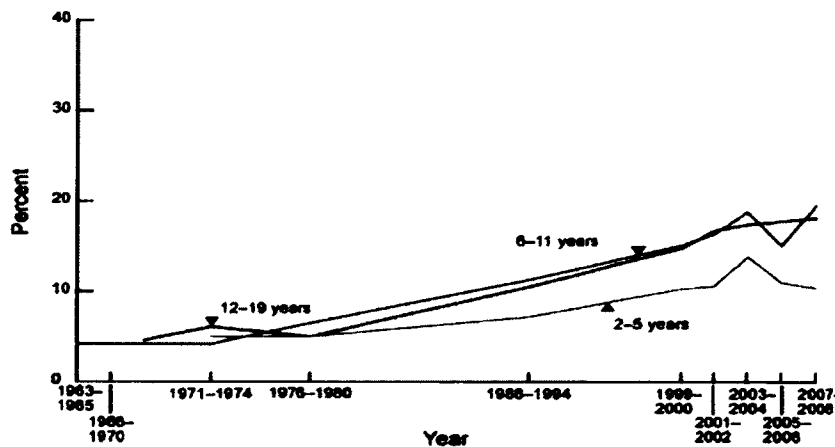
Figure 1. Trends in obesity among children and adolescents: United States, 1963-2008. Obesity is defined as body mass index (BMI) greater than or equal to sex- and age-specific 95th percentile from the 2000 CDC growth charts. Adapted from "Prevalence of Obesity Among Children and Adolescents: United States, Trends 1963-1965 Through 2007-2008" by C. Ogden and M. Carroll, 2010, Centers for Disease Control and Prevention (2010a).

Disparities exist amongst overweight and obese youth with higher incidence rates found in racial/ethnic minorities, low-income populations and immigrant groups (Institutes of Medicine, 2007). As compared to non-Hispanic white youth, obesity rates are approximately 20% higher among African American youth and 14% higher among Hispanic American youth (U.S. Department of Health and Human Services, 2008). According to the Institutes of Medicine (IOM) (2007), "African-American girls, aged 6-17 have experienced greater increases in obesity prevalence than white children and adolescents" (p. 76). In 2004, 20% of non-Hispanic black youth, 19% of Mexican American youth, and 16% of non-Hispanic white youth were found to be obese with the highest rates, 22% and 24%, found in Mexican American boys and African American girls, respectively (Caprio et al., 2008). Higher prevalence rates have been seen in "non-Hispanic black and Mexican-American children and adolescents, ages 2 to 10 years when compared to non-Hispanic white youth" (IOM, 2007, p. 77). Figures 2 and Figure 3 below delineate the prevalence of obesity among youth, aged 12-19 years, by race/ethnicity and gender.
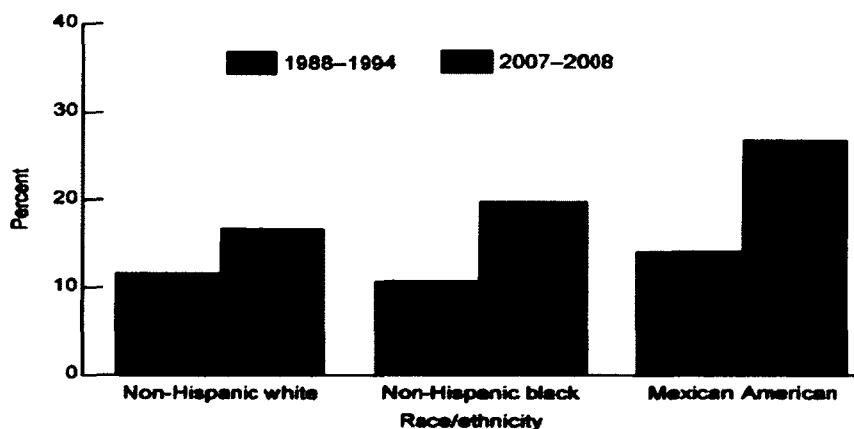
Figure 2. Prevalence of obesity among boys aged 12-19 years, by race/ethnicity: United States, 1988-1994 and 2007-2008. Obesity is defined as body mass index (BMI) greater than or equal to sex- and age-specific 95th percentile from the 2000 CDC growth charts. Adapted from "Prevalence of Obesity Among Children and Adolescents: United States, Trends 1963-1965 Through 2007-2008" by C. Ogden and M. Carroll, 2010, Centers for Disease Control and Prevention (2010a).
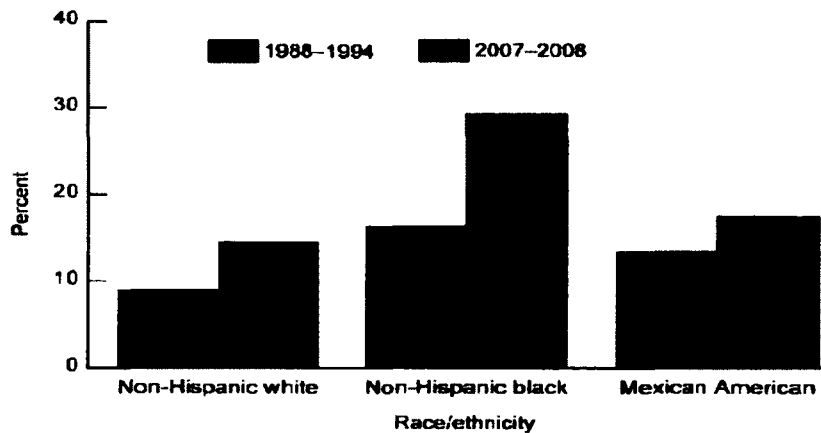
Figure 3. Prevalence of obesity among girls aged 12-19 years, by race/ethnicity: United States, 1988-1994 and 2007-2008. Obesity is defined as body mass index (BMI) greater than or equal to sex- and age-specific 95th percentile from the 2000 CDC growth charts. Adapted from "Prevalence of Obesity Among Children and Adolescents: United States, Trends 1963-1965 Through 2007-2008" by C. Ogden and M. Carroll, 2010, Centers for Disease Control and Prevention (2010a).

Higher incidence rates of child and adolescent obesity have also been shown to

vary amongst socioeconomic levels with the highest prevalence found in children who

live in poverty (family income below 100% of poverty) (Bethell, Simpson, Stumbo,

Carle, & Gombojav, 2010). In 2007, 44.8% of overweight and obese children lived in

poverty as compared to 22.2% of children living in households with a family income

greater than 400% of poverty (Bethell et al., 2010). Ethnicity and socioeconomic status

(SES) have been shown to negatively affect schools attended by minority and low SES

youth as these schools tend to be "clustered within poor school districts and have few

material resources (such as gymnasiums or athletic fields), human resources (coaches or

PE teachers) or programmatic support" (Li, Treuth, & Wang, 2009, p. 857).

Opportunities to be physically active are greatly diminished, thereby resulting in youth

spending an increased amount of time engaging in sedentary behaviors.

Obesity and physical inactivity among youth and adults places a tremendous

burden on both the U.S. economy and the nation's health-care system. Health care

spending alone has increased 36% as a result of obesity with the amount being spent on obesity-related conditions exceeding the amount spent on tobacco or alcohol-related conditions (Scott, 2008). Annual obesity-related medical costs increased from 6.5% of the total health care cost in 1998 to 9.2% in 2008 (CDC, 2009; Ward-Smith, 2010). Translated into actual dollars, the annual estimated cost in 1998 was $78 billion; by 2008, it had risen to $147 billion (DiNapoli & Lewis, 2008; Finkelstein, Trogdon, Cohen, & Dietz, 2009). The indirect costs related to adult obesity (i.e. lost work time, disability, lost productivity, and loss of income due to premature death), are staggering at approximately $66 billion in 2010 (Hammond & Levine, 2010). Costs associated with obesity-related diseases in youth have increased dramatically over the past two decades, rising from $35 million to $127 million (DiNapoli & Lewis, 2008; Zametkin et al., 2004). Hospitalization costs resulting from obesity-related conditions in youth were estimated to account for approximately 1.7% of the total annual hospital costs in the U.S. (Daniels, 2006). As reported by NASPE (2010b), it is estimated that $344 billion dollars will be spent on obesity-related costs by 2018 which will account for 21% of health-care spending in the U.S.

Being overweight and/or obese significantly affects not only a child's physical development but also their psychological, behavioral and psychosocial development (Murnan, Price, Telljohann, Drake, & Boardley, 2006). More immediate health consequences facing overweight children include fatigue, shortness of breath, and lack of motivation thus resulting in decreased concentration levels and difficulty learning. Long-term health effects include Type 2 diabetes, asthma, heart disease, high blood pressure (hypertension), high cholesterol, gallbladder disease,

osteoarthritis, menstrual irregularities, female infertility, and sleep apnea, many of which were once isolated to the adult population (Murnan et al., 2006; Pyle et al., 2006; Reed, et al., 2010).

Over the past 20 years, there has been a tenfold increase in pediatric Type 2 Diabetes in the general population which has been directly linked to increased overweight and obesity among youth (Barlow & Dietz, 2002; Dietz, 1998; Pinhas-Hamiel et al., 1996). Freedman, Dietz, Srinivasan, and Berenson (1999) found 60% of overweight children, aged 5-10, have one risk factor associated with cardiovascular disease and 20% to have two or more adverse risk factors. Obese youth have also been found to be nine times more likely to have high blood pressure compared to normal weight youth (Pyle et al, 2006). High blood pressure in childhood was determined to be one of the strongest predictors of having high blood pressure as an adult, thus greatly increasing the risk of developing cardiovascular disease later in life (Dietz, 1998; Pyle et al., 2006). Higher incidence levels of sleep apnea, ranging from 7% to 30%, have also been found in obese children (Barlow & Deitz, 2002; Dietz, 1998).

These conditions can have a significant impact on an overweight/obese child's overall quality of life especially if their condition persists into adulthood which, unfortunately, occurs more often than not. Research has shown being obese in childhood as the strongest predictor of adult obesity; the risk of becoming an overweight or obese adult is at least double for overweight children compared to children who were not overweight (Daniels, 2006; Dietz & Gortmaker, 2001; Fitzgibbon & Beech, 2009). This phenomenon was cited in the literature as early as the 1970's when

Abraham, Collins, and Nordsieck (1971) indicated approximately 80% of obese adolescents remained obese into adulthood. A study by Moran (1999) found similar results as three-fourths of the twelve-year-olds who were obese as a child became obese adults. A study by Smith (2004) noted that between 42-63% of school-aged children who were overweight carried that weight into adulthood. The Bogalusa Heart Study, which tracked approximately 2,400 children, aged 5-14 years, found 83% of obese black children remained obese as an adult as compared to 68% of obese white children (Freedman et al., 1999).

The age at which obesity starts has also been found to be an important indicator of adult obesity. Whitaker, et al. (1997) found in their study that children who became overweight before the age of 8 were more severely obese as adults. Gender plays a factor as well as it has been documented that obese women who were obese as a child tend to have lower education levels, earn lower wages, have a lower likelihood of getting married, and a higher likelihood of living in poverty (Gortmaker, et al., 1999). Due to the high prevalence of overweight and obesity from childhood to adulthood, researchers have predicted the current generation of children to have a lower life expectancy than their parents, a first in modern times (Preston, 2005; Olshansky et al., 2005).

Psychosocial and emotional issues such as depression, rejection by peers, low self-esteem, distorted body image, eating disorders, discrimination, and poor peer relationships have been found in children of all ages who are overweight or obese (Judge & Jahnes, 2007; Pyle et al., 2006). Judge and Jahnes (2007) found overweight girls, when compared to their non-overweight peers, to be at a higher risk

for negative social (i.e. loneliness and sadness) and behavioral (i.e. arguing and fighting) outcomes. Another study found a link between higher BMI scores in elementary school girls and depression (Erickson et al., 2000). According to a literature review conducted by Vàmosi, Heitmann, and Kyvik (2009), "symptoms of depression during childhood and adolescence were the most frequently identified risk factor related to adult obesity, particularly among women" (p. 181). Obese adolescents aged 13-14 reported increased sadness, loneliness, and anxiety compared to their non-obese peers (Pyle et al., 2006; Zametkin, et al., 2004). When compared with their average weight peers, obese children aged 9 to 12 years perceived their physical appearance more negatively and reported having a lower self-worth (Braet, Mervielde, & Vandereycken, 1997; Strauss, 1999). A study by Mustillo et al. (2003) found a direct relationship between chronic childhood obesity and oppositional defiant disorder in females and depression in males.

Dysfunctional eating behaviors have been found to be more prevalent in obese adolescents with the incidence of binge eating six times greater in this population (Zametkin et al., 2004). For these individuals, food often becomes a coping mechanism that allows them to better deal with the social, emotional, and psychological issues associated with being overweight (Pyle et al., 2006). In a study by VanderWal and Thelan (2000), overweight children were found to engage in dieting more frequently, express greater concerns about their weight and be more dissatisfied with their body image. This was seen to occur more frequently in girls as boys tended to be more concerned with muscular stature (McCreary & Sasse, 2000).

Increased suicidal thoughts and attempts were found in overweight adolescents

who reported being teased by their peers and/or family members (Daniels, 2006).

Hayden-Wade et al. (2005) found appearance-related teasing "to be pervasive and

frequent among the overweight sample" (p. 1387) as the overweight children were

teased almost three times more than the non-overweight children. Peer-teasing was

related to these children socially withdrawing, evident in the latter study as the

researchers found teasing to be "positively correlated with loneliness and preference

for sedentary, isolative activities" (Hayden-Wade et al., 2005, p. 1387). Peer-teasing was

also found to be a risk factor for the development of eating disorders due to a poor

self-perception of physical appearance (Hayden-Wade et al., 2005). In addition to the

teasing, "overweight children often experience higher rates of stigmatization and

social isolation than leaner children" (Judge & Jahns, 2007, p. 673). Several studies

have documented higher school absentee rates amongst obese children and

adolescents as compared to the general student population, possibly linked to the

pervasive bullying and teasing at school (Baxter, Royer, Hardin, Guinn, & Devlin,

2011; Geier et al., 2007; Schwimmer, Burwinkle, & Varni, 2003). According to

Bethell et al. (2010), obese and overweight children are more likely to be less

engaged in school, to miss more than two weeks of school in a given school year, and

to have to repeat a grade.

Quality of life is another psychosocial concern for overweight and obese youth.

These youth have been found to "have 5 times the risk of low health-related quality of

life compared to children of normal weight" (Murnan et al., 2006, p. 502). A study by

Brown, Birch, Teufel, and Kancherla, (2006) found the "majority of the students believed

that it was harder for overweight children to make friends with nearly a third claiming it

is *a lot harder*" (italics original) (p. 299). In a study by Zullig, Valois, Huebner, & Drane, (2005), the odds of an overweight adolescent reporting dissatisfaction with their life was found to increase linearly with the reporting of poor physical and mental health days. Schwimmer et al., (2003) found obese children and adolescents to be five times more likely than their counterparts to have quality of life scores comparable to that of pediatric cancer patients. Huurre, Aro, Rahkonen, and Komulainen, (2006) reported a link between poor physical and mental health as an adolescent and attainment of lower educational and socioeconomic levels in adulthood.

Early childhood has been found to be a critical time for the development of lifelong health habits as the maintenance of these habits into adulthood is often the result of the knowledge, attitudes, and behaviors acquired during these years (Li et al., 2009; Sharma, 2006). Engagement in regular physical activity and healthy eating are two of the key components to combating overweight and obesity amongst youth. Although the majority of youth, in a study by Brown et al., (2006), cited the primary reasons to becoming overweight to be lack of exercise and poor nutrition, many children and adolescents continued to engage in unhealthy lifestyles. Decreased exercise, increased consumption of high calorie snacks and general sedentary habits were found to be major contributors to the increased prevalence of overweight in youth (Brown, et al., 2006; Yetter, 2009). According to the CDC, in 2007, only 39% of 9-13 year olds reported participating in organized physical activity and only 17% of students in grades 9-12 stated they met the physical activity guidelines of engaging in physical activity for at least 60 minutes each day (CDC, 2010b). An additional study which examined data from the 2001-2006 National Health and Nutrition Examination Study found that

approximately 47% of children in the U.S. spent ≥2 hours engaging in sedentary behavior each day (Sisson et al., 2010). Li, Treuth and Wang (2009), in their study examining the patterns and trends of physical activity and sedentary behaviors amongst adolescents, found minorities, particularly African American students, to be less likely to engage in physical activity when compared to their Caucasian peers.

Technological advances have further attributed to the increase in sedentary behaviors among youth. A national survey of children and adolescents' use of all forms of available media found children spend, on a daily basis, an average of five and a half hours in front of a screen (e.g. television, computers, videogames) (Roberts & Foehr, 2004). Results from the 2007 Youth Risk Behavior Surveillance Survey found 24.9% of adolescents in the U.S. reported spending a daily average of greater than or equal to three hours of screen time not related to school work (CDC, 2008). A meta-analysis which looked at randomized controlled studies focused on reducing sedentary behavior with BMI as their primary outcome found TV viewing in excess of 2 hours each day was positively associated with "unfavourable body composition, decreased fitness, lowered scores for self-esteem and pro-social behavior and decreased academic achievement" (Tremblay et al., 2011, p. 98).

Physical Activity and Health

Regular physical activity has been shown to greatly influence the physical fitness levels of children and adolescents (Sollerhed & Ejlertsson, 1999). Physical activity guidelines, released by the CDC (2010b), recommend that children and adolescents engage in a minimum of 60 minutes of physical activity daily with most of this time spent in activities that are considered to be moderate or vigorous intensity (MVPA). The CDC

(2010b) also recommends that activities promoting strengthening of muscles and bones be included as part of the daily 60 or more minutes of physical activity. Objective PA-3 in *Healthy People 2020*, which focuses on increasing physical activity levels of youth, states; "Increase the proportion of adolescents who meet current Federal physical activity guidelines for aerobic physical activity and for muscle strengthening activity" (U.S. Department of Health and Human Services, 2010, p. 266). With schools being one of the only opportunities many youth have to engage in physical activity, reduction in time spent in health and physical education significantly decreases the likelihood that approximately 50% of children in the U.S. will meet these requirements (Trudeau & Shephard, 2005).

Regular physical activity has been shown to provide numerous health-related benefits to include disease risk reduction, better quality of life, longer life span, and improved psychological and emotional health (Bailey, 2006). Participation in regular physical activity among children has been found to be a key determinant in the prevention of chronic diseases and the successful management of weight (Dunn, Trivedi & O'Neal, 2001). According to Bailey (2006), a large body of literature exists which shows inactivity to be "one of the most significant causes of death, disability, and reduced quality of life across the developed world" (p. 398). The CDC (2011) also identified physical inactivity as one of six health behaviors that often emerges during youth, are persistent into adulthood and are linked to mortality, morbidity, and reductions in quality of life.

Physical activity has been documented to positively affect the psychological health of youth (Chomitz et al. 2009; Dishman, 1995). This has been shown to be

especially true with children's self-esteem level (Chomitz et al., 2009; Fox, 2000; Vail, 2006). Other documented benefits include reductions in stress, anxiety, and depression all of which affect student performance in school (Chomitz et al., 2009; Hassman, Koivula, & Uutela, 2000; Taras, 2005; Vail, 2006). Adolescents who are physically active "are less likely to attempt suicide, adopt risk-taking behaviors, and become pregnant" (Taras, 2005, p. 214).

Regular physical activity has been linked to improvements in cognition, memory, and concentration in all age groups (Etnier et al., 1997; Trudeau & Shephard, 2010). Experimental studies have provided evidence that physical activity improves blood flow to the brain thus possibly improving cognitive functioning and overall brain health (Blakemore, 2003; Taras, 2005; Trudeau & Shephard, 2010). Physical activity has also been shown to improve "the creation of networks of nerve cells, which is the essence of learning" (Sollerhed & Ejlertsson, 1999, p. 249). According to Kenneth H. Cooper, M.D., M.P.H, "father of aerobics" and founder and chairman of The Cooper Institute, increased amounts of exercise improves cardiovascular health which helps the brain to function more efficiently thus enhancing the ability to learn (Texas Education Agency, 2009). A meta-analysis by Sibley and Etnier (2003) found a small but significant link between PA and cognitive performance in school-aged children with one of largest effect relating to improvements in IQ. Improvement in classroom behavior was also noted to have occurred during a study which investigated the effects of infusing five minutes of daily physical activity into a second grade classroom (Maeda & Randall, 2003). The classroom teacher also "reported anecdotally that they were able to get more done" (Maeda &

Randall, 2003, p. 20). An additional review by Strong et al. (2005) found physical

activity to have an effect on concentration and classroom behavior.

Physical Fitness and Health

As recommended by NASPE, students should "achieve and maintain a health-

enhancing level of physical fitness which includes activities to improve cardiorespiratory

endurance" Eyler et al., 2010, p. 328). However, according to the National Health and

Nutrition Examination Survey (NHANES) (1999-2002), "roughly one third of U.S. youth

aged 12 to 19 fail to meet the levels of cardiorespiratory fitness deemed appropriate by

experts" (Pate, Wang, Dowda, Farrell, & O'Neill, 2006, p. 1010). In addition, data from

the 1999-2002 NHANES survey found fitness levels decreased as age increased (Pate et

al., 2006). Results from this survey also showed decreased fitness levels to be directly

linked to increased obesity amongst adolescents (Pate et al., 2006). Shriver et al. (2011),

in their study on the weight status, physical activity, and fitness of 237 rural third-grade

students, noted that 38% of the students were overweight or obese and those that were

obese had significant lower cardiovascular endurance levels as compare to the non-obese

children. An additional study of 2,927 children, aged 5-13, which investigated the

relationship of physical fitness to the prevalence of overweight school-aged children

found the overweight children to perform significantly lower on an endurance run test as

compared to the healthy-weight children (Kim et al., 2005). This study also found that

failing the cardiovascular test to be a significant predictor of obesity among the girls in

the sample population (Kim et al., 2005).

A study conducted by the Texas Education Agency, which analyzed FitnessGram

data from 6,532 schools (75% of all schools in Texas), found cardiovascular fitness levels

declined as students advanced grade level; girls were noted to exhibit higher performance

levels until grade 9 at which point the boys performance levels were higher (Morrow, Martin, Welk, Zhu, & Meredith, 2010; Texas Education Agency, 2009). A longitudinal study which followed the cardiorespiratory fitness levels of 274 adolescent girls from 8th through 12th grade reported fitness levels to decline during this time frame (Pfeiffer, Dowda, Dishman, Sirard, & Pate, 2007). A cross-sectional study of 6,511 students, aged 6-14, found the pass rate on the FITNESSGRAM tests (PACER, push-ups, trunk-lift, curl-ups & sit and reach) to decline markedly as the children aged; a difference in the declination level between the boys and girls was noted in the study (DiNapoli & Lewis, 2008).

Studies have also shown a strong association between physical activity and improvements in health-related fitness (i.e. body composition, cardiovascular endurance, muscular strength, muscular endurance, and flexibility). Physical activity is often viewed as the process by which health-related fitness is achieved (Cale & Harris, 2002; McKenzie & Kahan, 2004). A study of 248 children between the ages of 8 and 11 found the boys and girls that were more physically active for greater periods of time had higher aerobic endurance levels as compared to the less physically active children (Dencker et al., 2006). Results from these studies warrant the necessity of preventing declines in fitness by ensuring the health and well-being of youth.

Health-Related Fitness and Cognitive Ability

Several empirical studies have shown a direct correlation between physical activity and fitness levels and cognitive ability in youth (Blakemore, 2003). Research has consistently shown "that the more fit you are, the more resilient your brain becomes and the better it functions both cognitively and psychologically" (Ratey, 2008, p. 247). Hillman, Castelli, and Buck (2005) examined the relationship between fitness and

cognition in children. Their study, which compared the fitness level, determined via FitnessGram testing, of a sample of healthy preadolescent children to their performance on specific cognitive tasks, found the higher fit children to have greater attention levels and working memory resources as compared to those children placed in the lower fit category (Hillman et al., 2005). A meta-analysis by Etnier et al. (1997) found health-related fitness to improve cognitive, memory, and concentration skills. "Essentially, all studies examining physical education, physical activity, and cognitive performance have shown either a positive or neutral effect" (Le Masurier & Corbin, 2006, p. 48).

One of the first studies to investigate the correlation between health-related fitness and academic performance was conducted by Gabbard and Barton over three decades ago (Reed, et al., 2010). These findings were supported in a meta-analysis conducted by Sibley and Etnier (2003) which showed a significant link between the amount of exercise engaged in by youth and academic performance. An additional study conducted by Wittberg, Northrup, and Cottrel (2009), which investigated whether different areas of fitness were directly related to different academic areas, found a direct association between fitness level and cognitive functioning particularly in those children who had higher aerobic fitness levels. A longitudinal study by London and Castrechini (2011), which examined the relationship between changes in fitness and academic performance in both fourth through seventh and sixth through ninth grades (1,325 and 1,410 students respectively), found the "achievement gap between persistently fit and persistently unfit children begins as early as fourth grade" (p. 406). The results of this study suggests that a "fitter child is more likely to succeed in the academic environment" (Wittberg et al., 2009, p. 33). Reed et al., (2010), through their study examining to what extent would

integrating physical activity into elementary curricula affect fluid intelligence and academic achievement, provided further evidence that movement not only positively influences the "fluid intelligence of youth" but should also be considered an essential element in promoting cognition in elementary-age children (p. 349). According to Dr. John Ratey (2008), exercise is the single-most important means by which people can optimize brain function.

School-Based Health Programs

In the U.S., there are an estimated 66,000 public elementary schools, 12,000 middle schools, and 14,000 high schools (IOM, 2007). Within these schools, enrollment in grades pre-K-12 was projected at 55.5 million for the 2011-2012 school year (U.S. Census Bureau, 2011). School-based health programs have the ability to reach a large majority of youth not only because of the sheer number enrolled in schools but also due to the majority of children, starting at age 5, spend the majority of their day in school for 9 to 10 months each year (IOM, 2007; Tassitano et al., 2010; Trudeau & Shephard, 2005; Welk et al., 2010). They also reach youth from all socioeconomic backgrounds thus allowing programs to reach populations most at risk.

Schools have the capacity to have a long-term impact on health by promoting nutrition, physical activity, and fitness holistically throughout the school environment (Oliver, Schofield, & McEvoy, 2006). Schools are an ideal setting "to enhance students' dietary intake and physical activity opportunities and to provide relevant and behavioral change programs" (IOM, 2007, p. 280). Research-based curricula composed of activities focused on building skills and enhancing knowledge have been developed and tested in schools across the country, many of which have been found to be efficacious in evoking

positive lifestyle changes (IOM, 2007). School health programs are unique in that they have the ability to significantly impact the lives of youth by enhancing health-related knowledge, attitude and skills, instilling healthy behaviors and improving health, education, and social outcomes (Kolbe, 2002; Li et al., 2009; Trudeau & Shephard, 2008). Addressing the obesity epidemic through school-based programs promoting physical activity and health has been called for by medical groups and public health agencies across the country (IOM, 2007; Katz et al., 2005; Welk et al., 2010).

School-based interventions have been found to be efficacious in enhancing health-related knowledge and evoking behavioral changes regarding nutrition, physical activity, and fitness. Well-designed and implemented school curricula has the ability to "alter children's knowledge, attitudes and beliefs and lead to changes in either food consumption or activity levels at school and at home" (Dietz & Gortmaker, 2001, p. 339). Schools are an ideal setting for disseminating this type of information due to the number of students enrolled in school combined with the number of hours students spend in school each week helps to ensure a high compliance rate among participants (Pyle et al., 2006; Trudeau & Shephard, 2005). In addition, utilizing school-based interventions to target obesity through improving health is essential as the health of our children is needed for maximum gains in all aspects of education (Pyle et al., 2006). These types of interventions have been found to have the greatest impact if implemented during the elementary school years and sustained for a minimum of one school year (Greenberg, et al. 2003; Warren, Henry, Lightowler, Bradshaw, & Perwaiz, 2003; Yetter, 2009).

A longitudinal study by Gortmaker et al. (1999) tested the effectiveness of the "Eat Well and Keep Moving Program", a school-based program designed to improve

nutritional habits and increase physical activity levels of 4th and 5th grade elementary school children in Baltimore, MD. While the results of the study found the intervention to improve dietary habits and increase physical-activity knowledge across the 6 intervention schools, no effect was observed for time spent engaging in moderate physical activity (Gortmaker et al., 1999; Pyle et al., 2006). The results of a study which utilized the "Pathways" program, a culturally appropriate school-based curriculum designed to improve nutritional habits and increase physical activity levels among American Indian schoolchildren, found the program "induced significant positive changes in knowledge and health behaviors among treatment participants" (Davis et al., 2003; Pyle et al., 2006, p. 368). Study results from self-reported physical activity questionnaires also showed participants in the intervention group had higher physical activity levels as compared to the control group (Davis et al., 2003).

Study trials have shown improvements in youth nutritional habits, physical activity and fitness levels and reductions in obesity as a result of the implementation of well-designed interventions (Datar & Sturm, 2004). A review of the literature focused on school-based interventions targeting childhood obesity, identified 11 of 12 controlled experimental research studies in which there was a significantly higher reduction in the percentage of overweight youth as compared to the control group (Story, 1999). Of these twelve studies, a study by Brownell and Kaye (1982) exhibited one of the largest effects (15% reduction in overweight).This study also incorporated the most intervention components, notably physical activity, nutrition education, behavior modification, food service, and parental involvement (Brownell & Kaye, 1982). The review also found the most effective interventions to be those targeting young children (Story, 1999). While

these studies showed significant effects, only in two was follow-up data, up to six-months, available; therefore, evaluating the long-term effects of school-based interventions is warranted (Foster, Waddell, & Brownell, 1985; Zakus, Chin, Cooper, Makovsky, & Merrill, 1981).

A study conducted by Simons-Morton, Parcel, Baranowski, Forthofer, and O'Hara (1991) investigated the effectiveness of a school-based program focused on improving physical activity and nutrition behaviors amongst students. Four elementary schools in a Texas school district were recruited for the study; two were assigned to the intervention group and two to the control group. The results of the study showed students in the intervention schools to exhibit more positive behaviors towards nutrition and physical activity as compared to students in the control schools (Simons-Morton et al., 1991). These students exhibited much higher physical activity levels at posttest as compared to their baseline levels (Simons-Morton et al., 1991). This study was the first of its kind to "demonstrate the potential of altering the school environment to promote a more healthful diet and more vigorous physical activity among children" (Simons-Morton et al., 1991, p. 990). The study also showed the efficacy of schools as an important arena in which to improve the health-related behaviors of children (Simons-Morton et al., 1991).

The "Be Smart Program", developed by Warren et al., (2003) and implemented in the United Kingdom for children aged 5 to 7, focused on nutrition and physical activity. Program participants were randomly assigned to one of four groups, Eat Smart (nutrition), Play Smart (physical activity), Eat Smart, Play Smart (both topics), and Be Smart (control group) (Pyle et al., 2006, Warren et al., 2003). Results from the program

showed improvements among the three intervention groups in knowledge of nutrition with the largest effects being found in both the Eat Smart and Eat Smart, Play Smart groups (Warren et al., 2003). Results from the study demonstrated the viability of schools as a desirable setting for promoting healthy lifestyles among children (Warren et al., 2003).

A 2-year study by Donnelly et al., (1996) investigated the use of a school-based intervention focusing on increasing physical activity, enhancing knowledge of health lifestyles and changing food choices in the school cafeteria. Elementary schools in two school districts in rural Nebraska were randomly assigned to an intervention or control group and the program was implemented in grades 3 to 5 in the intervention schools (Donnelly et al., 1996). Aerobic fitness, body composition, nutritional knowledge, blood chemistry, energy intake, and physical activity data were collected on all students at the beginning and end of the school year (Donnelly, et al., 1996). The results of the study showed the intervention schools to have a marked increase in nutritional knowledge (Donnelly et al., 1999; Pyle et al., 2006).

Health and Physical Education

History of Health and Physical Education

Public education began in America in the 1600s as the first preliminary schools were established in several colonies throughout New England (Swanson & Spears, 1995). Early curriculums focused on teaching traditional subjects, i.e. reading, arithmetic, and religion, with little to no emphasis placed on physical education (Physical-education-institute, 2010). Some schools did, however, view exercise as a way to improve the health of their students and occasionally offered programs (Swanson & Spears, 1995).

Educators also viewed engaging children in games involving physical activity, e.g. Hop-

Scotch and Marbles, to be a way of teaching moral lessons (Swanson & Spears, 1995).

Friedrich Ludwig Jahn, considered to be the "father of modern physical

education", established the first gymnastic school for children in Germany in the early

1800s (Swanson & Spears, 1995; Physical-education-institute, 2010). Jahn's gymnastic

program, which led to the opening of gymnasiums across much of Europe, was brought

to America in the early 18th century by Dr. Charles Beck, Charles Follen, and Frances

Lieber, all former students of Jahn's (Swanson & Spears, 1995). This program remained

a part of physical education in America up through the 1920's (National Association for

Sport and Physical Education, 2010a). During the late 17th and early 18th centuries, an

increased emphasis was placed on improving health through exercise and movement.

Reformers played a key role in the first understandings of the connection between

physical inactivity and health as they "worried about the health of men living in towns

and cities because of the comparative lack of physical activity in their daily lives"

(Swanson & Spears, 1995, p. 86). The use of gymnasiums as a place to exercise became a

focus of the reformers with the first private gymnasium being opened at Harvard College

in 1820 (Sidentop, 2008).

During the early 1800s, girls attended either seminaries or academies. It was at

these schools that daily physical education programs focusing on such activities as

calisthenics, dancing, riding and walking began (Swanson & Spears, 1995). Journaling

was included in the curriculum as the girls were encouraged to record information and

observations about their health which could then be used to "determine the kind of

exercise, food, and general living most suited to their particular constitutions" (Swanson

& Spears, 1995). Catharine Beecher founded the Hartford Female Seminary in

Connecticut in 1824 and it was there that students devoted thirty minutes a day engaging

in Beecher's callisthenic program making it "perhaps the most vigorous and sustained

program of exercise available to women in the 1820s" (Sidentop, 2008; Swanson &

Spears, 1995, p. 93). The Round Hill School, founded by Joseph Cogswell and George

Bancroft, opened in 1823 in Massachusetts as the first school to make PE an "integral

part of the curriculum" (Swanson & Spears, 1995, p. 88). Dr. Charles Beck was hired to

teach PE in 1825 thus becoming the "first recognized teacher of physical education in the

United States" (Sidentop, 2005, p. 26).

By the mid-1800s, more of a societal focus on health and wellness began to

emerge. The first state legislation to pass requiring PE in public schools was introduced

by Swett, California State Superintendent of Public Instruction, in 1866 (Swanson &

Spears, 1995). Included in the legislation was a requirement that "primary schools must

allot a minimum of five minutes twice each day for free gymnastics and vocal and

breathing exercises" (Swanson & Spears, 1995, p. 130). In 1879, Dr. Dudley A. Sargent

was named Assistant Professor of Physical Training and Director of the Hemenway

Gymnasium at Harvard. Sargent was a proponent of anthropometry and believed physical

examinations, i.e. fitness testing, provided the basis upon which individualized fitness

could be built (Sidentop, 2005; Swanson & Spears, 1995).

The late 1800s became a time in which "Americans found joy and satisfaction in

many sports and accepted physical education as a means of improving the health and

general welfare of the nation's youth" (Swanson & Spears, 1995, p. 146). This time also

marked the beginning of the Industrial Revolution which was one of the most significant

events in the history of physical education (Physical-education-institute, 2010). As

factory work replaced the labor-intensive jobs of rural life and urbanization allowed

people to get around with less effort, physical activity levels decreased (Physical-

education-institute, 2010). Cardiovascular disease, cancer, and Type 2 diabetes became

prevalent and by the mid 20th century had emerged as the leading cause of disease and

death (Physical-education-institute, 2010). In response, doctors began recommending that

people of all ages engage in physical activity to maintain their health (Swanson & Spear,

1995).

Between 1885 and 1917, the number of public schools in America significantly

increased as more youth were attending school (Swanson & Spear, 1995). In the 1890s,

John Dewey led a group of educators to challenge the traditional public school

curriculum citing it was too narrow in focus (Swanson & Spears, 1995). As a result, the

curriculum was expanded to include PE and teachers were hired that were not only

qualified to teach health and physical education but to also coach interscholastic teams

(Swanson & Spears, 1995). In 1891, physical education was recognized by the National

Education Association as a curricular field and the need for PE teacher training programs

at the post-secondary level emerged (Sidentop, 2005). The philosophy of Thomas

Dennison Wood, head of the Physical Education department at the Teachers College,

strongly impacted what became known as the "new physical education system, a system

which emphasized the "natural" programs of play, games and sport for teaching

intellectual awareness and moral and social behavior" (Swanson & Spears, 1995, p. 185).

By 1917, formal physical education programs utilizing the "new physical education"

were in place in many schools.

Legislation requiring physical education was passed in many states in the 1920s and physical education programs became an accepted part of secondary and post-secondary curriculums (Boyce & Mitchell, 2011; Swanson & Spears, 1995). Sport was the dominant component of programs for boys at the secondary level while the girls programs focused on games, dance, and more individualized sports. At the elementary school level, physical education remained essentially nonexistent up until the 1950s as only a few schools in some of the larger cities had implemented formal programs prior to that time (Boyce & Mitchell, 2011; Swanson & Spears, 1995). In 1953, the Kraus-Weber study found American children to be less fit than children in Europe (Boyce & Mitchell, 2011). Concern over these results led to the formation of the President's Council on Physical Fitness in 1956 and an increased emphasis on health and physical education (Boyce & Mitchell, 2011; Sidentop, 2005). Schools began to hire qualified HPE specialists and more space was provided for programs in the schools. The Physical Education for Progress program was established under Title X of the Elementary and Secondary Education Act of 1965 (Lee et al., 2007). This program, currently known as the Carol M. White Physical Education Program (PEP), was designed "to initiate, expand, or enhance physical education programs, including after-school programs, for students in kindergarten through 12th grade" (Lee et al., 2007, p. 437). In the early 21st century, the National Association for Sport and Physical Education (NASPE) began establishing standards for quality physical education, sport and physical activity programs as well as for health and physical education teacher training programs (NASPE, 2011).

School-Based Health and Physical Education Programs (HPE)

A review of the literature by Kahn et al. (2002) identified five components which make up the core of effective physical education programs; increase in physical education minutes, inclusion of activities that are moderate or vigorous in intensity, certified Health and Physical Education teachers and professional development, a supportive environment (proper facilities, equipment), and interventions that are adapted to specific target populations (Brownson, Chriqui, Burgeson, Fisher, & Ness, 2010). Le Masurier and Corbin (2006) noted that criteria for quality health and physical education programs should include providing a variety of instructional activities designed to, through the use of motor skills, "enhance the physical, mental, and social/emotional development of every child, as well as the creation of an environment that supports the inclusion of all students" (p. 46). Physical education programs have also been found to be most successful when teacher training programs are included, physical activity concepts are incorporated into both core and physical education curricula and activities promoting movement are offered to students on a daily basis (Murnan et al., 2006).

Physical education is defined as an "academic subject offered during the school day and organized according to a curriculum that is regulated by some governmental rules" (Trudeau & Shephard, 2008, p. 267). As noted by NASPE (2010b), "physical education is a curricula area that helps students to develop physical and cognitive skills while engaging in physical activity" (para. 3). Physical education programs focus on "human and motor development acquired through knowledge and practice of physical activities" (Tassitano et al., 2010, p. 127). Quality physical education programs "provide learning experiences that improve mental alertness, academic performance, and readiness and enthusiasm for learning in our nations' youth" (NASPE, 2012b, para. 4). The four

components of a high-quality health and physical education program, as identified by NASPE (2012b), include the opportunity to learn, meaningful content, appropriate instruction and student performance and assessment. Programs that incorporate "meaningful and appropriate instruction" provide students with the means to learn significant lifetime skills (NASPE, 2010b), According to NASPE (2010b), providing a quality physical education program is an essential part of the formative growth of both children and adolescents.

The teacher has been shown to be a critical component of quality health and physical education programs; therefore, it is essential that school districts adopt policies which require all new teachers to not only have undergraduate and/or graduate training but to also be certified as health and physical education specialists. As recommended by NASPE (2004), highly qualified health and physical education teachers will be those that have received certification through the completion of an accredited health and physical education teacher education program. While results from the School Health Policies and Program Study (SHPPS) found that between 2000 and 2006, there was an increase in the percentage of school districts that had adopted policies requiring newly hired health and physical education teachers to have undergraduate and/or graduate training in physical education, there are still school districts in which the classroom teacher is required to provide instruction in physical education (Kann, Brener & Wechsler, 2007). At the high school level, the number of school districts that had adopted policies requiring health and physical education teachers to be certified by the state had increased from 78.6% to 92.6% (Kann et al., 2007).

As a result of their training, health and physical education specialists are the most prepared to offer high quality instruction. Studies have shown, as compared to their non-specialist peers, they incorporate longer and more intensive activities thus increasing the likelihood of having a positive impact on the health and fitness of their students (Janzen et al., 2003; Sallis et al., 1997). Health and physical education specialists, as compared to the classroom teacher, have been found to not only deliver instruction that is more meaningful and appropriate but to also have a much higher interest in teaching the material thus positively influencing students' attitudes towards engaging in activities that promote physical activity and fitness (Le Masurier & Corbin, 2006; Mandigo et al., 2004). Several studies have shown that participation in moderate-to-vigorous physical activity is higher when health and physical education is taught by specialists (McKenzie & Kahan, 2004; Sallis et al., 1997).

Impact of Physical Education

For youth, physical activity should be an integral part of their everyday life. Quality health and physical education programs have been shown to provide the best opportunity for youth to not only engage in physical activity but to also acquire the knowledge, skills, and attitudes needed to adopt and sustain an active and healthy lifestyle (Le Masurier & Corbin, 2006; NASPE, 2012a; Tassitano et al., 2010). However, for many youth, participation in a school-based PE program is often the only opportunity for them to be physically active (Bailey, 2006; Trudeau & Shephard, 2008). This is especially true for low-income youth as socioeconomic status has been found to be a major predictor of participation in physical activity outside of the school environment (Vilhjalmsson & Thorlindsson, 1998). As a result, engaging in moderate to vigorous physical activity at least three times per week should be a part of every school curriculum

(Leupker, 1999). NASPE guidelines state, "schools provide 150 minutes of instructional physical education for elementary school children, and 225 minutes for middle and high school students per week for the entire school year" (NASPE, 2012a, para. 2).

Through the offering of quality health and physical education programs that meet the time requirements set forth by NASPE, schools have the ability to greatly impact students' physical activity and fitness levels which may, in turn, have a lasting effect on their long-term health (Murnan et al., 2006; NASPE, 2010b; Trudeau & Shephard, 2005). A quality health and physical education curriculum not only provides students with the knowledge and skills to be physically active for a lifetime but also teaches motor skills and self-management and self-assessment skills (CDC, 2010b; Le Masurier & Corbin, 2006). Quality health and physical education programs utilize curriculum lessons that are appropriate to the age and skill level of the students, keep the students active and engaged greater than 50% of the class time and are enjoyable for all students (CDC 2010b; Shephard & Trudeau, 2008).

Participation in quality health and physical education programs has been found to have numerous benefits to include enhancement of self-efficacy and self-esteem, improvement in socialization skills, and increased social and cognitive development (Bailey, 2006; Trudeau & Shephard, 2008). Fundamental movement skills, developed as part of a quality PE program, provide the foundation for the skills needed for later participation in sports and physical activity (Gallahue & Ozmun, 1998; Maeda & Randall, 2003). Through development of these skills, children begin to understand not only how to be physically active but also the benefits of being physically active, benefits which will allow them to see the value of leading a physically active lifestyle into

adulthood (IOM, 2005; Maeda & Randall, 2003). A direct link has been shown between the development of a strong foundation in these skills and the level of physical activity, both in childhood and as an adult (Okely, Booth, & Patterson, 2001). As noted in the literature, physical education programs are being seen as a cost-effective way for the next generation of adults to lead physically active lives (Bailey, 2006; Shephard & Trudeu, 2000).

Lack of Physical Education

All students in grades Pre-K-12 should be given the opportunity to participate in a quality health and physical education program that meets the standards set forth by NASPE (2012b). However, this is not occurring as, according to the 2006 School Health Policies and Program Study (SHPPS), students were only required to take some form of physical education in 78.3% of schools in the U.S. (Kann, Brener & Wechsler, 2007). In addition, in many of these districts, the "forms of physical education" being offered did not meet the NASPE standards of a quality PE program (Kann et al., 2007). The study reported that only in 69.3% of elementary schools and 83.9% of middle schools were students required to take physical education either as a graduation requirement or to advance to the next grade level (Evenson, Ballard, Lee, & Ammerman, 2009; Kann et al., 2007; Lee et al., 2007). In 2007, only 53.6% of students in high school stated they attended PE on 1 or more days each week; less than 30% reported attending PE daily (CDC, 2008). In addition, in only 4% of elementary schools, excluding kindergarten, 8% of middle schools, and 2% of high schools was daily physical education or its equivalent provided for all students for the entire school year (Kann, Brener, & Wechsler, 2007;

Lee et al., 2007). As of 2010, in only five states, Illinois, Massachusetts, New Mexico,

Iowa, and Vermont, was physical education required in grades 1-12 (NASPE, 2010b).

There is a growing body of evidence suggesting that targeting the school

environment through policy-based approaches, e.g. health and physical education

programs, may have the most significant impact on youth obesity levels (Masse et al.,

2007). However, during the 2007-2008 school year, only one-third of all school districts

had a wellness policy stating specific time requirements for health and physical education

with only three to four percent implementing policies requiring health and physical

education times which met the recommended standards set forth by NASPE (Brownson

et al., 2010). Although 40 new laws increasing the amount of PE being offered in the

schools have been passed by states over the past couple of years, "many states still lack

PE time standards at all grade levels and classes that keep kids moving and having fun in

a variety of activities" (Winterfield, 2007, p. 36). In addition, most states do not have a

specified amount of time devoted to health and physical education instruction and about

half of all states allow exemptions, waivers, and/or substitutions (NASPE, 2010b). The

total amount of weekly curricula time allocated to health and physical education by the

local school board has been found to be "a major determinant of overall student PA"

(Trudeau & Shephard, 2005, p. 91). Students that have binding health and physical

education requirements throughout middle and high school have been shown to have

higher physical activity levels with a significant increase being seen amongst girls

(Durant et al., 2009). In addition, great variation exists in the delivery of programs in the

U.S. According to Shephard and Trudeau (2008), programs "range from a quality, high-

intensity offering taught 5 days a week by a PE specialist to a modest activity class taught

once per week by the homeroom teacher" (p. 253). Variations in curricula content also occur as instructional focus ranges from preparing students for competitive team sports to teaching lifetime health-related skills (Shephard & Trudeau, 2008).

One of the most significant constraints faced by health and physical education programs across the country is the pressure on schools to ensure student performance on state standardized testing is at a level that meets Adequate Yearly Progress (AYP) as defined by the No Child Left Behind (NCLB) Act of 2001 (Brownson et al., 2010; Welk et al., 2010; West & Shores, 2008). As a result of NCLB, school districts have decreased the time allotted for physical education and recess in order to focus on the core subjects, i.e. reading, writing, math, and science (Brown et al., 2006; Brownson et al., 2010; Chomitz et al., 2009). Physical education has historically been viewed as a subject that "reduces instruction time in other areas" (Maeda & Randall, 2003, p. 15). A report released by the Center on Educational Policy noted that in 46% of school districts in the U.S., instructional time in English/Language Arts and Math had increased while the time allotted to PE had concurrently decreased by 25 to 49 minutes per week (McMurrer, 2008). Achievement has become the focus of school curricula thereby making the health of America's youth a low priority of most school districts (Castelli, Hillman, Buck, & Erwin, 2007). Health and physical education specialists across the U.S. have cited PE being viewed as a low academic priority to be a significant barrier in increasing physical activity during the school day (Madsen et al., 2009). Budgetary constraints, reduction in facilities and limited resources have also contributed to the decline in the time allotted to PE (Leupker, 1999; Yetter, 2009; Welk, et al., 2010).

Physical Education and Health

In response to the youth obesity epidemic, experts in the field have called for an increased focus on physical education as a crucial public health strategy for addressing the health issues associated with being overweight and/or obese (Anderson, 2000; Berenson et al., 1998; Shephard, 2005; The President's Council on Physical Fitness and Sport, 2009). *Healthy People 2020*, released in 2010 by the Department of Health and Human Services (DHHS), included the following objectives which focus on increasing PE time in schools:

- PA-4: Increase the proportion of the Nation's public and private schools that require daily physical education for all students.

- PA-5: Increase the proportion of adolescents who participate in daily school physical education. (DHHS, 2010, p. 255-266)

Results from a study by Tassitano et al. (2010), which investigated the association between participation in PE and health-related behavior among students in high school, provided strong evidence "supporting the need to provide students with good quality PE at least twice a week" (p. 132). This study also noted health and physical education to be "a promising way to promote health-related behaviors among adolescents" (p. 132). The literature indicates that devoting more instructional time to health and physical education not only improves student behavior but also enhances academic performance (Strong et al., 2005). Students who regularly participate in health and physical education have been shown to be "better able to concentrate when they are in the classroom" (Vail, 2006, p. 15). Therefore, the evidence strongly supports the association between a well-planned and implemented program and the psychological well-being of youth (Bailey, 2008).

According to Jane Nelson, Texas Senator, "We have to stop treating PE as optional, because it is as fundamental to the success of our students as reading, writing and arithmetic" (Winterfield, 2007, p. 36).

The literature strongly suggests well-designed and well-implemented school-based health and physical education not only improves physical activity, physical competence and health-related fitness among youth but also promotes positive attitudes towards and enjoyment of physical activity (Bailey, 2006; NASPE, 2010b; Pate et al., 2005; Trudeau & Shephard, 2005; Tur, Puig, Benito, & Pons, 2004; Videon, & Manning, 2003; Xie, Gilliland, & Rockett, 2003). A longitudinal study by Prochaska, Sallis, Slymen, & McKenzie (2003) which examined the enjoyment levels towards health and physical education of 414 elementary school students over a 3-year period, found enjoyment levels to decrease dramatically from fourth to sixth grade. The researchers found enjoyment levels to be lower in girls and in those students not involved in organized sports; ethnicity and BMI were not found to be significant predictors of enjoyment level (Prochaska et al., 2003). The literature also suggests that students who have more positive attitudes towards participating in physical activity in PE were the ones who were more like to be physically active outside of school (Subramaniam & Silverman, 2007; McKenzie, 2003; Portman, 2003).

Developing these attitudes as a child has also been shown to play a crucial role in maintaining an active lifestyle through adulthood (Subramaniam & Silverman, 2007). Physical education programs, therefore, play a very influential role in helping students to not only develop positive attitudes towards physical activity but also to maintain these attitudes for a lifetime (McKenzie, 2003; Subramaniam & Silverman, 2007). This is

especially important in elementary school-age children as the perception of health and physical education as a positive experience has been shown to decline with age (Trudeau & Shephard, 2005). In addition, the quality of the program has been shown to have a strong bearing in positive perceptions of health and physical education and physical activity developed as a child being maintained into adulthood (Hagger, Chatzisarantis, & Biddle, 2002; Prochaska et al., 2003; Trudeau & Shephard, 2005; Zeng, Hipscher, & Leung, 2011).

A review of school-based health and physical education interventions, conducted by the Task Force on Community Preventive Services (2002), found health and physical education increases physical activity, improves fitness, and enhances health-related knowledge. The Bogalusa Heart Study, conducted by Myers, Strikmiller, Webber, and Berenson (1996), found children and adolescents, ranging in ages from 9 to 15 years who were enrolled in health and physical education, reported higher physical activity levels as compared to those not enrolled. A study by Tassitano et al. (2010), which looked at the association between enrollment in health and physical education and health-related behaviors among high school students in Brazil, found participation in health and physical education to be positively associated with physical activity levels. This study also found students attending health and physical education reported better eating habits as compared to those not enrolled (Tassitano et al., 2010).

The 1996 U.S. National Longitudinal Study of Adolescent Health which examined data on 17,766 adolescents found the students more likely to engage in an acceptable amount of moderate-to-vigorous physical activity (MVPA) were those who participated in daily health and physical education classes (Gordon-Larsen, McMurray, &

Popkin, 2000). An extensive review of the literature by Strong et al., (2005) led to the recommendation that youth in school should engage in 60 minutes or more of moderate-to-vigorous physical activity. As noted by LeMasurier and Corbin (2006), the link between participation in health and physical education and increased physical activity may be due to youth "choose to participate in physical activities if they have skills that enable them to participate" (p. 48). As such, school-based programs designed to increase MVPA levels are being viewed as a viable public health strategy to reduce child and adolescent obesity rates (Carlson et al., 2008; IOM, 2005).

Participation in physical education and physical activity has been found to decrease with age with the greatest declines being found among girls thus supporting the need for quality programs at the elementary school level (DeBate, Gabriel, Zwald, Huberty, & Zhang, 2009; Leupker, 1999; Li et al., 2009). According to Troiano et al. (2008), only 35% of 6-11 year olds and 3% of 12-15 year old girls meet the recommended amounts of daily physical activity. A study by Strauss, Rodzilsky, Burack, & Colin (2001) found, between the ages of 10 and 16, an approximate 35% reduction in physical activity at low and high energy levels among girls compared to boys. While the reasons for the decline in physical activity amongst girls remain unclear, several factors, to include low self-esteem and body image, decreased interest, motivation and enjoyment in participating in physical activity, low self-perception of athletic competence, and lack of support from parents and peers, have been postulated in the literature to account for the decline (DeBate et al., 2009). Several studies have been conducted which have demonstrated a strong link between self-esteem, body image and participation in MVPA thus supporting the rationale behind the decline in physical activity levels in girls

(Corbin, Nielson, Borsdorf, & Laurie, 1987; DeBate et al., 2009; Lee, 2004; Pesa, Syre & Jones, 2000; Vu, Murrie, Gonzalez, & Jobe, 2006).

Participation in a school-based health and physical education program has also been demonstrated to improve fitness and muscular endurance (Fairclough & Stratton, 2005; Sallis et al., 1997; Trudeau & Shephard, 2005). These programs have been shown to evoke additional health-related improvements; i.e. BMI, adiposity, and body composition (Gortmaker et al., 1999). A study by Dale, Corbin, and Cuddihy (1998) found lower levels of sedentary behavior among participants one year following enrollment in a 9th grade conceptual physical education program oriented towards personal fitness instruction. The students enrolled in the program were also found to meet physical activity guidelines for adolescents as compared to the control group which were enrolled in a traditional health and physical education program (Dale et al., 1998; Trudeau & Shephard, 2005). A randomized, controlled study in which 50 overweight middle school children were randomly assigned to either a health and physical education class focused on teaching lifestyle and fitness skills (intervention) or to a standard class (control) for 9 months, found participation in the lifestyle and fitness program not only increased physical activity levels but also significantly improved cardiovascular fitness (Carell et al., 2005).

Several studies have shown physical education programs emphasizing fitness and nutrition to evoke greater improvements in girls over boys. A study conducted by Vandongen et al., (1995), in which 1,147 10- to 12-year olds across 30 schools were randomly assigned to either one of four health programs or to the control group, found marked improvements in endurance fitness in both boys and girls with girls benefiting

from the fitness program at almost twice the rate as the boys. This finding may possibly have been attributed to girls having a lower baseline fitness level as compared to boys thereby emphasizing that health and physical education programs must provide activities directed at enhancing all components of physical fitness in both genders (Carlson et al., 2008; Vandongen et al., 1995). A longitudinal study by Camhi, Phillips, and Young (2011), in which 215 8th girls were randomly assigned to either an intervention health and physical education group or a standard (control) group and followed through the 11th grade, tested the "effects of a life skills-oriented physical activity intervention, conducted in health and physical education class, on physical activity and cardiorespiratory fitness" (p. 410). Results from the study showed endurance fitness levels improved in the normal-weight and overweight girls; no improvements were seen amongst obese girls (Camhi et al., 2011).

Physical Activity and Fitness Assessment

With the increasing obesity levels, the declining physical activity and fitness levels and the reductions in time spent in health and physical education, accurately assessing physical activity and fitness in youth should be a primary focus of the 21st century (Mood, Jackson, & Morrow, 2007; Morrow et al., 2010). Many states are now requiring schools to conduct fitness testing on a regular basis and in some states, testing is being conducted outside of school HPE programs (Silverman, Keating, & Phillips, 2008). However, according to Silverman et al., (2008), fitness testing should be used "in the context of a comprehensive physical education program" (p. 148) as testing can serve as a means to not only enhance a child's understanding of physical activity and fitness but to also "promote positive attitudes about physical activity" (p. 148). A lack of understanding has been shown to evoke negative views towards both fitness testing and

experiences in health and physical education; this, in turn, influences students' long-term attitudes regarding engaging in future testing and physical activity (Silverman et al., 2008).

Physical Activity Testing

Physical activity is one of the most challenging variables to measure in that results are primarily self-reported by participants. Self-report questionnaires, i.e. Physical Activity Recall Logs (PAR) (indirect assessment) and accelerometry (direct assessment), are currently the two most common methods being utilized to measure physical activity in the field (Mood et al., 2007). This section will focus specifically on the use of PAR logs as they were the assessment method utilized in this study. In large epidemiological studies, PAR logs tend to be the instrument chosen as they are the most feasible and cost-efficient and are the easiest to administer (Aadahl & Jorgensen, 2003; Sallis, 1991). However, caution must be taken when utilizing these types of logs in studies involving children as the data being reported is solely based on the child's cognitive ability to recall events that occurred previously (Sallis, 1991). According to Subramanian and Silverman, (2002), physical activity abilities reported by elementary school children tend to be inflated due to their limited developmental ability of self-evaluation. As a result, a significant potential for recall error is introduced when physical activity is self-reported by children (Montoye, Kemper, Saris, & Washburn, 1996). While therein lies an inherent limitation in using PAR logs, some studies have shown a 73.4% to 86.3% agreement between the PAR data and data collected on the same population via direct observation (Sirard & Pate, 2001).

PAR logs allow for multiple measures of physical activity to be recorded. Participants can be asked to not only recall and record the times during which they were physically active, but also the amount of time spent engaging in the activity as well as the intensity level of the activity. Data recall can span over various time frames, e.g. 24-hr. (PDPAR), 3-day (3DPAR) and 7-day (7DPAR) recalls, and physical activity levels are generally recorded in 30-minute to one-hour time increments. The 24-hr. or previous day recall may not accurately represent habitual physical activity levels; therefore, collecting data for multiple consecutive days may provide a better representation of the participant's physical activity level (Coe, 2003). In addition, according to Welk, Corbin, and Dale (2000), data collection over multiple days is needed to account for intra-individual variability in activity patterns among participants.

Validity of the 3DPAR was established in a study conducted by Pate, Ross, Dowda, Trost, and Sirard (2003); accelerometry was used as the criterion measure of physical activity. This study, which investigated the validity of a 3DPAR in a sample of 70 eighth and ninth grade females, found the instrument to be a valid method ($r=0.27$-0.46; $p<0.05$) for measuring moderate, vigorous and overall physical activity levels in adolescent females (Coe, 2003; Pate et al., 2003). Previous research has also shown the 7DPAR to be a reliable and valid instrument to measure physical activity in children as young as 5th grade (Sallis, Buono, Roby, Micale, & Nelson, 1993). The results of their study, which was conducted on a group of 5th (n=36), 6th (n=36) and 11th grade (n=30) males and females, found a high test-retest reliability coefficient ($r=0.77$) for the 7DPAR (Sallis et al., 1993). For the total sample population, validity of the 7DPAR was established with a correlation of 0.53 ($p<0.001$) (Sallis et al., 1993).

Fitness Testing

FITNESSGRAM testing was designed by Charles L. Sterling in the early 1980's

under the auspices of the Cooper Institute for Aerobics Research (Plowman et al., 2006).

Designed originally as a physical fitness "report card", FITNESSGRAM is now being

used by schools worldwide as an "educational assessment and reporting software

program" (Plowman et al., 2006, p. S6). Criterion-referenced health-related standards are

utilized to evaluate fitness performance in the five areas most directly linked to health

and overall quality of life; cardiorespiratory endurance, muscular strength, muscular

endurance, flexibility, and body composition (Cureton & Plowman, 2008). Fitness scores

are recorded for each individual testing component with student scores being categorized

into one of two areas; Healthy Fitness Zone (HFZ) and Needs Improvement Zone

(VDOE, 2006). Scores that either meet or exceed the target fitness level are placed in the

HFZ; these students are considered to have a satisfactory level of functional fitness

(VDOE, 2006). Scores that fail to meet the targeted fitness levels are placed in the Needs

Improvement Zone; these students are considered to have inadequate levels of functional

fitness and are identified to be at risk if their fitness levels remain the same over time

(VDOE, 2006).

The Progressive Aerobic Cardiovascular Endurance Run (PACER) test is used to

assess cardiorespiratory endurance, also referred to as aerobic capacity (Cureton &

Plowman, 2008). It is currently the recommended test for measuring aerobic capacity as

it has been found to alleviate some of the problems associated with previously used

fitness tests, most notably the one-mile run/walk test (Silverman et al., 2008). The

PACER, an adaptation of the 20-meter shuttle run, involves "running back and forth

across a 20-meter course in time to music played from a tape or CD" (Cureton &

Plowman, 2008, p. 99). Beeps in the music tell the student when they should reach the

end of the course and the student continues running until he/she can no longer maintain

the pace. The number of laps completed by the student is recorded and data is generally

self-reported to the teacher. Using FITNESSGRAM software, students' aerobic capacity

is estimated based on their performance and specific characteristics such as their age,

gender, body weight and ratio of weight to height, also termed Body Mass Index (BMI)

(Cureton & Plowman, 2008). Aerobic capacity scores are placed in one of the two areas

discussed above based on the student's performance.

Health and Physical Education Curricula Programs

Physical education curriculums have been shown to be "highly effective in

increasing physical activity at school" (Culpepper, Tarr, & Hillion, 2011, p. 163;

Graham, Holt-Hale, & Parker, 2006) while traditional curriculums, composed primarily

of sports-centered lessons, have contributed to physical inactivity as they have been

found to "turn students off to getting fit" (Yaussi, 2005, p. 106). As noted by McKenzie

and Kahan (2004), a curriculum focused primarily on sports and games is ineffective at

preparing youth to engage in physical activity outside of the school venue. In their study,

which examined the effect of time spent in elementary health and physical education on

change in BMI, Datar and Sturm (2004) concluded that "typical PE programs are

substandard and of limited value" (p. 1505). Modified PE programs have the potential to

help youth acquire the "benefits and joys of physical activity" (Story, 1999, p. S49). A

variety of instructional activities directed towards teaching both lifetime skills and sports

should be included in the health and physical education curriculum; only by doing so will programs be able to target the varying interests of youth (Shephard & Trudeau, 2008).

A paradigm shift is occurring in health and physical education as curriculums are slowly moving away from programs focused primarily on motor skill development through sports-based activities to ones that focus on increasing awareness of the various activities that improve health-related fitness (Shephard & Trudeau; 2000; Story, 1999; Yaussi, 2005). According to Pangrazi (2007), due to the percentage of overweight and obese youth in the U.S., programs should be based on the fitness model which is focused on teaching physical activity and fitness concepts. The research indicates, however, that different models of curricula are currently being utilized in school districts across the country. According to Kelly and Melograno (2004), activity-based models or combination models comprised of features from several different models are the most common types of curriculums at the elementary and secondary levels. Graham et al., (2006) indicated that most of the K-6 health and physical education curriculums emphasized a skill-based approach while Strong et al. (2005) stated that the sports-based approach continues to be the primary theme being utilized at the secondary level.

The research is limited in demonstrating the impact of each of these models on increasing physical activity and improving fitness. One recent study by Culpepper, et al., (2011) investigated the impact of the three most common curriculum models; i.e. the Fitness model, the Skill-Theme model, and the Game/Sport model, on students' physical activity level. Elementary, middle and high school physical education specialists from 19 elementary, eight middle, and nine high schools in the Midwest and Southern regions of the U.S. participated in the study. HPE specialists from the study schools were selected

based on meeting the criteria for teaching one of the three curricula models. The physical

activity levels of 1,111 students embedded within the classrooms of the HPE specialists

were assessed utilizing accelerometry (i.e. pedometers). Results of the study found the

lowest physical activity levels amongst those students who participated in the fitness

model curriculum; the highest levels were found in the students who participated in the

Game/Sport model (Culpepper et al., 2011). As in previous studies, males were found to

accrue the most number of steps as compared to females. In addition, the amount of class

time was found to contribute the most to the total number of steps thus indicating the

need for lessons to be created and implemented that focus on increasing movement and

activity among both genders (Culpepper et al., 2011).

From the study, the researchers concluded that the:

> Guiding force of PE curriculums should be the teacher's planning,
>
> organizing, and developing a curriculum that meets NASPE standards.
>
> The teacher should also use best practices during each class to provide
>
> developmentally appropriate lessons that meet all four domains:
>
> cognitive, affective, psychomotor, and the health-fitness domain. (p. 170)

Integrating curriculums, focused on teaching fitness and lifetime skills, into the

current health and physical education program, along with periodic fitness testing, have

been shown to be methods to enhance the effectiveness of PE programs (Corbin, Dale, &

Pangrazi, 1999; Strand, Scantling & Johnson, 1998). However, only two large studies

were found in the literature which evaluated the impact of such curriculums on youth

health-related fitness, both of which were outdated. The Trois-Riviéres study, conducted

in Quebec, Canada beginning in 1971, was the most comprehensive quasi-experimental

study which investigated the effectiveness of enhancing a primary school health and physical education program through the use of an experimental curriculum (Shephard & Trudeau, 2008). The study included 546 girls and boys, half of which were assigned to the experimental health and physical education curriculum which included five hours of weekly health and physical education taught by a specialist; the other half received the standard curriculum prevalent in the 1970's which included 40 minutes of health and physical education each week taught by the homeroom teacher (Shephard & Trudeau, 2008). The study took place from grades 1 through 6 with grades 1 and 2 focused on teaching motor skills, grades 3 and 4 on improving fitness, and grades 5 and 6 on teaching sports skills (Shephard & Trudeau, 2008). Results from the study showed an increase in aerobic endurance levels, muscular strength, net weekly physical activity and overall physical performance amongst students in the experimental group (Shephard & Trudeau, 2008). To investigate the long-term impact of the curriculum, the researchers followed up with the same subjects at the age of 30 to 35. Results from the follow-up "suggested that the experimental cohort had retained a number of health benefits relative to the controls, including a greater prevalence of participation in regular physical activity" (Shepard & Trudeau, 2008, p. 259).

The Child and Adolescent Trial for Cardiovascular Health (CATCH) study investigated, over a 2.5 year period, the use of an innovative, health-related curriculum which included a teacher training component (McKenzie et al., 1996). Ninety-six schools in four states were recruited for the study; students in these schools were followed from 3rd grade through 5th grade. Schools randomly assigned to the intervention group utilized the PE intervention over the course of the study. Results from the analysis of 2,096 health

and physical education lessons, 801 in control schools and 1,295 in interventions schools, showed the students in the intervention schools engaged in more moderate-to-vigorous physical activity as compared to the control schools (McKenzie et al., 1996). Staff development was also shown to have contributed to the increased levels of physical activity in the intervention schools (McKenzie et al., 1996). While the evidence supports the use of health-oriented programs over sports-oriented programs in promoting health and wellness, more research is needed to better understand the long-term impact of school-based health and physical education programs on health-related skills and behaviors (Tassitano et al., 2010; Trudeau & Shephard, 2008).

Five for Life Program

As the literature has shown, it is imperative that schools utilize quality, comprehensive health and physical education curricula programs. Quality curriculums should be based on national and state standards, should emphasize and encourage physical activity and healthy eating, and should teach knowledge and skills that prepare youth for an active lifestyle throughout their lifespan (Yetter, 2009). The *Five for Life* Program is "a research-based, K-12 fitness and health program aligned with state and national physical education and health standards" (Focused Fitness, 2009a, para. 1). NASPE Health and PE standards are based on four content areas: cognitive concepts of fitness and health, fitness education and assessment, motor skill development, and social/emotional development (Focused Fitness, 2009b). Centered on these four content areas, the program was designed to teach fitness and health-related concepts through age-appropriate, activity-based academic instructional units which link "activity, exercise, health, fitness, fun, personal achievement and a general sense of well being together to

provide everyone with the opportunity for success" (Focused Fitness, 2009b, para. 2). Curricula units, based on current research, focus on teaching the five components of fitness (cardiorespiratory endurance, flexibility, muscular strength, muscular endurance, and body composition) and nutrition. Activity-based lessons, which reinforce the concepts being taught, are included with each curricula unit. The curriculum was also designed in a manner which allows for the HPE teacher to communicate fitness and health concepts in a way that makes it easy for the student to understand.

The *Five for Life* curriculum was developed in 2003 when "a group of Physical Educators banded together to change the dynamics of Physical Education for Spokane Public Schools by creating a Physical Education Curriculum that would teach fitness and health concepts without sacrificing movement or activity" (Focused Fitness, 2009b, para. 2). The lack of resources and materials beyond the teaching of motor skills, not only in the state of Washington where Focus Fitness is currently located, but also across the U.S., was the driving force in the development of the curriculum (A. Lutz, personal communication, April 4, 2012). The *Five for Life* program was designed to allow students to meet the following program objectives (Focused Fitness, 2009a):

- Identify and perform activities that will maintain and develop the five components of fitness.
- Understand basic nutrition and how it affects health, performance and appearance.
- Understand the location and function of major bones and muscles.
- Understand and perform fitness measurements to improve and maintain fitness levels.
- Set realistic goals for improvement in the five components of fitness.
- Manage personal health habit information through the use of activity, diet, hydration, and sleep logs.
- Identify safety concerns associated with a variety of activities. (para. 1)

The *Five for Life* program is comprised of three levels of Fitness and Health curricula, Basic, Intermediate, and Advanced, all of which serve to allow students to progress through a continuum of learning without sacrificing time engaged in physical activity (Focused Fitness, 2009a). The Basic Curriculum was designed to provide students in grades K-5 with a foundation in fitness and health (Focused Fitness, 2009c). The Intermediate Curriculum, used primarily in grades 6-8, allows students to move towards developing an understanding of higher-level fitness and health concepts as well as the relationship between fitness, activity and lifelong health (Focused Fitness, 2009c). The Advanced Curriculum, designed for grades 9-12, centers on fitness and health planning in order to ensure that students have the skills needed to lead a fit, healthy and active lifestyle (Focused Fitness, 2009c). Measurement tools, which not only allow for assessment of students fitness levels but also provide students with the means to gauge individual improvements through the use of periodic self-evaluation, are included as part of the curriculum (Focused Fitness, 2009a). WELNET (previously called WELPRO), a K-12 Fitness and Health data management tool, was "designed to provide physical educators with a tool to gather student fitness data and communicate results." (Focused Fitness, 2009d, para.1). Additional curriculum materials available to school districts include the Nutrition and Circuit Training kits, DVD/Video series, resource CD, and equipment (Focused Fitness, 2009c).

Also included in the program is an intensive curriculum and activity training component through which teachers are guided by Focused Fitness trainers on "how to incorporate fitness and health academic content, fitness related activities and motor skills into easy to follow lesson plans" (Focused Fitness, 2009f, para. 1). Teachers are provided

with a "Teacher Information Packet" which includes the guidelines and tools needed to collect data as part of the PEP grant. Based on teacher preferences, age-appropriate functional fitness equipment packages are assembled and distributed. Additional components of the program include a "Literacy and Fitness Program" designed for Pre-K-3rd, additional equipment for the existing middle and high school fitness labs, and equipment and supplies for the after-school and summer programs (Focused Fitness, 2009e).

Results from an analysis conducted by Knuth Research, Inc. in 2009 (contracted by Focused Fitness to perform the analysis) demonstrated the effectiveness of the curriculum on important program indicators (Focused Fitness, 2009f). Pre/post data from 56,000 children, aged 10-17, in 24 school districts in the U.S. which had "implemented the *Five for Life* health and fitness curriculum in their PE programs between 2007-2009" (Focused Fitness, 2009f, para. 2) was analyzed during the 2009 school year. Results showed that overall, the weekly reported minutes of MVPA increased from pre to post by approximately 16% (Focused Fitness, 2009f). Students, on average, were also found to show improvement in cardiovascular endurance, muscular strength, and muscular endurance over the three year period (Focused Fitness, 2009f). An improvement in "academic knowledge of the components of both fitness and nutrition" was also noted (Focused Fitness, 2009f, para. 5).

The *Five for Life* program is currently being utilized in multiple school districts across the U.S. Twenty-five school districts have adopted the program as part of the Carol M. White PEP grant as a means by which to develop a more comprehensive Health and PE curriculum (A. Lutz, personal communication, April 4, 2012). Other

districts have formally adopted the curriculum and integrated it into their standard K-12 curriculum (A. Lutz, personal communication, April 4, 2012). The curriculum is also being used by individual teachers at specific grade levels (A. Lutz, personal communication, April 4, 2012). In total, Focused Fitness has worked with more than 60 school districts across the U.S. over the past three years (A. Lutz, personal communication, April 4, 2012).

The Present Study

The present descriptive study sought to examine the effect of the *Five for Life* curricula program on elementary school students' cardiorespiratory endurance level, physical activity level, understanding of fitness and nutrition concepts, and attitudes towards PE and health. Study participants were enrolled in elementary schools across a large, urban school district in the Southeastern part of the U.S. Data was collected on students enrolled in Cohort I, II, and III schools during the 2009-10, 2010-11, and 2011-12 academic years, respectively. Cohort I students were followed through their 4th and 5th grade years.

Cardiorespiratory fitness scores were obtained from the Progressive Aerobic Cardiovascular Endurance Run (PACER) test administered to all students both in the Fall and Spring as part of the required FITNESSGRAM testing. Pre- and post-data from the 3DPAR logs were collected and utilized to assess the physical activity levels of the students. Pre/post scores from the Five for Life K-5 assessment were used to evaluate the students understanding of the five components of fitness. Pre/post scores from the Food for Energy and Health 4-5 assessment evaluated the students understanding of basic nutritional concepts. *Five for Life* pre/post data from the Student Surveys was used to

assess students' attitudinal changes towards their health and physical education class and their overall health and fitness. Data was compiled and analyzed to determine if the *Five for Life* program had a significant impact on the program outcomes.

The desired long-term outcomes of the *Five for Life* program were to develop a comprehensive, coordinated health and physical education program, improve student performance in regards to health-related fitness and nutrition and increase the number of health and physical education teachers utilizing the program (Focused Fitness, 2009c). Implementing the fitness and health curriculum and providing functional fitness equipment not only increases the number of students exposed to the curriculum but also increases student participation in program activities. Integration of the curriculum into existing health and physical education programs enhances student awareness and understanding of the relationship between fitness and nutrition and overall health and wellness. Students learn the benefits of engaging in healthy behaviors; this, in turn, provides motivation for them to be physically active and to make healthier choices regarding nutrition.

Statement of the Problem

As demonstrated in the literature review, the child and adolescent overweight and obesity rates have nearly tripled over the last decade leading to a myriad of problems affecting the physical, mental, and social health of youth. Many of the health problems in youth related to obesity and physical inactivity mirror those found in adulthood. In addition, overweight and obesity in youth is carried into adulthood in a large proportion of youth. Behavioral habits regarding engaging in physical activity and eating healthy

have been found to be established at an early age; therefore, programs promoting healthy behaviors in youth need to begin at an early age.

While the literature review supports the use of school-based interventions in increasing physical activity and improving health-related fitness, few studies were found evaluating the effect of a Physical Education curricula program focused on improving health-related knowledge and promoting lifelong physical activity and healthy eating. Healthy People 2020 goals include increasing the number of schools requiring health and physical education on a daily basis and increasing the percentage of adolescents who participate in daily physical education (DHHS, 2010). The Carol M. White PEP Grant, awarded yearly to school districts and community organizations, is one means by which schools can expand and enhance existing health and physical education programs in grades K-12 (U.S. Department of Education, 2010). Quality health and physical education programs, as defined by NASPE, which impart the knowledge and skills youth need to adopt and maintain a healthy lifestyle and are feasible in real-world settings are being viewed as a viable means by which to improve existing programs at the elementary school level (NASPE, 2012b).

Quality programs with a comprehensive curriculum provide an important social environment in which youth not only gain information regarding physical activity, fitness, and nutrition but also develop behaviors and attitudes that will follow them into adulthood (NASPE, 2012b). There is agreement among health and physical education experts that the weapons needed to combat sedentary behavior and improve health in youth must be articulated to students within a comprehensive curriculum designed to provide the skills needed to move from dependence to independence (Booth &

Chakravarthy, 2002; Corbin, 2002; Repovich, 2011). Few studies investigating the effect of a comprehensive health and physical education program on increasing physical activity and improving fitness and health have been conducted on elementary school-age children (Fairclough & Stratton, 2005; Pate et al., 2007; Trudeau & Shephard, 2008).

From the literature review, gaps exist in the understanding of the relationships between physical education and improvements in students' health and wellness. Offering a comprehensive, quality health and physical education program that enhances motor skill development and provides students with the knowledge and skill levels for lifelong health is being touted as the "new PE" (Corbin, 2002; Pangrazi, 2010). The present study is significant in that the *Five for Life* curriculum not only meets NASPE criteria for being a comprehensive, quality curriculum but also utilizes a combination of the Fitness and Games/Sports Models as a means to enhance motor skill development while teaching health-related concepts. There is a significant gap in the literature as few studies have been conducted investigating the effect of these types of "new Health and Physical Education" curriculums. Further, as the literature review showed, many of the studies were dated thereby negating the relevancy of study findings to today's youth.

This study was also only one of a few which investigated the effect of a comprehensive health and physical education curriculum that not only included health-related fitness and nutrition education but also measured student outcomes in both areas. Few of the studies reviewed in the literature focused on the measurement of more than one or two health-related outcomes with many measuring physical activity and nutrition as the sole outcome. Specifically, there was a significant gap in the literature in studies which utilized fitness testing to measure cardiorespiratory endurance levels of youth.

Further, this study is unique in that elementary school students across an entire school

district comprised the study population. Lastly, the evaluation by Knuth Research, Inc.

(2009) is currently the only data available which supports the effectiveness of the *Five for*

Life program on the intended program outcomes; therefore, this study will serve to

provide empirical evidence as to the extent to which program outcomes were being met

in the study population.

Purpose of the Research

The purpose of this descriptive study was to measure the effect of a quality,

standards-based health and physical education curriculum on cardiorespiratory

endurance, physical activity, knowledge of fitness and nutritional concepts, and health-

related attitudes of elementary school students.

Research Questions

The following research questions were used to guide this study.

o RQ_1: Does participation in the *Five for Life* program improve cardiorespiratory
   endurance levels of elementary school students?

The literature has shown participation in quality school-based health and physical

education programs to be associated with improvements in fitness and muscular

endurance (Carell et al., 2005; Fairclough & Stratton, 2005; Sallis et al., 1997; Trudeau &

Shephard, 2005). While males and females were both found to have marked

improvements in fitness levels as a result of participating in programs emphasizing

fitness and nutrition, females have been shown to exhibit lower baseline scores as

compared to their male counterparts (Vandongen et al., 1995). The *Five for Life* program

was designed to provide students with the knowledge and skills needed to "identify and

perform activities that will maintain and develop the five components of fitness"

(Focused Fitness, 2009a, para. 1). The program also allows students to "understand and perform fitness measurement to improve and maintain fitness levels" (Focused Fitness, 2009a, para. 1). In addition, the PACER test has been shown to be a reliable and valid instrument for measuring cardiorespiratory endurance in youth (Cureton & Plowman, 2008).

Therefore, it is expected that participation in the *Five for Life* program will be positively associated with increases in students' cardiorespiratory endurance levels as measured by the FITNESSGRAM PACER test. According to the research, gender differences may be observed as well with females potentially reporting lower scores as compared to males. The results of this study, however, must be interpreted in the context of the limitations associated with measures utilizing self-reporting. These limitations will be discussed in Chapter Four.

o   RQ$_2$: Does participation in the *Five for Life* program increase physical activity levels of elementary school students?

For a high percentage of youth, PE is the only opportunity for them to be physically active (Bailey, 2006; Trudeau & Shephard, 2008). Numerous studies have shown improvements in physical activity as a result of student participation in well-designed, quality school-based health and physical education programs (Datar & Sturm, 2004; LeMasureire & Corbin, 2006; Murnan et al., 2006, NASPE, 2010b; Warren et al., 2003). The *Five for Life* program was created to "teach fitness and health concepts without sacrificing movement or activity" (Focused Fitness, 2009b, para. 2). Through the program, students are taught fitness and health-related concepts through activity-based lessons, thus allowing them to learn without sacrificing time engaged in physical activity (Focused Fitness, 2009a).

Thus, it is expected that students' physical activity levels will increase as a result

of their participation in the program. As with the PACER testing, gender differences may

be observed as females have been documented in the literature as having greater declines

in daily physical activity with age as compared to males (DeBate et al., 2009; Leupker,

1999; Li et al., 2009; Troiano et al., 2008). However, changes in physical activity levels

from pre-testing to post-testing must be interpreted with caution due to the limitations

associated with using self-reporting logs, i.e. 3DPAR, to collect physical activity data.

While 3DPAR logs have been found to be valid instruments for collecting physical

activity data, self-reported data is based solely on the cognitive ability of the child to

accurately recall events that occurred previously (Sallis, 1991). Due to their limited

cognitive abilities, it has been demonstrated that self-reporting instruments are not

appropriate for use in children under 10 years of age (Telford, Salmon, Jolly, &

Crawford, 2004). This will further limit the validity of the study results due to the

students from whom data was obtained for this study ranged in age from 10 to 11 years of

age. In addition, as a result of elementary school students' having limited developmental

ability to accurately self-evaluate, physical activity results collected using self-report logs

have been shown to be inflated, a phenomena expected to occur in this study

(Subramanian & Silverman, 2002).

- o RQ3: Does participation in the *Five for Life* program enhance understanding of the five components of fitness in elementary school students?

- o RQ4: Does participation in the *Five for Life* program enhance understanding of basic nutritional concepts in elementary school students?

In addition to improved fitness and increased physical activity, participation in

quality, school-based programs have been shown to be efficacious in enhancing health-

related knowledge (Datar & Sturm, 2004; Davis et al., 2003; Dietz & Gortmaker, 2001; Pyle et al., 2006; Warren et al., 2003). According to Dietz & Gortmaker (2001), well-designed school curricula programs have the ability to alter students' knowledge and behaviors regarding fitness, physical activity and nutrition. The *Five for Life* program was designed to help students not only develop an understanding of the five components of fitness and basic nutrition but also to understand how it affects health, performance, and appearance (Focused Fitness, 2009a). The Basic Curriculum, used at the elementary school level, was developed to provide students in grades K-5 with a strong foundation in fitness and health (Focused Fitness, 2009b).

Based on this, it is expected that student scores on both the "Five for Life 4-5", and the "Food for Energy and Health K-5" assessments will increase from pre-testing in the Fall to post-testing in the Spring. However, the ability to establish a true relationship between the teaching of the *Five for Life* and *Food for Energy and Health* curriculum units and student knowledge will be limited as a result of the number of questions on the assessments. In addition, no literature was found which supports the use of a 10 question multiple choice test to assess knowledge of fitness and health.

o   RQ$_5$: Does participation in the *Five for Life* program improve elementary school students' health-related attitudes?

    o   RQ$_{5a}$: What is the impact on students' attitudes regarding Physical Education class?

    o   RQ$_{5b}$: What is the impact on students' attitudes regarding the relationship between the fitness and health concepts taught in PE and their overall health and wellness?

    o   RQ$_{5c}$: What is the impact on students' attitudes towards the importance of being physically active outside of PE class?

Well-designed, quality physical education programs have been shown to be influential in helping students develop more positive attitudes towards physical education and health (McKenzie, 2003; Subramaniam & Silverman, 2007). Studies have found students who participate in health and physical education programs have more positive attitudes towards health and physical education, enjoy participating in physical activity in health and physical education, and were more likely to be physically active outside of school (Bailey, 2006; McKenzie, 2003; NASPE, 2010b; Pate et al., 2005, Portman, 2003; Subramaniam & Silverman, 2007). In addition, a strong link has been found between the quality of the health and physical education program and attitudes towards physical education and physical activity, not only in childhood but also as an adult (Hagger, Chatzisarantis, & Biddle, 2002; Prochaska et al., 2003; Trudeau & Shepard, 2005; Zeng et al., 2011).

Based on the literature, student attitudes, as measured by the student survey, are expected to be higher on the post-survey as compared to the pre-survey. However, as the literature has shown, both children's cognitive abilities and variations in the wording of the questions may have an effect on how they respond to the survey questions (Borgers, Hox, & Sikkel, 2004). In addition, due to the problems associated with using Likert scale responses to assess beliefs children, the study results may not be an accurate representation of the actual student attitudes (Borgers et al., 2004).

Study Limitations

There were several significant limitations to this study involving the study population and the manner in which the data was collected during the study. One of the strongest limitations was the lack of a control group which hindered the ability of the

researcher to determine cause and effect. A convenience sample from a large, affluent school district in Southeastern U.S. was used thereby reducing the generalizabilty of the results to other school districts. The study was a cross-sectional study which inhibited the researcher in making inferences towards the school population as a whole. Both the PACER and 3DPAR data were self-reported by the students thus affecting the validity of the data.

Assumptions

The primary assumption made by the researcher as part of this study was there was high degree of implementation fidelity of the *Five for Life* program by Health and PE teachers across the school district. The researcher assumed that administration of the PACER and the cognitive assessments by the Health and Physical Education teachers were conducted according to established guidelines. It was also assumed that the students accurately recorded their physical activity levels on the 3DPAR logs. The responses on the student surveys were assumed to accurately reflect the attitudes of the students.

Definition of Terms

The terms and concepts that follow were defined in order to give the reader a better understanding of the research study.

- Body Mass Index (BMI) - Measure of body fat based on an individual's height and weight. It is used as a screening tool as it is a reliable indicator of an individual's body fat (Centers for Disease Control and Prevention, 2009a).

- Cardiorespiratory endurance – "The ability of the lungs, heart, and blood vessels to deliver adequate amounts of oxygen to the cells to meet the demands of prolonged physical activity" (Hoeger & Hoeger, 2005, p. 149).

- Exercise – "Subset of physical activity that is planned, structured and repetitive and has as a final or intermediate objective the improvement or maintenance of physical fitness" (Caspersen, Powell, & Christenson, 1985, p. 126).

- FitnessGram – "A fitness assessment and reporting program for youth, first developed in 1982 by The Cooper Institute, in response to the need for a comprehensive set of assessment procedures in physical education programs" (Human Kinetics, 2012, para. 1).

- Health and Physical Education Programs – Structured standards-based school programs which offer children opportunities to be physically active and teaches the knowledge, skills and behaviors needed to develop and sustain a lifelong healthy lifestyle (NASPE, 2012b).

- Obesity – The abnormal accumulation of excess body fat, typically 20% or higher than ideal body weight (Child Obesity Center, 2009).

- Overweight – "Having excess body weight for a particular height from fat, muscle, bone, water, or a combination of these factors" (Centers for Disease Control and Prevention, 2011, para. 1).

- Physical Activity – "Any bodily movement produced by skeletal muscles that results in caloric expenditure, increases energy expenditure and can help prevent obesity" (West & Shores, 2008, p. 115).

- Physical Fitness – Set of health or skill-related attributes that relates to the ability to perform physical activity and can be measured with specific fitness tests (Caspersen et al., 1985)

- Standards of Learning (SOL) - A set of state mandated tests used to measure student achievement in English, mathematics, science, and history/social science (Virginia Department of Education, 2010).

- Wellness - "A multidimensional state of being describing the existence of positive health in an individual as exemplified by quality of life and a sense of well-being" (Corbin & Pangrazi, 2001, p. 3).

Summary

The number of overweight and obese children and adolescents in the U.S. has increased dramatically over the last three decades. Being obese as a child can result in serious health consequences which may persist into adulthood. School-based prevention programs have been identified in the literature as a viable avenue in which to improve students' health-related fitness as schools offer access to the vast majority of youth in this country, reach youth of all socioeconomic backgrounds, and have onsite, trained physical education specialists. School-based prevention programs targeting physical activity, fitness and nutrition have been implemented and tested in school districts across the country. The *Five for Life* program, a quality standards-based Health and PE curriculum is one such program that is currently being used by many schools districts across the U.S. as part of PEP grant funding. Through activity-based lessons, this program seeks to not only improve fitness and health but also to alter students' health-related attitudes towards physical education, fitness, and nutrition. This curriculum is designed to provide students with the knowledge and skills needed to adopt and maintain a healthy lifestyle in youth that can be carried into adulthood.

Chapter 2. Methods and Procedures

Overview

The purpose of this descriptive study was to investigate the extent to which

supplementation of an elementary school health and physical education program with an

activity-based curriculum would affect students' health-related fitness levels, knowledge

of fitness and nutritional concepts, and attitudes towards physical education and overall

health and wellness. The *Five for Live* program was adopted by the school district in

which this study was conducted as part of the Carol M. White PEP grant. Integrating this

program into the existing curriculum provided the means for a more comprehensive

health and physical education program focused on providing students with the knowledge

and skills for lifetime health and wellness. This chapter describes the study methodology

and procedures. A description of the school division along with the study population is

provided. In addition, a description of the study instruments as well as the data collection

procedures utilized in the study is presented. Statistical analysis to include reliability and

validity of the data collection tools is also included.

Research Design

This research was a descriptive study which utilized post hoc *Five for Life*

program data collected in a large urban school district in the Southeastern U.S. The

design of this study allowed the researcher to evaluate the effect of the program across

four study variables. The PACER test, part of the statewide FITNESSGRAM battery of

tests, was used to assess cardiorespiratory endurance levels over a two-year period.

PACER test data was collected in the Fall and Spring of each academic year. Three-day

PAR logs were utilized to evaluate physical activity levels and were collected during four

separate time periods over the course of a single school year. A pre/post cognitive

assessment was employed at the beginning and end of both the *Five for Life* and Food for

Energy and Health curricula units. An attitudinal survey was administered to students in

the fall and spring. Permission to include the *Five for Life* data collection instruments

developed by Focused Fitness, i.e. 3DPAR, "Five for Life 4-5" and 'Food for Energy and

Health K-5" assessments, and Student Survey, in this dissertation was obtained from

Amy Lutz, Vice President, Software at Focused Fitness. A copy of the permission letter

is provided in Appendix A. Measuring fitness, physical activity, knowledge, and attitude

provided for a more robust study as it allowed the researcher to examine the variables

identified in the literature as key to health and wellness among youth.

The *Five for Life* program components served as the dependent variables.

Implementation of the program in health and physical education classes across the school

district occurred over the course of three academic years; year one was the primary focus

of this study. This study sought to measure the effect of the program on the program

outcomes as detailed in the introduction section. Each outcome served as an independent

study variable; a description of each is included as part of this chapter.

Participants

The study utilized a convenience sample of 4th and 5th grade students enrolled in

elementary schools across a large, urban school district in the Southeastern U.S. For the

purposes of implementation of the *Five for Life* program across the school district, the

elementary schools were clustered into three cohorts consisting of 18, 15 and 19

elementary schools, respectively. Implementation of the program occurred in three phases

beginning with adoption of the program by Cohort I schools during the 2009-10

academic year. The program was subsequently implemented in Cohort II schools in

2010-11 with full implementation occurring in Cohort III schools in the 2011-12

academic year. Participant data selected for analysis in this study was obtained from 4th

and 5th grade students across all three cohorts.

Data collection and reporting was facilitated by the HPE teacher; therefore, the

sample population varied for each study variable. The database utilized in the analysis of

cardiorespiratory endurance and knowledge of fitness and nutrition was comprised of 4th

grade students (n=1,779) enrolled in Cohort I schools during the 2009-10 academic year.

The survey data consisted of the same groups of 4th graders (n=1,827); however, as a

result of the program's collection requirements, the data was received in a separate

database with unique student identifiers. The physical activity database was comprised of

data collected from 5th grade students across all three cohorts during year one of program

implementation. Cohort I data (n=1,552) was collected during the 2009-10 academic

year, Cohort II (n=1,621) during the 2010-11 academic year, and Cohort III (n=1,640)

during the 2011-12 academic year.

To protect anonymity of the study participants, student identification numbers

were recoded prior to distribution of the database to the researcher. For each variable,

only those participants with both pre- and post-scores were included in the sample

population. Pre- and/or post-data marked as "null" in the original databases indicated the

data had not been collected and/or reported by the teacher; these participants were not

included as part of the study sample. Prior to initiating data cleaning and analysis, an

approval letter granting permission to conduct the study was obtained from the Human

Subjects Review Committee of the Darden College of Education (Appendix B).

Variables

Cardiorespiratory Endurance Levels

FITNESSGRAM testing was first instituted in the state in which the study was

conducted during the 2006-07 academic year. Testing, administered twice a year (fall and

spring) to all students in grades 3-5 as part of the Health and Physical Education

curricula, is used to assess health-related fitness in the five areas most directly linked to

health and overall quality of life; cardiorespiratory endurance, muscular strength,

muscular endurance, flexibility and body composition. The Progressive Aerobic

Cardiovascular Endurance Run (PACER) test was utilized in the study to assess students'

cardiorespiratory endurance levels. The PACER, developed based on the same

physiologic and metabolic principles as the treadmill test, is currently the recommended

test for measuring aerobic capacity as it has been found to alleviate some of the problems

associated with previously used fitness tests, most notably the one-mile run/walk test

(Butterfield, Lehnhard, Mason, & McCormick, 2008; Silverman et al., 2008).

The PACER, an adaptation of the 20-meter shuttle run, involves students

"running back and forth across a 20-meter course in time to music played from a tape or

CD" (Cureton & Plowman, 2008, p. 99). Beeps in the music tell the student when they

should reach the end of the course and the student continues running until he/she can no

longer maintain the pace. The number of completed laps by the student, which is

representative of their maximum effort for that time point, is then self-reported to their

teacher (Butterfield et al., 2008). Using FITNESSGRAM software, students' aerobic

capacity is estimated based on the number of laps completed and specific characteristics

such as their age, gender, body weight and ratio of weight to height, also termed Body

Mass Index (BMI) (Cureton & Plowman, 2008). PACER scores, based on the total

number of completed laps, are recorded for each student and categorized into one of two

areas; Healthy Fitness Zone (HFZ) and Needs Improvement Zone (VDOE, 2006)

(Appendix C). Scores that either meet or exceed the target fitness level are placed in the

HFZ; these students are considered to have a satisfactory level of functional fitness.

Scores that fail to meet the targeted fitness levels are placed in the Needs Improvement

Zone; these students are considered to have inadequate levels of functional fitness and are

identified to be at risk if their fitness levels remain the same over time (Cureton &

Plowman, 2008).

PACER Reliability and Validity

Reliability is the "consistency with which a measuring instrument yields a certain

result when the entity being measured hasn't changed" (Leedy & Ormrod, 2005, p. 29).

According to the FITNESSGRAM reference guide, "consistently high reliability

coefficients have been reported for the PACER" (Cureton & Plowman, 2008, p. 100). In

five studies conducted between 1998 and 2006, reliability coefficients were "above 0.64

with no significant mean differences between two tests" (Cureton & Plowman, 2008, p.

101) (Table 1).

Validity refers to the degree to which an instrument measures what it was

designed to measure and "performs the function(s) it is purported to perform" (Patten,

2009, p. 61). Three types of validity, content, construct and criterion-related, have been

identified which assist in ascertaining the capability of an instrument to measure what it

intended to measure (Patten, 2009). According to Cureton and Plowman (2008), an

"attractive feature of the PACER is its high content (logical) validity (p. 104). Several

studies investigating the concurrent validity, a type of criterion-related validity, of the

PACER in youth have shown the PACER to have "moderate concurrent validity as a field

test of VO₂max" (Cureton & Plowman, 2008, p. 100). Validity coefficients from each of

these studies are summarized in Table 2 below. Overall, the "concurrent validity of the

PACER appears to be approximately the same as distance run tests for estimating

VO₂max" (Cureton & Plowman, 2008, p. 104).

Table 1

Reliability of the PACER in Children and Adolescents

Source	Sample	Reliability Coefficient ($\acute{a}$)
Beets and Pitetti (2006)	123 M, & 62 F 13-18 y	R = .68, .64
Dinschel (1994)	57 M & 44 F, 4-5th	R = .84
Leger et al. (1988)	139 M & F, 6-16 y	R = .89
Liu et al. (1992)	20 M & F, 12-15 y	R = .93
Mahar et al. (1997)	137 M & 104 F, 10-11 y	R = .90

Note. r = interclass reliability; R = intraclass reliability for a single trial. Adapted from "Aerobic Capacity Assessments" by K.J. Cureton and S. A. Plowman, 2008, FITNESSGRAM / ACTIVITYGRAM Reference Guide (3rd ed), p. 101.

Table 2

Concurrent Validity of the PACER in Children and Adolescents

Source	Sample	Validity Coefficient
Armstrong et al. (1988)	77 M, 11-14 y	.54
Barnett et al. (1993)	27 M & 28 F, 12-17 y	.74
		.82[b]
		.85[c]
		.72[a]
Boreham et al. (1990)	23 M, 14-16 y	.64
	18 F, 14-16 y	.90
	23 M & 18 F, 14-16 y	.87
Leger et al. (1988)	188 M & F, 8-19 y	.71
Liu et al. (1992)	22 M, 12-15y	.65
	26 F, 12-15 y	.51
	48 M & F, 12-15 y	.69
	48 M & F, 12-15 y	.72[a]
Mahar et al. (2006)	135 M & F, 12-14 y	.65[d]
Van Mechelen et al. (1986)	41 M, 12-14y	.68
	41 F, 12-14y	.69
	82 M & F, 12-14 y	.76

Note. [a]*Cross-validation of the Leger et al. (1988) equation;* [b]*Prediction from age, sex, and maximal shuttle speed;* [c]*Prediction from triceps, skinfold, sex, and maximal shuttle speed;* [d]*Prediction from gender, body mass, and PACER laps. Adapted from "Aerobic Capacity Assessments" by K.J. Cureton and S. A. Plowman, 2008, FITNESSGRAM / ACTIVITYGRAM Reference Guide (3rd ed), p. 105.*

Physical Activity Levels

The 3-Day Physical Activity Recall (3DPAR) logs, designed specifically to assess

physical activity levels of youth, allow for the recording of times during which youth

were physically active over a 24hr period, the amount of time they spent engaging in each

activity and the intensity level of the activity (Pate et al., 2003). These types of logs have

been found to be "well-suited for school-based investigations in which access to students

is limited to one of two class periods" (Pate et al., 2003, p. 258). In addition, monitoring

multiple days of physical activity has been shown to be a reliable characterization of usual participation in physical activity by youth (Trost et al., 1998).

The 3DPAR log utilized in this study (Appendix D) was developed by Focused Fitness as an adaptation of existing 3DPAR logs which have been found to be a valid tool for assessing physical activity of youth (Pate et al., 2003). Logs were distributed by PE teachers and the students were asked to self-record their physical activity levels for three consecutive days following the day they received the logs. In order to minimize variability in students' physical activity levels, the data collection periods occurred over a one-week window and included two weekdays and one weekend day. Participants were instructed to complete a separate log for each day of the data collection period. Five collection times occurred over the course of the academic year with two collection periods occurring in the first semester and three in the second. For the purposes of this study, only data collection periods one (pre) and four (post) were utilized.

The activity times on the 3DPAR log was divided into one-hour blocks beginning at 5:00 A.M. and ending at 11:00 P.M. The log was also divided into five columns each of which represented a separate level of intensity. Intensity levels ranged from 1-5 with Level 1 categorized as "Media/Seat", Level 2 as "Daily Activity", Level 3 as "Base", Level 4 as "Heart Health", and Level 5 as "Max". Levels 1 and 2 activities were categorized on the log as light, level 3 as moderate, levels 4 as hard, and level 5 as very hard. A written description along with caricature drawings were provided for each of the five intensity levels to allow for a better understanding of each level.

Participants were asked to record the number of minutes they were physically active during each hour block in the column that best represented what they believed to

be the intensity level of that activity. Time spent in PE class was excluded from the logs.

The total times for each column were totaled and recorded at the bottom of the activity

log. The participants were also instructed to record on each log the time they woke up,

the time they went to bed, the day of the week, and the date. Demographic information to

include name, period, student ID and teacher were included as well.

Validity and Reliability of 3DPAR

Only a few studies were found in the literature which documented the validity of

the 3DPAR for measuring physical activity of youth with little to none being found which

documented validity in elementary age youth. A study conducted by Pate et al., (2003),

which investigated the validity of a 3DPAR in a sample of 70 eighth and ninth grade

females, found the 3DPAR to be a valid method (r=0.27-0.46; P<0.05) for measuring

moderate, vigorous, and overall physical activity levels in adolescent females (Coe, 2003;

Pate et al., 2003). An additional study, conducted by Argiropoulou, Michalopoulou,

Aggeloussis, and Argerinos (2004), utilized the 3DPAR to measure the physical activity

levels of male and female Greek high school adolescents, aged 13-14. In this study, the

3DPAR was found to have a moderate correlation of 0.63 (P<0.01) when validated

against the Computer Science and Applications, Inc. 7164 accelerometer (Argiropoulou

et al., 2004). An additional study which sought to establish concurrent validity of the

3DPAR in a small sample of adolescent females, aged 12-14, found that the "3DPAR

validity coefficient for assessing vigorous and overall physical activity suggests that it

compares favorably to other reported validities in similar studies and can be

recommended for measurement of physical activity in adolescents aged 12-14 years"

(Stanley, Boshoff, & Dollman, 2007, p. 296). As with the study conducted by

Argiropoulou et al., (2004), this study found the 3DPAR to have a significantly moderate

correlation (r=0.46, P<0.01) when compared to the Computer Science and Applications, Inc. 7164 accelerometer (Stanley et al., 2007).

Cronbach's alpha, a "measure of the internal consistency of a test or scale" (Tavakol & Dennick, 2011, p. 53) is the most widely employed means by which to measure the reliability of an instrument. The internal consistency of an instrument provides insight into the inter-relatedness of the test items as it describes the "extent to which all the items in a test measure the same concept or construct" (Tavakol & Dennick, 2011, p.53). Acceptable values of Cronbach alpha have been noted in the literature to range from 0.70 to 0.95 with the number of test items, item interrelatedness and dimensionality all affecting the reliability value (DeVellis, 2003; Nunnally & Bernstein, 1994; Tavakol & Derrick, 2011). While the 3DPAR has been documented as a valid method to measure physical activity levels, no literature was found establishing the internal reliability of the instrument.

Physical activity recall data collected from the 5th grade students across all three cohorts was used to assess the reliability of the 3DPAR used in this study. For the pre-collection (time one) (n=3,408) and post-collection (time two) (n=3,417) periods, Cronbach's alpha was calculated on the total data of all three cohorts combined for max, heart health and base intensity levels across each administration of the 3DPAR (n=2) (Table 3). Cronbach alpha values of 0.66 and 0.67 were found for the pre- and post-base collection periods, respectively. The internal reliability scores at heart health intensity were acceptable for both the pre- (ά = 0.70) and post-collection periods (ά = 0.71). Acceptable internal reliability values were also found at pre-maximum intensity (ά = 0.81) and post-maximum intensity (ά = 0.78). Cronbach's alpha was also calculated on

the total data of all three intensity levels combined resulting in moderate $\acute{a}$ values of 0.68

at pre-collection and 0.67 at post-collection (Table 3).

Cronbach's alpha was also calculated across all three intensity levels for each

Cohort of students (Table 3). For Cohort I, acceptable $\acute{a}$ values of 0.76 and 0.77 were

found for pre- and post-base intensity. However, when calculated for Cohorts II and

Three, the internal reliability values were found to be lower at pre-base ($\acute{a}$ = 0.65; 0.58)

and post-base ($\acute{a}$ = 0.58; 0.65) intensity level, respectively. Cronbach's alpha was also

calculated at pre- and post-heart health intensity resulting in moderate to acceptable $\acute{a}$

values for Cohort I ($\acute{a}$ = 0.73; 0.66), Cohort II ($\acute{a}$ = 0.66; 0.74), and Cohort III ($\acute{a}$ = 0.69;

0.68). Acceptable $\acute{a}$ values were found across Cohorts I, II, and III for both pre- and post-

maximum intensity ($\acute{a}$ = 0.81; 0.78); ($\acute{a}$ = 0.74; 0.75); ($\acute{a}$ = 0.71; 0.81), respectively

(Table 3).

Table 3

Internal Consistency Reliability (Cronbach's Alpha) for 3DPAR

	Sample Size (n)		Reliability Coefficient ($\acute{a}$)	
Sample	Pre	Post	Pre	Post
Total of Three Cohorts	3,408	3,417	0.68	0.67
Base Intensity	3,390	3,414	0.66	0.67
Heart Health Intensity	3,408	3,413	0.70	0.71
Max Intensity	3,416	3,423	0.81	0.78
Cohort I				
Base Intensity	1,234	1,237	0.76	0.77
Heart Health Intensity	1,240	1,242	0.73	0.66
Maximum Intensity	1,241	1,242	0.81	0.78
Cohort II				
Base Intensity	976	1,005	0.66	0.56
Heart Health Intensity	1,000	995	0.66	0.74
Maximum Intensity	1,002	1,004	0.74	0.75

Cohort III				
Base Intensity	1,180	1,172	0.58	0.65
Heart Health Intensity	1,168	1,176	0.69	0.68
Maximum Intensity	1,173	1,177	0.71	0.81

Knowledge of Fitness and Nutrition

"Five for Life K-5" and "Food for Energy and Health 4-5" student assessments were used in the study to collect data regarding students' knowledge of basic fitness and nutritional concepts. Developed in 2003 as part of the *Five for Life* curriculum, the assessments were designed to evaluate students' understanding of the concepts taught through the fitness and nutrition instructional units. Assessment questions were developed through a collaborative effort between Focused Fitness staff. Questions were written specifically to address elements of the *Five for Life* program required through the grant proposal (i.e. five components of fitness and nutrition) and were aligned with the content for each instructional unit. Questions were also developed in alignment with national and state Health and Physical Education standards. The assessments have been adjusted as modifications have been made to the curriculum (A. Lutz, personal conversation, May, 3, 2012).

The "Five for Life K-5" student assessment (Appendix E) is a 10 question test consisting of eight multiple-choice and two open-ended questions (questions 9 and 10). Questions are designed to measure students' understanding of the five components of fitness; eight specifically addressed one of the five areas with the other two reflecting more general concepts taught in the fitness unit. The "Food for Energy and Health 4-5" assessment (Appendix F) contains 10 multiple-choice questions designed to measure understanding of the nutritional concepts taught within the nutrition unit.

As part of the grant requirement, the HPE teachers were provided with a designated time interval in which to teach both the Five for Life K-5 and Food for Energy and Health 4-5 instructional units. Timeframes in which each unit was designated to be taught during the school year were identified prior to implementation of the *Five for Life* program. Pre- and post-assessments were used to measure change in the students' understanding of the concepts taught in the fitness and nutritional units and the same test was used for both pre- and post-testing. The pre-assessment test was administered within 10 days prior to the unit being taught while the post- assessment was required to be administered within 10 days following completion of each unit. For each assessment, either a hard copy of the test was given on which the students were asked to circle the correct answer or the test was completed online in the WELNET system. For the two open-ended questions on the *Five for Life* assessment, students were told to write their answer in the space provided. A space was also provided for students to record their name.

Hard copies of the tests were returned to the HPE teacher who then graded them assigning one point to each multiple-choice question answered correctly. Grading for the two-open ended questions was subjective as no predetermined criteria were given for grading these questions. The teacher determined if the question was answered correctly and one point was given for a correct answer. Each test was assigned a summative score ranging from 0-10 based on the number of questions answered correctly. A summative score based on the number answered correctly was automatically generated for those students who completed the assessments in WELNET.

Reliability and Validity of Cognitive Assessments

The researcher was unable to establish reliability for the Five for Life K-5 and

Food for Energy and Health 4-5 assessments as only summative scores were reported in

the database. No data was available for the individual questions on each assessment. The

questions on each assessment, as noted above, were developed based on NASPE Health

and Physical Education standards thus giving credence to the content validity of the

instrument. However, no external review was conducted prior to the tests being

incorporated within the curriculum and used in the field. The researcher was unable to

secure any additional information from Focused Fitness on the reliability and validation

process for the cognitive assessments.

Student Attitudes

The *Five for Life* student survey was designed to measure students' attitudes

towards their physical education class, health-related fitness, and nutrition. The original

student survey was developed by Focused Fitness as a compilation of questions originally

derived from a questionnaire created by an Exercise Science Professor at Eastern

Washington University. This questionnaire was utilized in a study designed to measure

the components suggested by the literature to significantly impact students' activity

levels and health behaviors (Repovich, 2011). The questionnaire was adapted from

several existing assessment tools, described below, and the questionnaire was validated in

year one of the study (Repovich, 2011).

Questions from the "Modified Perception of Success Questionnaire (POSQ)

(Children's version)" were used to "reflect the goal orientation of the students in fitness

and health classes" (Repovich, 2011, p. 7). Reliability and validity of the POSQ has been

established in separate studies by Roberts, Treasure and Balague (1998) and Liukkonen

and Leskinen (1999). Modified questions from a Physical Self-efficacy scale originally

developed by Chase (2001) were used to assess students' self-efficacy on their ability to

be active outside of school. "Physical Activity Enjoyment Scale" questions were used to

determine the extent to which students enjoyed participating in their PE class (Repovich,

2011). A study conducted by Kendzierski and DeCarlo (1991) found this scale to have a

high internal consistency and test-retest reliability. Questions which measured student

motivation, attitudes, task challenges, and causal attributions were drawn from a

questionnaire developed by Ames and Archer (1988). Validity and reliability were

established for each subscale of the questionnaire (Ames & Archer, 1988).

Integrated into the *Five for Life* program in 2005, the student survey has gone

through several revisions since development of the original survey. Questions have been

deleted and new questions reflecting items deemed to be essential in measuring student

attitudes have been added; these questions were developed by Focused Fitness staff based

on real-world experiences in the health and physical education field (K. Cowan, personal

conversation, August 10, 2012). Nutrition and physical activity questions, i.e. questions

26-30, were adapted from the Youth Risk Behavioral Surveillance Survey (YRBSS) and

added to the survey to measure student behavior. The student survey used in this study is

the result of several iterations of the original survey. With the exception of the YRBSS

questions, the researcher was unable to secure any additional information from Focused

Fitness on the origin of the remaining survey questions.

The student survey was comprised of a total of 30 questions (Appendix G).

Twenty-five questions utilized a 5-point Likert scale ranging from "Disagree Strongly" to

"Agree Strongly" to measure students' attitudes towards PE, health-related fitness, and nutrition. The remaining five questions utilized Likert scales with varying degrees of responses to measure student behaviors over the previous 24 hours. The survey also contained six demographic questions; student ID, name of school district, name of school, name of homeroom teacher, gender and grade. For the purpose of this study, survey questions directly related to the research questions were used; therefore, only data collected for questions seven through thirty-one were included in the analysis.

Reliability and Validity of the Student Survey

To explore the underlying factor structure of the student survey, exploratory factor analysis (EFA) was conducted utilizing the pre-responses (n=1,536) to questions seven through thirty-one on the survey. The identified factors were extracted using Principal Component Analysis and Varimax (i.e. orthogonal rotation) with Kaiser Normalization (Field, 2009; Utley, 2011). Based on the literature, factors with eigenvalues equal to or greater than one were retained. (Guttman, 1954; Kaiser, 1965; Field, 2009; Barfield, Folio, Lam & Zhang, 2011). This criterion is recommended for the retention of factors due to it is "based on the idea that the eigenvalues represent the amount of variation explained by a factor and that an eigenvalue of 1 represents a substantial amount of variation" (Field, 2009, p. 640). Inspection of the scree plot, a graphic depiction of the factors against their eigenvalues in descending order, found the curve to have a sharp descent after the third factor and to taper off after the sixth factor (Field, 2009; Utley, 2011). These inflexions in the curve provide justification for retaining three or six factors (Field, 2009). Factor loadings equal to or greater than 0.4

were used as the determinant for retaining an item (Nunnally & Bernstein, 1994; Stevens, 2002; Field, 2009; Barfield et al., 2011).

The EFA identified six factors with eigenvalues greater than one; these factors accounted for 45.8% of the cumulative variation. Individually, the six factors accounted for 11.1%, 10.3%, 9.6%, 5.6%, 5.0%, and 4.0%, respectively, of the total variance. All but four items loaded on their respective factors with one item (question 12) double-loading, two items (questions 11 and 13) loading on factors not representative of what they were intended to measure and an additional item not loading based on the pre-defined criteria (question 16). As a confirmatory measure, an EFA was ran using the post-data responses (n=1,521) in order to verify the loadings for these items. All four items were found to load on their respective factors on the post-analysis; therefore, the factor loadings obtained from the post-survey EFA were used to categorize these items.

Based on the rotated component matrix, it was determined that nine items correlated with Factor I, eight items with Factor II, eight items with Factor III, three items with Factor IV, and one item each with Factors V and VI. The survey questions that clustered on each factor were reviewed for common themes from which four themes emerged. Factor I was found to represent students' attitudes towards their physical education class, Factor II students' attitudes towards what the concepts learned in health and physical education as related to overall health and wellness, and Factor III students' attitudes towards the importance of being physically active outside of school. The five items clustered under the remaining three factors were all found to represent students' health-related behaviors.

Cronbach's alpha was computed to determine the internal consistency of the student survey. Reliability coefficients of 0.88 were found on both the pre- and post-survey (Table 4). Cronbach's alpha was also calculated for each factor using pre-survey responses for the items clustered under each. The factor reliability coefficients along with a summary of the rotated factor loadings for each survey item are displayed in Table 5. Factor means and standard deviations (SD) for each survey item sorted by factor are also presented in Table 5. As the data shows, there was a moderate to high level of agreeability on the pre-survey to the items intended to measure students' attitudes. As a result of the low item correlations and reliability coefficients for Factors IV, V, and VI, questions 26-30 were removed by the researcher and not used in the data analysis. The three sub-questions for RQ4 were modified based on the factors which emerged in the EFA.

Table 4

Internal Consistency Reliability (Cronbach's Alpha) for Student Survey

	Sample Size (n)	Reliability Coefficient (á)
Pre-Survey	1,536	0.88
Post-Survey	1,521	0.88

Table 5

Rotated Component Matrix, Factor Means and Standard Deviations of Five for Life Student Survey

Factors (Cronbach's alpha)	Rotated Factor Loadings	Mean	SD
Factor I: Students' attitude towards HPE class (nine items) ($\acute{a}$=0.789)			
I like my PE class.	0.732	4.32	0.788
I enjoy learning new activities in PE.	0.656	4.31	0.775
My PE teacher gives me enough time in class to improve my fitness.	0.582	3.92	1.073
I am active most of the time in my PE class.	0.546	4.22	0.900
My teacher makes learning about fitness and eating healthy fun.	0.476	4.03	1.031
My PE class is giving me the information and skills to be fit.	0.556[a]	4.31	0.801
I feel good about myself when I know I have worked hard in PE.	0.465	4.41	0.808
I learn about enjoyable activities in PE that I can do outside of class.	0.439	4.22	0.901
I enjoy working hard enough that my heart rate and breathing increases.	0.407	3.98	0.993
Factor II: Students' attitude towards learning in HPE (eight items) ($\acute{a}$=0.731)			
Having fun helps me understand what I'm learning in PE.	0.474[a]	4.27	0.927
I learn enough in PE class about the Food Guide Pyramid to choose healthy foods.	0.587	3.73	1.153
I learn enough in PE class about setting goals to improve my fitness test scores.	0.550	4.08	0.973
I learn in PE class that being fit and eating healthy foods will make me healthy.	0.549	4.46	0.806
I learn enough in PE class about the five components of fitness to pick activities that improve my fitness.	0.513	3.90	1.008
I learn about health, fitness, and eating healthy in places at school other than my PE class.	0.502	3.85	1.067
I learn enough about intensity in PE class so I can apply it when I'm active.	0.481	3.98	0.957
The things I am learning about fitness and eating healthy in school will be important to me when I get older.	0.465	4.44	0.770

Table 5 continued

Factors (Cronbach's alpha)	Rotated Factor Loadings	Mean	SD
Factor III: Students' attitude towards importance of being physically active outside of school (eight items) (á=0.760)			
I am active outside of class because I want to improve my skills.	0.722	4.07	1.000
I am active outside of class because I want to increase my fitness.	0.720	4.04	1.001
I am following a plan outside of class to achieve my fitness goals.	0.622	3.67	1.126
When I'm active outside of class I choose activities of different intensity.	0.531	3.87	0.983
I work hard in PE on my skills and fitness so I can be active outside of class.	0.496	4.24	0.882
Setting fitness goals is important to me.	0.441	4.04	0.925
Being fit is important for my health.	0.604[a]	4.64	0.692
Making healthy food choices is important to me.	0.548[a]	4.35	0.822
Factor IV: Students' Health-related Behaviors – Nutrition (three items) (á=0.547)			
Yesterday, I ate fruit _____ times (do not count fruit juice).	0.791	3.85	1.813
Yesterday, I ate vegetables (other than french fried potatoes)_____times.	0.800	3.44	1.827
Yesterday, other than juice, milk or water, I drank _____ beverages.	0.481	3.08	2.117
Factor V: Students' Health-related Behaviors – Physically Active (one item) (á[b])			
In an average WEEK, how many minutes of activity do you get where you are breathing hard and your heart rate increases, including your PE class?	0.639	6.09	3.665
Factor V: Students' Health-related Behaviors – Screen Time (one item) (á[b])			
Yesterday, I spent _____ in front of a computer or TV.	-0.808	2.67	2.387

Note. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 8 iterations. [a] Factor loadings extracted from post-survey EFA. [b] Unable to calculate á value due to insufficient number of factor items.

Procedure

Adoption of the *Five for Life* program across the school district occurred in three phases starting with adoption of the program by Cohort I schools during the 2009-10 academic year. These schools were selected to participate in the first phase of implementation due to they were "made up of principals who were solicited volunteers" (S. Jones, personal communication, September 28, 2012). These principals were approached in advance of the PEP grant being awarded to the school district due to they were deemed by the Supervisor of Health and Physical Education to be "pro-PE" (S. Jones, personal communication, September 28, 2012). The program was subsequently implemented in Cohort II schools in the 2010-11 academic year with full implementation occurring across the Cohort III schools in the 2011-12 academic year. A Cohort I yearlong PE timeline for PEP grant year one (2009-10) detailing specific dates for program implementation and data collection is provided in Appendix H.

Implementation of the *Five for Life* program began in November, 2009 with a K-12 teacher training for all Health and Physical Education teachers in the Cohort I schools. Program equipment and curriculum materials were subsequently distributed to all of the teachers at the conclusion of the training. The teachers were then given the freedom to implement the program in a manner best suited to their individual Health and Physical Education classes. Data collection began in November with all students in grades 4-12 being required to complete the six FITNESSGRAM tests as part of the state requirement for fitness testing. Pre-measurements were conducted in November with post-measurements being completed in May. Student results were recorded by the PE teacher and either sent to the PEP coordinator or entered into WELNET. For the purposes of this

study, longitudinal Cohort I 4th and 5th grade PACER data collected during the 2009-10 and 2010-11 academic years was used.

Collection of physical activity data began in fall 2009 with students in 5th through 10th grade using 3DPAR logs to record their physical activity during five collection periods over the course of the academic year. The first collection period, Activity log #1, occurred in later December with the second data collection period, Activity log #2, taking place in early February. The third collection, Activity log #3 occurred in mid-March with data collection periods four and five, Activity Log #4 and #5, occurring in late April and early June, respectively. During each collection period, students recorded their physical activity levels on three consecutive days with two being weekdays and one a weekend day. Students were instructed that time spent in health and physical education was to be excluded from the logs. Activity logs were collected by the teacher at the end of each collection period and sent, along with a class roster, to the PEP coordinator. Data collected on 5th grade students enrolled in elementary schools across all three Cohorts during year one of program implementation were extrapolated from the main database and used for the purposes of this study. Data obtained for the study for Cohort I schools was collected during the 2009-10 academic year, Cohort II schools during the 2010-11 academic year and Cohort III schools during the 2011-12 academic year.

Only one grade level in elementary, middle, and high school (i.e. 4th, 7th, and 9th), were designated to receive the "Five for Life K-5" and "Food for Energy and Health 4-5" curriculum units in grant year one. The *Five for Life* curriculum unit was taught in December 2009 with the students completing the pre-assessment at the beginning of December and post-assessment at the end of January 2010. Teaching of the "Food for

Energy and Health 4-5" unit occurred in March 2010 with the pre-assessment given the first week of March and post-assessment in the latter part of April. Pre- and post-assessment scores were either entered into WELNET or sent to the PEP coordinator with the class roster attached. Assessments were required to have the students name and ID numbers. Summative assessment scores, (i.e. number correct out of 10) were recorded in the PEP grant database for the school district. Only Cohort I 4th grade pre- and post-data was utilized for this study due to assessments were not administered to these same group of students in their 5th grade year.

Students in grades 4-10 were required to complete the student survey and surveys were completed online in WELNET. The pre-survey was administered in early December with students completing the post-survey in early June. Cohort I 4th grade pre- and post-survey data collected during the 2009-10 academic year was used in this study.

Data Analysis

This study utilized a pre-test/post-test repeated measures design. The study data was obtained from the external evaluator contracted by the school system to organize and maintain the data in alignment with the PEP grant requirements. The study databases were sent in password protected files containing data for PEP grant years one through three; a separate database was received for the survey data. The data utilized to assess each research variable was extrapolated from the database by the researcher and a new spreadsheet was created for the study variables. Descriptive data was summarized for each of the four research variables to capture the characteristics of the study population. Descriptive statistics were run and the mean and standard deviation for each research variable were reported.

Using SPSS 21.0 for Windows, all datasets were screened for missing data, data entry errors and univariate outliers prior to analysis. Subjects with missing pre- or post-data were either deleted from the database or the missing scores were denoted as "999" in the dataset. Mean replacement was used to address missing items in the survey database. Univariate outliers were identified in SPSS using boxplots. All values denoted with asterisks (1.5 interquartile range beyond whisker/fence) within the boxplot were identified as outliers and either windsorized or denoted as "999"in the dataset and excluded from analysis.

Univariate normality was verified in SPSS for each continuous variable by examining a combination of histograms along with descriptive data (skewness and kurtosis) (A. Braitman, personal communication, February 18, 2013). While the histograms indicated a slight positive skew, all skewness values were found to be under the absolute value of three, a commonly accepted cutoff (A. Braitman, personal communication, February 18, 2013). Therefore, based on this information, it was determined that no transformations were necessary. Additionally, linearity between SES and each continuous outcome variable was verified using bivariate scatterplots (A. Braitman, personal communication, February 18, 2013).

Cases within the PACER original dataset (n=1,780) identified to have missing pre- and post-data in year one (n=14) and year two (n=23) were deleted from the original dataset. Cases with missing pre- or post-data in year one (n=116) or year two (n=562) were denoted as "999" in the SPSS dataset and excluded in the data analysis. The higher number of cases with missing data in year two resulted from four Cohort I elementary schools choosing not to continue participation in the grant in year two thus accounting for

the large number of subjects for whom 2nd year data was not available. Twenty outliers were identified in the year one dataset, 15 were changed to "999" and four were reduced to the value 98 while maintaining their rank in the data. Four outliers were identified in the year two dataset, two which were changed to "999" and excluded from the data analysis. The remaining two outliers were reduced to the value 85 while maintaining their rank in the data. No outliers were identified in the "Five for Life K-5" and "Food for Energy and Health 4-5" assessment data. The "Five for Life K-5; dataset was found to have 166 cases with missing pre- or post-data while 138 cases were identified as such in the "Food for Energy and Health 4-5" dataset. All cases were denoted as "999" in the SPSS dataset and excluded in the data analysis.

Prior to data cleaning, the physical activity dataset was comprised of data collected on 4,463 5th grade students from Cohort I (n=1552), Cohort II (n=1271) and Cohort III (n=1640). A total of 1,027 participants were identified as missing pre- or post-data and were deleted from the original dataset. Using boxplots in SPSS, 186 outliers were identified, 159 of which were changed to "999" in the dataset. Twenty-seven scores were windsorized while maintaining their rank in the data; two to the value 410, one to the value 411, two to the value 481, one to the value 541, five to the value 561, two to the value 562, seven to the value 581, three to the value 601, and four to the value 631. Once data cleaning was completed, a separate dataset was created for each of the cohorts to be used in data analysis.

Following data cleaning, mean composite scores were computed in SPSS for all three intensity levels and these scores were used in the data analysis. The composite score was calculated by computing the sum of the number of minutes across the three days of

data collection for each intensity level (e.g. total number minutes Day 1 Base + total number minutes Day 2 Base + total number minutes Day 3 Base). This resulted in individual composite scores for base, heart health, and maximum intensity at pre- and post-collection.

The original survey dataset (n=3,068) was comprised of pre- (n=1538) and post-survey (n=1,530) data collected on 4th grade students during the 2009-10 academic year. Initial screening of the data identified 145 cases with no data all of which were deleted from the dataset. A total of 464 cases were identified to be missing either pre- (n=218) or post-data (n=260) and were deleted from the dataset. Three additional cases were deleted as a result of five or more items ($\geq$20% of total number of items) were missing from either the pre- and/or post-survey.

The survey questions were sorted into three constructs with the items corresponding to Factors I, II, and III identified in the factor analysis clustered within each construct (Table 5). The data was then screened for missing items within each construct and all items were replaced using item-mean replacement. There were 176 missing data points scattered throughout the nine items clustered within Construct I. All 176 data points were replaced using item-mean replacement resulting in 162 participant surveys being altered in this manner. Within Construct II, there were 195 missing data points scattered throughout the eight items. All 195 data points were replaced using item-mean replacement resulting in 165 participant surveys being altered in this manner. There were 192 missing data points scattered throughout the eight items clustered within Construct III. All 192 data points were replaced using item-mean replacement resulting in 166 participant surveys being altered in this manner. Following completion of the data

cleaning, mean composite scores were created in SPSS for each of the constructs.

Composite scores were calculated for each individual item within the constructs by

dividing the sum of participant responses by the total number of items within that

construct. As a result, nine composite scores were computed for Construct I, eight for

Construct II, and eight for Construct III and these scores were used in the data analysis.

This study was a three-level nested design; therefore a statistical approach capable

of analyzing nested data was warranted (Wood, 2006; Witt & Dunn, 2012). Hierarchical

Linear Modeling (HLM), a multilevel modeling approach to establishing correlations

between variables, was selected by the researcher to be the optimum statistical approach

for analysis of the study data. HLM, used frequently in educational research, allows for

the "use of predictors at both the individual (or lowest) level (level 1) and the

organizational (or higher) level (level 2) to explain the variance in the dependent

variable" (McCoach, 2010, p. 123). Using HLM accounts for the fact that multiple levels

(i.e. individual students, classes, and schools) exist within school-based institutions

(Phillips, 2012). Utilizing a multilevel approach when analyzing nested data eliminates

the significant and interpretive problems that are encountered with such single-level

approaches as analysis of variance and regression (Wood, 2006; Chang, Denson, Saenz &

Misa, 2005; Snijders & Bosker, 1999).

Using HLM is advantageous when you wish to access "how intra-individual

differences (within-subject variation over time or settings) and inter-individual

differences (between-subject variation) are related" (Phillips, 2012, p. 34). HLM also

allows for interactions between variables to be modeled across multiple level of analysis

(Phillips, 2012). According to Holt (2006), HLM "allows for modeling the relationship

between effects that are repeated measures (i.e. measured within-persons) and individual-level effects (i.e. measure at the person level)" p. 118). Covariates assessed at the individual level can easily be incorporated into the level-two equations of the multilevel model (Holt, 2008; Raudenbush & Bryk, 2002). This provides the researcher the ability to "estimate the variation in growth patterns and the relationships with covariates both within and between individuals" (Phillips, 2012, p. 63). Additionally, in multilevel modeling, separate growth trajectories can be separated for each individual student (Holt, 2006). Additional advantages of HLM noted in the research include:

- Allows student achievement and growth as a function of school-level characteristics to be explained, with variance of student outcomes being accounted for.
- Models the effect of students characteristics (i.e. gender, age, ethnicity), on growth within schools or classrooms, and provides an explanation of these differences.
- Models the between and within school variances simultaneously thus producing a more accurate estimation of student growth (Arnold, 1992; Phillips, 2012; Raudenbush & Bryk, 2002).

Data analysis entailed the use of a three-level HLM in which a hierarchical structured set of regressions was conducted. HLM was used to estimate the effect of the *Five for Life* program on student growth across each study variable as well as the impact of the identified student-level and school-level covariates. In studies which measure change over time, Level One (L1) refers to periods of time over which individual changes are observed. At this level, "each person's development is represented by an individual growth trajectory that depends on a unique set of parameter" (Raudenbush & Bryk, 2002, p. 161). These growth parameters serve as the outcome variables in a Level Two (L2) and

Level 3 (L3) model (Raudenbush & Bryk, 2002). In this study, the pre/post time points

(L1) were nested within individual students (L2) and students were nested within

individual elementary schools (L3). L2 and L3 refer to the models which describe units

within a specific grouping (i.e. students within schools). An assumption of a repeated-

observations model is "growth parameters vary across individuals" (Raudenbush & Bryk,

2002, p. 162).

L1 in the study model consisted of the repeated measures which predicted

individual growth trajectory and random error for each student (i) in school (j) (Equation

1). Growth was assessed in terms of an intercept and rate of change (slope) with the

slopes for the student-level and school-level predictor variables fixed. This model is often

referred to as the unconstrained model as it contained no level-two (L2) or level-three

predictors (Georgio, 2012). The L1 model used in this study is represented in Equation 1,

(Raudenbush & Bryk, 2002).

Level One (time): $\quad Y_{tij} = \pi_{0ij} + \pi_{1ij}\alpha_{tij} + \pi_{2ij}\alpha^2_{tij} + \varepsilon_{tij}$ $\qquad$ (1)

This equation refers to the within-individual level of the model as it is representative of

the repeated measures nested within individual students (Giorgio, 2012). In this equation,

Y_{tij} represents the observed score on the dependent variable at time (t) for student (i) in

school (j). The growth parameter, π_{0ij} represents the initial score (intercept) for student (i)

in school (j) on the first measurement occasion (Giogio, 2012). The parameters, π_{1ij} and

π_{2ij}, represent the slopes "generated from previous measurement occasions" and α_{tij} and

α^2_{tij} are the time varying parameters (Giorgio, 2012, p. 118). The ε_{tij} is the random error,

assumed to be independent and normally distributed with a mean of zero and common

variance σ^2 (Raudenbush & Bryk, 2002; Chang, 2005; Holt, 2008).

The L1 equation is used to formulate the L2 equation with student-specific predictor variables added to the model. The L2 model used in this study is represented by Equation 2 (Raudenbush & Bryk, 2002; Holt, 2008).

Level Two (Students): $\quad \pi_{0ij} = \beta_{000j} + r_{0ij}$ $\qquad$ (2)

$$\pi_{1ij} = \beta_{10j}\alpha_{1ij} + r_{1ij}$$

$$\pi_{2ij} = \beta_{20j}\alpha_{2ij} + r_{2ij}$$

The L2 model assesses the between-student variability in growth trajectory. The variation in outcome π_{ij} for student (i) in school (j) is a function of the student-level characteristics. In this equation, π_{tij} represents the observed growth or achievement for student (i) in school (j). The β_{000j}, β_{10ij} and β_{20ij} represent the intercepts for student (i) in school (j) (Giorgio, 2012). The parameters, α_{1ij} and α_{2ij}, are representative of the student-level characteristics. These parameters are indicative of the "direction and strength of association" between each characteristic and the corresponding student outcome (Raudenbush & Bryk, 2002, p. 231). The r's are "level-1 random effects that represent the deviation of child ij's score from the predicted score based on the student-level model" (Raudenbush & Bryk, 2002, p. 231). In this model, the student-specific slopes are allowed to vary while the school-specific slopes remain fixed (Giorgio, 2012).

The L2 model is used to formulate the L3 model with the school-specific or institutional predictor variables being added to the model. The regression coefficients from the L2 model become outcome variables to be predicated by the school-level predictor variables (Raudenbush & Bryk, 2002). The L3 model used in this study is represented by Equation 3.

Level 3 (Schools): $\quad \beta_{00j} = \gamma_{000} + \mu_{00j}$ $\qquad$ (3)

$$\beta_{10j} = \gamma_{100}X_{1j} + \mu_{10ij}$$

The L3 model is characterized as the between-group model and is used to describe the differences that exist between the varying groups (i.e. schools) that the students are located within (Georgio, 2012). The β_{00j} and β_{10j} "represent the average intercept and rate of growth, respectively, in school j" (Phillips, 2012). The variation in outcome β_{10j} in school (j) is a function of school-level characteristics. When all the predictor variables are zero, the γ_{000} refers to the grand mean of the dependent variable scores across all groups while the γ_{100} represents the slope between the dependent variable and the level two predictor variables. The X_{1j} represents an individual school-level predictor variable. The parameter $\gamma_{100}X_{1j}$ represents a regression slope dictating how strong of an association exists between the X_{1j} and the outcome β_{10j}. The μ_{00j} and μ_{10ij} are the L3 random effects. In this model, the school-specific predictor variables are allowed to vary (Georgio, 2012).

Using HLM and controlling for student-level characteristics (L2), and school-level characteristics (L3) allowed for correlations between study participants and program outcomes to be elucidated across students, age, gender, and school SES (Raudenbush & Bryk, 2002; Wood, 2006). Socioeconomic status of each elementary school was determined based on the percentage of students receiving free/reduced lunch at each elementary school (VDOE, 2012). The assumption underlying HLM analysis in this study is that the student-level and school-level characteristics may have a differential impact on the outcome variables (Chen & Cragg, 2012). A summative view of the research questions, research variables, sample populations, instrument(s) utilized in data collection, and methodologies employed in the measurement of each research variable is provided in Appendix I.

Summary

The current study utilized pre-existing 4th and 5th grade data collected in a large, urban school district in the Southeastern, U.S. during the 2009-10, 2010-11, and 2011-12 academic years. Study data was collected as part of the reporting requirements for the Carol M. White PEP Grant. Findings from this study will serve to enhance the body of knowledge pertaining to the effect of a standards-based K-12 Health and Physical Education curricula program designed to teach the principles of health and fitness while improving students' health-related fitness levels throughout elementary, middle, and high school.

The research methods and procedures were presented in this chapter. A description of the study population for each research variable was provided. Each instrument was described in combination with the data collection procedures used in the collection of study data. Reliability and validity was specified for each measure. The chapter concluded with an overview of the Hierarchical Linear Model used to analyze the study data and answer the research questions.

The study results, conclusions, and recommendations are presented in Chapters 3 and 4. Statistical analyses are performed and major findings are discussed in relation to each research question. . Major limitations of the study are discussed as they relate to each of the research variables. Conclusions are drawn from the study results and recommendations for further research are given. Chapter 4 concludes with a discussion of the study implications for the field of Health and Physical Education.

Chapter 3. Results

Overview

This study utilized a three-level Hierarchical Linear Model to estimate the effects of the *Five for Life* curricula program on student outcomes as well as the impact of the covariates on the student growth trajectories. Effect was estimated by assessing the between and within group differences of the study variables while controlling for the student-level (i.e. age and gender) and school-level (i.e. SES) predictor variables, when applicable. Included in this chapter are the descriptive statistics for each variable along with the HLM results used to answer each of the five research questions. A detailed description of the three-level HLM used in the analysis is also provided.

Descriptive Statistics

Descriptive statistics were calculated for the four study variables. For each study variable, gender frequencies were compiled and pre/post means (M), and SD were computed for individual study populations. Means and SD are presented and discussed within the context of the results for each research question.

The percentage of males and females were relatively equal across all study populations (Table 6). Of the PACER YR One subjects (n=1,642), 50.2% were males and 49.8% were females. From this group, 1,195 were followed into their 5th grade year (PACER YR Two) where the gender frequencies were reversed as 49.8% were males and 50.2%. Data from this same population was used for evaluating the "Five for Life 4-5" and "Food for Energy and Health K-5" assessments. Of students for whom pre/post data was available from the "Five for Life 4-5" assessment (n=1,591), and the "Food for Energy and Health K-5" assessment (n=1,619), there was an almost equal distribution of

males and females; 49.8% and 49.9 % males and 50.2% and 50.1 % females, respectively.

Similar to the PACER and assessment populations, the 5th grade Cohort I physical activity data (n=1,242) was comprised of 49.9% males and 50.1% females. In Cohort II (n=1,010), there was a greater percentage of males as compared to females, 52.3% and 47.7%, respectively. Cohort III (n=1,184) was found to have 50.3% females and 49.7% males. The 4th grade survey population (n=1,220) was reflective of the aforementioned as there were 51.8% males and 47.7% females.

Table 6

Gender Frequencies by Study Population

Study Population	Valid Cases (n)	Gender Males f	Males %	Females f	Females %
Pacer YR 1	1,642	824	50.2	818	49.8
Pacer YR 2	1,195	595	49.8	600	50.2
Five for Life K-5	1,591	792	49.8	799	50.2
Food for Energy & Health 4-5	1,619	808	49.9	811	50.1
Physical Activity: Cohort 1	1,242	620	49.9	622	50.1
Physical Activity: Cohort 2	1,010	528	52.3	482	47.7
Physical Activity: Cohort 3	1,184	588	49.7	596	50.3
Student Survey	1,220*	632	51.8	582	47.7

Note. f = frequency. *Gender data missing from six surveys.

Statistical Analysis

Hierarchical Linear Modeling

In order to allow for the multilevel nature of the data, analysis for each of the five research questions were conducted in Mplus (version 6.1) (Muthén & Muthén, 2010). Assessment of change from pre-test to post-test was conducted using latent growth models. The cluster function accounted for the nesting of students within schools. The MPlus software was unable to accommodate a four-level model; therefore, a model could not be created for the nesting of schools within cohorts or academic years (Abby Braitman, personal conversation, February, 18, 2013). Separate analyses were conducted on the data for multiple cohorts and years in order to avoid violating the assumption of independence.

Separate HLM analyses were conducted for each of the study variables. The model consisted of a three-level design. L1 in the design referred to the repeated measures (i.e. pre/post scores) nested within each student while controlling for student-level (age and gender) and school-level covariates (school SES). L2 in the design model represented individual student scores on each study variable and age and gender were introduced as student-level predictor variables. L3 referred to the school level and school SES was introduced as a school-level predictor variable.

For each of the study variables, students' growth trajectories from pre-assessment to post-assessment were estimated by comparing the group differences in intercepts and slopes of the student outcomes. Initial performance, predicted to differ amongst the students, was estimated by the intercept of the model. Some of the variability in initial performance was considered to be random and "influenced by events or circumstances

preceding the first measurement" (Butterfield et al., 2008, p. 780). Students were also

predicted to vary in their rate of growth over the course of the school year and some of

this variability was random (Butterfield, et al., 2008). This was referred to as the random

slopes which indicated their rate of change from pre-testing to post-testing.

In order to control for age and gender (L2 predictor variables) and school SES (L3

predictor variable), these variables were included as predictors for each relevant

intercept-slope pair. Intercept and slope were estimated at each level with appropriate

covariates included in the analysis. A depiction of the student-level and school-level

analysis conducted in this study is provided in Figures 4 and 5.
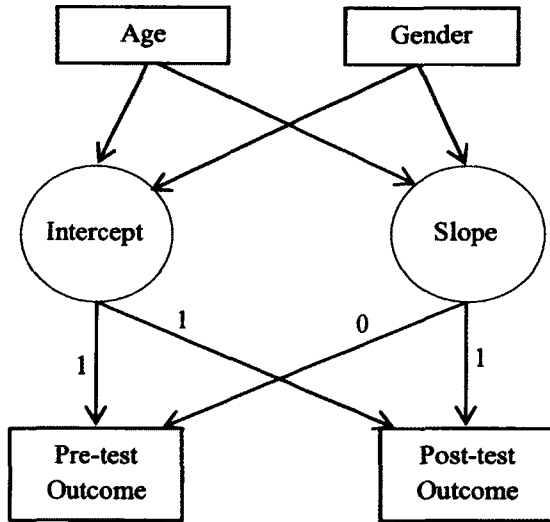
Figure 4. Student-level analysis of effect of *Five for Life* curricula program on student pre-test and post-test outcomes.
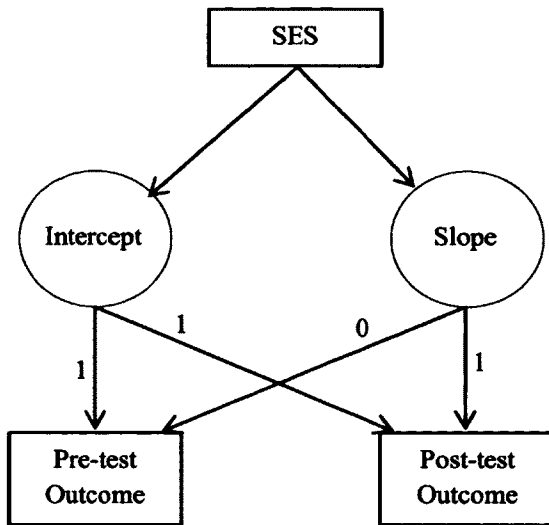
Figure 5. School-level analysis of effect of *Five for Life* curricula program on student pre-test and post-test outcomes

Analysis of Results

The first research question asked "Does participation in the *Five for Life* program improve the cardiorespiratory endurance levels of elementary school students"? In order to answer this question, HLM was used to estimate 4th grade students' growth trajectory from pre- to post-PACER testing across YR1 and YR2 by determining the differences in the intercepts and slopes of the scores.

The overall mean PACER score at pre-testing was 24.8 laps (SD) with a gain of 4.2 laps (M=29, SD=15.9) at post-testing (Table 7). The number of successfully completed laps reported by the students ranged from 3 to 98 at pre-testing and 3 to 97 at post-testing thus indicating a wide variability in performance. A similar increase was seen in YR 2 as the mean number of laps at pre-testing was 29.8 (SD=15.6) as compared to 34.5 (SD=15.9) at post-testing (Table 7). The reported number of laps ranged from 1 to 85 and 3 to 90 at pre- and post-testing, respectively. The PACER YR1 results showed a

significant increase in scores from pre- (B=23.95, SE=8.22) to post-testing (B=9.97,

SE=3.77); (t=2.65, p<0.05) when controlling for age, gender, and SES (Table 8). While

the average estimated number of laps was higher in YR2 as compared with YR1, both at

pre- and post-testing, the difference in intercept (B = 44.79, SE = 9.92) and slope (B =

13.27, SE = 8.38); (t =1.58, p >0.05) failed to show significance (Table 8). These results

may have been due to the study population in YR2 was 27% lower than in YR1 as a

result of four elementary schools which participated in the *Five for Life* program in YR1

deciding to not participate into YR2 (Table 6)

The HLM model, which assessed the impact of the student-level predictors (i.e.

age and gender) at L2, and school-level predictors (i.e. school SES) at L3 found gender to

be a significant predictor of YR1 students' performance on the PACER with females

reporting approximately five fewer laps at baseline (B = -5.36, SE = 0.83; t = -6.49,

p<0.05) and one fewer lap at post-testing (B = -1.14, SE = 0.03; t = -2.17, p<0.05) for

YR1 (Table 9). Gender was also found to be a significant predictor of PACER baseline

scores in YR2as females reported approximately two fewer laps compared to males (B =

2.08, SE = 0.94; t = -2.22, p<0.05) (Table 10). Gender was not found to be a significant

predictor of YR2 post-test scores (B = -0.90, SE = 0.56; t = -1.61, p>0.05). Neither age

nor school SES was found to significantly predict PACER scores in YR1 and YR2 (Table

10). The correlation between intercept and slope was found to be significant (r = -.20,

p<0.05) indicating that students who completed a higher number of laps at baseline had

less of an increase at post-testing.

Table 7

Means and SD of Cohort I PACER Scores Across Grade Levels

Time Point	Valid Cases (n)	Mean	SD	Minimum	Maximum
Pre-PACER YR1	1,642	24.8	14.4	3	98
Post-PACER	1,642	29.0	15.9	3	97
Pre-PACER YR2	1,195	29.8	15.6	1	85
Post-PACER	1.195	34.5	15.9	3	90

Note. YR1=4th grade students during 2009-10 academic year. YR2=5th grade students during 2010-11 academic year. Scores=Number of laps successfully completed.

Table 8

HLM Results of the Relationship Between the Five for Live Program and Cohort I PACER Scores Across Academic Years

Fixed Effects	Coefficient	SE	t-ratio	p
PACER YR1				
Intercept	23.95	8.22		
Slope	9.97	3.77	**2.65***	.08
PACER YR2				
Intercept	44.79	9.92		
Slope	13.27	8.38	1.58	.113

Note. $p<.05$. YR1=4th grade students during 2009-10 academic year. YR2=5th grade students during 2010-11 academic year. Intercept = **initial** (pre) value of outcome after controlling for age and gender (Level 2) and school SES (Level 3). Slope = **change** to post-test for outcome after controlling for age and gender (Level 2) and school SES (Level 3).

Table 9

Fixed Effects Estimates of Predictors of Cohort I 4th Grade Students Cardiorespiratory Endurance Levels Across PACER YR1

Fixed Effect	B	SE	t-ratio	p
Pre-PACER				
Age	0.64	0.95	0.67	.501
Gender	-5.36	0.83	**-6.49***	<.001
SES	0.15	0.11	1.41	.158
Post-PACER				
Age	-0.31	0.46	-0.67	.505
Gender	-1.14	0.53	**-2.17***	.030
SES	-0.07	0.06	-1.32	.186

Note. p<.05

Table 10

Fixed Effects Estimates of Predictors of Cohort I 4th Grade Students Cardiorespiratory Endurance Levels Across PACER YR2

Fixed Effect	B	SE	t-ratio	p
Pre-PACER				
Age	-1.20	0.81	-1.48	.14
Gender	-2.08	0.94	**-2.22***	.03
SES	-0.07	0.08	-0.84	.40
Post-PACER				
Age	-0.75	0.79	-0.95	.34
Gender	-0.90	0.56	-1.61	.11
SES	-0.01	0.05	-0.29	.77

Note. p<.05

The second research question assessed physical activity levels asking "Does participation in the *Five for Life* program increase physical activity levels of elementary school students? To answer this question, HLM was used to estimate 5th grade students' growth trajectory from pre- to post-testing by determining the differences in the

intercepts and slopes of the number of reported minutes of physical activity at base, heart

health, and maximum intensity levels. Cohort I (2009-10), Cohort II (2010-11), and

Cohort III (2011-12) data was analyzed independently of each other; results for each are

discussed and presented autonomously.

For each Cohort, means and SD were calculated using the composite scores at

base, heart health, and maximum intensity levels. Results for Cohort I are reported in

Table 11. At base intensity, the overall mean number of minutes reported at baseline was

128.1 (SD=115.3) with the average number of minutes reported at pre-collection ranging

from 0 to 650 minutes. Little to no increase was seen at post-collection in April as

students reported, on average, 129.9 (SD=122.0) minutes with scores ranging from 0 to

581. At heart health intensity, the average number of reported minutes was lower, as

compared to base, at both pre- (M=77.1, SD=73) and post-collection (M=89.7, SD=85.4).

The range in minutes reported was 0 to 430 minutes in December and 0 to 540 minutes in

April. As expected, there was a greater decline in minutes reported at maximum intensity

with students' reporting, on average, 20.5 (SD = 37.2) minutes during pre-collection as

compared to 23.2 (SD = 39.8) minutes in post-collection. Again, there was a wide range

in scores during pre- and post-testing, 0 to 340 minutes and 0 to 420 minutes,

respectively.

Table 11

Mean and SD of 5th Grade Cohort I Physical Activity Levels Across Base, Heart Health, and Maximum Intensities

Time Point	Valid Cases (n)	Mean	SD	Minimum	Maximum
Pre-Base	1,234	128.1	115.3	0	650
Post-Base	1,237	129.9	122.0	0	581
Pre-Heart Health	1,240	77.1	73.0	0	430
Post-Heart Health	1,242	89.7	85.4	0	541
Pre-Max	1,241	20.5	37.2	0	340
Post-Max	1,242	23.2	39.8	0	420

Note. Base=Low Intensity; Heart Health=Medium Intensity; Maximum=High Intensity. Scores=Average number of minutes of physical activity collected over a consecutive three-day period.

The observed change between the intercepts and slopes were not found to be significant at base (B = -59.30, SE = 213.33; t = -0.28, p>0.5), heart health (B = 95.78, SE = 87.43; t = 1.10, p>0.05) or maximum (B = 42.81, SE = -44.99; t = -1.77, p>0.05) intensity levels when controlling for age, gender, and school SES (Table 12). In the HLM model, gender was found to be the only significant predictor of physical activity levels as age and school SES was shown to exhibit no influence at base, heart health, or maximum intensity (Tables 13-15). Results showed gender to be significantly negatively related to PA at pre-heart health intensity as females reported, on average, 10.6 (SE = 5.10; t = -2.09, p<0.05) less minutes as compared to males (Table 14). A negative significant association was also found between gender and baseline physical activity levels at maximum intensity as there was a 6.3 (SE = 2.22) decrease in the number of minutes reported by females (t = -2.83, p<0.05) (Table 15).

Table 12

HLM Results of the Relationship between the Five for Live Program and Cohort I 5th Grade Students' Physical Activity Across Intensity Levels

Fixed Effects	Coefficient	SE	t-ratio	p
Base				
Intercept	62.71	91.99		
Slope	-59.30	213.33	-0.28	.78
Heart Health				
Intercept	-19.91	56.59		
Slope	95.78	87.43	1.10	.27
Maximum				
Intercept	42.81	23.87		
Slope	-44.99	25.48	-1.77	.08

Note. p<.05. Base=Low Intensity; Heart Health=Medium Intensity; Maximum=High Intensity. Intercept = **initial** (pre) value of outcome after controlling for age and gender (Level 2) and school SES (Level 3). Slope = **change** to post-test for outcome after controlling for age and gender (Level 2) and school SES (Level 3).

Table 13

Fixed Effects Estimates of Predictors of 5th Grade Cohort I Students Physical Activity Levels at Base Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Base				
Age	7.83	8.48	0.92	.36
Gender	5.92	7.52	0.79	.43
SES	-0.85	0.60	-1.41	.16
Post-Base				
Age	14.1	25.43	0.56	.58
Gender	-79.0	50.03	-1.58	.11
SES	0.82	0.69	-1.18	.24

Note. *p<.05. Base=Low intensity level.

Table 14

Fixed Effects Estimates of Predictors of 5ᵗʰ Grade Cohort I Students Physical Activity Levels at Heart Health Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Heart Health				
Age	10.52	5.99	1.75	.08
Gender	-9.36	4.97	-1.88	.06
SES	-0.26	0.28	-0.93	.35
Post-Heart Health				
Age	-7.16	8.77	-0.82	.41
Gender	-10.64	5.10	**-2.09***	.04
SES	-0.27	0.26	-1.07	.28

Note.* p<.05. Heart Health=Medium intensity level.

Table 15

Fixed Effects Estimates of Predictors of 5ᵗʰ Grade Cohort I Students Physical Activity Levels at Maximum Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Maximum				
Age	-1.70	2.73	-0.63	.53
Gender	-6.28	2.22	**-2.83***	.01
SES	-0.08	0.22	-0.38	.70
Post-Maximum				
Age	4.77	2.75	1.74	.08
Gender	-0.57	2.26	-0.25	.80
SES	-0.02	0.14	-0.15	.88

Note. *p<.05. Maximum=High intensity level.

For Cohort II, the average number of reported minutes at base intensity slightly increased from pre-testing (M = 195.6, SD = 148.4) to post-testing (M = 210.4, SD = 161.4) (Table 16). While the scores at baseline ranged from 0 to 660, the range at post-testing was much wider as scores ranging from 0 to 920 were reported. At heart health

intensity, a 16.1 minute decrease was seen in the average number of minutes reported at

baseline (M = 90.6, SD = 113.8) as compared to post-testing (M = 74.5, SD = 107.4)

(Table 16). Reported ranges of 0 to 581 were found at pre-testing compared to 0 to 560 at

post. The same phenomena was observed at maximum intensity as the mean number of

minutes decreased from 39.0 (SD = 84.8) at baseline to 21.0 (SD = 57.1) at post-testing

(Table 16). The range of reported minutes also decreased with students reporting 0 to 561

minutes at baseline and 0 to 481 at post-testing.

Table 16

Mean and SD of 5th Grade Cohort II Physical Activity Levels Across Base, Heart Health and Max Intensities

Time Point	Valid Cases (n)	Mean	SD	Minimum	Maximum
Pre-Base	976	195.6	148.4	0	660
Post-Base	1,005	210.4	161.4	0	920
Pre-Heart Health	1,000	90.6	113.8	0	581
Post-Heart Health	995	74.5	107.4	0	560
Pre-Max	1,002	39.0	84.8	0	561
Post-Max	1,004	21.0	57.1	0	481

Note. Base=Low Intensity; Heart Health=Medium Intensity; Maximum=High Intensity. Scores=Average number of minutes of physical activity collected over a consecutive three-day period.

As was found with Cohort I, no significant change was observed between the

intercepts and slopes for base intensity (B = 26.6, SE = 221.3; t = 0.12, p>0.5), heart

health (B = -9.33, SE = 119.6; t = -0.08, p>0.05) or maximum (B = -19.41, SE = 75.4; t =

-0.26, p>0.05) intensity levels (Table 17). Gender was once again found to be the only

significant predictor of students' physical levels. This association, however, was only

observed at pre-maximum intensity levels where females were shown to report an

average of 15.6 (SE = 7.61) less minutes of physical activity compared to males

(t = -2.05, p>0.05) (Table 20). Neither age nor school SES was found to be a significant

predicator of physical activity levels at base, heart health, or maximum intensity levels

(Tables 18-20).

Table 17

HLM Results of the Relationship between the Five for Live Program and Cohort II 5th Grade Students' Physical Activity Across Intensity Levels

Fixed Effects	Coefficient	SE	t-ratio	p
Base				
Intercept	193.89	250.32		
Slope	26.62	221.33	0.12	.90
Heart Health				
Intercept	90.97	131.43		
Slope	-9.33	119.60	-0.08	.94
Maximum				
Intercept	40.47	77.63		
Slope	-19.41	75.36	-0.26	.80

Note. p<.05. Base=Low Intensity; Heart Health=Medium Intensity; Maximum=High Intensity. Intercept = **initial** (pre) value of outcome after controlling for age and gender (Level 2) and school SES (Level 3). Slope = **change** to post-test for outcome after controlling for age and gender (Level 2) and school SES (Level 3).

Table 18

Fixed Effects Estimates of Predictors of 5th Grade Cohort II Students Physical Activity Levels at Base Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Base				
Age	0.74	24.78	0.03	.98
Gender	-6.57	10.75	-0.61	.54
SES	-0.36	0.30	-1.19	.23
Post-Base				
Age	-0.18	22.28	-0.01	.99
Gender	-1.19	15.86	-0.08	.94
SES	-0.47	0.51	-0.92	.36

Note. *$p<.05$. Base=Low intensity level.

Table 19

Fixed Effects Estimates of Predictors of 5th Grade Cohort II Students Physical Activity Levels at Heart Health Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Heart Health				
Age	0.89	13.31	0.07	.95
Gender	-14.19	7.94	-1.79	.07
SES	-0.13	0.46	-0.27	.78
Post-Heart Health				
Age	-0.51	12.14	-0.04	.97
Gender	6.72	8.51	0.79	.43
SES	-0.14	0.32	-0.44	.66

Note. *$p<.05$. Heart Health=Medium intensity level.

Table 20

Fixed Effects Estimates of Predictors of 5th Grade Cohort II Students Physical Activity Levels at Maximum Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Maximum				
Age	0.80	7.64	0.11	.91
Gender	-15.60	7.61	-2.05*	.04
SES	0.01	0.54	0.02	.98
Post-Maximum				
Age	-0.64	7.61	-0.08	.93
Gender	12.0	6.63	1.81	.07
SES	0.09	0.28	0.32	.75

Note. *p<.05. Maximum=High intensity level.

Cohort III students reported an average of 192.3 (SD = 169.7) minutes of low intensity physical activity at baseline with an approximate gain of 12 (SD = 165.9) minutes at post-testing (Table 21). Reported minutes ranged from 0 to 880 and 0 to 830 at pre- and post-testing, respectively. A slight increase in the overall mean number of minutes was observed at heart health as students reported an average of 30.7 (SD = 64.4) minutes at pre-testing compared to 34.7 (SD = 77.3) at post-testing (Table 21). The number of minutes ranged from 0 to 420 at baseline and 0 to 480 at post-testing. At maximum intensity, a mean average of 101.8 (SD = 114.9) minutes was reported at baseline compared to 104.9 (SD = 123.8) at post-testing (Table 21). Reported minutes ranged from 0 to 562 at pre-testing as compared to 0 to 601 at post-testing.

Table 21

Mean and SD of 5ᵗʰ Grade Cohort III Physical Activity Levels Across Base, Heart Health and Max Intensities

Time Point	Valid Cases (n)	Mean	SD	Minimum	Maximum
Pre-Base	1,180	192.3	169.7	0	880
Post-Base	1,172	184.0	165.9	0	830
Pre-Heart Health	1,168	30.7	64.4	0	420
Post-Heart Health	1,176	34.7	77.3	0	480
Pre-Max	1,173	101.8	114.9	0	562
Post-Max	1,177	104.9	123.8	0	601

Note. Base=Low Intensity; Heart Health=Medium Intensity; Maximum=High Intensity. Scores=Average number of minutes of physical activity collected over a consecutive three-day period.

While no significant change was observed between the intercepts and slopes at base intensity (B = 2.21, SE = 110.7; t = 0.02, p>0.5), or maximum intensity (B = -2.73, SE = 77.2; t = -0.04, p>0.05) intensity levels, the results showed a significant decrease at heart health intensity as students reported, on average, 142 less minutes of physical activity at post-testing (B = 142.2, SE = 52.4) compared to baseline (B = 94.9, SE = 43.5; t = -2.72, p<0.05) (Table 22). As seen with the PACER data, a significant negative correlation was found between the intercept and slope at base (r = -.60, p<0.001), heart health (r = -.63, p<0.001), and maximum (r = -.79, p<0.001) intensity levels. These results indicate that students' reporting a higher number of minutes at baseline had less of an increase at post-testing compared to students who reported lower minutes initially.

School SES was found to be a significant negative predictor of physical activity levels at both post-base intensity (B = -2.21, SE = 0.94; t = -2.36, p<0.05) and post-heart

health intensity (B = -0.77, SE = 0.24; t = -3.18, p<0.05) as students attending schools with a higher percentage of students receiving free and reduced lunch exhibited a slightly lower growth (Tables 23 & 24). As with Cohorts I and II, gender was once again shown to be a significant predictor as a negative association was shown between gender and reported minutes at both pre-heart health (B = -12.25, SE = 3.55; t = -3.45, p<0.05) and pre-maximum intensity (B = -24.20, SE = 7.04; t = -3.44, p<0.05) (Tables 24 & 25). As indicated by these results, females reported, on average, 12 less minutes of physical activity at medium intensity and 24 less minutes at maximum intensity at baseline compared to males. Age was also found to be a significant predictor at post-heart health intensity (B = 15.69, SE = 5.48; t = 2.86, p<0.05) as less of a decrease in reported minutes was reported by students who were older (Table 24).

Table 22

HLM Results of the Relationship between the Five for Live Program and Cohort III 5th Grade Students' Physical Activity Across Intensity Levels

Fixed Effects	Coefficient	SE	t-ratio	p
Base				
Intercept	250.9	127.19		
Slope	2.21	110.72	0.02	.98
Heart Health				
Intercept	94.93	43.47		
Slope	-142.21	52.36	-2.72*	.01
Maximum				
Intercept	113.7	58.99		
Slope	-2.7	77.17	-0.04	.97

Note. p<.05. Base=Low Intensity; Heart Health=Medium Intensity; Maximum=High Intensity. Intercept = **initial** (pre) value of outcome after controlling for age and gender (Level 2) and school SES (Level 3). Slope = **change** to post-test for outcome after controlling for age and gender (Level 2) and school SES (Level 3).

Table 23

Fixed Effects Estimates of Predictors of 5th Grade Cohort III Students Physical Activity Levels at Base Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Base				
Age	-5.69	12.38	-0.46	.65
Gender	-8.60	8.93	-0.96	.34
SES	-0.12	0.98	-0.12	.90
Post-Base				
Age	1.78	11.79	0.15	.88
Gender	-3.58	8.43	-0.43	.67
SES	-2.21	0.94	**-2.36***	.02

Note. *p<.05. Base=Low intensity level.

Table 24

Fixed Effects Estimates of Predictors of 5th Grade Cohort III Students Physical Activity Level at Heart Health Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Heart Health				
Age	-5.98	4.09	-1.46	.14
Gender	-12.3	3.55	**-3.45***	.00
SES	0.3	0.25	1.29	.12
Post-Heart Health				
Age	15.7	5.48	**2.86***	.00
Gender	-4.9	3.82	-1.31	.19
SES	-0.8	0.24	**-3.18***	.00

Note. *p<.05. Heart Health=Medium intensity level.

Table 25

Fixed Effect Estimates of Predictors of 5th Grade Cohort III Students Physical Activity Level at Maximum Intensity

Fixed Effect	B	SE	t-ratio	p
Pre-Maximum				
Age	0.27	5.87	0.05	.96
Gender	-24.2	7.04	-3.44*	.00
SES	0.02	0.49	0.04	.97
Post-Maximum				
Age	0.89	8.14	0.11	.91
Gender	10.35	11.91	0.87	.38
SES	-0.79	0.89	-0.89	.37

Note. *p<.05. Maximum=High intensity level.

The third and fourth research questions assessed whether 4th grade students knowledge of the five components of fitness and of basic nutritional concepts would improve as a result of participating in the *Five for Life* program. Ten question pre- and post-assessments were given prior to and after completion of the "Five for Life 4-5" and "Food for Energy and Health K-5" curricula units. Means and SD for both assessments are provided in Table 26. As the results show, there was a 1.5 (SD = 1.7) point increase in the mean number of questions answered correctly on the "Five for Life 4-5" assessment and a 2.0 (SD = 2.2) point increase on the "Food for Energy and Health K-5" assessment (Table 26).

Table 26

Means and SD of Cohort I 4th Grade Five for Life 4-5 and Food for Energy and Health K-5 Cognitive Assessment Scores

Cognitive Assessment	Valid Cases (n)	Mean	SD
Pre-Five for Life 4-5	1,591	6.2	1.6
Post- Five for Life 4-5	1,591	7.7	1.7
Pre-Food for Energy and Health K-5	1,619	4.3	2.1
Post- Food for Energy and Health K-5	1,619	6.4	2.3

Note. Scores=Average number of questions out of 10 answered correctly.

Students' knowledge of the five components of fitness significantly increased from pre-testing (B = 5.74, SE = 1.18) to post-testing (B = 3.84, SE = 1.28; t = 2.99, $p<0.05$) when controlling for age, gender, and school SES (Table 27). The average number of questions answered correctly on the "Five for Life 4-5" assessment was shown to increase by approximately four questions. The results also showed a significant increase in students' knowledge of basic nutritional concepts as students also answered an average of four (B = 3.67, SE = 1.35) additional questions correctly following completion of the nutrition unit as compared to before the unit was introduced (B = 4.41, SE = 1.24; t = 2.72; $p<0.05$) (Table 27).

The HLM model showed a very slight association between school SES, the L3 predictor variable, and student performance on the "Five for Life 4-5" pre-assessment (B = 0.01, SE = 0.00; t = 2.18, $p<0.05$) (Table 28). These results indicated that students attending schools with a lower percentage of students receiving free and reduced lunch scored 0.01 points higher compared to those students attending school with higher percentages. School SES was not found to be a significant predictor on the post-

assessment and no association was found between age and gender, the L2 predictors, and the "Five for Life 4-5" pre- and post-assessment scores (Table 28). Neither age, gender, or school SES was found to be significant predictors of student scores on the "Food for Energy and Health K-5" pre- or post-assessment (Table 29). Consistent with the PACER and physical activity results, a significant negative correlation was found between the intercept and slope for the "Five for Life 4-5" assessment ($r = -.61$, $p<0.001$), and the "Food for Energy and Health" assessment ($r = -.50$, $p<0.001$). These results indicate that students' who scored higher on the pre-assessments had less of an increase on the post-assessment compared to students who had lower scores initially.

Table 27

HLM Results of the Relationship Between the Five for Live Program and Cohort I 4th Grade Students' Knowledge of the Five Components of Fitness and Nutrition

Fixed Effects	Coefficient	SE	t-ratio	p
Five for Life 4-5				
Intercept	5.74	1.18		
Slope	3.84	1.28	**2.99***	.00
Food for Energy and Health K-5				
Intercept	4.41	1.24		
Slope	3.67	1.35	**2.72***	.01

Note.*p<.05. Intercept = **initial** (pre) value of outcome after controlling for age and gender (Level 2) and school SES (Level 3). Slope = **change** to post-test for outcome after controlling for age and gender (Level 2) and school SES (Level 3).

Table 28

Fixed Effects Estimates of Predictors of 4th Grade Cohort I Students Knowledge of Five Components of Fitness

Fixed Effect	B	SE	t-ratio	p
Pre-Five For Life 4-5				
Age	0.03	0.12	0.28	.78
Gender	-0.02	0.07	-0.20	.84
SES	0.01	0.00	**2.18***	.03
Post-Five for Live 4-5				
Age	-0.21	0.15	-1.36	.17
Gender	-0.08	0.12	-0.69	.49
SES	-0.02	0.01	-1.44	.15

Note. *p<.05.

Table 29

Fixed Effects Estimates of Predictors of 4th Grade Cohort I Students Knowledge of Basic Nutritional Concepts

Fixed Effect	B	SE	t-ratio	p
Pre-Food for Energy and Health K-5				
Age	0.00	0.10	0.00	.10
Gender	0.08	0.10	0.78	.44
SES	-0.01	0.01	-0.92	.36
Post-Food for Energy and Health K-5				
Age	-0.13	0.12	-1.04	.30
Gender	-0.12	0.15	-0.81	.42
SES	-0.01	0.02	-0.47	.63

Note. *p<.05

The final research question asked whether participation in the *Five for Live* program would improve 4th grade students health-related attitudes. Each survey construct was analyzed independently of each other; therefore, results for each are discussed and

presented separately. Means and SD were computed on pre- and post-composite scores for each construct and results are shown in Table 30. As the results show, there was no change in the average response on the nine questions clustered within Construct I as the mean score on the pre-survey was 4.2 (SD = 0.59) as compared to 4.2 (SD = 0.62) on the post-survey. The mean pre- and post-scores on the eight questions clustered within Construct II were 4.4 (SD = 0.56) and 4.2 (SD = 0.62), respectively. The pre- and post-survey results on the eight questions clustered within Construct III showed the mean scores to be 4.3 (SD = 0.61) and 4.1 (SD = 0.62), respectively.

Table 30

Means and SD of 4th Grade Survey Scores by Survey Construct

Time Point by Construct	Valid Cases (n)	Mean	SD
Pre-Construct I (n=9)	1,220	4.2	0.59
Post-Construct	1,220	4.2	0.62
Pre-Construct II (n=8)	1,220	4.4	0.56
Post-Construct	1,220	4.2	0.62
Pre-Construct III (n=8)	1,220	4.3	0.61
Post-Construct	1,220	4.1	0.62

Note. Scores=Average Likert-scale score on total questions within each construct. n=number of questions within construct.

Results for Construct I, which assessed change in students' attitudes towards their health and physical education class, showed no significant difference in the intercepts and slopes for both the pre-survey (B = 4.14, SE = 0.07) and post-survey (B = -0.03, SE = 0.05; t = -0.66, p<0.05) when controlling for gender and school SES (Table 31). Age was not available for the survey data; therefore, the researcher was unable to include it as a L2

predictor in the HLM model. Gender was found to be a significant predictor of students'
pre-survey scores (B = 0.07; SE = 0.03; t = 2.45, p<0.05) as males were found to exhibit
very slightly higher attitudes towards their PE class as compared to their female
counterparts (Table 32). A significant negative correlation was found between the
intercept and slope for Construct I (r = -.53, p<0.001) indicating that higher attitudes on
the pre-survey were more related to a decrease in attitude on the post-survey.

The questions clustered within Construct II sought to determine the change in
students' attitudes regarding the relationship between the fitness and health concepts
taught in health and physical education and their overall health and wellness. The results
demonstrated a slightly significant change in the intercepts and slopes of the pre-survey
(B = 4.30, SE = 0.05) and post-survey (B = -0.23, SE = 0.04; t = -5.69, p<0.001)
responses when controlling for gender and school SES (Table 31). As indicated by these
results, student attitudes slightly decreased between administration of the survey in
December and June. School SES was found to be the only significant predictor as
students attending schools with a lower percentage of free and reduced lunch were found
to have slightly higher attitudes (B = 0.003, SE = 0.00; t = 2.332, p<0.05) on the pre-
survey (Table 32). No association was found between school SES and post-survey
results. Gender was also not found to influence either the pre- or post-survey responses
(Table 32). As with Construct I, a significant negative correlation (r = -.53, p<0.001) was
found between the intercept and slope indicating that higher attitudes on the pre-survey
were more related to a decrease in attitude on the post-survey.

The questions clustered within Construct III assessed the change in student
attitudes towards the importance of being physically active outside of their PE class. The

results for these questions were not found to be significant as no change was observed in

the intercepts and slopes for the pre-survey (B = 4.27, SE = 1.75) and post-survey

(B = -0.22, SE = 1.94; t = -0.11, p>0.05) when controlling for gender and school SES

(Table 31). Neither gender nor school SES was found to be significant predictors of

student responses on the survey questions clustered within this construct (Table 32). A

nonsignificant negative correlation between the intercept and slope was observed for this

construct.

Table 31

HLM Results of the Relationship between the Five for Live Program and Cohort I 4th
Grade Students' Health-Related Attitudes Across Survey Constructs

Fixed Effect	Coefficient	SE	t-ratio	p
Construct I				
Intercept	4.14	0.07		
Slope	-0.03	0.05	-0.66	.51
Construct II				
Intercept	4.30	0.05		
Slope	-0.23	0.04	**-5.69***	<.001
Construct III				
Intercept	4.27	1.75		
Slope	-0.23	1.94	-0.11	.91

Note. p<.05. n=number of survey questions clustered within each construct. Intercept = **initial** (pre) value of outcome after controlling for gender (Level 2) and school SES (Level 3). Slope = **change** to post-test for outcome after controlling for gender (Level 2) and school SES (Level 3).

Table 32

Fixed Effects Estimates of Predictors of 4th Grade Cohort I Students' Health-Related Attitudes by Survey Construct

Fixed Effect	B	SE	t-ratio	p
Condition				
Pre-Construct I				
Gender	0.070	0.03	**2.45***	.01
SES	0.003	0.00	1.42	.16
Post-Construct I				
Gender	0.010	0.04	0.19	.85
SES	0.001	0.00	0.31	.75
Pre-Construct II				
Gender	-0.010	0.03	-0.42	.67
SES	0.003	0.00	**2.33***	.02
Post-Construct II				
Gender	0.020	0.03	0.93	.33
SES	-0.001	0.00	-0.89	.38
Pre-Construct III				
Gender	0.060	0.76	0.08	.94
SES	0.002	3.90	0.00	.10
Post-Construct III				
Gender	0.020	3.34	0.00	.99
SES	-0.001	4.87	0.00	.10

Note. *p<.05

Summary

The results of the HLM model presented in this chapter provided support for the first research question which looked at the impact of participation in the *Five for Life* program on students' cardiorespiratory endurance levels. Research questions three and four, which assessed whether participation would enhance knowledge of the five components of fitness and basic nutritional concepts, was also supported by the HLM

analysis. The HLM results, however, did not provide support for the second research question which looked at whether physical activity levels would increase in elementary school students who participated in the program. Support for the fifth research question, which looked at changes in student attitudes, was also not supported by the HLM results. Gender, age, and school SES were controlled for in the HLM model. The lack of significant findings for both physical activity and attitudes could be due in part to limitations of the measures used for students of this age.

The HLM analysis showed gender to be a significant predictor at L2 of the model across all variables with the exception of knowledge of fitness and nutrition. Age, the other L2 predictor variable introduced into the model, was only shown to be associated with Cohort III physical activity levels. School SES, the only predictor variable introduced into the L3 of the model, was shown to be a significant predictor for physical activity levels (Cohort III), knowledge of the five components of fitness (Cohort I) and student attitudes for the questions clustered within Construct Two (Cohort I).

Chapter 4. Conclusions, and Recommendations

As physical activity and fitness levels among youth continue to decline and

childhood obesity rates continue to rise in the U.S., time spent in Health and Physical

Education class in many school districts across the country is being reduced or eliminated

due to an increased focus on academics (Maeda & Randall, 2003; Brown et al., 2006;

McMurrer, 2008; Chomitz, 2009; Brownson et al., 2010). In addition, many students are

not physically active during the time spent in PE class. Schools have been identified as

playing a crucial role in providing students with the knowledge and skills needed to adopt

and maintain healthy behaviors and attitudes. Implementing a high-quality course of

study based on national standards in both health and physical education are strategies

identified by the CDC that schools can use to promote healthy eating and physical

activity among youth (Weschler, McKenna, Lee, & Dietz, 2004). School programs that

are well-designed, and well implemented have been found to be effective in increasing

health-related knowledge, and promoting physical activity, fitness, and healthy eating

habits (Dietz & Gortmaker, 2001; Pyle et al., 2006; CDC, 2008).

The *Five for Life* program, developed by Focused Fitness, is a "research-based

K-12 fitness and health program that aligns with physical education and health standards"

(Focused Fitness, 2009a, para. 1). Adopted in 2009 by the school-district in which this

study was conducted as part of the Carol M. White Physical Education grant, this

curricula program utilized activity-based lessons to teach health and fitness-related

concepts. The overarching purpose of this study was to evaluate the effect of participation

in the *Five for Life* program across five program variables amongst 4th and 5th grade

children enrolled in elementary schools across the school district. The study also sought

to identify the influence of individual-level and school-level characteristics on student performance. A discussion of the results for each of the five research questions posed in Chapter One and their relatedness to the literature are provided in this chapter. Conclusions from the study findings as well as limitations, and recommendations for future research are also provided.

Summary of Results

This section presents a discussion of the study results in the context of the effectiveness of the *Five for Life* program. Significant associations between student and school-level predictors and student outcomes will be presented. The findings will be related to the existing literature.

Effect of *Five for Life* program on Cardiovascular Endurance.

This study found 4th grade cardiovascular endurance levels to significantly improve from pre-testing to post-testing in YR1 when controlling for age, gender, and school SES. Overall, students completed, on average, 10 more laps during administration of the PACER test in the spring as compared to the Fall. While a significant difference was not found in YR2, the results did show the average number of laps completed at pre-testing to have increased from 24 in YR1 to 45 in YR2. Students also increased their completed number of laps at post-testing in YR2 by an additional 3.5 laps compared to YR1. The increase seen from YR1 to YR2 suggests that the effect of the *Five for Life* program in YR1 was sustained into YR2. This result is worth noting as it does not support the findings of several studies which have demonstrated fitness levels to markedly decline in children as they age (DiNapoli & Lewis, 2008; Pfeiffer et al., 2007).

Overall, these results support the literature which has shown school-based PE interventions to be effective in improving fitness levels (Camhi et al., 2011; Datar & Sturm, 2004; Task Force on Community Preventive Services, 2002; Vandongen et al., 1995). Participation in PE programs has also been demonstrated to improve fitness levels in children (Fairclough & Stratton, 2005; Sallis et al., 1997; Trudeau & Shephard, 2005).

Gender was found to be a significant predictor of pre-PACER scores in both YR1 and YR2 with females reporting fewer laps compared to males. Post-testing scores were also found to be significantly lower in females in YR1; however, no significant difference was found in YR2. While females and males differed in the number of reported laps, the difference in their scores between YR1 and YR2 narrowed suggesting that females had marked gains from participating in the *Five for Life* program. This finding supports previous research conducted by Vandongen et al. (1995) which demonstrated that, although girls had lower baseline fitness levels as compared to males, their fitness levels greatly improved as a result of participating in a health and physical education program emphasizing fitness.

Effect of *Five for Life* Program on Physical Activity Levels.

As noted by previous research, school-based programs have been shown to be efficacious in increasing physical activity levels (Datar & Sturm, 2004; Gortmaker et al., 1999; Simons-Morton, et al., 1991; Pyle et al., 2006; Task Force on Community Preventive Services, 2002; Tassitano et al., 2010; Warren et al., 2003). However, this study did not support this finding as a non-significant change in physical activity levels in YR1 of program implementation across all three cohorts was observed between administration of the 3DPAR in the Fall and in the Spring. In fact, contrary to these

findings, physical activity levels at base, and maximum intensity levels actually declined

mong students in Cohort I from pre- to post-testing. This decline was also observed at

heart health and maximum intensity among students in Cohorts II and III. While results

of a study by Gortmaker et al., (1999) found 4th and 5th grade students' physical activity

levels to improve following participation in a school-based program, no effect was

observed at moderate intensity levels. This finding is consistent with the results of this

study.

A notable finding of many studies measuring youth physical activity was the

declination of physical activity with age (DeBate et al., 2009; Li, Treuth, & Wang, 2009;

Sherar, Eslinger, Baxter Jones, & Tremblay, 2007; Ziviani, Macdonald, Ward, Jenkins, &

Rodger, 2008). This study revealed age to be a significant predictor of physical activity

among Cohort III students but only at post-heart health intensity levels. The narrow gap

in the study participants' age, (i.e. 10 to 11 years) could be a potential reason for age not

consistently being found to significantly influence physical activity levels.

Gender differences in physical activity have been noted in several studies with

females having lower physical activity levels compared to males (DeBate et al., 2009;

Leupker, 1999; Li et al., 2009; Ziviani, et al., 2008). Results of the study showed gender

to be a significant predictor of students' physical activity levels. This result is consistent

with the literature as females in this study were repeatedly shown to report fewer minutes

of physical activity compared to males across all three Cohorts. This finding, however,

was not seen consistently across intensity levels. In Cohort I, females were only noted to

have significantly lower physical activity levels at post-heart health and pre-maximum

intensity. In Cohort II, only at pre-maximum intensity were females found to have

significantly lower levels. Gender had the most influence on females' physical activity levels in Cohort III as a significant association was seen at post-base, pre- and post-heart health, and pre-maximum intensity levels.

Research has also shown socioeconomic status to be a major predictor of students' physical activity level outside of school (Vilhjalmsson & Thorlindsson, 1998). While student SES was not available for this study, an association between school SES, and students' physical activity levels was observed in Cohort III with students attending schools with higher percentages of free and reduced lunch recorded less minutes of physical activity outside of school compared to schools with lower percentages. This association, however, was only observed at post-base and post-heart health intensity levels. No association was seen in Cohorts I and III.

Effect of *Five for Life* Program on Knowledge of Fitness and Nutrition.

Participation in school-based PE programs has been demonstrated in the literature to enhance health-related knowledge (Donnelly et al., 1996; Pyle et al., 2006; Task Force on Community Preventive Services, 2002; Warren et al., 2003). In this study, a significant increase was observed in scores on both the "Five for Life 4-5" and "Food for Energy and Health K-5" cassessments from pre-testing in the Fall to post-testing in the Spring. On the "Five for Life 4-5" assessment, which measured knowledge of the five components of fitness, students were found, on average, to answer six questions correctly at pre-testing. Following completion of the *Five for Life* curricula unit, student scores, at post-testing, increased by approximately four points. A similar increase was seen with scores on the "Food for Energy and Health K-5" assessment as student scores increased, on average, from four out of ten on the pre-assessment to eight out of ten on the post-

assessment. These increases are significant in that a score of seven out of ten was determined to be the cutoff for passing the assessments thus showing that a higher percentage of students successfully passed the post-assessments compared to the pre-assessment. These results are consistent with the literature as they indicated that participation in the *Five for Life* program was effective in improving students' knowledge of fitness and nutrition.

While school SES was found to be the only significant predictor of scores on the "Five for Life 4-5" assessment, the observed change in scores was miniscule and not noteworthy. No significance was found with school SES on the "Food for Energy and Health K-5" assessment. Age and gender were not found to be significant predictors when included in the model for both assessments. No literature was found which looked at the effect of age, gender, or school SES on health-related knowledge.

Effect of *Five for Life* Program on Student Attitudes.

As suggested in the literature, participation in well-designed and well-implemented school-based PE programs has been shown to be efficacious in promoting positive attitudes towards physical education and physical activity (Bailey, 2006; McKenzie, 2003; NASPE, 2010b; Subramaniam & Silverman, 2007; Trudeau & Shephard, 2005). Results from this study did not show a significant change in student attitudes from pre-survey to post-survey across all three survey constructs. While students' attitudes did not significantly change as a result of participation in the *Five for Life* program, it is worth noting that responses on the pre-survey indicated that the students' had, on average, higher attitudes prior to implementation of the program thus leaving little room for attitudes to change over the course of the school year. This was

observed across all three survey constructs as the mean pre-score for each of the constructs showed the students, on average, "agreed" with the majority of the survey items.

Gender and age differences have been found to be associated with students' perception of and attitudes towards physical education (Prochaska et al., 2003; Trudeau & Shephard, 2005). Elementary students' attitudes have been consistently found to decline with age with females exhibiting lower attitudes and enjoyment levels compared with males. Consistent with these findings, males were found to have slightly higher attitudes, albeit small, towards their health and physical education class, on the pre-survey, as measured by the nine questions clustered within Construct I. No significance change was noted on the post-survey. Student ages were not available; therefore, the impact of age on students' attitudes could not be assessed.

Negative correlations between individual change and initial status were observed across all study variables thus indicating that the trajectory growth rate of students who had lower scores initially was higher over the course of the school year compared to those students with higher scores at pre-testing. Based on these results, it could be postulated that participation in the *Five for Life* program was more effective in evoking change among those students whose performance levels were lower prior to the program being implemented. However, these results must be interpreted with caution as, according to Raudenbush & Bryk (2002),

> It is impossible, however, to obtain a consistent estimate of this relationship in a simple pre-test-post-test design. Researchers have typically found spurious negative correlations between initial status and rate of growth in pre-post studies,

correlations that occur because the measurement errors in the pretest and the observed change score are negatively correlated (p. 166).

Conclusions

The following conclusions were derived from the study results and relate to the problem statement and the five research questions. However, these conclusions must be interpreted in the context of the study limitations discussed below.

When controlling for student and school-level characteristics, participation in the *Five for Life* program appeared to be effective in improving students' cardiorespiratory endurance levels as well as their knowledge of fitness and nutrition. Contrary to the literature, students who participated in the program did not show improvements in physical activity levels or health-related attitudes. However, caution should be taken in interpretation of the physical activity results in relation to the effectiveness of the *Five for Life* program due to the limitations associated with using recall logs in the collection of physical activity data. The results of this study support the use of the *Five for Life* program in health and physical education as a means by which to improve students' health-related knowledge and fitness levels. Additional research is needed to assess the effectiveness of the program on students' physical activity levels and attitudes towards physical education and health.

While the students' cardiorespiratory endurance levels at post-testing were, on average, at the lower end of the Healthy Fitness Zone range, the scores in YR2 at post-testing improved by an average of 23 laps. (Appendix B). This finding provides evidence that the benefits obtained as a result of students' participating in the *Five for Life* program in YR1 were carried into and sustained through YR2 of the program. Additional research needs to be conducted to confirm these results in different student populations.

Gender was observed to be a significant predictor of student performance across all study variables with the exception of knowledge of fitness and nutrition. Consistent with the literature, females were found to perform slightly lower compared to their male counterparts. However, this gap was found to narrow at post-testing as the differences in performance between males and females seen at pre-testing became non-significant at post-testing in all cases with the exception of YR1 PACER scores where female performance was still observed to have improved. These results are consistent with several studies which have demonstrated greater improvements in fitness and health in females versus males as a result of participation in a physical education program emphasizing fitness and nutrition (Camhi et al., 2011; Carlson et al., 2008; Vandongen et al., 1995). With the decline in physical activity and fitness in females as they age, this study supports the use of the *Five for Life* program in school-based physical education programs as a means by which to improve health and fitness levels in females thus helping to reverse the slow decline found in previous studies.

Physical activity guidelines released by the CDC (2010b) recommend that children and adolescents engage in a minimum of 60 minutes of daily physical activity with the majority of the time spent engaging in moderate to vigorous intensity activities (MVPA). However, in this study, the number of reported minutes of physical activity, across all three Cohorts, was found to be highest at base or low intensity levels. On average, students reported spending an hour or less over the three day collection period engaging in medium (moderate) and maximum (vigorous) intensity activities at pre-testing with little to no improvement seen at post-testing. This conclusion is noteworthy as the CDC, in 2007, reported that only 39% of children, aged 9-13 year olds, engaged in

organized, daily physical activity (CDC 2010b). In addition, only 17% of students in grades 9-12 were reported to have met the daily physical activity recommendations (CDC, 2010b). With school-based physical education programs being, for many youth, the only opportunity for them to engage in physical activity, the results of this study emphasize the importance of utilizing quality health and physical education curricula programs that not only promote physical activity but also provide students with the knowledge and skills to be physically active both inside and outside of school.

Limitations

Inherent in this study were limitations in the study design, the collection of data, and in the measures used in the data-collection process. Described in this section are the major study limitations of the study.

The most limiting feature of this quasi-experimental study design was the absence of a control group which greatly hindered the ability to make inferences on causality. As a result, the researcher could not infer that implementation of the *Five for Life* program was truly related to the study results. In addition, without the use of a control group, it is difficult to determine which, if any, of the program components or collection of components were more closely related to the program outcomes.

This study utilized a cross-sectional design which further inhibited the ability of the researcher to draw conclusions on causality between implementation of the *Five for Life* program and program outcomes. In addition, the study population was derived from a large, affluent school district in the Southeastern U.S. which severely hindered the generalizability of results to similar populations within other school districts.

Pretest-posttest designs have been found to "often be inadequate for studying

individual growth" as they only allow for performance to be measured at two points, beginning and end (Bryk & Raudenbush, 2002, p. 161). As a result, the ability to accurately assess growth over time was limited in this study (Bryk & Raudenbush, 2002; Butterfield, 2008).

Due to the retrospective nature of the design, the researcher had no control over program implementation or collection and organization of data. While the data was ecologically valid, the data was collected by the health and physical education specialists within the individual elementary schools and sent to an outside evaluator. The data was then forwarded to the researcher for use in the study.

While age, gender and school SES were controlled for in the study, the researcher was unable to control for the effect of the health and physical education teacher or for student SES, two covariates which could have profound effects on the study variables. In addition, home-related and peer-related variables were not able to be controlled for in the study.

The degree of implementation fidelity of the *Five for Life* program was not measured or included as part of the data analysis. Implementation fidelity is commonly referred to in the literature as the implementation of a program as it was intended by the program developers (Pankratz et al., 2006, Sànchez et al., 2007; Pascual et al., 2011). Viewing implementation fidelity from the perspective of the teacher is "related to the amount of change that occur(s) in the teacher's practice" (O'Donnell, 2008, p. 39). As part of the *Five for Life* program, the health and physical education teachers participated in intensive curriculum and activity training sessions. However, research has shown that

most teachers tend to make adaptations to curricula lessons; therefore, measuring implementation fidelity is warranted in any school-based intervention.

Inherent to using recall logs to collect physical activity data is the risk of reporting bias due to overestimation of activity levels (Gidlow, Johnston, Crome, Ellis, & James, 2006; Jancey et al., 2007). Overestimation may also occur more frequently in groups who are less active, especially at post-testing. In addition, as discussed previously, the ability to accurately report minutes of physical activity is based solely on the child's cognitive ability to recall events that occurred previously (Sallis, 1991). Therefore, the results of the analysis of the physical activity data may not truly represent the physical activity levels of the study population.

There are several limitations to using surveys to assess attitudes in children which may have attributed to the lack of significant findings in this study. Students were collectively found to "agree" with the survey statements on the pre- and post-survey. Several factors, to include low motivation, difficulty of questions, and low cognitive ability have been found to "lead respondents to provide a satisfactory response instead of an optimal one" (Borgers, Hox, & Sikkel, 2004, p. 18). The varying levels of cognitive abilities and social skills among children may result in very different strategies being used to answer questions (Borgers et al., 2004). In addition, children adequately responding to survey questions has been found to be highly affected by limitations in their comprehension and verbal memory (Borgers et al., 2004, p. 20).

Limitations also exist when using Likert scale responses. Typically, respondents are only asked whether they agree or disagree with a question which does not allow for an understanding of why (Ambrose, Phillip, Chauvot, & Clement, 2003). Likert scale

questions are also not contextual in nature and often do not provide "good ways for determining how important the issue is to the respondent" (Ambrose et al., 2003, p. 35). The combination of the aforementioned factors may have greatly affected the reliability of the survey responses in this study as the responses may not have provided a true reflection of the students' attitudes towards the constructs being measured in the study. In addition, validity and reliability for the student survey used in this study had not been established prior to it being utilized in the data collection process.

Recommendations for Future Research

The results of this study indicated that while the *Five for Life* program was effective in improving fitness and health-related knowledge in the study population, no changes were seen in students' physical activity levels or health-related attitudes. Due to the limitations of this study and the inability to determine causality, further research is warranted. Provided in this section are recommendations for future research.

A more rigorous design which better captures the complexity of measuring the effectiveness of an intervention in large populations is needed in future research studies. First and foremost, in order to ascertain a causal link between implementation of the *Five for Life* program and program outcomes, a control group should be a part of any future study that is conducted. While incorporating control groups into studies conducted within school districts is difficult, future multiyear implementations of the *Five for Life* program, such as what occurred with the school district in which this study was conducted, could provide an optimum opportunity for this study to be replicated using a true experimental design. In this type of design, schools receiving the program the first year of implementation would serve as the experimental group while schools

designated to implement the program in the second year would serve as the control group for year one. All facets of data collection would occur in both the control and experimental groups thus providing the means by which the researcher would be able to establish cause-and-effect relationships between program outcomes and program effectiveness.

With the exception of the PACER test, this study only measured change over the course of one academic year. In addition, only pre-test and post-test scores were utilized, which, as discussed in the limitations section, does not allow for the true measurement of individual growth over time. This study also only looked at one grade level for each study variable. As a result, future studies should be based on a longitudinal, multiple-time-point design in which student growth is assessed over a period of time that has been determined to sufficiently reflect behavior change. This type of design would also allow for the collection of data at multiple points thereby providing a more accurate representation of the students' growth trajectory. With the compelling evidence in the literature regarding the relationship between age and gender and physical activity and fitness levels, conducting a longitudinal study would allow changes in these behaviors to be tracked by age and gender.

A strong link has been shown in the literature between physical activity and fitness as students who engage in regular physical activity are more likely to have higher fitness levels (Cale & Harris, 2002; McKenzie & Kahan, 2004; Sollerhead & Ejlertsson, 1999). A strong correlation has also been shown in youth between physical activity, fitness, and cognitive ability (Blakemore, 2003; Ratey, 2008). Due to the varying study populations used in this study, making causal inferences regarding the relationships

between the outcome variables was not possible. In subsequent studies, if physical activity levels are found to have increased, it will be important to determine if these increases were positively associated with improvements in cardiorespiratory endurance levels among the same study participants. Did these same students also show improvements in their knowledge of fitness and nutrition as shown by their assessment scores? Were attitudes towards physical education and health found to be higher in this population? Demonstrating associations between the program outcomes will help to provide more solid evidence of the benefits associated with utilizing the *Five for Life* program to improve student health-related outcomes.

Different outcome measures may be useful in determining the impact of the *Five for Life* program on physical activity and student health-related attitudes. With the myriad of issues associated with using recall logs to collect physical activity data, future studies measuring physical activity levels in youth should include using pedometers in lieu of recall logs. The 3DPAR log has since been replaced with pedometer logs in the *Five for Life* program. Therefore, future studies should be conducted using outcome data from school districts in which pedometers were being utilized to collect physical activity data. Consideration needs to be taken when using survey instruments in youth especially those utilizing Likert-scale responses. As a result, a more robust, evidence-based measure should be used to evaluate the impact of the program on students' health-related attitudes. Validity and reliability of the instrument in measuring health-related attitudes in elementary school-age children needs to have been established prior to it being used as part of the *Five for Life* data collection process.

With the data that was available, only age, gender and school SES were included in the HLM model as moderating variables. Only gender was found to consistently be significantly related to student performance on the program variables. Socioeconomic status has been documented to be a significant predictor of daily physical activity in low socioeconomic youth (Erwin, 2008; Vilhjalmsson & Thorlindsson, 1998). SES has also been linked to childhood obesity and adult morbidity with physical activity levels being a potential mitigating factor (Rizzo, Ruiz, Wennlöf, Kwak, & Sjöström, 2010). To truly understand what effect, if any, student SES may have on *Five for Life* program outcomes, it is imperative that future studies include student SES levels as a moderating variable in L2 of the HLM model.

As documented in the literature, the teacher has been shown to be a critical component of quality health and physical education programs (NASPE, 2004). As part of the *Five for Life* program, teachers participate in curriculum and activity training sessions facilitated by Focus Fitness trainers (Focused Fitness, 2009e). However, it is up to the teacher to return to their classrooms and implement the program in the manner it was intended. Due to variations in program implementation and the impact these variations could have on program outcomes, future studies should include the physical education teachers as a moderating variable in the HLM model. Additional studies should also look at including degree of implementation fidelity of the *Five for Life* program in the study analysis.

Student BMI levels were not part of the PEP grant data collection requirements for this specific school district; therefore, this data was not available to be included as part of this study. As a result, the researcher was unable to determine causality between

implementation of the *Five for Life* program and changes in obesity rates amongst the study population. In addition to improving cardiorespiratory endurance and physical activity, school-based interventions have been linked to reductions in obesity levels as measured through changes in BMI (Brownell & Kaye, 1982; Datar & Sturm; 2004; Story, 1999). As a result, future studies should include BMI as a study variable as doing so will allow for causal inferences to be made regarding the effectiveness of the *Five for Life* program in decreasing obesity rates.

As indicated by the literature, students who develop a strong foundation in the health-related knowledge, skills, and attitudes needed to lead an active and healthy lifestyle early in life have been shown to be more likely to maintain an active lifestyle into adulthood (IOM, 2005; Maeda & Randall, 2003; Subramamiam & Silverman, 2007). Comprehensive school-based health and physical education programs focused on increasing physical activity and improving fitness and nutrition are being touted as providing the best avenue by which to have a lasting impact on students' overall health and wellness (IOM, 2007; Murnan et al., 2006; NASPE, 2010b; Trudeau & Shephard, 2005). This study focused specifically on determining if using an activity-based health and physical education curricula program would be efficacious in evoking changes in students' health-related knowledge, behaviors, and attitudes. The study findings offer strong support for the use of this type of program and could inform future studies aimed at determining effectiveness of implementing similar programs at the elementary school level.

With the lack of time spent in physical education in elementary schools across the country, programs focused on teaching fitness and health through activity-based lessons

can play an integral role in providing students with the knowledge and skills needed to be healthy as a child and into adulthood. This study adds to the literature that health and physical education programs of this type are beneficial in improving student's health-related outcomes. This research also serves to provide health and physical education teachers with evidence-based practices that may be incorporated into their classrooms to promote physical activity, fitness and healthy eating. Using data from this study and future studies may provide a basis for endorsing the integration of programs, such as the *Five for Life* program, into existing health and physical education curriculums. However, until health and physical education is recognized as a "core" subject and schools are mandated that students must meet the recommended 150 minutes of weekly physical activity set forth by the CDC and NASPE, the impact of findings from studies such as this will be limited.

References

Aadahl, M., & Jorgensen, T. (2003). Validation of a new self-report instrument for measuring physical activity. *Medicine & Science in Sports & Exercise, 35*(7), 1196-1202.

Abraham, S., Collins, G., & Nordsieck, M. (1971). Relationship of childhood weight status to morbidity in adults. *Public Health Report, 86*(4), 273-284.

Ambrose, R., Phillip, R., Chauvot, J., & Clement, L. (2003). A web-based survey to assess prospective elementary school teacher's beliefs about mathematics and mathematics learning: An alternative to Likert scales. In N. A. Pateman, B.J. Dougherty, & J.T. Zilliox (Eds.), *Proceedings of the 2003 Joint Meeting of PME and PMENA* (Vol. 2, p. 33-39).

Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology, 80*(3), 260-267.

Anderson, R.E. (2000). The spread of the childhood obesity epidemic. *Canadian Medical Association Journal, 163*(11), 1461-1462.

Argiropoulou, E., Michalopoulou, M., Aggeloussis, N., & Argerinos, A. (2004). Validity and reliability of physical activity measures in Greek high school age children. *Journal of Sports Science and Medicine, 3*(3), 147-159.

Armstrong, N., Williams, J., & Ringham, D. (1988). Peak oxygen uptake and progressive shuttle run performance in boys aged 11-14 years. *British Journal of Physical Education, 19*(Suppl. 4), 10-11.

Arnold, C. (1992). An introduction to hierarchical linear models. *Measurement and Evaluation in Counseling and Development*, 25(2), 58-90.

Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *Journal of School Health*, 76(8), 397-401.

Barlow, S.E., & Dietz, W.H. (2002). Management of child and adolescent obesity: Summary and recommendations based on reports from pediatricians, pediatric nurse practitioners, and registered dieticians. *Pediatrics*, 110(1), 236-238.

Barfield, J.P., Folio, M.R., Lam, E.T.C., & Zhang, J.J. (2011). Development of a scale to determine enrollment barriers into Allied Health Program. *Measurement in Physical Education and Exercise Science*, 15(1), 47-66.

Barnett, A., Chan, L.Y.S., & Bruce, I.C. (1993). A preliminary study of the 20-m multistage shuttle run as a predicator of peakO$_2$ in Hong Kong Chinese students. *Pediatric Exercise Science*, 5(1), 42-50.

Baxter, S.D., Royer, J.A., Hardin, J.W., Guinn, C.H., & Devlin, C.M. (2011). The relationship of school absenteeism with body mass index, academic achievement, and socioeconomic status among fourth-grade children. *Journal of School Health*, 81(7), 417-423.

Beets, M.W. & Pitetti, K.H. (2006). Criterion-referenced reliability and equivalency between the PACER and 1-mile run/walk for high school students. *Journal of Physical Activity and Health*, 3(Suppl. 2), S17-S29.

Berenson, G.S., Srinivasan, S.R., Bao,W., Newman, W.P., III, Tracy, R.E., & Wattigney, W.A. (1998). Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. *New England Journal of Medicine, 338*(23), 1650-1656.

Bethell, C., Simpson, L., Stumbo, S., Carle, A.C., & Gombojav, N. (2010). National, state, and local disparities in childhood obesity. *Health Affairs, 29*(3), 347-356.

Blakemore, C.L. (2003). Movement is essential to learning. *Journal of Physical Education Recreation and Dance, 74*(22-24), 41.

Booth, F.W. & Chakravarth, M. V. (2002). Cost and consequences of sedentary living: New battleground for an old enemy. *President's Council on Physical Fitness and Sports Research Digest, 3*(16), 1-8.

Boreham, C.A.G., Paliczka, V.J., & Nichols, A.K. (1990). A comparison of the PWC_{170} and 20-MST tests of aerobic fitness in adolescent schoolchildren. *Journal of Sports Medicine and Physical Fitness, 30*(1), 19-23.

Borgers, N., Hox, J., & Sikkel, D. (2004). Response effects in surveys on children and adolescents: The effect of number of response options, negative wording, and neutral mid-point. *Quality & Quantity, 38*(1), 17-33.

Boyce, B.A. & Mitchell, M. (2011). *Physical education – overview, preparation of teachers.* Retrieved from http://education.stateuniversity.com/pages/2324/ Physical-Education.html

Braet, C., Mervielde, I., & Vandereycken.W. (1997). Psychological aspects of childhood obesity: A controlled study in a clinical and nonclinical sample. *Journal of Pediatric Psychology, 22*(1), 59-71.

Brown, S., Birch, D., Teufel, J., & Kancherla, V. (2006). Overweight in children: The perspectives of 9-13 year olds. *American Journal of Health Education, 37*(5), 296-305.

Brownell, K.D., & Kaye, F.S. (1982). A school-based behavior modification, nutrition education and physical activity program for obese children. *The American Journal of Clinical Nutrition, 35(2)*, 277-283.

Brownson, R.C., Chriqui, J.F., Burgeson, C.R., Fisher, M.C., & Ness, R.B. (2010). Translating epidemiology into policy to prevent childhood obesity: The case for promoting physical activity in school settings. *Annals of Epidemiology, 20*(6), 436-444. doi: 10.1016/j.annepidem.2010.03.001

Butterfield, S.A., Lehnhard, R.A., Mason, C.A., & McCormick, R. (2008). Aerobic performance by children in grades 4 to 8: A repeated measures study. *Perceptual and Motor Skills, 107*(3), 775-790.

Cale, L., & Harris, J. (2002). National testing for children: Issues, concerns, and alternatives. *British Journal of Teaching Physical Education, 33*(1), 32-34.

Camhi, S.M., Phillips, J., & Young, D.R. (2011). The influence of body mass index on long-term fitness from physical education in adolescent girls. *Journal of School Health, 81*(7), 409-416.

Caprio, S., Daniels, S.R., Drewnowski, A., Kaufman, F.R., Palinkas, L.A., Rosenbloom, A.L., & Schwimmer, J.B. Influence of race, ethnicity, and culture on childhood obesity: Implications for prevention and treatment. *Diabetes Care, 31*(11), 2211-2221. doi: 10.2337/dc08-9024

Carlson, S.A., Fulton, J.E., Lee, S.M., Maynard, M., Brown, D.R., Kohl, H.W., & Dietz, W.H. (2008). Physical education and academic achievement in elementary school: Data from the early childhood longitudinal study. *American Journal of Public Health, 98*(4), 721-727.

Carrel, A.L., Clark, R.R., Peterson, S.E., Nemeth, B.A., Sullivan, J., & Allen, D.B. (2005). Improvement of fitness, body composition, and insulin insensitivity in overweight children in a school-based exercise program: a randomized control study. *Archives of Pediatric and Adolescent Medicine, 159*(10), 963-968.

Caspersen, C.J., Powell, K.E., & Christenson, G.M. (1985). Physical activity, exercise and physical fitness: Definition and distinctions for health-related research. *Public Health Reports, 100*(2), 126-131.

Castelli, D.M., Hillman, C.H., Buck, S.M., & Erwin, H.E. (2007). Physical fitness and academic achievement in third- and fifth-grade students. *Journal of Sport & Exercise Psychology, 29*(2), 239-252.

Centers for Disease Control and Prevention. (2008). *Make a difference in your school! CDC resources can help you implement strategies to prevent obesity among children and adolescents.* Retrieved from http://www.cdc.gov/HealthyYouth/ keystrategies/pdf/make-a-difference.pdf

Centers for Disease Control and Prevention, (2009). *Study estimates medical cost of obesity may be as high as $147 billion annually.* Retrieved from http://www.cdc.gov/media/pressrel/2009/r090727.htm

Centers for Disease Control and Prevention. (2010a). *NCHS health e-stat.*

Retrieved from http://www.cdc.gov/nchs/data/hestat/obesity_child_07_08/

obesity_child_07_08.htm

Centers for Disease Control and Prevention (CDC). (2010b). *Physical activity guidelines*

for Americans: Children and adolescents. Retrieved from http://www.cdc.gov/

healthyyouth/physicalactivity/guidelines.htm

Centers for Disease Control and Prevention. (2011). *Adolescent and school health:*

Childhood obesity facts. Retrieved from http://www.cdc.gov/healthyyouth/

obesity/facts.htm

Chang, M.J., Denson, N., Saenz, V., & Misa, K. (2005). The educational benefits of

sustaining cross-racial interaction among undergraduates. *The Journal of Higher*

Education, 77(3), 430-455.

Chase, M.A. (2001). Children's self-efficacy, motivational intentions and attributions in

physical education and sport. *Research Quarterly for Exercise and Sport, 72*(1),

47-54.

Chen, P.D., & Cragg, K. (2012). Multilevel modeling: Applications to research on the

assessment of student learning, engagement, & developmental outcomes. *New*

Directions for Institutional Reseach, 2012(154), 95-109. doi: 10.1002/ir.20016

Child Obesity Center. (2009). *Definition of obesity.* Retrieved from http://childobesity

cause.info/definition-of-obesity.htm

Chomitz, V.R., Slining, M.M., McGowan, R.J., Mitchell, S.E., Dawson, G.F., & Hacker, K.A. (2009). Is there a relationship between physical fitness and academic achievement? Positive results from public school children in the Northeastern United States. *Journal of School Health, 79*(1), 30-37.

Coe, D.P. (2003). *The importance of physical education classes in relation to physical activity behaviors, physical fitness, and academic achievement in middle school children.* (Doctoral dissertation). Retrieved from ProQuest. (AAT 3115952).

Corbin, C. (2002). Physical education as an agent of change. *Quest, 54*(2), 182-195.

Corbin, C., Nielson, A., Borsdorf, L., & Laurie, D. (1987). Commitment to physical activity. *International Journal of Sport Psychology, 18*(3), 215-222.

Corbin, C., Dale, D., & Pangrazi, R. (1999). Promoting physically active lifestyles among youth. *Journal of Physical Education, Recreation, and Dance, 70*(6), 26-28.

Corbin, C.B. & Pangrazi, R.P. (2001). Toward a uniform definition of wellness: A commentary. *The President's Council on Physical Fitness and Sports Research Digest, 3*(15), 1-8.

Culpepper, D.O., Tarr, S.J., & Killion, L.E. (2011). The role of various curriculum models on physical activity levels. *The Physical Educator, 68*(3), 163-170.

Cureton, K.J. & Plowman, S.A. (2008). Aerobic Capacity Assessments. In Welk, G. J. & Meredith, M.D. (Eds.), *Fitnessgram/Activitygram Reference Guide (3rd ed.)*, 96-120. Retrieved from http://www.cooperinstitute.org/ourkidshealth/fitnessgram/documents/FITNESSGRAM_ReferenceGuide.pdf

Dale, D., Corbin, C.B., & Cuddihy, T.F. (1998). Can conceptual physical education promote physically active lifestyles? *Pediatric Exercise Science, 10*(2), 97-109.

Daniels, S.R. (2006). The consequences of childhood overweight and obesity. *The Future of Children, 16*(1), 47-67.

Datar, A., & Sturm, R. (2004). Physical education in elementary school and body mass index: Evidence from the early childhood longitudinal study. *American Journal of Public Health, 94*(9), 1501-1506.

Davis, S.M., Clay, T., Smyth, M., Gittelsohn, J., Arviso, V., Flint-Wagner, H., Rock, B.H., ...Stone, E.J. (2003). Pathways curriculum and family interventions to promote healthful eating and physical activity in American Indian schoolchildren. *Preventive Medicine, 37*(1), 24-34.

DeBate, R.D., Gabriel, K.P., Zwald, M., Huberty, J., & Zhang, Y. (2009). Changes in psychosocial factors and physical activity frequency among third- to eighth-grade girls who participated in a developmentally focused youth sport program: A preliminary study. *Journal of School Health, 79*(10), 474-484.

Dencker, M., Thorsson, O., Karlsson, M.K., Lindén, C., Eiberg, S., Wollmer, P., & Andersen, L.B. (2006). Daily physical activity related to body fat in children aged 8-11 years. *Journal of Pediatrics, 149*(1), 38-42.

Department of Health and Human Services (2010). *Healthy people 2020 objectives.* Retrieved from http://www.healthypeople.gov/2020/topicsobjectives2020/pdfs/HP2020objectives.pdf

DeVellis, R. (2003). *Scale development: Theory and applications* (2nd ed). Thousand Oaks, CA: Sage.

Dietz, W.H. (1998). Health consequences of obesity in youth: Childhood predictors of adult disease. *Pediatrics, 101*(3), 518-525.

Dietz, W.H., & Gortmaker, S.L. (2001). Preventing obesity in children and adolescents. *Annual Review of Public Health, 22*(1), 337-353.

DiNapoli, P.P., & Lewis, J.B. (2008). Understanding school-age obesity through participatory action research. *American Journal of Maternal Child Nursing, 33*(2), 104-110.

Dinschel, K.M. (1994). *Influence of agility on the mile run and PACER tests of aerobic endurance in fourth and fifth grade school children.* Unpublished master's thesis,

Dishman, R. (1995). Physical activity and public health: mental health. *Quest, 47*(3), 362-385.

Donnelly, J.E., Jacobsen, D.J., Whatley, J.E., Hill, J.O., Swift, L.L., Cherrington, A., et al. (1996). Nutrition and physical activity program to attenuate obesity and promote physical and metabolic fitness in elementary school children. *Obesity Research, 4*(3), 229–243.

Dunn, A.L., Trivedi, M.H., & O'Neal, H.A. (2001). Physical activity dose-response effects on outcomes of depression and anxiety. *Medicine & Science in Sports & Exercise, 33*(Suppl 6), S587-S597.

Durant, N., Harris, S.K., Doyle, S., Person, S., Saelens, B.E., Kerr, J., Norman, G.J., & Sallis, J.F. (2009). Relation of school environment and policy to adolescent physical activity. *Journal of School Health, 79*(4), 153-159.

Erikson, S.J., Robinson, T.M., Haydel, K.F., & Killen, J.D. (2000). Are overweight children unhappy? Body mass index, depressive symptoms, and overweight concerns in elementary school children. *Journal of the American Medical Association, 154*(9), 931-935. doi:10.1001/archpedi.154.9.931

Erwin, H.E. (2008). Middle school students' leisure activity engagement: Implications for park and recreation administrators. *Journal of Park & Recreation Administration, 26*(3), 59-74.

Etnier, J.L., Salazar, W., Lander, D.M., Petruzzello, S.J., Han, M., & Nowell, P. (1997). The influence of physical fitness and exercise upon cognitive functioning: a meta-analysis. *Journal of Sport & Exercise Psychology, 19*(3), 249-277.

Everson, K.R., Ballard, K., Lee. G., & Ammerman, A. (2009). Implementation of a school-based state policy to increase physical activity. *Journal of School Health, 79*(5), 231-238.

Eyler, A.A., Brownson, R.C., Aytur, S.A., Cradock, A.L., Doescher, M, Evenson, K.R., ...Schmid, T.L. (2010). Examination of trends and evidence-based elements in state physical education legislation: a content analysis. *Journal of School Health, 80*(7), 326-332.

Fairclough, S., & Stratton, G. (2005). "Physical education makes you fit and healthy". Physical education's contribution to young people's physical activity level. *Health Education Research, 20*(1), 14-23. doi: 10.1093/her/cyg101

Field, Andy. (2009). *Discovering statistics using SPSS* (3rd ed). Thousand Oaks, CA: Sage Publications.

Finkelstein, E.A., Trogdon, J.G., Cohen, J.W., & Dietz, W. (2009). Annual Medical Spending Attributable To Obesity: Payer-And Service-Specific Estimates. *Health Affairs, 28*(5), 822-831. doi: 10.1377/hlthaff.28.5.w822

Fitzgibbon, M.L., & Beech, B.M. (2009). The role of culture in the context of school-based BMI screening. *Pediatrics, 124*(1), S50-S62. doi:10.1542/peds.2008-3586H

Focused Fitness. (2009a). *Five for Life*. Retrieved from http://www.focusedfitness.org/index.php?id=19&title=five-for-life

Focused Fitness. (2009b). *Focused Fitness*. Retrieved from http://www.focusedfitness.org/index.php?id=16&title=about

Focused Fitness. (2009c). *The Five for Life program*. Retrieved from http://www.focusedfitness.org/index.php?id=42&title=five-for-life

FocusedFitness. (2009d). *WELNET*. Retrieved from http://www.focusedfitness.org/index.php?id=20&title=welnet

Focused Fitness. (2009e). *Five for Life training*. Retrieved from http://www.focusedfitness.org/index.php?id=35&title=five-for-life-training

Focused Fitness. (2009f). *Knuth Research, Inc.: Research Letter*. Retrieved from http://www.focusedfitness.org/zlcms/editor/uploads/files/54L%20Research%20Letter.pdf

Foster, G.D., Wadden, T.A. & Brownell, K.D. (1985). Peer-led programs for the treatment and prevention of obesity in the schools. *Journal of Consulting and Clinical Psychology 53*(4), 538-540.

Fox, K.R. (2000). The effects of exercise on self-perceptions and self-esteem. In Biddle, S., Fox, K., & Boutcher, S.H. (Eds), *Physical Activity and Psychological Well-Being* (pp. 88-117). London, UK: Routledge.

Freedman, D.S., Dietz, W.H., Srinivasan, S.R., & Berenson, G.S. (1999). The relation of

overweight to cardiovascular risk factors among children and adolescents: The

Bogalusa Heart Study. *Pediatrics 103*(6), 1175-1182.

Gallahue, D.L., & Ozmun, J.C. (1998). *Understanding motor development: Infants,*

Children, Adolescents, Adult (5th ed.). Boston, MA: McGraw-Hill.

Geier A.B., Foster, G.D., Womble, L.G., McLaughlin, J., Borradaile, K.E., Nachmani, J.,

Sherman, J., Sherman, S., Kumanyika, S., & Shults, J. (2007). The relationship

between relative weight and school attendance among elementary schoolchildren.

Obesity, 15(8), 2157-2161. doi: 10.1038/oby.2007.256

Gibson C.A., Smith, B.K., DuBose, K.D., Greene, J.L., Bailey, B.W., Williams, S.L., …

Donnelly, J.E. (2008). Physical activity across the curriculum: year one process

evaluation results. *International Journal of Behavioral Nutrition and Physical*

Activity, 5(36). doi:10.1186/1479-5868-5-36

Gidlow, C., Johnston, L., Crome, D., Ellis, N., & James, D. (2006). A systematic review

of the relationship between socio-economic position and physical activity. *Health*

Education Journal, 65(4), 338-367.

Giorgio, D. (2012). *A three-level hierarchical linear model to assess student growth*

curves. (Doctoral Dissertation). Retrieved from Proquest. (3546837)

Gordon-Larsen, P., McMurray, R.G., & Popkin, B.M. (2000). Determinants of

adolescent physical activity and inactivity patterns. *Pediatrics, 105*(6), e83.

doi: 10.1542/peds.105.6.e83

Gortmaker, S.L., Cheung, L.W., Peterson, K.E., Chomitz, G., Cradle, J.H., Dart, H., ...

    Laird, N. (1999). Impact of a school-based interdisciplinary intervention on diet

    and physical activity among urban primary school children. *Archives of Pediatric*

    and Adolescent Medicine, 153(9), 975-983.

Gortmaker, S.L., Peterson, K., Wiecha, J., Sobol, A.M., Dixit, S., Fox, M.K., & Laird, N.

    (1999). Reducing obesity via a school-based interdisciplinary intervention among

    youth: Planet Health. *Archives of Pediatric and Adolescent Medicine, 153*(4),

    409-418.

Graham, G., Holt-Hale, S., & Parker, M. (2006). *Children moving: A reflective approach*

    to teaching physical education (7th ed.). New York, NY: McGraw-Hill.

Greenberg, M.T., Weissberg, R.P., O'Brien, M.U., Zins, J.E., Fredericks, L., Resnik, H.,

    & Elias, M.J. (2003). Enhanced school-based prevention and youth development

    through coordinated social, emotional, and academic learning. *American*

    Psychologist, 58(6-7), 466-474. doi: 10.1037/0003-066X.58.6-7.466

Guttman, L. (1954). Some necessary conditions for common factor analysis.

    Pscychometrika, 18(3), 179-186.

Hagger, M.S., Chatzisarantis, N.L., & Biddle, J.H. (2002). A meta-analytic review of the

    theories of reasoned action and planned behavior in physical activity: Predictive

    validity and the contribution of additional variables. *Journal of Sport & Exercise*

    Physiology, 24(1), 3-32.

Hammond, R.A., & Levine, R. (2010). The economic impact of obesity in the United

    States. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy, 3*, 285-

    295. doi: 10.2147/DMSOTT.S7384

Hassman, P., Koivula, N., & Uutela, A. (2000). Physical exercise and psychological well-being: a population study in Finland. *Preventive Medicine, 30*(1), 17-25.

Hayden-Wade, H.A., Stein, R. I., Ghaderi, A., Saelens, B.E., Zabinski, M.F., & Wilfley, D. E. (2005). Prevalence, characteristics, and correlates of teasing experiences among overweight children vs. non-overweight peers. *Obesity Research, 13*(8), 1381-1392.

Hedley, A.A., Ogden, C.L., Johnson, C.L., Carroll, M.D., Curtin, L.R., & Flegal, K.M. (2004). Prevalence of overweight and obesity among U.S. children, adolescents and adults, 1999-2002. *Journal of the American Medical Association, 291*(23), 2847-2850.

Hillman, C.H., Castelli, D.M., & Buck, S.M. (2005). Aerobic fitness and neurocognitive function in healthy preadolescent children. *Medicine & Science in Sports & Exercise, 37*(11), 1967-1974. doi: 10.1249/01.mss.0000176680.79702.ce

Hoeger, W.K., & Hoeger, S.A. (2005). *Lifetime physical fitness and wellness: A personalized program* (8th ed.). Belmont, CA: Thomson Wadsworth.

Holt, J. (2006). How do we measure up? Capturing the complexities of educational growth. *Mid-Western Educational Researcher, 19*(1), 2-7.

Human Kinetics. (2012). *Fitnessgram program overview.* Retrieved from http://www.fitnessgram.net/programoverview/

Huurre, T., Aro, H., Rahkonen, O., & Komulainen, E. (2006). Health, lifestyle, family and school factors in adolescence: predicting adult educational level. *Educational Research, 48*(1), 41-53.

Institutes of Medicine. (2005). *Preventing childhood obesity: Health in the balance*. J.P. Koplan, C.T. Liverman, & V.I. Kraak. (Eds.). Washington DC: National Academies Press.

Institutes of Medicine. (2007). *Progress in preventing childhood obesity: How do we measure up?* J.P. Koplan, C.T. Liverman, V.I. Kraak & S.L. Wisham. (Eds.). Washington DC: National Academies Press.

Irwin, C.C., Irwin, R.L., Miller, M.E., Somes, G.W. & Richey, P.A. (2010). Get fit with grizzlies: a community-school-home initiative to fight childhood obesity. *Journal of School Health, 80*(7), 333-339.

Jancey, J.M., Lee, A.H., Howat, P.A., Clarke, A., Wang, K., & Shilton, T. (2007). The effectiveness of a physical activity intervention for seniors. American Journal of Health Promotion, 22(5), 318-321.

Janzen, H., Halas, J., Dixon, S., DeCorby, K., Booke, J., & Wintrup, L. (2003). The quality of physical education in Manitoba Schools: A three year study. *Physical and Health Education Journal, 69*(2), 44.

Judge, S., & Jahns, L. (2007). Association of overweight with academic performance and social and behavioral problems: An update from the early childhood longitudinal study. *Journal of School Health, 77*(10), 672-677.

Kahn, E.B., Ramsey, L.T., Brownson, R.C., Heath, G.W., Howze, E.H., Powell, K.E., ...Corso, P. (2002). The effectiveness of interventions to increase physical activity. A systematic review. *American Journal of Preventive Medicine, 22*(4 Suppl. 1), 73-107.

Kaiser, H.F., & Caffrey, J. (1965). Alpha factor analysis. *Psychometrika, 30*(1), 1-14.

Kann, L., Brener, N.D., & Wechsler, H. (2008). Overview and summary: School health

policies and programs study 2006. *Journal of School Health, 77*(8), 385-397.

Katz, D.L., O'Connell, M., Yeh, M.C., Nawaz, H., Njike, V., Anderson, L.M., ... Dietz,

W. (2005). Public health strategies for preventing and controlling overweight and

obesity in school and workforce settings: A report on recommendations of the

Task Force on Community Preventive Services. *Morbidity and Mortality Weekly*

Report: Recommendation and Reports, 54(10), 1-12.

Kelly, L.E., & Melograno, V.J. (2004). *Developing the physical education curriculum.*

An achievement-based approach. Champaign, IL: Human Kinetics.

Kendizierski, D., & DeCarlo, K.J. (1991). Physical activity enjoyment scale: Two

validation studies. *Journal of Sport & Exercise Physiology, 13*(1), 50-64.

Kim, J., Must, A., Fitzmaurice, G.M., Gillman, M.W., Chomitz, V., Kramer, E,

McGowan, R., & Peterson, K.E. (2005). Relationship of physical fitness to

prevalence and incidence of overweight among schoolchildren. *Obesity Research,*

13(7), 1246-1254. doi: 10.1038/oby.2005.148

Kolbe, L.J. (2002). Education reform and the goals of the modern school health program.

State Education Standard, 3(4), 4-11.

Lee, A. (2004). Promoting lifelong physical activity through quality physical education.

Journal of Physical Education, Recreation & Dance, 75(21), 26.

Lee, S.M., Burgeson, M.A., Fulton, J.E. & Spain, C.G. (2007). Physical education and

physical activity: Results from the school health policies and programs study

2006. *Journal of School Health, 77*(8), 435-463.

Leedy, P.D. & Ormrod, J.E. (2005). *Practical research: Planning and design. (8th ed).*

Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Leger, L., & Gadoury, C. (1989). Validity of the 20 m shuttle run test with 1 min stages

to predict VO2max in adults. *Canadian Journal of Sport Sciences, 14*(1), 21-26.

Le Masurier, G., & Corbin, B. (2006). Top 10 reasons for quality physical education. The

Journal of Physical Education, Recreation & Dance, 77(6), 44-55.

Liu, N.Y-S., Plowman, S.A., & Looney, M.A. (1992). The reliability and validity of the

20-meter shuttle test in American students 12 to 15 years old. *Research Quarterly*

for Exercise and Sport, 63(5), 360-365.

Liukkonen, J., & Leskinen, E. (1999). Reliability and validity of scores from the

children's version of the POSQ. *Educational & Psychological Measurement,*

59(4), 651-664.

Li, S., Treuth, M.S., & Wang, Y. (2009). How active are American adolescents and have

they become less active? *Obesity Reviews 11*(12), 847-863

Lobstein, T., Baur, L., & Uauy, R. (2004). Obesity in children and young people: a crisis

in public health. *Obesity Reviews, 5*(Suppl. 1), 4-85.

London, R.A., & Castrechini, S. (2011). A longitudinal examination of the link between

youth physical fitness and academic achievement. *Journal of School Health,*

81(7), 400-408.

Luepker, R.V. (1999). How physically active are American children and what can we do

about it? *International Journal of Obesity, 23*(Suppl. 2), S12-S17.

McKenzie, T.L., Sallis, J.F., Prochaska, J.J., Conway, T.L., Marshall, S.J., & Rosengard,

P. (2004). Evaluation of a two-year middle-school physical education

intervention: M-SPAN. *Medicine & Science in Sports & Exercise, 36*(8), 1382-

1388.

Madsen, K.A., Thompson, H.R., Wlasiuk, L., Queliza, E., Schmidt, C., & Newman, T.B.

(2009). After-school program to reduce obesity in minority children: a pilot study.

Journal of Child Health Care, 13(4), 333-346. doi: 10.1177/1367493509344823

Maeda, J.K., & Randall, L.M. (2003). Can academic success come from five minutes of

physical activity? *Brock Education Journal, 13*(1), 14-22.

Mahar, M.T., Rowe, D.A., Parker, C.R., Mahar, F.J., Dawson, D.M., & Holt, J.E. (1997).

Criterion-referenced and norm-referenced agreement between the mile run/walk

and PACER. *Measurement in Physical Education and Exercise Science, 1*(4),

245-258.

Mahar, M.T., Welk, G.J., Rowe, D.A., Crotts, D.J., & McIver, K.L. (2006). Development

and validation of a regression model to estimate VO2peak from PACER 20-m

shuttle run performance. *Journal of Physical Activity and Health, 3*(Suppl 2),

S34-S46.

Mandigo, J. L., Spence, J. C., Thompson, L. P., Melnychuk, N., Schwartz, M., Marshall,

D., & Causgrove-Dunn, J. (2004). What's going on in physical education

classes? An Alberta example. *Avante, 10*(1), 1-15.

Masse, L.C., Chriqui, J.F., Igoe, J.F., Atienza, A.A., Kruger, J., Kohl, H.W., Frosh,

M.M., & Yaroch, A.L. (2007). Development of a physical education-related state

policy classification system (PERSPCS). *American Journal of Preventive

Medicine, 33*(4), 264-276.

McCoach, D.B. (2010). Hierarchical linear modeling. In G.R. Hancock & R.O. Mueller

(Eds.), *The Reviewer's Guide to Quantitative Methods in the Social Sciences* (pp.

123-140). New York, NY: Routledge.

McCreary, D.R., & Sasse, D.K. (2000). An exploration of the drive for muscularity in

adolescent boys and girls. *Journal of American College Health, 48*(6), 297-304.

McKenzie, T.L. (2003). Health-related physical education: Physical activity, fitness, and

wellness. In S.J. Silverman, & C.D. Ennis (Eds.), *Student learning in physical*

education: Applying research to enhance instruction (pp. 207-226). Champaign,

IL: Human Kinetics.

McKenzie, T.L., & Kahan, D. (2004). Impact of the Surgeon General's report: Through

the eyes of physical education teacher educators. *Journal of Teaching in Physical*

Education, 23(4), 300-317.

McKenzie, T.L., Nader, P.R., Strikmiller, P., Yang, M., Stone, E., Perry, C., ... Kelder,

S.H. (1996). School physical education: Effect of the child and adolescent trial for

cardiovascular health. *Preventive medicine, 25*(4), 423-431.

McMurrer, J. (2008). *NCLB Year 5: Instructional time in elementary schools: a closer*

look at changes for specific subjects. Retrieved from http://www.cep-

dc.org/displayDocument.cfm?DocumentID=309

Mihalic, S.F., Fagan, A.A., & Argamaso, S. (2008). Implementing the lifeskills training

drug prevention program: factors related to implementation fidelity.

Implementation Science, 3(5), 1-16. doi: 10.1186/1748-5908-3-5

Mood, D.P., Jackson, A.W., & Morrow, J.R. (2007). Measurement of physical fitness and

physical activity: Fifty years of change. *Measurement in Physical Education and*

Exercise Science, 11(4), 217-227.

Montoye, J.H., Kemper, H.C.G., Saris, W.H.M., & Washburn, R.A. (1996). *Measuring*

physical activity and energy expenditure. Champaign, IL: Human Kinetics.

Moran, R. (1999). *Evaluation and treatment of childhood obesity. American Family Physician, 59*(4), 861-868.

Morrow, J.R., Martin, S.B., Welk, G.J., Zhu, W., & Meredith, M.D. (2010). Overview of the Texas youth fitness study. *Research Quarterly for Exercise and Sport, 81*(Suppl. 3), S1-S5.

Myers, L., Strikmiller, P.K., Webber, L.S., & Berenson, G.S. (1996). Physical and sedentary activity in school children grades 5-8: The Bogalusa Heart Study. *Medicine & Science in Sports & Exercise, 28*(7), 852-859.

Murnan, J., Price, J.H., Telljohann, S.K., Dake, J.A. & Boardley, D. (2006). Parents' perceptions of curricular issues affecting children's weight in elementary schools. *Journal of School Health, 76*(10), 502-511.

Mustillo, S., Worthman, C., Erkanli,A., Keeler, G., Angold, A., & Costello, E.J. (2003). Obesity and psychiatric disorder: Developmental trajectories. *Pediatrics, 111*(5), 851-859.

Muthén, L.K. and Muthén, B.O. (1998-2010). *Mplus User's Guide. Sixth Edition.* Los Angeles, CA: Muthén & Muthén

National Association for Sport and Physical Education. (2004). *Moving into the future: National standards for physical education, 2nd Edition.* Retrieved from http://www.aahperd.org/naspe/standards/nationalStandards/PEstandards.cfm

National Association for Sport and Physical Education. (2010a). *Suggested guidelines for teaching undergraduate history of physical education and sport in a physical education teacher education program*. Retrieved from http://www.aahperd.org/naspe/publications/teachingTools/upload/Guidelines-for-Teaching-Undergraduate-History-of-Physical-Education-Sport.pdf

National Association for Sport and Physical Education. (2010b). *Shape of the nation report: Status of physical education in the USA. Executive summary*. Retrieved from http://www.aahperd.org/naspe/publications/upload/Shape-of-the-tion-Revised2PDF.pdf

National Association for Sport and Physical Education. (2011). *Mission and strategic plan*. Retrieved from http://www.aahperd.org/naspe/about/mission.cfm

National Association for Sport and Physical Education. (2012a). *Is it physical education or physical activity?* Retrieved from http://www.aahperd.org/naspe/publications/teachingTools/PAvsPE.cfm

National Association for Sport and Physical Education. (2012b). *Quality physical education (QPE)*. Retrieved from http://www.aahperd.org/naspe/publications/teachingTools/QualityPE.cfm

National Center for Education Statistics. (2010). *Digest of education statistics: 2010*. Retrieved from http://nces.ed.gov/programs/digest/d10/tables/dt10_001.asp?referrer=list

Nunnally, J., & Bernstein, L. (1994*). Psychometric theory*. New York, NY: McGraw-Hill Education.

O'Donnell, C.L. (2008). Defining, conceptualizing, and measuring fidelity of

implementation and its relationship to outcomes in K-12 curriculum intervention

research. *Review of Education Research, 78*(1), 33-84. doi: 10.3102/

0034654307313793

Ogden, C., & Carroll, M. (2010). *Prevalence of obesity among children and adolescents:*

United States, trends 1963-1965 through 2007-2008. Retrieved from

http://www.cdc.gov/nchs/data/hestat/obesity_child_07_08/obesity_child_07_08.p

df

Ogden, C.L., Carroll, M.D., & Flegal, K.M. (2008). High body mass index for age among

US children and adolescents. *Journal of the American Medical Association,*

299(20), 2401-2405.

Oliver, M., Schofield, G., & McEvoy, E. (2006). An integrated curriculum approach to

increasing physical activity in children: A feasibility study. *Journal of School*

Health, 76(2), 74-79.

Olshansky, S.J., Passaro, D.J., Hershow, R.C., Layden, J., Carnes, B.A., Brody, J., &

Ludwig, D.S. (2005). A potential decline in life expectancy in the United States in

the 21st century. *New England Journal of Medicine, 352*(11), 1138-1145.

Okely, A., Booth, M., & Patterson, J.W. (2001). Relationship of physical activity to

fundamental skills among adolescents. *Medicine & Science in Sports & Exercise,*

33(11), 1899-1904.

Pangrazi, R. (2007). *Dynamic physical education for elementary school children*

(15th ed.). New York, NY: Benjamin Cummings.

Pangrazi, R. (2010). Chasing unachievable outcomes. *Quest, 62*(4), 323-333.

Pankratz, M.M, Jackson-Newsom, J., Giles, S.M., Ringwalt, C.L., Bliss, K., & Bell, M.L. (2006). Implementation fidelity in a teacher-led alcohol use prevention curriculum. *Journal of Drug Education, 36*(4), 317-333.

Pascual, C., Escarti, A., Llopis, R., Gutierrez, M., Martin, D., & Wright, P.M. (2011). Implementation fidelity of a program designed to promote personal and social responsibility through physical education: A comparative case study. *Research Quarterly for Exercise and Sport, 82*(3), 499-511.

Pate, R.R., Ross, R., Dowda, M., Trost, S.G., & Sirard, J. (2003). Validation of a 3-day physical activity recall instrument in female youth. *Pediatric Exercise Science, 15*(3), 257-265.

Pate, R.R., Wang, C.Y, Dowda, M., Farrell, S.W., & O'Neill, J.R. (2006). Cardiorespiratory fitness levels among US youth 12 to 19 years of age: Findings from the 1999-2002 National Health and Nutrition Examination Survey. *Archives of Pediatric and Adolescent Medicine, 160*(10), 1005-1012.

Pate, R.R., Ward, D.S., Dowda, M., & O'Neill, J.R. (2006). Enrollment in physical education is associated with overall physical activity in adolescent girls. *Research Quarterly for Exercise & Sport, 78*(4), 265-270.

Patten, M. L. (2009). *Understanding research methods: An overview of the essentials* (7th ed). Glendale, CA: Pyrczak Publishing.

Pesa, J., Syre, T., & Jones, E. (2000). Psychosocial differences associated with body weight among female adolescents: the importance of body image. *Journal of Adolescent Health, 26*(5), 330-337. doi: 10.1016/S1054-139X(99)00118-4

Phillips, W.A. (2012). *Evaluation of the effectiveness of the students and teachers achieving reading success program for first graders*. (Doctoral dissertation). Retrieved from Proquest. (3542638)

Physical-education-institute. (2010). *The history of physical education*. Retrieved from http://www.physical-education-institute.com/history_of_physical_education.html

Pfeiffer, K.A., Dowda, M., Dishman, R.K., Sirard, J.R. & Pate, R.R. (2007). Physical fitness and performance. Cardiorespiratory fitness in girls-change from middle to high school. *Medical & Science in Sports, 39*(12), 2234-2241.

Pinhas-Hamiel, O., Dolan, L.M., Daniels, S.R., Standiford, D., Khoury, P.R., & Zeitler, P. (1996). Increased incidence of non-insulin-dependent diabetes mellitus among adolescents. *Journal of Pediatrics, 128*(5), 608-615.

Plowman, S.A., Sterling, C.L., Corbin, C.B., Meredith, M.D., Welk, G.J., & Morrow, J.R. (2006). The history of FITNESGRAM. *Journal of Physical Activity and Health, 3*(Suppl 2), S5-S20).

Portman, P.A. (2003). Are physical education classes encouraging students to be physically active? Experiences of ninth graders in their last semester of required physical education. *Physical Educator, 60*(3), 150-160.

Powers, T.G., Bindler, R.C., Goetz, S. & Daratha, K.B. (2010). Obesity prevention in early adolescence: Student, parent and teacher views. *Journal of School Health, 80*(1), 13-19.

Preston, S.H., (2005). Deadweight? The influence of obesity on longevity. *New England Journal of Medicine, 352*(11), 1135-1137.

Prochaska, J.J., Sallis, J.F., Slymen, D.J., & McKenzie, T.L. (2003). A longitudinal study of children's enjoyment of physical education. *Pediatric Exercise Science, 15*(2), 170-178.

Pyle, S.A., Sharkey, J., Yetter, G., Felix, E., & Furlong, M.J. (2006). Fighting an epidemic: The role of schools in reducing childhood obesity. *Psychology in the Schools, 43*(3), 361-376.

Ratey, J.J., & Hagerman, E. (2008). *SPARK: The revolutionary new science of exercise and the brain.* New York, NY: Hachette Book Group.

Raudenbush, S.W. & Bryk, A.S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed). Thousand Oaks, CA: Sage Publications.

Reed, J.A., Einstein, G., Hahn, E., Hooker, S.P., Gross, V.P. & Kravitz, J. (2010). Examining the impact of integrating physical activity on fluid intelligence and academic performance in an elementary school setting: A preliminary investigation. *Journal of Physical Activity and Health, 7*(3), 343-351.

Repovich, W.E.S. (2011). *Integrated, articulated fitness and health curriculums and methods of evaluation.* Forum on Public Policy Online, 2011(1). Retrieved from http://www.eric.ed.gov/PDFS/EJ944206.pdf

Rizzo, N.S., Ruiz, J.R., Wennlöf, A.H., Kwak, L., & Sjöström, M. (2010). Socioeconomic status and its association with objectively-measured total physical activity and body fat in children. *International Journal of Body Composition Research, 8*(1), 93-98.

Roberts, D., & Foehr, U. (2004). *Kids and media in America.* Cambridge, MA: University Press.

Roberts, G.C., Treasure, D.C., & Balague, G. (1998). Achievement goals in sport: The development and validation of the perception of success questionnaire. *Journal of Sports Science, 16*(5), 337-347.

Sallis, J.F. (1991). Self-reported measures of children's physical activity. *The Journal of School Health, 61*(5), 215-219. doi: 10.1111/j.1746-1561.1991.tb06017.x

Sallis, J.F., Buono, M.J., Roby, J.J., Micale, F.G., & Nelson, J.A. (1993). Seven-day recall and other physical activity self-reports in children and adolescents. *Medicine and Science in Sports and Exercise, 25*(1), 99-108.

Sallis, J.F., McKenzie, T.L., Alcaraz, J.E., Kolody, B., Faucette, N., & Hovell, M.F. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students: Sports, play and active recreation for kids. *American Journal of Public Health, 87*(8), 1328-1333.

Sanchez, V., Steckler, A., Nidrat, P. Halltors, D., Cho, H., & Brodish, P. (2007). Fidelity of implementation in a treatment effectiveness trial of reconnecting youth. *Health Education Research, 22*, 95-107.

Schwimmer, J.B., Burwinkle, T.M., & Varni, J.W. (2003). Health-related quality of life of severely obese children and adolescents. *Journal of the American Medical Association, 289*(14), 1812-1819. doi: 10.1001/jama.289.14.1813

Scott, M. (2008). *Obesity more costly to U.S. companies than smoking, alcoholism.* Retrieved from http://www.workforce.com/section/00/article/25/46/91.html

Sharma, M. (2006). International school-based interventions for preventing obesity in children. *Obesity Reviews, 8*(2), 155-167.

Shephard, R.J. & Trudeau, F. (2000). The legacy of physical education: influences on

adult lifestyle. *Pediatric Exercise Sciences, 12*(1), 34-50.

Shephard, R.J. (2005). The obesity epidemic: A challenge to pediatric work

physiologists? *Pediatric Exercise Science, 17*(1), 3-17.

Shephard, R.J., & Trudeau, F. (2008). Research on the outcomes of elementary school

physical education. *The Elementary School Journal, 108*(3), 251-263.

Sherar, L.B., Eslinger, D.W., Baxter Jones, A.D.G., & Tremblay, M.S. (2007). Age and

gender differences in youth physical activity: Does physical maturity matter?

Medicine & Science in Sports & Exercise, 39(5), 830-835.

Shriver, L.H., Harrist, A.W., Hubbs-Tait, L., Topham, G., Page, M., & Barrett, A. (2011).

Weight-status, physical activity, and fitness among third-grade rural children.

Journal of School Health, 81(9), 536-544.

Sibley, B.A., & Etnier, J.L. (2003). The relationship between physical activity and

cognition in children: a meta-analysis. *Pediatric Exercise Science, 15*(3), 243-

256.

Sidentop, D. (2008). *Introduction to physical education, fitness, and sport* (7th ed).

Columbus, OH: McGraw Hill-Higher Education.

Silverman, S., Keating, X.D., & Phillips, S.R. (2008). A lasting impression: A

pedagogical perspective on youth fitness testing. *Measurement in Physical

Education and Exercise Science, 12*(3), 146-166.

Simons-Morton, B.G., Parcel, G.S., Baranowski, T., Forthofer, R., & O'Hara, N.M. (1991). Promoting physical activity and a healthful diet among children: Results of a school-based intervention study. *American Journal of Public Health, 81*(8), 986-991.

Sirard, J.R., & Pate, R.R. (2001). Physical activity assessments in children and adolescents. *Sports Medicine, 31*(6), 439-454.

Sisson, S.B., Church, T.S., Martin, C.K., Tudor-Locke, C., Smith, S.R., Bouchard, C., Earnest, C.P.,...Katzmarzyk, P.T. (2010). Profiles of sedentary behavior in children and adolescents: The U.S. national health and nutrition examination survey, 2001-2006. *International Journal of Pediatric Obesity, 4*(4), 353-359. doi: 10.3109/17477160902934777

Snijders, T., & Bosker, R. (1999). *An introduction to basic and advanced multilevel modeling.* London: Sage Publishers.

Sollerhed, A.C., & Ejlertsson, G. (1999). Low physical capacity among adolescents in practical education. *Scandinavian Journal of Medicine & Science in Sports, 9*(5), 249-256.

Stanley, R., Boshoff, K., & Dollman, J. (2007). The concurrent validity of the 3-day physical activity recall questionnaire administered to female adolescents aged 12-14 years. *Australian Occupational Therapy Journal, 54*(4), 294-302.

Stevens, J.P., (2002). *Applied multivariate statistics for the social sciences* (4th ed). Hillsdale, NJ: Erlbaum.

Story, M. (1999). School-based approaches for preventing and treating obesity. *International Journal of Obesity, 23*(Suppl 2), S43-S51.

Strand, B., & Scantling, E. (1994). An analysis of secondary student preferences towards physical education. *The Physical Educator, 51*(3), 119-129.

Strand, B., Scantling, E., & Johnson, M. (1998). Preparing pre-service physical educators to teach a concepts-based fitness course. *Journal of Physical Education, Recreation and Dance, 69*(9), 57-61.

Strauss, R.S. (2000). Childhood obesity and self-esteem. *Pediatrics, 105*(1), e15.

Strauss, R.S., Rodzilsky, D., Burack, G., & Cohn, M. (2001). Psychosocial correlates of physical activity in healthy children. *Archives of Pediatrics & Adolescent Medicine,* 155(8), 897-902.

Strong, W.B., Malina, R.M., Blimke, C.J.R., Daniels, S.R., Dishman, R.K., Gutin, B., ... Trudeau, F. (2005). Evidence based physical activity for school-age youth. *The Journal of Pediatrics, 146*(6), 732-737.

Subramaniam, P.R., & Silverman, S. (2002). Using complimentary data: An investigation of student attitude in physical education. *Journal of Sport Pedagogy, 8*(2), 74-91.

Subramaniam, P.R., & Silverman, S. (2007). Middle school students' attitudes towards physical education. *Teaching and Teacher Education, 23*(5), 602-611.

Swanson, R. & Spears, B. (1995). *History of sport & physical education in the United States* (4th ed). Columbus, OH: The McGraw-Hil Companies, Inc.

Taras, H. (2005). Physical activity and student performance at school. *Journal of School Health, 75*(6), 214-219.

Task Force on Community Preventive Services. (2002). Recommendations to increase physical activity in communities. *American Journal of Preventive Medicine,* 22(Suppl 4), 67-72.

Tassitano, R.M., Barros, M.V.G., Tenróio, M.C.M., Beserra, J., Florindo, A.A., & Reis, R.S. (2010). Enrollment in physical education is associated with health-related behavior among high school students. *Journal of School Health, 80*(3), 126-133.

Tavakol, M. & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2*, 53-55. doi: 10.5116/ijme.4dfb.8dfd

Telford, A., Salmon, J., Jolley, D., & Crawford, D. (2004). Reliability and validity of physical activity questionnaires for children: The children leisure activities study survey (CLASS). *Pediatric Exercise Science, 16*(1), 64-78.

Texas Education Agency. (2009). *Physically fit students more likely to do well in school, less likely to be disciplinary problems*. Retrieved from http://www.tea.state.tx.us/news_release.aspx?id=2147490622&menu_id=692

The President's Council on Physical Fitness and Sport. (2009). School physical education as a viable change agent to increase youth physical activity. *Research Digest, 10*(2), 1-8.

Torre, S.B.D., Swiss, R.D., Akre', C., & Suris, J.C. (2010). Obesity prevention opinions of school stakeholders: A qualitative study. *Journal of School Health, 80*(5), 233-239.

Tremblay, M.S., LeBlanc, A.G., Kho, M.E., Saunders, T.J., Larouche, R., Colley, R.C., Goldfield, G., & Gorber, S.C. (2011). Systematic review of sedentary behavior and health indicators in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity, 8*(1), 98-119.

Troiano, R.P., Berrigan, D., Dodd, K.W., Masse, L.C., Tilert, T., & McDowell, M. (2008). Physical activity in the United States measured by accelerometer. *Medicine and Science in Sports and Exercise, 40*(1), 181-188.

Trost, S.G., Ward, D.S., Moorehead, S.M., Watson, P.D., Riner, W., & Burke, J.R. (1998). Validity of the computer science and applications (csa) activity monitor in children. *Medicine & Science in Sports Exercise, 30*(4), 629-633.

Trudeau, F., & Shephard, R.J. (2005). Contributions of school programmes to physical activity levels and attitudes in children and adults. *Sports Medicine, 35*(2), 89-106.

Trudeau, F., & Shephard, R.J. (2008). Is there a long-term health legacy of required physical activity education? *Sports Medicine, 38*(4), 265-270.

Trudeau, F., & Shephard, R.J. (2010). Relationships of physical activity to brain health and the academic performance of schoolchildren. *American Journal of Lifestyle Medicine, 4*(1), 138-150.

Tur. J.A., Puig, M.S., Benito, E., & Pons, A. (2004). Associations between sociodemographic and lifestyle factors and dietary quality among adolescents in Palma de Mallorca. *Nutrition 20*(6), 502-508.

U.S. Census Bureau. (2011). *Profile America facts for features: Back to school 2010-2011*. Retrieved from http://www.census.gov/newsroom/releases/archives/ facts_for_features_special_editions/cb11-ff15.html

U.S. Department of Education, (2010). *Carol M. White physical education program*. Retrieved from http://www2.ed.gov/programs/whitephysed/index.html

U.S. Department of Health and Human Services. Centers for Disease Control and

Prevention (2008). *Overweight and obesity*. Retrieved from www.cdc.gove/

nccdphp/dnpa/obesity/

Utley, C.A. (2011). A psychometric investigation of the multicultural and special

education survey: An exploratory factor analysis. *Learning Disabilities: A

Contemporary Journal, 9*(1), 47-70.

Vàmosi, M., Heitmann, B.L., & Kyvik, K.O. (2009). The relation between an adverse

psychological and social environment in childhood and the development of adult

obesity: a systematic literature review. *Obesity Reviews, 11*(3), 177-184.

doi: 10.1111/j.1467-789X.22009.00645.x

Vail, K. (2006). Is physical fitness raising grades? *Education Digest, 71*(8), 13-19.

VanderWal, J.S., & Thelan, M.H. (2000). Eating and body image concerns among obese

and average-weight children. *Addictive Behaviors, 25*(5), 775-788.

Vandongen, R., Jenner, D.A., Thompson, C., Taggart, A.C., Spickett, E., Burke,V.,

Beilin, M.A., Milligan, R.A. & Dunbar, D.L. (1995). A controlled evaluation of a

fitness and nutrition intervention program on cardiovascular health in 10- to 12-

year-old children. *Preventive Medicine, 24*(1), 9-22.

van Mechelen, W., Hlobil, H., & Kemper, H.C.G. (1986). Validation of two running tests

as estimates of maximal aerobic power in children. *European Journal of Applied

Physiology and Occupational Physiology, 55*(5), 503-506. doi: 10.1007/

BF00421645

Videon, T.M., & Manning, C.K. (2003). Influences on adolescent eating patterns: The

importance of family meals. *Journal of Adolescent Health, 32*(5), 365-373.

Vilhjalmsson, R., & Thorlindsson, T. (1998). Factors related to physical activity: A study of adolescents. *Social Science Medicine, 47*(5), 665-675.

Virginia Department of Education. (2006). *Health-Related Fitness Testing Guidelines*. Retrieved from: http://www.doe.virginia.gov/instruction/physed/fitness_testing/fitness_testing_info.pdf

Virginia Department of Education. (2010). *Testing and Standards of Learning (SOL)*. Retrieved from http://www.doe.virginia.gov/testing/index.shtml

Virginia Department of Education. (2012). *School year 2011-2012 national school lunch program (NSLP) free and reduced price eligibility report*. Retrieved from http://www.doe.virginia.gov/support/nutrition/statistics/free_reduced_eligibility/2011-2012/schools/frpe_sch_report_sy2011-12.pdf

Vu, M., Murrie, D., Gonzalez, V., & Jobe, J. (2006). Listening to girls and boys talk about girl's physical activity behaviors. *Health Education & Behavior, 33*(1), 81-96. doi: 10.1177/1090198105282443

Ward-Smith, P. (2010). Obesity – America's health crisis. *Urologic Nursing, 30*(4), 242-245.

Warren, J.M., Henry, C.J.K., Lightowler, H.J., Bradshaw, S.M., & Perwaiz, S. (2003). Evaluation of a pilot school programme aimed at prevention of obesity in children. *Health Promotion International, 18*(4), 287–296. doi: 10.1093/heapro/dag402

Welk, G. J. & Blair, S. N. (2008). *Health Benefits of Physical Activity and Fitness in Children*. In G.J. Welk & M.D. Meredith (Eds.), Fitnessgram /Activitygram Reference Guide (pp. Internet Resource). Dallas, TX: The Cooper Institute.

Welk, G.J., Corbin, C.B., & Dale, D. (2000). Measurement issues in the assessment of physical activity in children. *Research Quarterly for Exercise and Sport, 71*(Suppl 2), S59-S73.

Welk, G.J., Jackson, A.W., Morrow, Jr., J.R., Haskell, W.H., Meredith, M.D., & Cooper, K.H. (2010). The association of health-related fitness with indicators of academic performance in Texas schools. *Research Quarterly for Exercise and Sport, 81*(S3), S16-S23.

Weschler, H., McKenna, M.L., Lee, S.M., & Dietz, W.H. (2004). The role of schools in preventing childhood obesity. *State Education Standard, 5*(2), 4-12.

West, S.T., & Shores, K.A. (2008). A comparison of four recreation facilitation styles and physical activity outcomes in elementary school children. *Journal of Park and Recreation Administration, 26*(2), 115-133.

Whitaker, R.C., Wright, M.D., Pepe, M.S., Sneidel, M.S., & Dietz, W.H. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *New England Journal of Medicine, 337*(13), 869-873.

Winterfield, A. (2007). PE makes a comeback. *State Legislatures, 33*(10), 36-37.

Witt, K.E. & Dunn, C. (2012). Increasing fruit and vegetable consumption among preschoolers: Evaluation of Color Me Healthy. *Journal of Nutrition Education and Behavior, 44*(2), 107-113.

Wittberg, R.A., Northrup, K.L., & Cottrel, L. (2009). Children's physical fitness and academic performance. *American Journal of Health Education, 40*(1), 30-36. doi: 10.1080/19325037.2009.10599076

Wood, D.E. (2006). Modeling the relationship between oral reading fluency and

performance on a statewide reading test. *Educational Assessment, 11*(2), 85-104.

Xie, B., Gilliland, F.D., Li, Y.F., & Rockett, H.R.H. (2003) Effects of ethnicity, family

income, and education on dietary intake among adolescents. *Preventive Medicine,*

36(1), 30-40.

Yaussi, S.C. (2005). The obesity epidemic: How non-pe teachers can improve the health

of their students. *The Clearing House, 79*(2), 105-108.

Yetter, G. (2009). Exercise-based school obesity prevention programs: An overview.

Psychology in the Schools, 46(8), 739-747.

Zakus, G., Chin, M.L., Cooper, H., Makovsky, E., & Merrill, C. (1981). Treating

adolescent obesity: A pilot project in a school. *Journal of School Health, 51*(10),

663-666.

Zametkin, A.J., Zoon, C.K., Klein, H.W., & Munson, S.M. (2004). Psychiatric aspects of

child and adolescent obesity: A review of the past 10 years. *Journal of the*

American Academy of Child and Adolescent Psychiatry, 43(2), 134-150.

Zeng, H.Z., Hipscher, M., & Leung, R.W. (2011). Attitudes of high school students

towards physical education and their sport activity preferences. *Journal of Social*

Science, 7(4), 529-537.

Ziviani, J., Macdonald, D., Ward, H., Jenkins, D., & Rodger, S. (2008). Physical activity

of young children: A two-year follow-up. *Physical & Occupational Therapy in*

Pediatrics, 28(1), 25-39. doi: 10.1300/J006v28n01_03

Zullig, K.J., Valois, R.F., Huebner, E.S., & Drane, J.W. (2005). Adolescent health-related

quality of life and perceived satisfaction with life. *Quality of Life Research,*

14(6), 1573-1584. doi: 10.1007/s11136-004-7707-y

Appendix A

Focused Fitness Permission Letter

FOCUSEDFITNESS
Sensible Fitness and Health Programs for Today's Kids

December 31, 2012

Re: Use of data collection instruments for use in Dissertation

To whom it may concern,

This letter is to certify that Kim Baskette has permission to use data collection instruments developed by Focused Fitness in use for her dissertation entitled *Five for Life: Evaluating the Effect of an Activity-Based Fitness and Health Curricula Program on Physical Fitness, Physical Activity, Health-related knowledge, and Attitudinal Outcomes.*

Data collection items to be included are the Activity Log, Five for Life Cognitive Assessment, the Food for Energy Assessment and the 5-12 Student Survey.

These items can be used in the dissertation and appendices as necessary to complete the required work. They cannot otherwise be sold or distributed without express written consent from Focused Fitness.

Please feel free to contact me if you have any questions.

Thank you,

Amy Lutz
VP- Software

Appendix B

IRB Approval Letter

OLD DOMINION UNIVERSITY

Darden College of Education
Office of the Dean
Norfolk, Virginia 23529
Phone 757 683 3948
Fax 757 683 5246
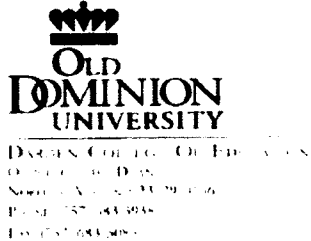
March 21, 2013   Approved Application Number 201302017

Dr. Phil Reed
Department of STEM Education and Professional Studies

Dear Dr. Reed:

Your Revised Application for Exempt Research with Kimberly G. Baskette entitled, "Five for Life: Evaluating the Effect of an Activity Based Fitness and Health Curricula Program on Physical Fitness, Physical Activity, Health-Related Knowledge, and Attitudinal Outcomes," has been found to be EXEMPT from IRB review by the Human Subjects Review Committee of the Darden College of Education, and you may begin your research project when you are ready. You will receive a signed copy of this letter in the campus mail.

The determination that this study is EXEMPT from IRB review is for an indefinite period of time provided no significant changes are made to your study. If any significant changes occur, notify me or the chair of this committee at that time and provide complete information regarding such changes.

In the future, if this research project is funded externally, you must submit an application to the University IRB for approval to continue the study.

Best wishes in completing your study.

Sincerely,

Theodore P. Remley, Jr., J.D., Ph.D.
Professor and Batten Endowed Chair in Counseling
Department of Counseling and Human Services
ED 110
Norfolk, VA 23529

Chair
Darden College of Education Human Subjects Review Committee
Old Dominion University

tremley@odu.edu

Old Dominion University is an equal opportunity, affirmative action institution

Appendix C

FITNESSGRAM Standards - PACER Test

TABLE 9.1   FITNESSGRAM Standards for Healthy Fitness Zone

BOYS

Age	VO₂max (ml·kg⁻¹·min⁻¹)		20-meter PACER (Enter # laps in software)		15-meter PACER (Use conversion chart; enter in software)†		One-mile run (min:sec)		Walk test (VO₂max)		Percent fat		Body mass index	
5	Participation in run. Lap count standards not recommended.						Completion of distance. Time standards not recommended.				25	10	20	14.7
6											25	10	20	14.7
7											25	10	20	14.9
8											25	10	20	15.1
9											25	7	20	13.7
10	42	52	23	61	30	80	11:30	9:00			25	7	21	14.0
11	42	52	23	72	30	94	11:00	8:30			25	7	21	14.3
12	42	52	32	72	42	94	10:30	8:00			25	7	22	14.6
13	42	52	41	83	54	108	10:00	7:30	42	52	25	7	23	15.1
14	42	52	41	83	54	108	9:30	7:00	42	52	25	7	24.5	15.6
15	42	52	51	94	67	123	9:00	7:00	42	52	25	7	25	16.2
16	42	52	61	94	80	123	8:30	7:00	42	52	25	7	26.5	16.6
17	42	52	61	106	80	138	8:30	7:00	42	52	25	7	27	17.3
17+	42	52	72	106	94	138	8:30	7:00	42	52	25	7	27.8	17.8

Age	Curl-up (no. completed)		Trunk lift (inches)		90° push-up (no. completed)		Modified pull-up (no. completed)		Flexed arm hang (seconds)		Back-saver sit and reach* (inches)	Shoulder stretch
5	2	10	6	12	3	8	2	7	2	8	8	Healthy Fitness Zone = touching fingertips together behind the back on both the right and left sides.
6	2	10	6	12	3	8	2	7	2	8	8	
7	4	14	6	12	4	10	3	9	3	8	8	
8	6	20	6	12	5	13	4	11	3	10	8	
9	9	24	6	12	6	15	5	11	4	10	8	
10	12	24	9	12	7	20	5	15	4	10	8	
11	15	28	9	12	8	20	6	17	6	13	8	
12	18	36	9	12	10	20	7	20	10	15	8	
13	21	40	9	12	12	25	8	22	12	17	8	
14	24	45	9	12	14	30	9	25	15	20	8	
15	24	47	9	12	16	35	10	27	15	20	8	
16	24	47	9	12	18	35	12	30	15	20	8	
17	24	47	9	12	18	35	14	30	15	20	8	
17+	24	47	9	12	18	35	14	30	15	20	8	

Number on left is lower end of HFZ; number on right is upper end of HFZ.
*Test scored Pass/Fail; must reach this distance to pass.
†Conversion chart on page 94.
© 1992, 1999, 2004 The Cooper Institute, Dallas, Texas.

Note. Reprinted by permission, from the Cooper Institute, 2007, FITNESSGRAM/ACTIVITYGRAM Test Administration manual Fourth Edition (Champaign, IL, Human Kinetics).

Appendix C (continued)

TABLE 9.2 FITNESSGRAM Standards for Healthy Fitness Zone

GIRLS

Age	$\dot{V}O_2$max (ml·kg⁻¹·min⁻¹)		20-meter PACER (Enter # laps in software)		15-meter PACER (Use conversion chart; enter in software)†		One-mile run (min:sec)		Walk test ($\dot{V}O_2$max)		Percent fat		Body mass index	
5	Participation in run. Lap count standards not recommended.						Completion of distance. Time standards not recommended.				32	17	21	16.2
6											32	17	21	16.2
7											32	17	22	16.2
8											32	17	22	16.2
9											32	13	23	13.5
10	39	47	7	41	9	54	12:30	9:30			32	13	23.5	13.7
11	38	46	15	41	19	54	12:00	9:00			32	13	24	14.0
12	37	45	15	41	19	54	12:00	9:00			32	13	24.5	14.5
13	36	44	23	51	30	67	11:30	9:00	36	44	32	13	24.5	14.9
14	35	43	23	51	30	67	11:00	8:30	35	43	32	13	25	15.4
15	35	43	32	51	42	67	10:30	8:00	35	43	32	13	25	16.0
16	35	43	32	61	42	80	10:00	8:00	35	43	32	13	25	16.4
17	35	43	41	61	54	80	10:00	8:00	35	43	32	13	26	16.8
17+	35	43	41	72	54	94	10:00	8:00	35	43	32	13	27.3	17.2

Age	Curl-up (no. completed)		Trunk lift (inches)		90° push-up (no. completed)		Modified pull-up (no. completed)		Flexed arm hang (seconds)		Back-saver sit and reach* (inches)	Shoulder stretch
5	2	10	6	12	3	8	2	7	2	8	9	Healthy Fitness Zone = touching fingertips together behind the back on both the right and left sides.
6	2	10	6	12	3	8	2	7	2	8	9	
7	4	14	6	12	4	10	3	9	3	8	9	
8	6	20	6	12	5	13	4	11	3	10	9	
9	9	22	6	12	6	15	4	11	4	10	9	
10	12	26	9	12	7	15	4	13	4	10	9	
11	15	29	9	12	7	15	4	13	6	12	10	
12	18	32	9	12	7	15	4	13	7	12	10	
13	18	32	9	12	7	15	4	13	8	12	10	
14	18	32	9	12	7	15	4	13	8	12	10	
15	18	35	9	12	7	15	4	13	8	12	12	
16	18	35	9	12	7	15	4	13	8	12	12	
17	18	35	9	12	7	15	4	13	8	12	12	
17+	18	35	9	12	7	15	4	13	8	12	12	

Number on left is lower end of HFZ; number on right is upper end of HFZ.
*Test scored Pass/Fail; must reach this distance to pass.
†Conversion chart on page 94.
© 1992, 1999, 2004, The Cooper Institute, Dallas, Texas.

Note. Reprinted by permission, from the Cooper Institute, 2007, FITNESSGRAM/ACTIVITYGRAM Test Administration manual Fourth Edition (Champaign, IL, Human Kinetics).
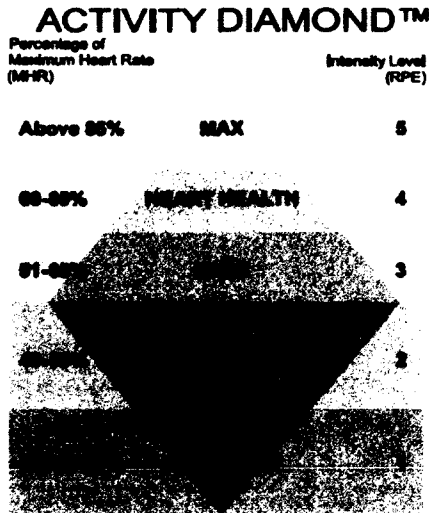
Appendix D

Five for Life 3DPAR Log

FIVE FOR LIFE
ACTIVITY LOG #____

Name_____   Period_____

Student ID_____   Teacher_____

ACTIVITY DIAMOND™

Percentage of Maximum Heart Rate (MHR)   Intensity Level (RPE)

Above 85%   MAX   5

80-85%   HEART HEALTH   4

71-80%   3

2

MAX Intensity Level-5: Very, very difficult; no-talk zone; I can only keep up this pace for a short period

HEART HEALTH Intensity Level-4: Vigorous; I can still talk, but really don't want to; sweating

BASE Intensity Level-3: Moderate; I am slightly uncomfortable; sweating a little and talking requires some effort

DAILY ACTIVITY Intensity Level-2: Easy; I am comfortable and could maintain this pace all day long; I can talk with almost no effort

MEDIA/SEAT Intensity Level-1: Very easy; I am sitting; I can talk with no effort

INSTRUCTIONS:
Please circle each 10 minute activity period completed in an hour.

Time	Level 5 INTENSITY Max: very difficult, no-talk zone	Level 4 INTENSITY Heart Health: vigorous, sweating, little talking	Level 3 INTENSITY Base: moderate, slightly uncomfortable	Level 2 INTENSITY Daily Activity: comfortable, easy	Level 1 INTENSITY Media/Seat: very easy, no effort
Time Woke Up:___ Time Went to Bed:___ Day of week:___ Date:___					
5:00 A.M.	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
6:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
7:00					
8:00					
9:00					
10:00					
11:00					
12:00 P.M.					
1:00					
2:00					
3:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
4:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
5:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
6:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
7:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
8:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
9:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
10:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
11:00	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10	10 10 10 10 10 10
Total Time					
	Level 5	Level 4	Level 3	Level 2	Level 1

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Appendix E

"Five for Life K-5" Assessment

FIVE FOR LIFE
K-5

*Student
Assessment*

STUDENT ASSESSMENT

*Name*_____

1. How many components of fitness are there?
   a. 3
   b. 5
   c. 6
   d. 10

2. Having good cardiorespiratory endurance means a person can:
   a. Shoot 5 baskets
   b. Run for 10 minutes
   c. Do 2 pull-ups
   d. Do 1 cartwheel

3. If a person cannot lift something very heavy, he/she would need more:
   a. Flexibility
   b. Muscular strength
   c. Cardiorespiratory endurance
   d. Muscular endurance

4. If a dancer or gymnast could not do splits, he/she would need to work on:
   a. Flexibility
   b. Muscular strength
   c. Cardiorespiratory endurance
   d. Muscular endurance

5. Body composition refers to:
   a. The relationship of fat-free mass to fat mass
   b. The number of fat cells a person is born with
   c. How tall a person is compared to his/her weight
   d. The number of push-ups a person can do compared to his/her weight

6. What do the heart and lungs supply to the muscles during long periods of exercise?
   a. Food
   b. Water
   c. Oxygen
   d. Carbon dioxide

7. What changes happen in the body during a long run?
   a. Breathing slows down
   b. Heart rate beats faster
   c. The body feels cooler
   d. Hair begins to grow

FIVE FOR LIFE K-5

FIVE FOR LIFE
K-5

STUDENT ASSESSMENT
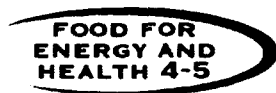
Name_____

8. Being able to do more than 12 bicep curls will help improve:
   a. Flexibility
   b. Muscular strength
   c. Cardiorespiratory endurance
   d. Muscular endurance

9. List one activity that will help improve cardiorespiratory endurance:

10. List one reason why the body needs fat:

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Appendix F

"Food for Energy and Health" 4-5 Assessment

FOOD FOR
ENERGY AND
HEALTH 4-5

*Student
Assessment*

STUDENT ASSESSMENT

*Name*_____

1. Carbohydrates are:
   a. The most preferred source of energy
   b. The slowest source of energy
   c. The building blocks of the body
   d. Neither animal or vegetable

2. To have a healthy diet:
   a. Stay away from foods with fat
   b. Avoid foods with carbohydrates
   c. Eat a variety of foods
   d. Never eat ice cream

3. A gram of fat contains how many calories:
   a. 2
   b. 4
   c. 9
   d. 15

4. Besides providing energy for the body, fat helps to:
   a. Build muscle
   b. Heal cuts
   c. Absorb vitamins
   d. Fight colds

5. It is important to eat enough calories every day so we can:
   a. Store extra calories in fat mass
   b. Have more than we can use
   c. Run faster and jump farther
   d. Grow and have plenty of energy

6. A gram of protein contains how many calories:
   a. 2
   b. 4
   c. 9
   d. 15

FOOD FOR
ENERGY AND
HEALTH 4-5

Student
Assessment

STUDENT ASSESSMENT

Name_____

7. The three nutrients that provide the body with energy are:
   a. Carbohydrate, fat and protein
   b. Calories, fat and vitamins
   c. Carbohydrate, vitamins and fat
   d. Calories, vitamins and minerals

8. Vitamins and minerals are required for a wide variety of functions for the body, including:
   a. Losing fat mass
   b. Normal growth
   c. Extending the elbow
   d. Causing dehydration

9. A gram of carbohydrate contains how many calories:
   a. 2
   b. 4
   c. 9
   d. 15

10. The nutrient found in food that builds muscle tissue is:
   a. Carbohydrate
   b. Protein
   c. Fat
   d. Vitamins

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Appendix G

Five for Life **Student Survey**

FOCUSEDFITNESS

Instructions: The purpose of this survey is to get your thoughts about your physical education class, healthy eating and physical activity. Your teacher will not see your answers. You can choose to answer all, some, or none of the questions.

1. Please enter the ID number given to you by your teacher.

2. What's the name of your school district?

3. What is the name of your school?

4. What's the name of your teacher? Elementary School students should choose their Home Room teacher. Middle and High School students should choose their P.E. teacher.

5. Please indicate your gender.
   a. Female
   b. Male

6. What grade are you in?

Directions: For each of the following statements please tell us how much you agree or disagree with it.

7. I like my PE class.
   a. Disagree Strongly
   b. Disagree
   c. Neither Agree nor Disagree
   d. Agree
   e. Agree Strongly

8. I enjoy learning new activities in PE.
   a. Disagree Strongly
   b. Disagree
   c. Neither Agree nor Disagree
   d. Agree
   e. Agree Strongly

9.   I enjoy working hard enough that my heart rate and breathing increases.
   a. Disagree Strongly
   b. Disagree
   c. Neither Agree nor Disagree
   d. Agree
   e. Agree Strongly

10.   I feel good about myself when I know I have worked hard in PE.
    a. Disagree Strongly
    b. Disagree
    c. Neither Agree nor Disagree
    d. Agree
    e. Agree Strongly

11.   Being fit is important for my health.
    a. Disagree Strongly
    b. Disagree
    c. Neither Agree nor Disagree
    d. Agree
    e. Agree Strongly

12.   My PE class is giving me the information and skills to be fit.
    a. Disagree Strongly
    b. Disagree
    c. Neither Agree nor Disagree
    d. Agree
    e. Agree Strongly

13.   Making healthy food choices is important to me.
    a. Disagree Strongly
    b. Disagree
    c. Neither Agree nor Disagree
    d. Agree
    e. Agree Strongly

14.   The things I am learning about fitness and eating healthy in school will be important to me when I get older.
    a. Disagree Strongly
    b. Disagree
    c. Neither Agree nor Disagree
    d. Agree
    e. Agree Strongly

15.   Setting fitness goals is important to me.

a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

16. Having fun helps me understand what I'm learning in PE.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

17. I learn enough about intensity in PE class so I can apply it when I'm active.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

18. I learn enough in PE class about the five components of fitness to pick activities that improve my fitness.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

19. I learn enough in PE class about setting goals to improve my fitness test scores.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

20. I learn enough in PE class about the Food Guide Pyramid to choose healthy foods.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

21. My PE teacher gives me enough time in class to improve my fitness.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

22. I am active most of the time in my PE class.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

23. I learn in PE class that being fit and eating healthy foods will make me healthy.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

24. I learn about enjoyable activities in PE that I can do outside of class.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

25. I learn about health, fitness and eating healthy in places at school other than my PE class.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

26. My teacher makes learning about fitness and eating healthy fun.
a. Disagree Strongly
b. Disagree
c. Neither Agree nor Disagree
d. Agree
e. Agree Strongly

27. I work hard in PE on my skills and fitness so I can be active outside of class.
   a. Disagree Strongly
   b. Disagree
   c. Neither Agree nor Disagree
   d. Agree
   e. Agree Strongly

28. I am active outside of class because I want to improve my skills.
   a. Disagree Strongly
   b. Disagree
   c. Neither Agree nor Disagree
   d. Agree
   e. Agree Strongly

29. I am active outside of class because I want to increase my fitness.
   a. Disagree Strongly
   b. Disagree
   c. Neither Agree nor Disagree
   d. Agree
   e. Agree Strongly

30. I am following a plan outside of class to achieve my fitness goals.
   a. Disagree Strongly
   b. Disagree
   c. Neither Agree nor Disagree
   d. Agree
   e. Agree Strongly

31. When I'm active outside of class I choose activities of different intensity.
   a. Disagree Strongly
   b. Disagree
   c. Neither Agree nor Disagree
   d. Agree
   e. Agree Strongly

32. In an average WEEK how many minutes of activity do you get where you are breathing hard and your heart rate increases, including your PE class?

    a. Less than 30 Minutes
    b. 30 Minutes
    c. 60 Minutes (1 hour)
    d. 90 Minutes (1.5 hours)
    e. 120 Minutes (2 hours)
    f. 150 Minutes (2.5 hours)
    g. 180 Minutes (3 hours)
    h. 210 Minutes (3.5 hours)
    i. 240 Minutes (4 hours)
    j. 270 Minutes (4.5 hours)
    k. 300 Minutes (5 hours)
    l. More than 300 Minutes (More than 5 hours)

33. Yesterday, I ate fruit _____ times (do not count fruit juice).
    a. I did not drink 100% fruit juice yesterday.
    b. 1 to 3 times
    c. 4-6 times
    d. 1 time
    e. 2 times
    f. 3 times
    g. 4 or more times

34. Yesterday, I ate vegetables (other than french fried potatoes) _____ times.
    a. I did not eat vegetables yesterday
    b. 1 to 3 times
    c. 4-6 times
    d. 1 time
    e. 2 times
    f. 3 times
    g. 4 or more times

35. Yesterday, other than juice, milk or water, I drank _____ beverages.

36.   Yesterday, I spent _____ in front of a computer or TV.
    a. Less than 30 minutes
    b. At least 30 minutes but less than 1 hour
    c. At least 1 hour but less than 1.5 hours
    d. At least 1.5 hours but less than 2 hours
    e. At least 2 hours but less than 2.5 hours
    f. At least 2.5 hours but less than 3 hours
    g. At least 3 hours but less than 3.5 hours
    h. At least 3.5 hours but less than 4 hours
    i. At least 4 hours but less than 4.5 hours
    j. At least 4.5 hours but less than 5 hours
    k. 5 hours or more

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Appendix H

Yearlong PE Timeline – Year 1 of PEP Grant

Schools: All

FOCUSEDFITNESS
Sports Fitness and Health Programs for Today's Kids

Begin Date: 9/8/09 End Date: 6/18/09

Projected Date	Item	Notes
11/16-19	Focused Fitness K-12 Training	Location & Time:
11/18	Teacher Pre-Survey	Go to www.WELPRO.org (click on teacher survey)
Completed	Fitness Pre-Measurements	4th-10th grades required (trunk lift, pacer, back saver sit & reach, cadence curl-ups, cadence push-ups)
Pre: 12/1 Post: 1/22	Five Components of Fitness Unit Pre-Assessment/Post-Assessment	4th, 7th and 9th grades required (basic book pages 1.9–1.10) pre-and post-assessments to be completed and entered on WELPRO or sent w/class roster (total scores for both pre-& post- to PEP coordinator by 1/22 must have student ID # w/name)
12/2	Fitness Pre- Measurements Data Complete	Fitness pre- measurements to be completed and sent to PEP coordinator or entered into WELPRO
12/9	Student Pre-Survey	4th-10th grade required-bring students to computer lab go to www.WELPRO.org click on student survey (students need ID#)
12/22	Activity Log #1	5th-10th grade activity log/three consecutive days (two week days and one weekend day). Send logs with a class roster to PEP coordinator by 12/22
2/5	Activity Log #2	5th-10th grade activity log/three consecutive days (two week days and one weekend day). Send logs with a class roster to PEP coordinator by 2/5

	Focused Fitness Training	Location & Time:
Pre: 3/8 Post: 4/23	Food for Energy and Health Pre-and Post-Assessments	4th, 7th and 9th grades required (basic book pages 2.36-2.37) pre-and post-assessments to be completed and entered on WELPRO or sent w/class roster (total scores for both pre-& post- to PEP coordinator by 4/23 must have student ID# w/name)
3/19	Activity Log #3	5th-10th grade activity log/three consecutive days (two week days and one weekend day). Send logs with a class roster to PEP coordinator by 3/19
4/30	Activity Log #4	5th-10th grade activity log/three consecutive days (two week days and one weekend day). Send logs with a class roster to PEP coordinator by 4/30
6/4	Activity Log #5	5th-10th grade activity log/three consecutive days (two week days and one weekend day). Send logs with a class roster to PEP coordinator by 6/4
	Focused Fitness Training	Location & Time:
5/26	Post-Fitness Measurements	4th-10th grades required (trunk lift, pacer, back saver sit & reach, cadence curl-ups, cadence push-ups)
5/26	Fitness Post-Assessment Data Complete	Fitness post-assessments to be completed and sent to PEP coordinator
5/28	Teacher Post-Survey	Go to www.WELPRO.org (click on teacher survey)
6/4	Student Post-Survey	4th-10th grade required - students to computer lab go to www.WELPRO.org click on student survey (students need ID#)
6/11	Send Student/Parent Fitness Report (optional)	Print student/student parent report. Send home at conferences or with report cards.
July 19-21	Five for Life Summer Institute	Grant will sponsor trainer's travel, lodging, registration and meal costs

Note. Five activity logs throughout the year; two logs must be completed by February for evaluation report. Two cognitive pre- and post-assessments (Five for Life unit and the Food for Energy and health unit).

Appendix I

Data Analysis Table

Research Questions	Sample	Variable	Instrument	Data Analysis
RQ1: Does participation in the *Five for Life* program improve cardiorespiratory endurance levels of elementary school students?	Pre- and post-data on Cohort 1 students during 4th and 5th grade years	Cardiorespiratory endurance as measured by laps completed	PACER TEST	Multilevel Modeling
RQ$_2$: Does participation in the *Five for Life* program increase physical activity levels of elementary school students?	5th grade students in Cohorts 1 & 2. Four data collection periods during school year.	Physical Activity levels (overall, and at base, heart health and max intensities)	3-day Physical Activity Recall Logs	Reliability - Cronbach's alpha Multilevel Modeling
RQ$_3$: Does participation in the *Five for Life* program enhance understanding of the five components of fitness in elementary school students?	Pre- and post-data on Cohort 1 4th grade students - summative scores on assessment.	Cognitive ability to understand material taught in the Five Components of Fitness curriculum unit; measured by performance on 10-item assessment.	Five for Life K-5 Cognitive Assessment	Multilevel Modeling
RQ$_4$: Does participation in the *Five for Life* program enhance understanding of basic nutritional concepts in elementary school students?	Pre- and post-data on Cohort 1 4th grade students - summative scores on assessment.	Cognitive ability to understand material taught in the Food for Energy and Health curriculum unit; measured by performance on 10-item assessment.	Food for Energy and Health 4-5 Cognitive Assessment	Multilevel Modeling

Appendix I (continued)

RQ$_5$: Does participation in the *Five for Life* program alter elementary school students' health-related attitudes? Subquestions: a. What is the impact on students' attitudes towards their Physical Education class? b. What is the impact on students' attitudes regarding the relationship between the fitness and health concepts taught in PE and their overall health and wellness? c. What is the impact on students' attitudes towards the importance of being physically active outside of PE class?	Pre- and Post-data on Cohort 1 students during 4th and 5th grade years.	Student attitudes towards Physical Education class and overall health and wellness. Factor 1: student attitudes about their PE class. Factor 2: student attitudes about what they are learning in PE. Factor 3: student attitudes about engaging in physical activity outside of school.	Five for Life Student Survey (Questions 1-25); Items 7, 8, 9, 10, 12, 21, 22, 24, 26 Items 14, 16, 17, 18, 19, 20, 23, 25 Items 11, 13, 15, 27, 28, 29, 30, 31	Reliability - Cronbach's alpha - Pre- and Post-survey data; Pre-survey Factor items. Survey validation - Exploratory Factor Analysis Multilevel Modeling

RESUME

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EDUCATION & TRAINING

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Doctor of Philosophy in Education (2013)

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY - Blacksburg, Virginia
Master of Science in Health and Physical Education (2002)
  Master's Option in Health Promotion (*G.P.A 4.0)*
 Bachelor of Science in Biology, Minor in Chemistry (1989)

BAPTIST MEDICAL CENTER, School of Medical Technology, Columbia, South Carolina
American Society of Clinical Pathologists Certified Medical Technologist

PROFESSIONAL CERTIFICATIONS AND HONORS

2010-present, Member – Iota Lambda Sigma Honor Society, Old Dominion University
2004-present, Certified Health and Fitness Specialist, American College of Sports Medicine (ACSM)
2011–present, Member - American Alliance for Health Physical Education Recreation and Dance Member
2013-present, Member – American Evaluation Association

PUBLICATIONS

Baskette, K.G. & Ritz, J.M. (2010). Organ Harvesting and Transplants. *Technology Teacher, 69*(7), 5-10.

Baskette, K.G., Fantz, T.D., & Katsioloudis, P.J. (2012). Technological literacy for all: A course designed to raise the technological literacy of college students. *Journal of Technology Education* (Under review).

Greico, C. R., Swain, D.P., Colberg-Ochs, S., Dowling, E., **Baskette, K.**, Zarrabi, L., Gandrakota, R., Kotipalli, U., Sechrist, S.R., & Somma, C.T. (2013). Effect of intensity of aerobic training on insulin sensitivity/resistance in recreationally active adults. *Journal of Strength & Conditioning Research,* (published online ahead of print March 21, 2013). doi: 10.1519/JSC.0b013e31827da2f0

PROFESSIONAL EXPERIENCE

QUALITY MEASURES - Chesapeake, Virginia
Research Associate (03/13-present)

- Assist in developing and selecting the research methods and evaluation models.
- Assist in identifying and developing data-gathering instruments via research of current measures and review or development of customized measures.
- Assist in providing oversight of the data collection, data mining, data review, and data storage processes for appropriate analyses.
- Conduct basic statistical and qualitative analyses that inform whether project goals and/or objectives are being met.

OLD DOMINION UNIVERSITY – Norfolk, Virginia
Program Case Manager – PROJECT LAUNCH (9/12-present)

- Design and develop program materials and presentations.
- Coordinate and oversee recruitment and enrollment of Portsmouth Public High School (PPHS) students.
- Collect, enter and maintain program data in the Virginia WIA Participant Tracking System (VOS).
- Coordinate and attend program activities to include arranging travel for program participants.
- Provide comprehensive guidance, counseling, and referral services to meet individual student goals.
- Work closely with program participants to track and document progress in the program.

Research Assistant – Department of STEM and Professional Studies (8/11-5/12)

- Assisted in conducting STEM-related research studies.
- Developed and administered student survey to study participants.
- Collected, entered and analyzed survey data.
- Compiled data analysis and co-wrote research article for publication.

Graduate Teaching Assistant - Department of STEM and Professional Studies (8/09-8/11)

- Taught OTS 110T: Technology And Your World & OTS 330: Medical, Agricultural and Bio-related Technologies
- Provided assistance to faculty as needed.
- Served on panel for new Graduate Teaching Assistants orientation (Fall 2010 & 2011)

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