2010

Survey of physical activity in elementary school classrooms in the state of Virginia

Gail Smith Elmakis
College of William & Mary - School of Education

Follow this and additional works at: https://scholarworks.wm.edu/etd
Part of the Educational Leadership Commons, and the Elementary Education Commons

Recommended Citation
https://dx.doi.org/doi:10.25774/w4-73d6-s035

This Dissertation is brought to you for free and open access by the Theses, Dissertations, & Master Projects at W&M ScholarWorks. It has been accepted for inclusion in Dissertations, Theses, and Masters Projects by an authorized administrator of W&M ScholarWorks. For more information, please contact scholarworks@wm.edu.
SURVEY OF PHYSICAL ACTIVITY
IN ELEMENTARY SCHOOL CLASSROOMS
IN THE STATE OF VIRGINIA

A Dissertation
Presented to
The Faculty of the School of Education
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

by
Gail Smith Elmakis
April 2010
SURVEY OF PHYSICAL ACTIVITY IN ELEMENTARY SCHOOL CLASSROOMS IN THE STATE OF VIRGINIA

by

Gail Smith Elmakis

Approved April 2010 by

James H. Stronge, Ph.D.
Chairman of Dissertation Committee

Michael F. DiPaola, Ed.D.
Committee Member

Thomas J. Ward, Ph.D.
Committee Member
DEDICATION

This dissertation is dedicated to my late father, Dr. Abraham Smith, who laid the foundation for my accomplishments, and to my first grandchild, Sophie, who was born a few months prior to the completion of this work. My father’s model of lifelong learning and constantly striving to improve his life, the life of his family, and the lives of his patients was a source of inspiration. From his example, I learned that I am worth the caliber of my thoughts and of my actions. My worth is measured by the relationships I build and the character I develop. I am worth the value I help others to perceive in themselves, the truths I tell and the good I do. As I learned from my father’s example, my hope is that Sophie will want to learn from my example.
ACKNOWLEDGEMENTS

Thank you to my committee who challenged and supported me on this journey - chair, Dr. James Stronge, and committee members, Dr. Michael DiPaola, and Dr. Tom Ward. Dr. Stronge, I told you often that you have a way of elucidating and simplifying like no other. Dr. DiPaola, you advised me from the beginning of my program and steered me in the right direction toward the completion of this degree. Dr. Ward, I am humbled that you agreed to work with me, and your advice was invaluable.

To the faculty and staff at the College of William and Mary, thank you for providing me with the context to become a better person, student, educator, and social worker. Dr. Christopher Gareis, thank you for your high expectations. Dr. Judith Connell, a consummate professional and transformational leader, thank you for unknowingly planting the seed for my dissertation topic. My fellow students, Terri Roettinger and Doris Feltman, may never truly know how much I appreciated their encouragement, collaboration, and love over these past five and half years. I am proud to call you friends and will forever be indebted to both of you.

I am grateful for the financial support from The Delta Kappa Gamma Society of Key Women Educators International and Virginia, IOTA State Organization. Their encouragement and assistance helped make it possible for me to achieve this dream.

I extend my gratitude and love to my husband, Daniel, for his enduring patience, constant support, and never ending faith in my abilities. Thank you from the bottom of my heart. Your attitude toward life is a daily inspiration to me. To my mother, Betty Smith, thank you for trying to understand why I have been so unavailable for the duration of these
studies. The same thanks go to my children, Avrum and Anne, and my daughter-in-law, Lauren, and son-in-law, Christopher. Thanks go to Stan Smith, my brother, who surfaced with words of wisdom at just the right times.

Thanks to my colleagues, friends, other family, and gym buddies who have been supportive beyond expectation. You are too numerous to name individually, but you know who you are.
TABLE OF CONTENTS

DEDICATION ........................................................................................................................................ iii
ACKNOWLEDGEMENTS ......................................................................................................................... iv
LIST OF TABLES .................................................................................................................................... ix
LIST OF FIGURES .................................................................................................................................. xi
ABSTRACT ............................................................................................................................................... xii
CHAPTER 1: THE PROBLEM ................................................................................................................... 2
  Introduction ........................................................................................................................................ 2
  Statement of the Problem ..................................................................................................................... 3
  Purpose of the Study ............................................................................................................................ 4
  Research Questions ............................................................................................................................. 5
  Significance of the Study ....................................................................................................................... 5
  Theoretical Rationale ............................................................................................................................ 8
  Definition of Terms ............................................................................................................................... 9
  Limitations of the Study ......................................................................................................................... 11
  Delimitations of the Study ...................................................................................................................... 12
  Major Assumptions .............................................................................................................................. 12
CHAPTER 2: REVIEW OF THE LITERATURE ......................................................................................... 13
  Introduction ....................................................................................................................................... 13
  History of Physical Activity in Elementary School ........................................................................... 15
  Philosophical Foundation ..................................................................................................................... 15
  Need for Physical Activity Identified .................................................................................................. 17
  Evolving Perspective of Mind/Body Relationship ............................................................................... 18
Description of the Sample ................................................................. 57
Factor Analysis ....................................................................................... 60
Internal Consistency Reliability ............................................................. 65
Analysis of Research Questions ............................................................ 66
CHAPTER 5: SUMMARY, DISCUSSION AND RECOMMENDATIONS ........ 82
Introduction .......................................................................................... 82
Summary of the Study ........................................................................... 82
Discussion of the Findings ................................................................. 84
Factor Analysis ....................................................................................... 93
Implications for Practice ....................................................................... 95
School/Home/Community Collaboration .............................................. 95
Connection between School and Health ............................................. 96
Implementation Process ....................................................................... 97
Leadership ............................................................................................ 99
Recommendations for Further Research ............................................ 101
Conclusions ........................................................................................ 103
Appendix A ......................................................................................... 105
Appendix B ......................................................................................... 110
Appendix C ......................................................................................... 111
Appendix D ......................................................................................... 112
Appendix E ......................................................................................... 113
References ......................................................................................... 117
LIST OF TABLES

Table 1 Published Physical Activity Programs Available to Teachers................................... 34
Table 2 Research Supporting Positive Association between Physical Activity and Cognition ................................................................................................................................... 43
Table 3 Organizations/Agencies Supporting the Increase of Physical Activity in School..... 44
Table 4 Table of Specifications - Factors Related to Embedding Physical Activities ........... 52
Table 5 Data Analysis Table................................................................................................... 55
Table 6 Description of Sampled Schools................................................................................ 58
Table 7 Frequency and Percentage of Participating Elementary Teachers by Grade......... 59
Table 8 Rotated Factor Matrix................................................................................................ 64
Table 9 Reliability Analysis for Dimensions Related to Physical Activity in the Classroom 65
Table 10 Survey Frequency and Percentage of Daily Time for Physical Activity Incorporated in Classroom Lessons by Grade Band ................................................................. 67
Table 11 Physical Activity Component Included as Part of Instruction................................ 68
Table 12 Means and Standard Deviations for Amount of Physical Activity Based on Grade Band ......................................................................................................................... 68
Table 13 Independent Samples t-Test Results for Use of Physical Activity ...................... 69
Table 14 Teacher Perceived Level of Fitness........................................................................ 70
Table 15 Descriptive Statistics for K-5 Teacher Perceived Level of Fitness and Amount of Physical Activity in Classroom................................................................. 71
Table 16 ANOVA of Mean Scores for Teacher Perceived Level of Fitness and Amount of Physical Activity in Classroom................................................................. 71
Table 17 Post Hoc Test of Multiple Comparisons for Teacher Level of Perceived Fitness and Amount of Physical Activity in Classroom Tukey HSD ............................................ 73
Table 18 Academic Benefits ................................................................................................... 75
Table 19 Behavioral Benefits .............................................................................................. 77
Table 20 Factor Overview Data .......................................................................................... 78
Table 21 Categorized Facilitating and Inhibiting Factors Related to the Incorporation of Physical Activity in the Classroom ........................................................................ 79
LIST OF FIGURES

Figure 1 Prevalence of Overweight Among Children and Adolescents
Ages 6-19 Years................................................................. 23
SURVEY OF PHYSICAL ACTIVITY IN ELEMENTARY SCHOOL CLASSROOMS IN THE STATE OF VIRGINIA

ABSTRACT

Elementary school age children engage in levels of physical activity that are well below recommended guidelines. It has been suggested that classroom teachers can assist in remedying the problem by providing physical activity breaks and physical activity embedded in instruction. This study utilized the instrument, *Physical Activity in the Classroom*, to investigate the level of physical activity used in classrooms and to discover whether teachers differed in the amount of activity based on grade level and their own perceived level of personal fitness. It explored academic and behavioral benefits related to incorporating physical activity in the classroom and discovered what supports teachers report they need to incorporate more physical activity during the school day.

The 31-item instrument was tested on a random cluster sample of 393 K-5 elementary school teachers. Findings revealed that teachers incorporated low levels of physical activity during their lessons. Math was identified as the subject area where they are most likely to incorporate a physical activity component. The K-5 teachers endorsed academic and behavioral benefits of including physical activity throughout the school day.

They maintained willingness to accept responsibility for including more physical activity but need support from administration and professional development to accomplish the goal. A factor analysis of the study instrument indicated that further refinement is needed to improve construct validity.

GAIL SMITH ELMAKIS
PROGRAM IN EDUCATIONAL PLANNING, POLICY, AND LEADERSHIP
THE COLLEGE OF WILLIAM AND MARY IN VIRGINIA

xii
Survey of Physical Activity
in Elementary School Classrooms
in the State of Virginia
CHAPTER 1: THE PROBLEM

Introduction

Education is a broad social process and not simply schooling. Inasmuch as education is a value-charged activity, confusion and disagreement is rampant about what should be taught in schools and what activities should be incorporated in the school day. The standards used in making judgments about our society and about our schools arise out of our culture. These criteria are carried into programs for social and educational actions (Urban & Wagoner, 2009). The concept of including physical activity in elementary classrooms throughout the school day is one of these value-charged activities.

The current focus of educational practice and policy is overwhelmingly on academic achievement. Academic achievement is student mastery of grade level skills in subjects such as math, reading, science and social studies. However, academic achievement is only one element of student learning and development and only a part of any complete system of educating students (Hayward, 2008). A strict focus on increased academics, leading to the reduction or elimination of physical education and recess, may not take into account students’ physiological, psychological, and neurological need for movement activities as they relate to physical health and learning outcomes.

A comprehensive approach to learning recognizes that successful young people are not only knowledgeable but physically healthy as well. Additionally, a growing body of
evidence validates the physical and mental benefits of regular physical activity for all children and youth (Burgeson, Wechsler, Brener, Young, & Spain, 2001; Center for Disease Control [CDC], 1997; United States Department of Health and Human Services [USDHHS], 2003).

While it is proper and desirable that all citizens participate in deciding what should be taught in schools or what activities should be incorporated in the school day, teachers need to take leadership in stimulating and guiding discussion. Teachers cannot remain neutral in educational controversies, because they have a professional obligation to work toward clarification as to what is worth teaching in American schools. Things taught in schools reflect judgments of what is of vital importance in the society in which the schools exist.

With public school enrollment increasing 26 percent between 1985 and 2007, virtually all children in the United States attend school (Digest of Education Statistics, 2007). In addition, schools have traditionally held a major role in health promotion for children (Digest of Education Statistics, 2007). Consequently, schools are identified as primary and influential agents of change in the drive to improve the short and long-term health benefits of children. Schools cannot take responsibility for meeting every need of their students; but when the need directly affects learning and health, the school must meet the challenge (Carnegie Council on Adolescent Development, 1989). Children need to increase their physical activity levels, and it is important to investigate effective ways to achieve this goal.

Statement of the Problem

Even with agreement that increasing physical activity in schools is necessary, how are we going to accomplish this goal? Schools are already lamenting that they barely have enough time to cover material in courses required for accountability programs and standards.
Music, art, and physical education programs are being put aside to make room for remediation in core academic areas. One response to this dilemma could be embedding short bursts of physical activity in the curriculum.

The literature supports the premise that the introduction of more physical activity in schools may improve student health and academic achievement (Bogden & Vegas-Matos, 2000; California Department of Education, 2001; Castelli, Hillman, Buck, & Erwin, 2007; Etnier, Salazaw, Landers, Petruzzello, et. al., 1997; Sallis, McKenzie, Kolody, & Lewis, et. al., 1999). The literature also supports the notion that teachers are poorly equipped to support introducing physical activity across the curriculum because health and physical education are considered by most elementary school teachers to be specialized subjects outside of their teaching dominion (Bogden & Vegas-Matos, 2000; Cooper & Taras, 2003; Keays & Allison, 1995; Shephard, 1996; 1997; Strong, Malina, Blimkie, & Daniels, et. al., 2005).

The problem is agreeing on what constitutes a reasonable and fair amount of physical activity embedded throughout the school day, who should be held accountable for how much physical activity is actually included in the school day, and preparing classroom teachers to incorporate physical activity into their learning strategies.

**Purpose of the Study**

In an effort to investigate the inclusion of physical activity throughout the school day, this study utilized an unpublished survey instrument (Elmakis, 2007) aimed at one group of informants responsible for introducing and sustaining that inclusion: elementary classroom teachers. Classroom teachers are situated in a position to recognize potential benefits and barriers related to the introduction of additional strategies to be incorporated in their teaching day. Their insights into the factors related to embedding physical activity throughout the
school day are essential in securing a meaningful and thorough picture of the components necessary for incorporating the concept. Their knowledge and expertise may also facilitate the refinement of the survey instrument (Gall, Gall, & Borg, 2007).

Research Questions

The following research questions guided this study:

1. What is the level of physical activity in classrooms at public elementary schools in Virginia, and do elementary teachers differ in the amount of physical activity embedded in the classroom based on grade level (e.g., K-2 or 3-5)?

2. Do elementary teachers differ in the amount of physical activity embedded in the classroom based on the teachers' perceived level of personal fitness (e.g., Excellent, Fair, or Poor)?

3. What academic and/or behavioral benefits related to embedding physical activity in the classroom are endorsed by teachers?

4. What support systems do teachers need to incorporate physical activity into their teaching and learning strategies?

Significance of the Study

In a country where the prevalence of obesity in children has been increasing exponentially (CDC, 2004), the importance of research in this area cannot be overemphasized. Physical inactivity remains at epidemic levels, and we do not use the knowledge we have created about how to promote physical activity. As health providers, government agencies, non-profit organizations, parents, and the community strive to overcome health problems associated with lack of physical activity, they turn to the place the majority of young people spend a significant amount of time during the day, their schools.
Health providers are on the front lines dealing with the day to day health issues facing our children, government agencies attempt to create policy solutions to the obesity epidemic, and local communities and families try to respond at a local level.

The CDC (2004) reported that obesity is the most prevalent nutrition problem of youth in America and the lack of physical activity is related to direct medical costs in the billions. Brownell and Horgen (2004) told us that, “American children may be the first generation in modern history to live shorter lives than their parents” (p. 55). Fewer than one in four children report getting at least half an hour of any type of daily physical activity and do not attend any school physical education classes (Burgeson et al., 2001; National Association for Sport and Physical Education’s Shape of the Nation Survey, 2002). Even before the passage of the No Child Left Behind Act [NCLB], only 8% of elementary schools provided daily physical education classes (Burgeson et al., 2001). Being overweight is associated with inactivity and poor academic achievement (Davis, Tkacz, & Tomporowski, 2007).

Philosophers and leaders such as Plato, Locke, Rousseau and Thomas Jefferson wrote extensively about the mind/body connection and advocated for physical activity. John Dewey (1897) in his famous declaration concerning education wrote:

I believe that the active side precedes the passive in the development of the child nature; that expression comes before conscious impression; that the muscular development precedes the sensory; that movements come before conscious sensations; I believe that consciousness is essentially motor or impulsive; that conscious states tend to project themselves in action. (p. 79)
An ecological model of physical activity leads one to identify the settings where physical activity and sedentary behaviors take place, provide opportunities and incentives for physical activity in those settings, and reduce opportunities and incentives for sedentary behavior. There are multiple possible intervention components to include behavior change programs, mass media, environmental change and incentives. The policies in place affect the supply and demand of each intervention; thus, policy research and change need to be at the forefront. We need to identify policies that can create demand for programs, provide incentives for physical activity and create activity-friendly environments. We need a conceptual model to guide research and policy initiatives.

There are evidence based physical activity interventions available, but they are inadequately diffused. Therefore, ineffective or untested interventions continue to be used in practice. The successful implementation of physical activity breaks and physically active lessons embedded throughout the school day could go a long way toward increasing the amounts of physical activity for school age children and potentially stabilize or reverse current obesity trends. Schools provide an ideal place for the development and maintenance of healthy habits. They have significant influence on the lives of young people and provide a setting in which behavioral norms are developed and reinforced. The limited research dedicated specifically to physical activity throughout the school day clearly points to a need to learn more about the factors that contribute to successful implementation and how these can be potentially beneficial to student engagement and student achievement along with improving children’s health. Student engagement includes factors such as attendance, attention, classroom behavior, and attitude toward school. Student achievement includes factors such as performance on formative and summative evaluations. The bottom line is we
all benefit when students are healthy and ready to learn. When put in perspective, physical activity may be one area of focus to improve health and learning outcomes, but we have to start somewhere.

Theoretical Rationale

The primary single factor within the school setting that has the most influence on the outcome expectations for the student and the school is the classroom teacher (Stronge, 2007). Teachers’ attitudes and perceptions of a proposed change will often make or break an adoption and successful implementation of that innovation (Fullan, 1991). To be successful, any attempts at making a school more physically active must have the support of the teachers – the gatekeepers for school change. Yet, involving and committing classroom teachers to innovative physical activity programs is a significant challenge.

When applied to school staff, social cognitive theory (Bandura, 1997) postulated that in order to adopt a change, there must be an expectation the change will lead to desired outcomes. Individuals must have a conviction that they can successfully execute the necessary behavior to produce the desired result. Social cognitive theory proposes that teachers might give up if they sense that their best efforts are having little or no effect, necessitating interventions that address the policies and practices of the organization. According to social cognitive theory, if teachers are provided with opportunities, skills, and incentives - if they believe that the particular innovation will lead to positive results for them and their students; and if they believe they are jointly capable of implementing the change process, then they will expend and sustain the effort necessary to attain their desired outcome. The introduction of this new curriculum into the educational environment, particularly because it is not grounded in pedagogical practices advocated by educational
reform, must take into account the human capacity for self-regulation and self-reflection that enable us to make choices. Social cognitive theory implies that teachers must believe that embedding physical activity throughout the school day is a worthwhile endeavor in order for it to become institutionalized.

Definition of Terms

An understanding of several terms specific to this study will be helpful to comprehending this research.

**Body Mass Index (BMI)**

BMI is an indicator of body size based on height and weight with good correlation to body fat. It is calculated as weight in kilograms divided by height in meters squared. For children (ages 2-20), a BMI below the 5th percentile for age and gender is underweight; between the 85th and 95th percentile is at risk for overweight; and at or above the 95th percentile is overweight (CDC, 2004).

**Childhood obesity/Childhood overweight**

This describes children with greater than a 95th percentile body mass index (BMI) for age and gender for youth over two years of age (CDC, 2004).

**Exercise**

Exercise is physical activity that is planned or structured and involves repetitive bodily movement done to improve or maintain one or more of the components of physical fitness – aerobic fitness, muscular strength, muscular endurance, flexibility, and body composition (CDC, 2004). Exercise is generally associated with activities performed in school physical education programs but could be included as a part of embedding physical activity throughout the school day. It is one type of physical activity.
Physical activity

Physical activity is any bodily movement produced by skeletal muscles that results in an expenditure of energy (CDC, 2004).

Physical activity breaks/Integrating physical activity throughout the curriculum

Physical activity breaks describe a variety of activities including stretches, jogs around the room, calisthenics and other movement whereas integrating physical activity in the classroom includes embedding physical activity in teaching methods to present content area lessons. Both constitute physical activity. Integrating physical activity throughout the curriculum encompasses the use of physical activity strategies to reach Standards of Learning (SOL) objectives. For the purpose of this study, no distinction will be made between physical activity breaks or integrating physical activity through the curriculum.

Physical fitness

Physical fitness is a set of attributes that persons have or achieve that relates to the ability to perform physical activity. Performance-related components of fitness include agility, balance, coordination, power, and speed. Health-related components of physical fitness include body composition, cardio respiratory function, flexibility, and muscular strength/endurance (CDC, 2004).

Regular physical activity

Regular physical activity is a pattern of physical activity if activities are performed most days of the week, preferably daily; five or more days of the week if moderate-intensity activities (in bouts of at least 10 minutes for a total of at least 30 minutes per day); or three or more days of the week if vigorous-intensity activities (for at least 20-60 minutes per session) (CDC, 2004). The difference between moderate-intensity physical activity and vigorous-
intensity physical activity relates to perceived exertion – moderate intensity physical activity produces some increase in breathing or heart rate whereas vigorous-intensity physical activity produces a large increase in breathing or heart rate to the point where conversation is difficult or "broken." For purposes of this study, physical activity means regular physical activity performed at mild to moderate intensities.

Limitations of the Study

Limitations are defined by Rudestam and Newton (2007) as "restrictions in the study over which you have no control" (p.105) and relate to internal validity. Internal validity refers to the credibility of the findings and results (Gall, Gall, & Borg, 2007). Several aspects of this study limit the generalizability of results. The study used data collected from a random cluster sample of teachers within school districts located in the State of Virginia. The study was based solely on an elementary school student population. Data collected were the result of self-reporting by teachers. Thus, these data were a reflection of individual teachers' perceptions. The data were impacted by the fact that not all teachers who were contacted chose to participate.

Another limitation was the lack of existing research specifically related to embedding physical activity through breaks and during lessons in the school day. Although much research exists on general physical activity and health aspects of physical activity, relatively little research has been undertaken on systematically embedding physical activity in the school setting. As a result, some conclusions advanced by this study relied on the similarities between school physical education programs and embedding physical activity throughout the curriculum.
Delimitations of the Study

Delimitations are purposefully imposed limitations on the research design in a study (Rudestam & Newton, 2007). They include factors within the researcher’s control that may affect external validity (Gall et al., 2007). The delimitations associated with this study included soliciting participants only from school districts in the State of Virginia. The sample for this study was restricted to kindergarten, first, second, third, fourth and fifth grade teachers. As a result of the focus on an exclusive state and selected grade levels, generalizations must be made with caution outside the state and grade levels included within the context of this study.

Major Assumptions

The following major assumptions were ongoing throughout the course of this study:

1. Teachers were able to access and complete the survey instrument.
2. Teachers responded honestly to the on-line survey instrument.
3. Teachers completing the on-line survey instrument were kindergarten, first, second, third, fourth or fifth grade regular education teachers.
4. Teachers completing the on-line survey instrument were representative of the teachers in the sample school districts.
5. This sample of classroom teachers provided an adequate representation for statistical purposes.
6. The on-line survey instrument used provided valid and reliable data for the intended purposes of the study.
CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

Physical activity is cited as the leading health indicator in *Healthy People 2010* (United States Department of Health and Human Services [USDHHS], 2000). There are statistical indicators that active children stay active, inactive children remain inactive, and that national inactivity levels currently increase from childhood through adolescence and into adulthood (Center for Disease Control [CDC], 1997; Pate, Baranowski & Dowda, 1996, Pate, Long & Heath, 1994; Raitakari, et al., 1994; USDHHS, 1996, 2000). The CDC (1997) reported that the percentage of young people who are overweight has more than doubled in the past 30 years, that 11% of children and adolescents aged 7-17 years are seriously overweight, and that obese children are more likely to become obese adults.

The question is, “should schools be concerned about decreases in student physical activity accompanied by increases in children’s obesity statistics?” According to the Digest of Educational Statistics (2007), virtually all children in the United States attend school; and schools have traditionally held a major role in health promotion for children. Consequently, schools are identified as primary and influential change agents in the drive to increase physical activity and instill long-term health benefits in children. It is important to address this issue in the early school years when students’ attitudes and beliefs about physical activity are likely to be formed.
Although school physical education programs are identified as an important mechanism in the effort to increase physical activity, there is little empirical information regarding the best approach toward accomplishing this goal. Physical education is a part of the total educational program that contributes, primarily through physical activity, to the total growth and development of all children. It has defined educational objectives that include promoting a physically active lifestyle, developing physical fitness, and developing social, emotional, and physical skills (McKenzie & Kahan, 2008). There are differences between physical activity and physical education. According to Dr. Graham J. Fishbourne, “Whereas it is very unlikely that you could have meaningful physical education without participation in physical activity, it is quite possible to participate in physical activity without any meaningful education” (Fishbourne & Hickson, 2005, p. 4).

It is difficult to conceive that an unhealthy student would be able to learn at her or his maximum level. The healthy mind/healthy body adage points out that learning academic skills is not enough. Physical health is a requisite for learning, and energy and vitality are necessary if quality learning experiences are to continue throughout the school day (Pangrazi, 2001). Evidence suggests that for physical activity interventions to be successful, they need to extend beyond the physical education class to include the whole school environment (McKenzie et al., 1995; McKenzie et al., 1996; Powers, Conway, McKenzie, Sallis, & Marshall, 2002; Sallis et al., 2001; Sallis & McKenzie, 1991; Strelow, et al., 2002).

Elementary physical education in the United States is most often a shared responsibility between a physical education specialist and the classroom teacher (Allison, 1990; McKenzie, Sallis, Kolody, & Faucette, 1997; McKenzie, Alcaraz, Sallis, & Faucette, 1998). Traditionally, classroom teachers’ attitudes and performance as physical educators have been
found to be lacking (Buschner, 1985; Faucette, McKenzie, & Patterson, 1990; Faucette, Nugent, Sallis, & McKenzie, 2002; Faulkner & Reeves, 2000). This creates a challenge for involving and committing classroom teachers in innovative physical activity programs.

If elementary physical education programs are most often the responsibility of a generally unenthusiastic classroom teacher (Allison, 1990; McKenzie et al., 1997; McKenzie et al., 1998), and we recognize that classroom teachers’ attitudes toward their roles as physical educators have been found to be negative, then we must create an avenue for teachers to become more comfortable with and supportive of including physical activity in their daily lessons. Adding to the difficulties, school administrators are reluctant to intervene since most school emphasis is on academic performance. These attitudes persist even though research indicates that increased activity levels may have favorable effects on a student’s academic achievement (Sallis et al., 1999).

One solution to this dilemma is to increase children’s activity levels through collaborative efforts such as whole school programs involving the classroom teachers. If this approach is to be successful, it is important to investigate ways that elementary classroom teachers can be actively involved in school level programs that will ultimately increase children’s physical activity levels, and that is the focus of this investigation.

History of Physical Activity in Elementary School

Philosophical Foundation

Physical activity at the elementary school level is not recent. Educators and philosophers as far back as the early Greeks advocated that physical activities be a part of the
education process. For instance, over 2300 years ago, Plato suggested that all early education should be a sort of play and develop around play situations (Humphrey, 1990).

In the 17th century, Locke, the English philosopher, believed that children should get plenty of exercise (Humphrey, 1990). Rousseau, the notable French writer, held much the same opinion, believing that learning should develop from the activities of childhood (Cheyne, 1989). These men and others influenced the path for elementary school physical education.

Throughout the ages physical education programs have been caught between preparation of the body for combat and recognition of the essential unity of the mind and body in the educative process. In addition, there have been periods of time when any type of physical education program was abandoned purely on the basis that body pleasure of any sort must be subjugated because it was associated with evil doing (Humphrey, 1990). The early American pioneers more or less typified this kind of puritanical thinking because there was no emphasis on physical education for the pioneer child as far as formal education was concerned. Although physical education received no attention in the early American schools, a series of factors over a period of a few years were instrumental in effecting a radical change. These included Western expansion, wars, application of inventions which revolutionized travel and communication, and the concentration of population, all having an influence on the growth of the early common schools (Humphrey, 1990). Although the early grade schools in the mid 19th century were concerned predominantly with the academic subject matter of reading, writing, and arithmetic, the need for physical activity as a part of the school day was becoming evident.
As a result, some time for physical exercise was allotted in the school programs of Boston as early as 1852. St. Louis and Cincinnati followed this procedure in 1855 and 1859 respectively. Interest at the state level began to appear, and a state law requiring physical education was passed in California in 1866. The fact that the public was becoming conscious of the physical activity needs of children was indicated by the establishment of the first playground in Boston in 1885 (Humphrey, 1990).

Need for Physical Activity Identified

In 1889 in Boston an interesting development occurred at a conference dealing with physical training. School administrators were beginning to feel the pressure and need for some kind of formal physical activity as a genuine part of the school program. Acting in a conservative manner at this conference, some school administrators proposed that a physical training program might be introduced as a part of the school day, but that it must consume only a short period of time, minimal expenditure of money, and take place in the classroom. The Swedish pedagogical system of gymnastics, which was designed to systematically exercise the entire body in a single lesson, was proposed since this system satisfactorily met the criteria established by the school administrators. On June 24, 1890, the Boston School Committee voted that this system of gymnastics be introduced in all of the public schools of Boston (Humphrey, 1990). Although this proposal was a far cry from a well-balanced elementary physical education program as we understand it today, it nevertheless served as a formal introduction of organized physical activity into the elementary school on the recommendation of school administrators. It should be mentioned, however, that the main objective of physical activity in the eyes of school administrators of that day was that it
should serve as a release for prolonged periods of mental fatigue. It was believed the main purpose of engaging in physical activity was to provide children with a break in the school day so that they would approach their studies with more vigor.

Evolving Perspective of Mind/Body Relationship

This condition existed until such time that there was more widespread acceptance of the theory of mind-body relationship and the education of the whole person. John Dewey, one of the early believers in this principle, introduced the concept of a balanced physical education program while at the University of Chicago Laboratory School in the last century. Rather than only the more or less formalized gymnastics program, this school began to include games and dancing as a part of the physical education experiences for children. Some years later Dewey commented that, “Experience has shown that when children have a chance at physical activities which bring their natural impulses into play, going to school is a joy, management is less of a burden, and learning is easier” (Dewey, 1919, p. 228).

However, up until World War I, physical education programs for elementary school children, where they did exist, consisted mainly of the formalized gymnastics and/or exercise types of programs. The period between the two world wars saw more attempts at balancing physical education programs at the elementary school level with more emphasis being placed upon games and rhythmic activities. The period from 1950 to 1975 saw a continuation of the foundation that had been laid in the preceding years. Numerous national conferences, the appointment of an Elementary School Consultant by the American Alliance for Health, Physical Education, and Recreation, and upgrading of teacher preparation in the area of elementary school physical education were important factors. Since that time the status of
physical activity in the schools has lost ground to make way for academically based initiatives such as NCLB (2002).

Role of Physical Education in Physical Activity

The difficulty with traditional physical activity based interventions is that physical education classes in schools are limited in frequency, length, participation, and qualified staffing. These limitations do not allow for the recommended national standards of physical activity to be met (McKenzie, 1999; McKenzie et al., 1995; McKenzie, Marshall, Sallis, & Conway, 2000; McKenzie & Kahan, 2008). A suggested expansion of physical education’s role in physical activity, rather than in primarily achieving fitness, received wide recognition in the field in 1991. This was a result of the Research Quarterly of Exercise and Sport [RQES] devoting a special forum issue to the matter (Physical Education’s Role in Physical Activity, 1991). This forum issue was in part a response to the earlier publication in RQES of a review by Simons-Morton, O’Hara, Simons-Morton and Parcel (1987) that indicated that regular physical activity, rather than physical fitness, was a more important and beneficial health goal for children. The five related manuscripts in the 1991 issue presented professional physical education providers and researchers with the issues and challenges concerning physical education’s role in physical activity. The consensus of these articles was that the then current approach to physical education needed to be changed or expanded.

Much of the early research on physical education’s role in increasing activity levels focused on physical education classes and the amounts of ongoing activity observed (McKenzie, Sallis, Faucette, Roby, & Kolody, 1993; Simons-Morton, O’Hara, Parcel, & Baranowski, 1990).
These studies were not specifically related to national health objectives, but they documented that children were not very active in their physical education classes. More recent evidence suggested that for physical activity interventions to be successful they need to extend beyond the physical education class to include the whole school environment and supervision (McKenzie et al., 1995, 1996; Powers et al., 2002; Sallis et al., 2001; Sallis & McKenzie, 1991; Strelow, et al., 2002). In conjunction, the association of perceived parent and peer support in modifying children's physical activity levels has been shown to be a significant correlate (Prochaska, Rodgers, & Sallis, 2002). It should be noted that physical education classes still play a vital role in physical activity levels. Studies indicated that children reporting no physical education class during school also reported lower activity overall (Dale, Corbin, & Dale, 2000; Myers, Strikmiller, Webber, & Berenson, 1996).

Elementary schools did not assume their role as physical activity providers well. Daily quality physical activity in schools is a mantra of health professionals and physical educators who seek a fit and healthy child. Unfortunately though, only one state even nominally required daily physical education in elementary schools, and the historical trend over the years was for states and school districts to continue to reduce the amount of time students were exposed to any physical education. Forty-five states recommended specialists but allowed physical education to be taught by non-specialists at the elementary level (Morrow & Jackson, 1999; National Association for Sport and Physical Education [NASPE], 2000). Physical education classes alone cannot provide children with the amounts of physical activity recommended by national standards. However, the concept of using children's
accumulated physical activity levels as a critical focus of physical education has wide national support both governmentally and professionally.

According to the CDC (2004), nearly one-third of elementary schools nationwide no longer offer recess, and, between 1991 and 2003, the number of high school students taking physical education declined from 41 percent to 28 percent. Yet the NASPE recommended that children get a minimum of sixty minutes per day of combined moderate and vigorous physical activity (NASPE, 2000).

**Childhood Obesity**

*Etiology*

The causes of the childhood obesity epidemic and of weight problems are medical, environmental, and difficult to treat. When genetics and an unhealthy lifestyle merge, weight gain begins. When the balance between incoming energy and outgoing energy gets out of phase, weight gain begins. When eating choices become less healthy and portions increase, children lose some of their steady state mode. If, at the same time, they are not leading an active lifestyle, including structured physical activity, they stop burning off excess fat and go into a fat storage, weight gain mode. With the body's tremendous capacity to store body fat, the problem can become a lifelong journey of gaining weight.

The difference between an overweight and an obese student is a matter of degree. Obesity is a progression from normal to overweight. Overweight and obesity can be a continuum – weight usually increases over time, punctuated by intermittent period of weight stability, weight gain, and even transient weight loss. During childhood, weight loss is not always the goal. For younger children, prevention of unhealthy weight gain may be enough.
By preventing or correcting abnormal overweight in school-age children, we can slow down the obesity problem that is spreading.

**Prevalence of Childhood Obesity**

According to the American Academy of Pediatrics, over 15 percent of children in the U.S. are overweight or obese, and 80 percent of obese youth become obese adults (Council on Sports Medicine and Fitness & Council on School Health, 2006). Brownell and Horgen (2004) warned us that American children may be the first generation in modern history to live shorter lives than their parents. Those authors estimated that 16% to 40% of elementary school children were joining the ranks of being overweight or seriously overweight.

According to William Dietz, M.D. et al. (2002), of the CDC, childhood and adolescent overweight and obesity are public health concerns of such magnitude that unhealthy weight is rapidly becoming the most prevalent nutrition problem of this age group in America and worldwide. Dr. Dietz testified before the Committee on Health, Education, Labor, and Pension Sub-committee on Public Health, U.S. Senate, that 60% of overweight children have at least one additional cardiovascular disease risk factor, and 25% have two or more heart-related risk factors (Dietz, Bland, Gortmaker, Molloy & Schmid, 2002). To put it simply, the more weight gained the more danger of developing medical complications.

As shown in Figure 1, there is an increasing trend in prevalence of overweight among children and adolescents ages 6-19 years.
According to the CDC (2004), there are more medications prescribed, more physician visits required, and more frequent hospitalizations needed due to poor exercise habits in children. Lack of physical activity was related to direct medical costs totaling $76 billion in the year 2000.

Coordination among Systems

The USDHHS recommended that all children over two years old get 60 minutes of moderate to vigorous exercise on most days of the week (Council on Physical Education for Children, 2001; Strong et al., 2005). In addition, the NASPE cautioned schools against
allowing children to be inactive for longer than two hours at a time (Council on Physical Education for Children, 2001). Part of the reason is that the percentage of school-age children who are obese has doubled in the past 30 years (Ogden, Flegal, Carroll, & Johnson, 2002).

As far back as 1987, Allensworth and Kolbe stated that “schools could do more perhaps than any other single agency in society to help young people, and the adults they will become, to live healthier, longer, more satisfying, and more productive lives” (p. 410). They suggested that the integrated efforts of schools, families, health professionals, and community agencies would have effects in protecting and improving health and promoting the well-being of children and youth. The purpose of their proposed expanded concept was to encourage everyone concerned with the health and well-being of the national’s children and youth to work together as a team to achieve this common goal (Allensworth & Kolbe, 1987).

Further work of Kolbe and the CDC and Prevention Division of Adolescent and School Health (CDC/DASH) identified and tracked the six priority risk behaviors that lead to almost two thirds of premature death and disability of our nation’s youth. They are inadequate nutrition, insufficient physical activity, sexual behaviors that result in pregnancy, sexually transmitted disease/human immune deficiency (STD/HIV) infection, intentional and unintentional injuries, tobacco use, and drug and alcohol abuse (Kolbe, 1990). These six behaviors are usually “established during youth; persist into adulthood; are interrelated; contribute simultaneously to poor health outcomes, poor education outcomes, and poor social outcomes; and are preventable” (Kolbe, Collins, & Cortese, 1997, p. 257).

About 61.5% of children do not participate in any organized physical activity during nonschool hours, and 22.6% do not engage in any free-time physical activity (Prevention of
Pediatric Overweight and Obesity Policy Statement, 2003). The policy statement from the American Academy of Pediatrics, “Prevention of Pediatric Overweight and Obesity,” reviewed national survey data and indicated that 20% of U.S. children reported two or fewer vigorous physical activity sessions per week, and more than 25% watched at least four hours of television per day. The heavier children watched more TV than average-weight children by 50% (Prevention of Pediatric Overweight and Obesity Policy Statement, 2003).

Physical inactivity is a strong contributor to overweight. Sedentary activities such as excessive television viewing, computer use, video games, and telephone conversations need to be discouraged. Reducing sedentary behavior is important to increase physical activity and to improve health.

Methods for Including Physical Activity in Elementary School Curricula

Interdisciplinary Teaching

The school day provides a fixed place and frequent contact where a focus on physical activity change can have a large positive effect. Education leads to understanding and sets the groundwork for change, and positive lifestyle changes promote better health. A healthier child has a better opportunity to learn. As Bandura (1997) surmised:

Like other professionals, educators devote a major share of their efforts to the activities on which they are evaluated. As long as health promotion is regarded as tangential to the central mission of schools, it will continue to be slighted. However, schools can adopt some health promoting practices with beneficial results that do not require time, new resources, or the restructuring of social relationships. (p. 305)
Teachers can have significant influences on the healthy behaviors and lifetime choices of their students when physical activity is integrated into the total learning experience (Weinstein & Rosen, 2000). An assortment of classroom learning experiences can be incorporated into academics that involve movement as part of the learning process.

Interdisciplinary teaching is commonly defined as a small group of teachers from two or more academic disciplines who communicate the responsibility for planning, teaching, and assessing students (Placek & O’Sullivan, 1997). A focus on interdisciplinary teaching as a component of school reform offers an excellent forum for providing students with opportunities to engage in more physical activity in the school day. The trend tended to be rather one-sided or uni-directional; that is, integration usually meant that physical educators included academic concepts in their classes or based their lessons on academic themes (Placek & O’Sullivan, 1997).

For teachers, interdisciplinary teaching in itself may be a novel and intimidating experience (Welsh, 1998). A major past obstacle to interdisciplinary teaching was the fact that teacher education programs traditionally prepared pre-service teachers in isolation from one another (Winitsky, Sheridan, Crow, Welch, & Kennedy, 1995). Elementary school teachers need adequate training to instruct in an interdisciplinary mode. With a focus on movement, teachers require an understanding of physical education and the impact that it has on young children. When teachers have opportunities to collaborate with other professionals in their schools, supporters of integration can share workable ideas for incorporating movement into lessons. Across a curriculum there are a variety of ways to include interdisciplinary teaching ideas (Cone, Werner, Cone, & Woods, 1998; Placek & O’Sullivan,
By connecting with other professionals in the school, teachers can also discover fun and innovative movement ideas that may potentially be effective in the classroom, and there are several examples in the literature to follow that demonstrate successful integration of movement and academics.

*Integrating Movement and Academics*

Well-designed physical education classes, where teachers used innovative strategies to integrate journal writing or lessons with a variety of games and activities have been used to increase students' overall activity levels without sacrificing the skill development that was a traditional focus of physical education (Strand & Reeder, 1996). Some physical education teachers used movement to link physical education to other disciplines by having students devise movements that illustrated words or concepts (e.g. walk to show clouds moving, pose to show ice freezing, or run to show lightning flashing) (Riley & Cardillo, 1998). While activities of this type add a creative dimension to physical activity, there are few examples of the reverse: classroom teachers integrating physical movement into the academic curriculum. Yet it is not difficult to envision how this can be done. Movements that suggest water flowing or freezing or rain falling can be done in the classroom as part of the science lesson as well as in the gymnasium. Children performing animal movements in the classroom as part of a thematic unit on rain forests as they study animals increases the opportunity to be active during the school day.

Buchoff (1995) advocated the use of jump rope rhymes and street chants to help older elementary school students shed negative perceptions they may have about poetry. He conceptualized these popular forms of verse as "part of an oral tradition that links
communication and play” (p. 149). While jump ropes may be highly impractical in the classroom, the author noted children seem naturally motivated to move when reciting the rhythmic chants. The chants stimulated both physical and mental involvement. As an adjunct, Buchoff suggested that including these rhymes in the classroom may motivate students to engage in rope jumping as a recreational physical activity.

Many educators turned to pedometers to monitor children’s daily physical activity. Beighle, Pangrazi, and Vincent (2001) proposed that pedometers be used in classrooms to promote activity during lessons. The use of pedometers enhanced Christie’s (2000) assertion that physical movement offers an excellent vehicle for teaching mathematical and scientific concepts. Pedometers have a dual advantage in that they provide an accurate assessment of children’s activity as well as being adaptable to academic exercises such as calculating energy expenditure, daily walking mileage, or the number of steps taken in various sports and activities.

The Association of Childhood Education International [ACEI] (2007) suggested that pre-service teachers have adequate training experiences to better understand how positive healthy behaviors affect the quality of life. They argued that pre-service teachers should learn how to present the best learning experiences that will maintain children’s intellectual, emotional, social, physical, and artistic growth. The National Council for Accreditation of Teacher Education [NCATE] (2007) suggested that future teachers comprehend and utilize physical activity as a basis for encouraging active, healthy lifestyles and improved quality of life for elementary students. According to the NCATE standards, future teachers should
comprehend and use the connections of concepts, methods, and applications from content areas to inspire elementary students across curriculums in real life situations.

There are several examples in the literature of interdisciplinary programs demonstrating that when teachers have adequate support, this approach can enhance children's educational experiences. On that note, classroom teachers can be prepared better to teach physical education. Selected examples follow:

**Project SPARK.** Project Sports, Play, and Active Recreation for Kids [SPARK] (Sallis et al., 1997) was developed as a comprehensive physical education program for upper elementary school students. Elementary school teachers who were trained were able to improve the quality of physical activity in the classroom. Compared to control teachers, the SPARK-trained elementary teachers taught more physical education and provided students with more opportunities for physical activity. A shortcoming of SPARK, however, was that, in some programs, teachers were too reliant on the physical education specialists for the provision of quality physical instruction (McKenzie et al., 1997). For example when classroom teachers had full responsibility for teaching physical education in their schools, they offered their students just 55% of the number of lessons and only 47% of the minutes of physical education than what the specialists had offered. In contrast, a positive note is that the classroom teachers who had received specialized training maintained comparable levels of quality fitness instruction even after the physical education specialists left the site.

**Multiple Intelligence Theory and Physical Activity.** Howard Gardner's (1983) vision of multiple intelligences (MI) provided an explanation of how people learn based on the premise that individuals exhibit different types of intelligence in unique and individual
variations. Included among those intelligences is bodily-kinesthetic intelligence. Children whose learning modality is primarily kinesthetic possess an intuitive understanding of how to use their physical body and an inner need to explore the world by interacting with space. The kinesthetic learner processes information primarily through touching and movement. This is aligned with the notion that physical activity is related to learning. Many teachers instinctively respond to the idea that students learn and excel in a variety of ways and offer an array of learning opportunities. Gardner provided cautions against defining students exclusively by one or more of his categories.

Proponents of MI theory were in the forefront of curriculum integration. It was broadly used in preschool and elementary school settings where teachers were responsible for teaching all disciplines (Vialle, 1997). Australian educators used two basic approaches, conceptualized as teaching to and teaching through. For example, in one session students learned to play a musical instrument to develop their musical intelligence. In another session, a musical jingle was used to remember a mathematical formula. Teaching to the intelligence was designed to develop that specific intelligence. Teaching through the intelligence was used to develop students’ skills in specific disciplines by presenting new topics or providing activities through several intelligences. This approach engaged children with various needs, abilities, interests, and learning styles by offering more opportunities to be physically active as well as using the body creatively in a kinesthetic sense. The extensive use of MI theory in preschool and primary grades was not surprising. Educators of young children have traditionally incorporated music and movement into everyday lessons.
Marxen’s (1995) use of movement to teach children basic physics required creativity and strategic planning, but it did not drastically depart from the concrete methods needed to explain abstract concepts to children. The integration of movement into the curriculum is more complex for older learners; however, examples from classrooms and schools that have done so successfully demonstrate that it is not an impossible barrier. When using an active approach to teaching physics to young children, Marxen described the teacher’s role as multi-faceted, where the teacher planned and created age-appropriate physics topics and decided on integration activities. In schools that are based on MI models or other models in which physical activity is embedded in the academic curriculum, teachers routinely collaborate to develop and implement interdisciplinary strategies.

In many schools, even those who favor curriculum integration, classroom teachers may be unsure of how to integrate physical activity into the lesson plan. In fact, Gardner (1995) cautioned against the assumption that all topics can be effectively taught using all intelligences. Kinesthetic intelligence, in particular, can be misused if teachers assume that any physical movement is a constructive use of the body. As Gardner stated, “random muscular movements have nothing to do with the cultivation of the mind...or even of the body!” (p. 206). Ongoing collaboration can assist teachers in devising constructive activities that use movement as part of a multi-faceted approach. Schools that adopted Gardner’s theory of MI incorporated lessons addressing bodily or kinesthetic intelligence as an integral part of the academic classroom. For example, an innovative primary grade teacher synthesized musical and kinesthetic intelligence in the form of a ballet illustrating the life cycle of a frog (Hoerr, 1997). Both within and apart from the concept of MI, teachers have
used movement to teach young children basic physics concepts. In the most effective experiments, children created the movement themselves - engaging in activities such as throwing, rolling, pushing, balancing, or swinging objects, including their own weight (Marxen, 1995).

*TAKE 10!* In recognition of the fact that children do not typically get enough exercise during the school day, some schools implemented creative physical activity interventions in the classroom specifically designed to increase the amount of time allotted to physical activity, as well as to promote healthy and active lifestyles. One such program is *TAKE 10!* designed for children in grades K-5 that integrated physical activity and nutrition into the curriculum along with phonics, reading, creative writing, and mathematics (Peregrin, 2001). Teachers have extensive training through an instructional video, activity cards, worksheets, and curriculum objectives provided by International Life Sciences Institute (ILSI), an Atlanta-based non-profit foundation that focuses on health-related education. “Achieving the 60 minutes of recommended exercise a day can be successfully accumulated over time, with several shorter activities, which can be just as beneficial as one long, continuous activity” (p. 1409). *TAKE 10!* is recommended to be implemented at least once daily. Teachers can devise their own versions of *TAKE 10!* tailored to meet individual needs. Even though data assessing the program’s effectiveness were not drawn from the study, teachers reported highly favorable attitudes toward the program, noting that “the students love to get out of their chairs” (p. 1409), an observation that underscores the need to provide children with more movement opportunities during the school day.
**Topic Teamwork.** Educators seemed to be most perplexed about how to integrate mathematics across the curriculum (Mason, 1996). Ironically, Christie (2000) countered that math is “arguably the most readily adaptable subject area for *Topic Teamwork*” (p. 30). *Topic Teamwork* refers to a school-wide collaborative model focused on integrating physical education into other disciplines. All sports involve some form of mathematical calculations such as scoring, batting averages, speed, or acceleration. Another example is the “Human Calculator,” in which students answer fitness-related questions by jumping onto a square on a grid on the floor designed to resemble a calculator. Students are also taught to monitor their heart rates as part of the math lesson; movement can be incorporated into the class so that students can monitor their heart rates before, during, and after activity. Like Marxen (1995), Christie recommended using movement to teach physics, proposing more sophisticated techniques that appealed to older children. *Topic Teamwork* differed from most integration programs involving physical education in that physical education was a focal point of collaboration. No academic discipline was excluded from the collaborative process. Christie cited games in which movement was used as a medium to promote language skills such as Alphabet Freeze Tag, Body Spell, and Jump Rope Spelling. Innovative educators have created these games and numerous possibilities exist for devising activity-oriented lessons. In actual practice, *Topic Teamwork* is a framework in which subject areas are rotated as the basis for curricular emphasis. For example, physical education may be the central topic for two weeks, followed by language arts, mathematics, or social studies.

**Standards of Learning Activities.** A professor at the Department of Health, Recreation and Kinesiology at Longwood University in Virginia developed materials along with her
students to incorporate movement into the Virginia math, English, and science SOLs in grades K-5 (Colvin, 2005). The purpose of these activities was to reinforce the content and to provide creative ways to teach it.

There are a variety of published physical activity program available to teachers, and Table 1 summarizes some of them.

Table 1

<table>
<thead>
<tr>
<th>Published Physical Activity Programs Available to Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program</strong></td>
</tr>
<tr>
<td>Brain Breaks</td>
</tr>
<tr>
<td>Coordinated Approach To Child Health</td>
</tr>
<tr>
<td>Energizers</td>
</tr>
<tr>
<td>Longwood University</td>
</tr>
<tr>
<td>Minds in Motion</td>
</tr>
<tr>
<td>Sport, Play and Active Recreation for Kids</td>
</tr>
<tr>
<td>Take 10!</td>
</tr>
<tr>
<td>Topic Teamwork</td>
</tr>
</tbody>
</table>
Findings and Methodological Issues Related to Embedding Physical Activity

Attempts have been made to create and teach lessons that are integrated or interdisciplinary in nature, where movement and manipulative activities are infused with other subject areas such as science and math. This is challenging because neither physical educators nor classroom-based teachers are typically trained in content and pedagogical knowledge to teach outside their specific areas. Web resources, practical books (e.g., Cone et al., 1998), and a few programs such as TAKE 10! (Stewart, Dennison, Kohl, & Doyle, 2004) are available, but there are few objective data on either the prevalence of integrated physical education or its efficacy in promoting physical activity. In contrast, results of the Promoting Lifestyle Activity for Youth [PLAY] program showed that directly targeting physical activity by having structured breaks during the school day significantly increased the amount of physical activity children received at school (Pangrazi, Beighle, Vehige, & Vac, 2003).

Despite a growing body of evidence documenting the positive lifelong impact of physical activity on physical and mental health (CDC, 1997; NASPE, 2002; USDHHS, 1996), a number of sources confirmed that the majority of U.S. children are not engaging in appropriate amounts of activity in physical education or other settings (Bar-Or, 2000; Dale, et al., 2000; Lowry, Wechsler, Kann, & Collins, 2001; McKenzie, 1999; Strauss & Young, 2001). Ironically, surveys of school children and their responses to physical activity programs clearly indicated that children enjoy being active (Haskell, 1996).

The federal government unveiled their first-ever physical activity guidelines for children. This was similar to a food guide pyramid for exercise that outlined a comprehensive set of recommendations about the types and amounts of physical activity that offered
substantial health benefits. The "2008 Physical Activity Guidelines for Americans" (www.health.gov/PAGuidelines) said children should have one hour or more of moderate or vigorous aerobic physical activity a day like biking or running and sports such as soccer or basketball, including vigorous intensity physical movement such as hiking or skateboarding at least three days a week. Incorporating muscle strengthening activities, such as rope climbing, sit-ups, and tug-of war, three days a week was also suggested, as were bone-strengthening pursuits, such as jumping rope, running, and skipping. These activities improve cardio respiratory and muscular fitness in children and teens, as well as bone health, and contribute to favorable body composition said the guidelines by the USDHHS.

A review of the literature indicated that teachers do encourage children to be physically active and that most children enjoy participating. As Haskell (1996) pointed out, it is ironic that at a time when advances in technology continue to create an environment that requires less and less physical activity to accomplish everyday tasks, more and more scientific evidence accumulates demonstrating the critical role that habitual physical activity plays in maintaining health, performance capacity, and overall quality of life. (p. S37) A study of third-grade children in four states found that, on average, the children engaged in 89.9 minutes daily of moderate-to-vigorous physical activity (MVPA), a finding consistent with national guidelines and prior studies of children of similar age (Simons-Morton et al., 1987). MVPA is competitive (e.g. soccer) or non-competitive (e.g. cycling to school) activity lasting 10 minutes or longer. While this finding may seem promising, it must be noted that the distribution of participation was quite inconsistent, with 20% of the children engaging in 120 minutes of MVPA or more, 36.5% reporting 60 minutes or less, 12.8% reporting 30
minutes or less, and 5.3% involved in no MVPA. In effect, "a substantial proportion of the population obtained less than recommended levels of activity" (p. 48). Furthermore, most of the physical activity in which children engaged took place outside of school.

In a study conducted by the California Department of Education, Delaine Eastin, State Superintendent of Public Instruction, reported a positive relationship between academic achievement and physical fitness of California public school students. Results were based on matching mathematics and reading scores from the spring 2001 state achievement test with a mandated physical fitness test of 600,000 students in Grades 5, 7 and 9. Higher levels of achievement were associated with higher levels of fitness at each of the three grade levels (California Department of Education, 2002). Dr. Eastin indicated there is proof available that children learn more when physically fit. Teachers overwhelmingly appreciated the relationship between being physical active and having a better ability to learn (Robert Wood Johnson Foundation, 2003). It has been widely accepted that relationships exist between good physical fitness and positive self-esteem and lower negative effects of unchecked stress.

Studies have been conducted to test the potentially beneficial effects of physical activity on cognition. Two of them demonstrated that providing more time for physical activity by reducing class time can lead to increased test scores, particularly in the area of mathematics (Shephard, 1997; Shephard et al., 1984). In one of these studies, students placed in an experimental group engaged in 24 minutes of additional physical activity per week and had a corresponding decrease in class time for academics. Mathematics test scores in this group were consistently higher than for students in a control group, who saw no change in time allocation (Shephard et al., 1984).
Another study linked physical activity programs to stronger academic achievement, increased concentration, and improved math, reading, and writing test scores (Symons, Cinelli, James, & Groff, 1997). Physical education and physical activity may strengthen academic achievement, self-esteem, and mental health, all leading to stronger student performance (Cooper & Taras, 2003; Keays & Allison, 1995; Sallis et al., 1999; Shephard, 1996).

Over ten years ago results of meta-analytic reviews of this literature suggested that there was a positive association between participation in physical activity and cognitive performance. The 1997 meta-analysis carried out by Etnier and a number of colleagues found five studies out of a total 134 looking at the importance of exercise that focused on normal adolescents and cognitive abilities (Etnier et al., 1997). The other studies targeted different populations. The results of these studies suggested that cognitive abilities were benefited by physical activity for adolescents. Physical activity could be making a difference in a number of ways. In puberty, physical activity may be stabilizing children from having big hormonal level swings, which would allow them to concentrate better. Also, activity helps with tension; if a student is having behavioral problems, exercise could bring about a fatigue preventing them from having as many outbursts. As soon as they do that, they start learning more, because they can pay attention (Etnier et al., 1997). Etnier et al. added that another, subtler mental facet is affected a great deal by exercise - self-confidence. When students exercise and attain these accomplishments in the physical activity realm, they feel better and more confident, and that transfers to the classroom. They may be more participatory in class. If
they feel better about themselves, they may perform better. The science behind this still needs to be clarified.

Etnier et al.'s 1997 meta-analysis confirmed a correlation between physical activity and cognition. She and Sibley (Sibley & Etnier, 2003) conducted another meta-analysis in 2003 again supporting a positive association with physical activity and cognition. Then in 2006, she and colleagues published yet another meta-analysis that found minimal support for aerobic fitness as a mediator of the effect of physical activity on cognition (Etnier, Nowell, Landers, & Sibley, 2006). The authors purported that there are too many other variables that could cause changes in cognition.

Few controlled intervention studies with adequate statistical power tested whether exercise affects children’s cognition to establish causation. This is what led Catherine Davis and her colleagues to conduct a randomized controlled trial supported by the National Institute of Health to determine if physical activity improved academic achievement (Davis, Tkacz, & Tomporowski, 2007). No effect was found on reading, but significance was found for math achievement and executive function. Executive function is the ability to plan, initiate, and carry out activity sequences that make up goal-directed behavior, self monitoring, and self control (Welsh, Friedman, & Spieker, 2006). Results showed that physical activity may be an effective method of enhancing aspects of children’s mental functioning that is central to cognitive and social development (Davis et al., 2007).

Children’s cognitive functioning may be particularly sensitive to the influence of physical activity, given the evidence for a relation between children’s early experiences, brain development, and cognitive function (Carlson, 2005; Nelson, 1999). Because children
are developing central nervous system structures, there is reason to expect that the cognitive benefits of exercise may be significant.

Stone et al. (1998) conducted a review of school-based health intervention programs targeting physical activity from 1980 to 1997. They identified two physical education based intervention programs using classroom teachers and specialists cooperatively in which the benefits were well documented. Both interventions appeared to be examined using rigorous methods of measurement and design and were related to national activity goals. The Child and Adolescent Trial for Cardiovascular Health (CATCH) was evaluated by Luepker et al., 1996; McKenzie, 1999; & McKenzie et al., 1997. Assessments of the Sports, Play, and Active Recreation for Kids Curriculum (SPARK) were completed as well (Faucette et al., 2002; McKenzie et al., 1997; Sallis et al., 1997; & Sallis et al., 1999) These studies indicated both short and long term benefits of the school-based interventions along a broad spectrum of health and academic outcomes.

Position statements by health and physical education organizations supported the involvement of teachers and significant others in promoting physical activity among children (CDC, 1997; American College of Sports Medicine, 1999; USDHHS, 2000). Schools across the country began implementing programs to address childhood obesity and lack of physical activity available to students in the school setting. The National Association of State Boards of Education acknowledged the benefits of recess, physical activity, and physical education (Bogden & Vegas-Matos, 2000). They stated, “Health and success in school are interrelated. Schools cannot achieve their primary mission of education if students and staff are not healthy and fit physically, mentally, and socially” (p. A-2).
The Robert Wood Johnson Foundation (2003) found that 90% of teachers and 86% of parents are convinced that physically active children are better able to learn. Parents also believe that more focus is needed on fitness, and attitudes and expectations about physical activity in schools need to be revisited.

A systematic literature review spearheaded by William B. Strong, M.D. et al. (2005) identified 850 articles to review the effects of physical activity on health and behavior outcomes and to develop evidence-based recommendations for physical activity in youth. Researchers overwhelmingly agreed that school-age youth should participate daily in 60 minutes or more of moderate to vigorous physical activity that is developmentally appropriate, enjoyable, and involves a variety of activities. They supported a positive association between academic performance and physical activity. Furthermore, results showed that physical activity had a positive influence on concentration, memory, and classroom behavior (Strong et al., 2005).

Charles Hillman was the lead researcher in a study that investigated the relationship between age, aerobic fitness, and cognitive function by comparing high and low fit preadolescent children and adults (Hillman, Castelli, & Buck, 2005). Findings suggested that fitness was positively associated with neuroelectric indices of attention and working memory and response speed in children. Fitness was also associated with cognitive processing speed. This study attempted to examine underlying brain function associated with cognition in high and low fit children by measuring the neuroelectric system. It provided information regarding how neural resources were allocated and displayed topographical and temporal aspects of
neural processing of the stimulus. This was the first known test of the relationship between fitness and neuroelectric indices of cognition (Hillman et al., 2005).

The 2007 study led by Darla Castelli was part of a recent and growing movement in science showing that physical activity may be related to academic performance (Castelli, Hillman, Buck, & Erwin, 2007). With her colleagues in Illinois, she measured the body mass index (BMI) of 259 3rd and 5th graders and put them through classic physical education routines such as sit and reach, brisk running, and timed pushups and sit ups. Then she checked their physical abilities against their math and reading scores on a statewide standardized test. Results showed that students with the fittest bodies were the ones with the fittest minds, even when factors such as socioeconomic status were taken into consideration (Castelli et al., 2007).

Buck, Hillman and Castelli (2008) also investigated the relation between aerobic fitness and interference control, one component of executive function, in 74 children between 7 and 12 years of age. Participants completed a paper-and-pencil version of the Stroop color-word task and the FITNESSGRAM®, a valid and reliable test measuring different components of physical fitness (i.e., aerobic, muscle, and body composition). Data were collected on IQ and personal and health demographics to account for other factors influencing the relationship between fitness and executive function. Their findings suggested that increased levels of fitness may be beneficial to cognition during preadolescent development.

Table 2 provides a summary of research that supports positive associations between physical activity and cognition.
Table 2

Research Supporting Positive Association between Physical Activity and Cognition

<table>
<thead>
<tr>
<th>Researcher(s)</th>
<th>Year</th>
<th>Major Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buck et al.</td>
<td>2008</td>
<td>Increased levels of fitness beneficial to cognition during preadolescent development</td>
</tr>
<tr>
<td>Castelli et al.</td>
<td>2007</td>
<td>Fittest bodies associated with fittest minds</td>
</tr>
<tr>
<td>Cooper &amp; Taras</td>
<td>2003</td>
<td>Physical activity associated with strengthened academic achievement, self-esteem and mental health</td>
</tr>
<tr>
<td>Davis et al.</td>
<td>2007</td>
<td>Overweight associated with inactivity and poor academic achievement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increased physical activity has effect on math achievement and executive function</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Physical activity enhances mental functioning central to cognitive and social development</td>
</tr>
<tr>
<td>Etnier et al.</td>
<td>1997</td>
<td>Physical activity stabilizes hormonal swings allowing for better concentration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Physical activity improves concentration</td>
</tr>
<tr>
<td>Etnier et al.</td>
<td>2006</td>
<td>Minimal support for aerobic fitness as mediator of effect of physical activity on cognition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cognitive abilities in adolescents benefit from physical activity</td>
</tr>
<tr>
<td>Hillman et al.</td>
<td>2005</td>
<td>Fitness positively associated with attention, working memory, and response speed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fitness positively associated with cognitive processing speed</td>
</tr>
<tr>
<td>Keays &amp; Allison</td>
<td>1995</td>
<td>Physical activity associated with strengthened academic achievement, self-esteem and mental health</td>
</tr>
<tr>
<td>Sallis et al.</td>
<td>1999</td>
<td>Increased activity levels have favorable effect on academic achievement</td>
</tr>
<tr>
<td>Shephard</td>
<td>1996</td>
<td>Physical activity associated with strengthened academic achievement, self-esteem and mental health</td>
</tr>
<tr>
<td>Shephard</td>
<td>1997</td>
<td>Increase in physical activity can lead to increase in math test scores</td>
</tr>
<tr>
<td>Shephard et al.</td>
<td>1984</td>
<td>Increase in physical activity leads to increase in academic achievement</td>
</tr>
<tr>
<td>Sibley &amp; Etnier</td>
<td>2003</td>
<td>Meta analysis confirmed correlation between physical activity and cognition</td>
</tr>
<tr>
<td>Strong et al.</td>
<td>2005</td>
<td>Physical activity has positive influence on concentration, memory and classroom behavior</td>
</tr>
<tr>
<td>Symons et al.</td>
<td>1997</td>
<td>Physical activity linked to increased concentration and improved math, reading and writing test scores</td>
</tr>
</tbody>
</table>
Table 3 provides a list of some of the organizations/agencies that support increasing physical activity in schools.

<table>
<thead>
<tr>
<th>Organization/Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action for Healthy Kids</td>
</tr>
<tr>
<td>American College of Sports Medicine</td>
</tr>
<tr>
<td>California Department of Education</td>
</tr>
<tr>
<td>Center for Disease Control</td>
</tr>
<tr>
<td>National Association for Sport &amp; Physical Education</td>
</tr>
<tr>
<td>National Association of State Boards of Education</td>
</tr>
<tr>
<td>National Institutes of Health (NIH)</td>
</tr>
<tr>
<td>Michigan Department of Education</td>
</tr>
<tr>
<td>North Carolina Department of Education</td>
</tr>
<tr>
<td>Robert Wood Johnson Foundation</td>
</tr>
<tr>
<td>South Carolina Department of Education</td>
</tr>
<tr>
<td>South Dakota Department of Education</td>
</tr>
<tr>
<td>Tennessee Department of Education</td>
</tr>
<tr>
<td>United States Department of Health and Human Services</td>
</tr>
</tbody>
</table>
Summary

According to NASPE (2002) a number of sources confirmed that the majority of children in the U.S. do not participate in recommended amounts of physical activity even though they enjoy being active. Ideally, the trend toward curriculum integration offers teachers the opportunity to extend children’s activity by incorporating movement into the classroom. Evidence from schools that have adopted collaborative strategies of this type, such as those based upon MI theory (Hoerr, 1997; Vialle, 1997) and Topic Teamwork (Christie, 2000) demonstrated that physical movement can be successfully integrated across the curriculum. Additionally, data from projects such as SPARK (McKenzie et al., 1997; Sallis et al., 1997) and TAKE 10! (Peregrin, 2001) showed that classroom teachers can learn to engage students in physical activity as part of a comprehensive health initiative.

The design of past research demonstrated the tacit assumption that changes in aerobic fitness contribute to changes in cognitive performance. In the exercise and cognition literature, the experimental design of the majority of the studies suggested that the researchers were interested in testing the cardiovascular fitness hypothesis as it applied to cognitive performance. That is, many authors used aerobic fitness as the independent variable designed to distinguish between two or more groups that are expected to exhibit differences in cognitive performance. Some of these researchers used cross-sectional designs to compare the cognitive performance of groups of differing levels of aerobic fitness. A cross-sectional design looks for changes in a population over time. Data is collected at one point in time from samples that vary in age of developmental stage (Gall, Gall, & Borg, 2007). Others used exercise interventions to manipulate aerobic exercise levels in a treatment group, used
aerobic fitness levels to confirm the efficacy of the intervention, and then compared cognitive performance either from pretest to posttest or between the treatment group and the control group. The limitation of the literature is that few researchers actually tested aerobic fitness as a mediator of the relationship between physical activity and cognitive performance because they did not test a dose-response relationship between the aerobic fitness differences or gains and the cognitive performance differences or gains. This might explain why the results of individual studies that manipulated physical activity and demonstrated a change in aerobic fitness did not consistently demonstrate a beneficial effect on cognitive performance. It may be that a more clear and consistent relationship could be evidenced by studies that assess mechanisms that are more closely tied to cognitive performance.

Although a number of meta-analytic reviews have been conducted, results must be viewed with caution. Reasons include the fact that summary statistics from individual studies are combined (Gall et al., 2007). Also, meta-analytic reviews cannot be used to make judgments about cause-and-effect relationships (Gall et al., 2007). That is, fitness may be the first event in a series of events that ultimately impact cognitive performance. If this is the case, then changes in fitness might, in fact, be necessary for changes in cognitive performance to occur, but fitness itself might not be a sensitive indicator of the cognitive benefits that can be obtained through physical activity participation.

Educational and health professionals intuitively believe that students who are physically active and fit perform better in school. Several studies documented a positive relationship between physical fitness and academic achievement or other cognitive performance measures (Shephard, 1997; Shephard et al., 1984; Sibley & Etnier, 2003). Other
studies observed small relationships (Daley & Ryan, 2000). A meta-analysis conducted by Marzano and his colleagues (2001) found that details are best remembered when learned by dramatic instruction. This means that students remembered details better when learned by doing as opposed to other forms of instruction.

Although a rationale has been presented that classroom teachers can integrate movement into their learning activities, the increases in childhood obesity attributed to lack of physical activity suggest that, by and large, teachers are not encouraging their students to be active. If schools are to play an important role in increasing children’s activity levels, then it is essential that classroom teachers be involved in this process, because instructional time from physical education specialists is not sufficient to address the problem.
CHAPTER 3: METHODOLOGY

Introduction

The purpose of this study was to describe the status of physical activity incorporated throughout the school day in elementary school classrooms by surveying classroom teachers throughout the State of Virginia. This chapter provides the research methods for the study including: (a) restatement of the research questions, (b) data collection, (c) instrumentation, (d) data analysis, and (e) discussion of the ethical safeguards.

Research Questions

The following questions were addressed in this study:

1. What is the level of physical activity in classrooms at public elementary schools in Virginia, and do elementary teachers differ in the amount of physical activity embedded in the classroom based on grade level (e.g., K-2 or 3-5)?

2. Do elementary teachers differ in the amount of physical activity embedded in the classroom based on the teachers’ perceived level of personal fitness (e.g., Excellent, Fair, or Poor)?

3. What academic and/or behavioral benefits related to embedding physical activity in the classroom are endorsed by teachers?

4. What support systems do teachers need to incorporate physical activity into their teaching and learning strategies?
Data Collection

Sample

The reason for selecting a sample is to gain information concerning the target population, the group of interest to which results of the study will be generalizable (Gall et al., 2007). The target population for this study was classroom teachers in the State of Virginia.

It made use of data collected from a sample of active K-5 elementary classroom teachers from each of the eight regions throughout the state of Virginia identified by the Virginia Department of Education (VDOE). The classroom teachers were selected based on the percentage of elementary schools in the respective regions. Data collected were the result of self-reporting by teachers. Although there was the potential for bias in selection, it was a random cluster sample selected from all geographic regions of the state.

Generalizability

The results of this study may be generalized to Virginia K-5 classroom teachers. Generalizations beyond Virginia are not intended and will be avoided due to external validity threats. The study was conducted using only those classroom teachers willing to participate, thus, the influence of volunteerism entered into the study. It was understood that classroom teachers less comfortable with the topic may have declined to participate in the study.

Procedures

The data collection method consisted of a slightly modified version of the researcher created survey, *Physical Activity in the Classroom Survey* (see Appendix A). The researcher sent the survey to potential participants via electronic correspondence inviting them to use a link to complete the online survey (see Appendix B). Teachers were given a two-week
timeframe to complete the survey. They were offered access to a summary of the research findings.

Any undeliverable messages or responses declining participation in the study were listed as "nonparticipants" on the revised contact list. Furthermore, any electronic mail addresses that were returned with an error message (e.g., delivery failure, undeliverable, returned host/user unknown) or out-of-office assistant messages stating the teacher would be out past the survey deadline were removed from the contact list.

The data collection time period was open for two weeks. To increase participation, an electronic correspondence reminder was sent one week after initial contact. Based on the revised contact list, all participants were sent the reminder (see Appendix C). The timeframe for follow-ups and the timeline for keeping the survey tool active were based on previously published research finding that a majority of respondents (over 50%) respond within the first six days (Sheehan & McMillan, 1999).

To obtain permission from the study participants, the first statement of the survey asked the participants to agree to be included in the study. This statement outlined the purposes of the study, guaranteed that participants’ responses would be anonymous, and offered participants voluntary choice to participate in or withdraw from the study at anytime without penalty. To ensure participants’ confidentiality, the online survey was designed to collect anonymous responses, and respondents’ IP addresses were not stored with the survey results.
Instrumentation

A review of the published literature failed to reveal an instrument that measured anything related to embedding physical activity in the classroom. Consequently, the researcher used a survey instrument (Elmakis, 2007) developed as part of an applied field research project at the College of William and Mary. Survey items were generated by reviewing the literature, and an attempt was made to mirror factors contained in the literature that were related to the use of physical activity in the classroom. The survey collected responses to questions about embedding physical activity in the classroom along with targeted demographic information. The researcher’s intent was to discover whether and to what degree teachers perceived benefits to including physical activity in classroom lessons, to determine what type of physical activity was being used in the classroom, how often it was used, and how comfortable teachers were with the notion of including physical activity in their daily lessons. Modifications were made to the existing instrument in order to answer specific research questions addressed in this study.

For the original survey validation process, the purposive sample of subjects was divided into two distinctive groups with two different selection criteria. The first group came from classroom teachers in two elementary schools from a public school district in Virginia. Student populations ranged from 300 to 500 students in grades K-5. Permission was secured from the school superintendent and participating school principals to conduct the study. The second group of subjects comprised the expert panel. They were selected with particular attention to each person’s experience in education, experience with physical activity, and in one case, with survey design.
The instrument development employed the following procedures: (a) development of an initial instrument, (b) data collection, (c) validation, and (d) perform factor analysis to verify dimensions of the construct. The survey instrument specifically targeted concepts identified through the creation of a research matrix. That research matrix was updated based on additional research conducted for this study (see Appendix D). In addition, the Table of Specifications in Table 4 that follows was updated to reflect the identification of concepts addressed by each survey item.

Table 4

*Table of Specifications - Factors Related to Embedding Physical Activities*

<table>
<thead>
<tr>
<th>Content</th>
<th>Physical Health Benefits</th>
<th>Mental Health Benefits</th>
<th>Student Engagement</th>
<th>Student Achievement</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical health</td>
<td>1*, 2*, 23*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24*, 25*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress and anxiety</td>
<td>3*, 4*, 6*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-esteem</td>
<td></td>
<td>5*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendance</td>
<td></td>
<td></td>
<td>10*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude toward school</td>
<td></td>
<td></td>
<td>11*, 12*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom behavior</td>
<td></td>
<td></td>
<td>13*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td></td>
<td></td>
<td>7*</td>
<td>9*</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
<td></td>
<td>8*, 20*, 21*, 22*</td>
<td></td>
</tr>
<tr>
<td>Who’s responsible</td>
<td></td>
<td></td>
<td></td>
<td>14*, 19*</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
<td>15*</td>
<td></td>
</tr>
<tr>
<td>Resources/Professional Development</td>
<td></td>
<td></td>
<td></td>
<td>16*, 17*, 18*</td>
<td></td>
</tr>
</tbody>
</table>

* Refers to statement number of item in survey instrument.
Content validity was estimated using a process to include creating an initial draft of the instrument based on content drawn from a review of the extant literature, selecting a panel of experts to evaluate the instrument, and field testing the instrument with potential respondents. Because the researcher was interested in the validity of the statements as opposed to the responses given, the primary focus during the validation process was on whether the statements were perceived to be clear and relevant.

The updated version of the survey was converted to a web-based online survey software program, Survey Monkey, to design the survey into the final on-line version, collect the responses, and analyze the data. Furthermore, it allowed the researcher to send out electronic correspondence with the survey link embedded in it.

Data Analysis

Content Analysis

This mixed-design study included descriptive statistics and content analysis of classroom teachers’ perceptions about embedding physical activity. Descriptive statistics attempt to describe and explain conditions by using frequency distributions, contingency tables, and means. Descriptive research can rely on data gathered from a broad range of sources such as written documents, personal interviews, test results, and surveys (Gall et al., 2007, p. 301). The researcher used frequency tables to describe the survey responses. Means and frequency distributions were provided to summarize responses.

Quantitative strategies were used to analyze the survey recognizing that different statistical analyses are appropriate for different types of data. Inferential statistics were run by using Microsoft ® Office Excel 2007. The inferential statistics included a t test for Research Question 1 and an analysis of variance (i.e., ANOVA) procedure for Research...
Question 2 to compare the mean factor scores to determine if any significant statistical differences existed among the groups. A Post-hoc followed.

Measures of relationship indicate the degree to which variables are related. Pearson correlation coefficient ($r$) was used to determine relationships in Research Question 1 and Research Question 2. A factor analysis was performed using data collected during this study to determine construct validity of the Likert-scale survey items for analysis of the results for Research Question 3.

Content analysis was used for the data gathered by the open-ended survey item. Content analysis "entails the systematic examination of forms of communication to objectively document patterns" (Rossman & Rallis, 2003, p. 198). Content analysis entailed both quantitative and qualitative analyses. The unit of analysis was the message unit for those survey items that had a comment box.

With regard to the qualitative text content analysis, the researcher used a constructivist paradigm. Therefore, the researcher did not attempt to change the classroom teachers' perception about embedding physical activity. Content analysis included a qualitative review of the written data and coding scheme based on emergent categories. Responses were coded and categorized. In summary, descriptive statistics and content analysis were used to address the specific research questions. Table 5 displays a visual model of the quantitative and qualitative analyses for each of the research questions.
Table 5

*Data Analysis Table*

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data source</th>
<th>Data Analysis Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is the level of physical activity in the classroom at public elementary schools in Virginia, and do elementary teachers differ in the amount of physical activity embedded in the classroom based on grade level (e.g., K-2 or 3-5)?</td>
<td>Survey Instrument</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frequency Distributions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>t-test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pearson Correlation Coefficient (r)</td>
</tr>
<tr>
<td>2. Do elementary teachers differ in the amount of physical activity embedded in the classroom based on the teachers’ perceived level of personal fitness (e.g., Excellent, Fair, or Poor)?</td>
<td>Survey Instrument</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frequency Distributions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ANOVA and Post Hoc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pearson Correlation Coefficient (r)</td>
</tr>
<tr>
<td>3. What academic and/or behavioral benefits related to embedding physical activity in the classroom are endorsed by teachers?</td>
<td>Survey Instrument</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frequency Distributions</td>
</tr>
<tr>
<td>4. What support systems do teachers need to incorporate physical activity into their teaching and learning strategies?</td>
<td>Survey Instrument</td>
<td>Content Analysis</td>
</tr>
</tbody>
</table>
Data Analysis Summary

Results from the *Physical Activity in the Classroom Survey* were analyzed to determine classroom teachers’ responses. The raw data collected by the online tool were exported into Microsoft® Office Excel 2007 where they were revised to allow for statistical analyses. Open-ended responses were coded for content analysis using Microsoft® Office Excel 2007.

Ethical Safeguards

Prior to conducting this study, the researcher obtained permission from the Human Subjects Committee at the College of William and Mary. Ethical safeguards were conducted in a manner to protect the anonymity of the school districts and confidentiality of the individuals participating in the study. Permission requesting participants to be in the study was completed by the first statement of the online survey. Each prospective participant received the details of the study, had an opportunity to refrain from answering the questions, and had the option to withdraw from the study at any time. The researcher designed the online survey for anonymous responses. Specifically, respondents’ IP addresses were not stored with the survey results.

The researcher conducted this study in accordance with acceptable ethical research practices and according to the Code of Federal Regulations for the Protection of Human Subjects.
CHAPTER 4: ANALYSIS OF RESULTS

Introduction

This study explored the use of physical activity during the school day by elementary classroom teachers throughout the state of Virginia. Specifically, it examined teachers' perceptions of academic and behavioral benefits related to incorporating physical activity in the classroom and discovered what facilitating and inhibiting factors teachers report they experience with regard to including physical activity during the school day. Having completed the data reduction and conceptualization of the measure in the pilot study, a 31-item instrument, Physical Activity in the Classroom, was rated by a random cluster sample of K-5 elementary school teachers in Virginia. This chapter presents a description of the sample followed by the results of the factor analysis and the reliability analysis of the survey instrument. It includes the results of the data analysis for the four stated research questions.

Description of the Sample

The process for identifying study participants started with the Virginia Department of Education (Virginia Department of Education [VDOE], 2010) website identifying approximately 1,200 elementary schools representing 132 school districts spread across eight regions in Virginia. The state Director of Elementary Instruction identified approximately 26,877 practicing public school K-5 teachers throughout the state.

Two thousand eighty-two of those K-5 Virginia public school classroom teachers were invited to participate in this study prior to and within two months after the beginning of
the 2009-2010 school year. Email addresses were gathered from individual school websites within a selected region. The entire school staff of K-5 classroom teachers from the 109 randomly selected schools was used. Of the 2,082 email addresses collected, 329 were returned as “undeliverable” and were removed from the participant list. From the 1,753 teachers who actually received the online survey, 10% initially participated. The final response rate of 22.4% (N=393) was computed after a follow-up reminder was sent. Twelve teachers opted out of the survey. Table 6 illustrates the sample selection process.

Table 6

<table>
<thead>
<tr>
<th>Descriptors of regions</th>
<th>Total Districts in the State</th>
<th>Districts Sampled</th>
<th>Schools Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regions 1 and 8: Central</td>
<td>27</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Regions 2 and 3: Tidewater &amp; Northern Neck</td>
<td>32</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>Region 4: Northern</td>
<td>19</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>Regions 5 and 6: Valley &amp; Western</td>
<td>35</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>Region 7: Southwest</td>
<td>19</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Totals</td>
<td>132</td>
<td>65</td>
<td>109</td>
</tr>
</tbody>
</table>

Teachers were invited to email the researcher upon completion of the survey if they wanted to participate in a drawing for prizes and/or if they wanted a copy of the executive summary. One hundred six participants elected to enter their name in the drawing. Eighteen participants requested an executive summary.
Although the frequency and percentage of participating elementary teachers by grade among grade levels K, 1, 2, 4, and 5 and between the total K-2 and 3-5 teachers were comparable, the percentage of third grade teachers who responded was less well represented than the rest of the population. According to the state Director of Elementary Instruction, the number of third grade teachers was expected to be comparable to the number of teachers in the other grades based on the data in the Student Fall Membership by school division and by grade for the 2009-2010 school year (VDOE, 2010). Data indicating the actual number of teachers at each grade level were not available. Table 7 illustrates the frequency and percentage of the participating teachers' grade level taught.

Table 7

<table>
<thead>
<tr>
<th>Grade</th>
<th>Frequency (f)</th>
<th>Percentage of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten</td>
<td>65</td>
<td>16.5%</td>
</tr>
<tr>
<td>First</td>
<td>72</td>
<td>18.3%</td>
</tr>
<tr>
<td>Second</td>
<td>62</td>
<td>15.8%</td>
</tr>
<tr>
<td>Third</td>
<td>50</td>
<td>12.7%</td>
</tr>
<tr>
<td>Fourth</td>
<td>63</td>
<td>16.0%</td>
</tr>
<tr>
<td>Fifth</td>
<td>73</td>
<td>18.6%</td>
</tr>
<tr>
<td>K-2</td>
<td>199</td>
<td>50.7%</td>
</tr>
<tr>
<td>3-5</td>
<td>186</td>
<td>47.3%</td>
</tr>
<tr>
<td>No Grade Level selected</td>
<td>8</td>
<td>2.0%</td>
</tr>
<tr>
<td>Total</td>
<td>393</td>
<td>100%</td>
</tr>
</tbody>
</table>
Factor Analysis

Previous instruments that focused on physical activity in the classroom and demonstrated both reliability and validity were sought for the online survey. However, a review of the extant literature yielded the conclusion that physical activity in the classroom setting has not been sufficiently measured. No relevant surveys were located, and the Physical Activity in the Classroom instrument was created, content validated and field tested in 2007. A factor analysis was conducted using data collected during this study to analyze the 25 Likert-scale survey items and confirm the factors identified in the extant literature. The analysis yielded two major factors that explained 46% of the variance.

Five factors were initially identified for the instrument. They were captured through the following numbered items on the survey instrument:

**Physical health benefits,**
- 1 Regular physical activity has beneficial effects on aspects of health such as muscular strength, aerobic/cardio fitness, bone and body mass, and blood pressure.
- 2 Students get enough physical activity during the school day and do not need additional physical activity in core curriculum classes.
- 23 Increased physical activity reduces obesity.
- 24 Increased physical activity in the classroom translates to increased physical activity in other locations.
- 25 Physical activity embedded throughout the school day improves students' general physical health.

**Mental health benefits,**
- 3 Regular physical activity reduces student anxiety.
- 4 Regular physical activity reduces student stress.
- 5 Regular physical activity increases student self-esteem.
• 6 Physical activity incorporated into activities within the classroom helps students reduce stress.

**Student engagement as it relates to physical activity,**

• 7 Physical activity incorporated into activities within the classroom helps increase student attention.

• 9 A short stretch or activity break boosts student attention.

• 10 Physical activity incorporated into activities within the classroom improves school attendance.

• 11 My students would be interested in having physical activity interspersed throughout the day.

• 12 Physical activity is important to the teaching/learning process.

• 13 Physical activity incorporated into activities within the classroom helps improve student behavior.

**Student achievement as it relates to physical activity,**

• 8 Students perform better academically when they are physically active.

• 20 An increase in physical activity in the classroom translates to an increase in student achievement.

• 21 Student ability to recall information is enhanced by embedding physical activity throughout the curriculum.

• 22 Physical activity supports learning core curriculum subjects.

and **Barriers to the inclusion of physical activity.**

• 14 One of my responsibilities as a teacher is to see that my students are physically active.

• 15 There is enough time during the teaching day to incorporate physical activity.

• 16 Physical activity should be an integral part of the class schedule.

• 17 I feel prepared to integrate physical activity into daily classroom lessons.

• 18 I need professional development to learn how to integrate physical activity into daily classroom lessons.
• 19 Classroom teachers do not need to embed physical activity/movement throughout the school day, because that is the physical educator's responsibility.

The factor analysis did not reveal the same groupings. This sample of respondents identified two primary factors that grouped as follows:

Factor 1
• 10 Physical activity incorporated into activities within the classroom improves school attendance.
• 14 One of my responsibilities as a teacher is to see that my students are physically active.
• 16 Physical activity should be an integral part of the class schedule.
• 20 An increase in physical activity in the classroom translates to an increase in student achievement.
• 21 Student ability to recall information is enhanced by embedding physical activity throughout the curriculum.
• 22 Physical activity supports learning core curriculum subjects.
• 24 Increased physical activity in the classroom translates to increased physical activity in other locations.

Factor 2
• 6 Physical activity incorporated into activities within the classroom helps students reduce stress.
• 7 Physical activity incorporated into activities within the classroom helps increase student attention.
• 9 A short stretch or activity break boosts student attention.
• 11 My students would be interested in having physical activity interspersed throughout the day.
• 12 Physical activity is important to the teaching/learning process.
Factor 1 was named *Academic Benefits*, and Factor 2 was named *Behavioral Benefits*.

Table 8 displays the factor matrix to show the items that clustered in each of the factors in addition to displaying where the two new factors aligned.
Table 8

Rotated Factor Matrixa

<table>
<thead>
<tr>
<th></th>
<th>Initial Factors</th>
<th>Revised Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Q1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>.912</td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>.843</td>
<td></td>
</tr>
<tr>
<td>Q5</td>
<td>.556</td>
<td></td>
</tr>
<tr>
<td>Q6</td>
<td>.486</td>
<td></td>
</tr>
<tr>
<td>Q7</td>
<td>.654</td>
<td></td>
</tr>
<tr>
<td>Q8</td>
<td>.419</td>
<td>.522</td>
</tr>
<tr>
<td>Q9</td>
<td>.613</td>
<td></td>
</tr>
<tr>
<td>Q10</td>
<td>.568</td>
<td></td>
</tr>
<tr>
<td>Q11</td>
<td>.590</td>
<td></td>
</tr>
<tr>
<td>Q12</td>
<td>.569</td>
<td></td>
</tr>
<tr>
<td>Q13</td>
<td>.447</td>
<td>.638</td>
</tr>
<tr>
<td>Q14</td>
<td>.494</td>
<td></td>
</tr>
<tr>
<td>Q15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q16</td>
<td>.432</td>
<td></td>
</tr>
<tr>
<td>Q17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q20</td>
<td>.729</td>
<td></td>
</tr>
<tr>
<td>Q21</td>
<td>.780</td>
<td></td>
</tr>
<tr>
<td>Q22</td>
<td>.715</td>
<td></td>
</tr>
<tr>
<td>Q23</td>
<td></td>
<td>.426</td>
</tr>
<tr>
<td>Q24</td>
<td>.477</td>
<td></td>
</tr>
<tr>
<td>Q25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extraction Method: Maximum Likelihood.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

* Note. These items align with the newly identified factors.
Q 1, 2, 19 did not load on any factor and were discarded.
Q 3, 4, 5, 15, 17, 18, 23, 25 loaded on weak factors and were discarded.
Q 8, 13 loaded on more than one factor and were discarded.
Subsequent to the establishment of the two primary factors, the analysis that follows in the remainder of this chapter was conducted using those two factors.

Internal Consistency Reliability

A reliability analysis on the Likert-scale items in the survey, *Physical Activity in the Classroom-Revised* (see Appendix E), was performed to determine the internal consistency of the instrument through the calculation of Cronbach’s alpha coefficient. Cronbach’s alpha measures how well a set of items measures a single unidimensional latent construct. A latent construct is a variable that cannot be measured directly. Thus, the researcher must capture the variable through questions representing the presence/level of the variable in question. Generally, scales that obtain alpha levels of 0.70 or greater are considered to be reliable. The two dimensions of academic and behavioral benefits related to the inclusion of physical activity in the classroom appear to present a cohesive and coherent representation of physical activity in the classroom thus indicating that the *Physical Activity in the Classroom Survey-Revised* will constitute a reliable measure of physical activity. Cronbach’s alpha for the survey composite index was 0.909. Table 9 provides alpha scores.

Table 9

| Reliability Analysis for Dimensions Related to Physical Activity in the Classroom |
|---------------------------------|-----------------|-----------------|
| Factor                          | Number of items | Cronbach’s Alpha |
| Academic Benefits               | 7               | 0.881           |
| Behavioral Benefits             | 5               | 0.850           |
| Composite                       | 12              | 0.909           |
Analysis of Research Questions

1. What is the level of physical activity in classrooms at public elementary schools in Virginia, and do elementary teachers differ in the amount of physical activity embedded in the classroom based on grade level (e.g., K-2 or 3-5)?

This research question was addressed by analyzing teachers’ responses to an estimate of how much time they devote daily to integrating physical activity in classroom lessons and what academic classes they teach with a physical activity component. The amount of time was coded such that responses of none were given a value of 1, 1-15 minutes were given a value of 2, 16-30 minutes were given a value of 3, and more than 30 minutes were given a value of 4.

Table 10 indicates the amount of time teachers participating in the survey devote to incorporating physical activity in their classroom lessons. Most teachers (94.7%) utilized some time for physical activity in their classrooms with the majority (55.4%) reporting the use of between one and 15 minutes each day.

A Pearson correlation was conducted to verify if there was a significant relationship between grade level configuration and use of physical activity. The results $r (381) = -0.19$, $p < .01$ suggested that both groups use physical activity in similar amounts of time in the classroom.
Table 10

<table>
<thead>
<tr>
<th>Amount of Time</th>
<th>K-2</th>
<th>3-5</th>
<th>K-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 30 Minutes</td>
<td>31</td>
<td>8</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>(15.7%)</td>
<td>(4.3%)</td>
<td>(10.2%)</td>
</tr>
<tr>
<td>16-30 Minutes</td>
<td>59</td>
<td>52</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td>(30%)</td>
<td>(28.3%)</td>
<td>(29.1%)</td>
</tr>
<tr>
<td>1-15 Minutes</td>
<td>100</td>
<td>111</td>
<td>211</td>
</tr>
<tr>
<td></td>
<td>(50.8%)</td>
<td>(60.3%)</td>
<td>(55.4%)</td>
</tr>
<tr>
<td>None</td>
<td>7</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>(3.5%)</td>
<td>(7.1%)</td>
<td>(5.3%)</td>
</tr>
<tr>
<td>Totals</td>
<td>197</td>
<td>184</td>
<td>381</td>
</tr>
<tr>
<td></td>
<td>(100%)</td>
<td>(100%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

Notes. One 3-5 teacher did not respond to this item. Three teachers (two K-2 and one 3-5) selected more than one response. Eight teachers did not indicate grade level. None of those responses were included. K-2 were coded with a 1 and 3-5 were coded with a 2.

The combined (K-5) survey participants identified math as the subject area where they are most likely to incorporate a physical activity component and reading as the content area where they are least likely to incorporate a physical activity component. Table 11 indicates which content areas teachers incorporate a physical activity component in K-5.
Table 11

Physical Activity Component Included as Part of Instruction

<table>
<thead>
<tr>
<th>Grade</th>
<th>Math</th>
<th>Reading</th>
<th>Science</th>
<th>Social Studies</th>
<th>Language Arts</th>
<th>Other</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-2</td>
<td>73.6%</td>
<td>47.3%</td>
<td>45.8%</td>
<td>41.3%</td>
<td>62.2%</td>
<td>17.9%</td>
<td>8.0%</td>
</tr>
<tr>
<td>3-5</td>
<td>60.7%</td>
<td>25.1%</td>
<td>58.6%</td>
<td>49.2%</td>
<td>34.0%</td>
<td>7.3%</td>
<td>9.9%</td>
</tr>
<tr>
<td>K-5</td>
<td>67.5%</td>
<td>36.6%</td>
<td>52.2%</td>
<td>45.3%</td>
<td>48.6%</td>
<td>12.8%</td>
<td>8.9%</td>
</tr>
</tbody>
</table>

The Independent Samples t Test procedure compared the means for K-2 and 3-5 teachers' use of physical activity in their classrooms. A 95% confidence interval, p < .05, was used to determine if there was a significant difference in means. Based on the results of this test, equal variance cannot be assumed. A statistically significant difference between the means of the two groups at the 0.000 significance level, favoring K-2 teachers, was found. In practical terms, K-2 teachers appeared to use slightly more physical activity than 3-5 teachers. Tables 12 and 13 provide a summary of these findings.

Table 12

Means and Standard Deviations for Amount of Physical Activity Based on Grade Band

<table>
<thead>
<tr>
<th>Grade</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-2</td>
<td>197</td>
<td>2.58</td>
<td>.795</td>
<td>.06</td>
</tr>
<tr>
<td>3-5</td>
<td>184</td>
<td>2.30</td>
<td>.663</td>
<td>.05</td>
</tr>
</tbody>
</table>

Note. The amount of time was coded such that responses of none were given a value of 1, 1-15 minutes were given a value of 2, 16-30 minutes were given a value of 3, and more than 30 minutes were given a value of 4.
Table 13

**Independent Samples t-Test Results for Use of Physical Activity**

<table>
<thead>
<tr>
<th>Levene’s Test for Equality of Variances</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
<td>16.248</td>
<td>0.000</td>
<td>3.714</td>
<td>379</td>
<td>.000</td>
<td>.280</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>3.737</td>
<td>374.303</td>
<td>.000</td>
<td>.280</td>
<td>.075</td>
<td></td>
</tr>
</tbody>
</table>

One question on the survey instrument asked if teachers were willing to incorporate more physical activity throughout the school day. Of the 387 teachers who responded, 363 (93.8%) said, "yes" and 24 (6.2%) indicated, "no."

2. *Do elementary teachers differ in the amount of physical activity embedded in the classroom based on the teachers’ perceived level of personal fitness (e.g., Excellent, Fair, or Poor)?*

This research question was addressed by analyzing responses to an estimate of teachers’ individual perceived level of personal fitness (Excellent, Fair, or Poor) compared to the amount of time they included physical activity (none, 1-15 minutes, 16-30 minutes, or more than 30 minutes) calculated to show the relationship of teachers’ perceived level of personal fitness to the amount of physical activity used in the classroom.

The combined set of teachers (K-5) rated themselves to have predominantly average levels of personal fitness (70.7%). The least amount of teachers (11.3%) rated themselves as having a poor personal fitness level, and 18% of the teachers rated themselves excellent.
Table 14 indicates the perceived personal fitness level of the classroom teachers responding to the survey.

Table 14

<table>
<thead>
<tr>
<th>Teacher Perceived Level of Fitness</th>
<th>Poor</th>
<th>Average</th>
<th>Excellent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-5 Teachers</td>
<td>44</td>
<td>275</td>
<td>70</td>
<td>389</td>
</tr>
<tr>
<td></td>
<td>(11.3%)</td>
<td>(70.7%)</td>
<td>(18%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

Forty-four teachers perceived their level of fitness as poor, 275 teachers perceived their fitness as average, and 70 teachers perceived their level of fitness as excellent. Within the group that perceived their fitness level to be average, participants selected among all choices for the amount of time (none, 1-15 minutes, 16-30 minutes, or more than 30 minutes) of physical activity they used in the classroom. There was not one choice that stood out over the others. There was relatively high variability (.749) in the standard deviation indicating that a significant difference between the groups existed. Table 15 provides descriptive statistics.
Table 15

Descriptive Statistics for K-5 Teacher Perceived Level of Fitness and Amount of Physical Activity in Classroom

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>44</td>
<td>2.20</td>
<td>.795</td>
<td>.120</td>
</tr>
<tr>
<td>Average</td>
<td>275</td>
<td>2.44</td>
<td>.719</td>
<td>.043</td>
</tr>
<tr>
<td>Excellent</td>
<td>70</td>
<td>2.57</td>
<td>.809</td>
<td>.097</td>
</tr>
<tr>
<td>Total</td>
<td>389</td>
<td>2.43</td>
<td>.749</td>
<td>.038</td>
</tr>
</tbody>
</table>

A one-way analysis of variance (ANOVA) was calculated in which the K-5 teachers differed significantly with regard to the amount of physical activity used in the classroom at the F (2, 386) = 3.284, p<.05, level with regard to perceived teacher fitness level. Table 16 summarizes the results of the analysis of variance.

Table 16

ANOVA of Mean Scores for Teacher Perceived Level of Fitness and Amount of Physical Activity in Classroom

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3.640</td>
<td>2</td>
<td>1.820</td>
<td>3.284</td>
</tr>
<tr>
<td>Within Groups</td>
<td>213.938</td>
<td>386</td>
<td>.554</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>217.578</td>
<td>388</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p<.05

The ANOVA showed a significant difference among the levels of fitness. A post hoc test (Tukey’s HSD test) was performed. The post hoc revealed that teachers with poor and average fitness levels spend similar amounts of time on physical activity in the classroom.
Furthermore, teachers who reported average and excellent fitness levels reported spending similar amounts of time on physical activity. This confound of having the average group no different than the other two groups was a statistical outcome. There was not enough precision to properly place the average group. The strongest conclusion was that the teachers who perceived their level of personal fitness as excellent devoted more time to physical activity than the teachers who perceived their level of fitness as poor. Table 17 summarizes the post hoc results.
Table 17

<table>
<thead>
<tr>
<th>Fitness Level</th>
<th>Fitness Level</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>Average</td>
<td>-.207</td>
<td>.121</td>
<td>.203</td>
<td>-.49</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>Excellent</td>
<td>-.344*</td>
<td>.143</td>
<td>.045</td>
<td>-.68</td>
<td>-.01</td>
</tr>
<tr>
<td>Average</td>
<td>Poor</td>
<td>.207</td>
<td>.121</td>
<td>.203</td>
<td>-.08</td>
<td>.49</td>
</tr>
<tr>
<td></td>
<td>Excellent</td>
<td>-.137</td>
<td>.100</td>
<td>.356</td>
<td>-.37</td>
<td>.10</td>
</tr>
<tr>
<td>Excellent</td>
<td>Poor</td>
<td>.344*</td>
<td>.143</td>
<td>.045</td>
<td>.01</td>
<td>.68</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>.137</td>
<td>.100</td>
<td>.356</td>
<td>-.10</td>
<td>.37</td>
</tr>
</tbody>
</table>

A Pearson correlation was conducted to verify if there was a significant relationship between teachers’ perceived fitness level and use of physical activity in the classroom. The results \( r (388) = .12, p<.01 \) suggested there is a statistical relationship that teachers who rated themselves with excellent fitness utilize more physical activity in their classrooms than their counterparts who rated their fitness level as poor.

3. What academic and/or behavioral benefits related to embedding physical activity in the classroom are endorsed by teachers?

This research question was addressed through a review of the extant literature upon which the initial content validity of the survey was based. Specifically, Section 1 of the survey (25 Likert-scale questions) was divided into five domains based on the research review: (a) physical health benefits; (b) mental health benefits; (c) student engagement; (d) student achievement; and (e) barriers. The factor analysis discussed earlier in this chapter identified two primary domains: (1) academic benefits and (2) behavioral benefits. The data analysis that follows was based on the results from those two domains. Based on the review
of the data, the K-5 teachers perceived academic and behavioral benefits to including physical activity in the classroom. The survey items were coded such that responses of *strongly agree* were given a value of 5, *agree* were given a value of 4, *neutral* were given a value of 3, *disagree* were given a value of 2, and *strongly disagree* were given a value of 1. The following sections detail the descriptive statistics for each domain and summarize the data for each survey item.

*Academic Benefits*

Seven of the survey questions in Section 1 addressed teachers’ beliefs regarding the *academic benefits* of physical activity in the classroom, and descriptive statistics for this domain are summarized on Table 18. The participants’ responses for the seven questions on *academic benefits* were combined for this domain and resulted in the mean rating of 3.92 (SD = 0.81). The majority (70.5%) of teachers chose strongly agree (26.3%) or agree (44.2%) for questions related to the domain of positive *academic benefits*. Some participants chose *neutral* (24.9%), and a few participants chose *disagree* (4.2%) or *strongly disagree* (0.4%) in relation to academic benefits of physical activity.
Table 18

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Physical activity incorporated into activities within the classroom improves school attendance.</td>
<td>70 (17.9%)</td>
<td>109 (27.9%)</td>
<td>177 (45.3%)</td>
<td>32 (8.2%)</td>
<td>3 (0.8%)</td>
<td>391</td>
<td>3.54</td>
</tr>
<tr>
<td>14</td>
<td>One of my responsibilities as a teacher is to see that my students are physically active.</td>
<td>101 (25.7%)</td>
<td>179 (45.5%)</td>
<td>81 (20.6%)</td>
<td>29 (7.4%)</td>
<td>3 (0.8%)</td>
<td>393</td>
<td>3.88</td>
</tr>
<tr>
<td>16</td>
<td>Physical activity should be an integral part of the class schedule.</td>
<td>126 (32.1%)</td>
<td>190 (48.5%)</td>
<td>62 (15.8%)</td>
<td>13 (3.3%)</td>
<td>1 (0.3%)</td>
<td>392</td>
<td>4.09</td>
</tr>
<tr>
<td>20</td>
<td>An increase in physical activity in the classroom translates to an increase in student achievement.</td>
<td>100 (25.4%)</td>
<td>190 (48.3%)</td>
<td>98 (24.9%)</td>
<td>5 (1.3%)</td>
<td>0 (0.0%)</td>
<td>393</td>
<td>3.98</td>
</tr>
<tr>
<td>21</td>
<td>Student ability to recall information is enhanced by embedding physical activity throughout the curriculum.</td>
<td>118 (30.3%)</td>
<td>198 (50.8%)</td>
<td>70 (17.9%)</td>
<td>4 (1.0%)</td>
<td>0 (0%)</td>
<td>390</td>
<td>4.10</td>
</tr>
<tr>
<td>22</td>
<td>Physical activity supports learning core curriculum subjects.</td>
<td>106 (27.2%)</td>
<td>198 (50.8%)</td>
<td>75 (19.2%)</td>
<td>11 (2.8%)</td>
<td>0 (0.0%)</td>
<td>390</td>
<td>4.02</td>
</tr>
<tr>
<td>24</td>
<td>Increased physical activity in the classroom translates to increased physical activity in other locations.</td>
<td>91 (23.2%)</td>
<td>169 (43.1%)</td>
<td>112 (28.6%)</td>
<td>17 (4.3%)</td>
<td>3 (0.8%)</td>
<td>392</td>
<td>3.84</td>
</tr>
</tbody>
</table>
Behavioral Benefits

Five of the survey questions in Section 1 addressed teachers' beliefs regarding the behavioral benefits of physical activity in the classroom, and descriptive statistics for this domain are summarized on Table 19. The participants' responses for the five questions on behavioral benefits were combined for this domain and resulted in the mean rating of 4.48 (SD = 0.61). The majority (94.6%) of teachers chose strongly agree (54.1%) or agree (40.5%) for questions related to the domain of positive behavioral benefits. A few participants chose neutral (4.8%), and fewer participants chose disagree (0.6%) or strongly disagree (0%) in relation to behavioral benefits of physical activity.
Table 19

**Behavioral Benefits**

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Physical activity incorporated into activities within the classroom helps students reduce stress.</td>
<td>169</td>
<td>193</td>
<td>28</td>
<td>3</td>
<td>0</td>
<td>393</td>
<td>4.34</td>
</tr>
<tr>
<td>7</td>
<td>Physical activity incorporated into activities within the classroom helps increase student attention.</td>
<td>226</td>
<td>148</td>
<td>14</td>
<td>4</td>
<td>0</td>
<td>392</td>
<td>4.52</td>
</tr>
<tr>
<td>9</td>
<td>A short stretch or activity break boosts student attention.</td>
<td>266</td>
<td>122</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>392</td>
<td>4.67</td>
</tr>
<tr>
<td>11</td>
<td>My students would be interested in having physical activity interspersed throughout the day.</td>
<td>211</td>
<td>156</td>
<td>26</td>
<td>0</td>
<td>0</td>
<td>393</td>
<td>4.47</td>
</tr>
<tr>
<td>12</td>
<td>Physical activity is important to the teaching/learning process.</td>
<td>189</td>
<td>176</td>
<td>22</td>
<td>5</td>
<td>0</td>
<td>392</td>
<td>4.40</td>
</tr>
</tbody>
</table>


This sample of teachers endorsed both academic and behavioral benefits for including physical activity in the classroom. Table 20 presents the means of the composite factors.

Table 20

<table>
<thead>
<tr>
<th>Factor Overview Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
</tr>
<tr>
<td>Academic Benefits</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Behavioral Benefits</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

4. What support systems do teachers need to incorporate physical activity into their teaching and learning strategies?

This research question was addressed using inductive analysis to identify categories found in the participants’ response to the open-ended question asking what supports teachers believed they need in order to utilize physical activity in the classroom. Meaning categorization, where responses were coded into categories, and meaning interpretation, which allowed for the researcher to speculate interpretation, were used (Rossman & Rallis, 2003). Two hundred seventy-one teachers (representing 70% of the sample) responded to this open-ended question. There were varied interpretations of the question, and responses were classified as either facilitating factors or inhibiting factors to the inclusion of physical activity in the classroom. Facilitating factors are those things that are helpful to teachers as they incorporate physical activity. Inhibiting factors are those things that impede incorporating
physical activity. Two-hundred four comments were related to facilitating factors and 87 comments were related to inhibiting factors. More ideas and activities were identified as the most potent facilitating factor. Facilitating factors (70.1%) outweighed inhibiting factors (29.9%).

Note that for the factors of time and support, more detailed analysis revealed the intent of the comment could be interpreted to be either a facilitating factor or an inhibiting factor depending on the context. Table 21 displays the categories that emerged.

Table 21

<table>
<thead>
<tr>
<th>Factors</th>
<th>Facilitating Factors</th>
<th>Inhibiting Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>More Ideas and Activities</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>Training</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>32</td>
<td>3</td>
</tr>
<tr>
<td>Space</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Curriculum Standards</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>204 (70.1%)</td>
<td>87 (29.9%)</td>
</tr>
</tbody>
</table>

The following are representative responses of facilitating factors teachers reported assist in the implementation of physical activity in the classroom.

- You need to make sure you have built a strong rapport with your students and have modeled the guidelines for each physical activity. Teachers would benefit from a posted list of activities and ideas used by other teachers in each subject area.
• I need more professional development on how to integrate physical activity into instruction.

• A workshop on this subject would be very helpful to give teachers ideas on how to incorporate more activities in their lessons. Movement is good for the teacher as well as the students.

• I need to know how to have students moving in a tight space.

• Reminders, guidance, ideas

• I just need ideas. I feel creatively tapped out just planning lessons most of the time.

• Ways to make lesson plans as well as already prepared lesson plans as examples. It also would be great if it is a school initiative so that teachers could work together to create ways to incorporate more physical activity.

The following are representative responses of inhibiting factors that make it difficult to incorporate physical activity in the classroom:

• There’s enough to do as it is, and even though I feel it’s important, I feel that the camel’s back is about to break in the regular education teacher’s room.

• There is not enough time in my school day!

• I need more room in my classroom, more time in the day, less emphasis on standards of learning (SOL) and (AYP) goals, and an open minded administration.
• I wish there were less assessment driven county policies

• Less emphasis on standardized testing.

• I need administrator support and approval.

• More room! With 20 kids, plus desks, plus tables, etc… it is hard to find the room for a great deal of physical activity.

• Time. Through the years, there seems to be more and more pressure from above to have students’ active learning time increased (which is important). I think we need to recognize a human NEED for balance that includes physical activity as both part of the learning and as a break between for the body and mind to promote a healthier way of living and learning.
CHAPTER 5: SUMMARY, DISCUSSION AND RECOMMENDATIONS

Introduction

In the preceding chapter, the presentation and analysis of data have been reported. Chapter 5 consists of a summary of the study, discussion of the findings, further examination of the factor analysis, implications for practice, recommendations for further research, and conclusions. The purpose of the latter sections is to expand upon the concept of physical activity in the classroom in an effort to provide a further understanding of teachers' perceptions and the status of physical activity as an integral part of the school day. Finally, a synthesizing statement is offered to capture the substance and scope of what has been attempted in this research.

Summary of the Study

The purpose of this study was to explore the inclusion of physical activity in elementary classrooms in the state of Virginia. The study utilized the Physical Activity in the Classroom instrument to address each research question. This instrument was created by the researcher in a graduate course at The College of William and Mary in 2007 and content validity was established at that time. Descriptive statistics, correlation coefficients, t tests, one-way analysis of variance (ANOVA), and content analysis were data analysis methods utilized to interpret data. A factor analysis was conducted to verify the factor structure. Based on those results, the factors were revised. Cronbach's Alpha was used to determine internal reliability using the two identified factors.

82
The study included 393 elementary classroom teacher participants randomly selected through cluster samples from throughout the eight regions designated by the VDOE. It included four research questions:

1. What is the level of physical activity in classrooms at public elementary schools in Virginia, and do elementary teachers differ in the amount of physical activity embedded in the classroom based on grade level (e.g., K-2 or 3-5)?

2. Do elementary teachers differ in the amount of physical activity embedded in the classroom based on the teachers' perceived level of personal fitness (e.g., Excellent, Fair, or Poor)?

3. What academic and/or behavioral benefits related to embedding physical activity in the classroom are endorsed by teachers?

4. What support systems do teachers need to incorporate physical activity into their teaching and learning strategies?

Questions one, two and three were answered quantitatively from the data obtained from the survey instrument. Question one was answered using the results from descriptive statistics indicating how much time teachers report they used physical activity as a component and in what subjects. The results from a \( t \) test for independent means were used to compare the means of K-2 and 3-5 teachers and calculate group differences. A Pearson \( r \) was used to determine how grade level configuration and use of physical activity were related. To answer question two, descriptive statistics were used to show the relationship of teachers' perceived level of personal fitness to the amount of physical activity used in the classroom. An ANOVA was computed to analyze if elementary teachers differed on the amount of
activity used in their classrooms with respect to their perceived level of personal fitness. A Pearson $r$ was used to measure how personal fitness level and use of physical activity were related. Question three was answered using results from the Likert-scale questions covering two domains, academic and behavioral benefits. To answer the qualitative questions, data were categorized and coded to determine emergent terms.

Discussion of the Findings

Physical health is a requisite for learning, and energy and vitality are necessary if quality learning experiences are to continue throughout the school day (Pangrazi, 2001). Despite a growing body of evidence documenting the positive lifelong impact of physical activity on physical and mental health (CDC, 1997; NASPE, 2002; USDHHS, 1996), a number of sources confirm that the majority of U.S. children are not engaging in appropriate amounts of physical activity (Bar-Or, 2000; Dale et al., 2000; Lowry et al., 2001; McKenzie, 1999; Strauss & Young, 2001). School programs have been identified as important in the effort to increase activity levels.

Previous researchers studied the effects of physical activity on various aspects of students’ physical and mental health and academic performance. The goal of this study was to identify perceptions of classroom teachers, front-line advocates for change in schools. This section discusses the implications of the four research questions.

Research Question One

*What is the level of physical activity in classrooms at public elementary schools in Virginia, and do elementary teachers differ in the amount of physical activity embedded in the classroom based on grade level (e.g., K-2 or 3-5)?*
The findings resulting from research question one indicated that teachers in this sample incorporate physical activity throughout the day. Most teachers (94.7%) utilized some form of physical activity in their classrooms with the majority (55.4%) reporting the use of between one and 15 minutes each day. In addition, an overwhelming majority (93.8%) of teachers endorsed that they are willing to incorporate more physical activity in their classrooms with a small minority (6.2%) indicating that they are not willing to incorporate more activity. This is consistent with the literature review indicating that teachers encourage children to be physically active, and that most children enjoy doing so; but the daily activity levels for children the United States average well below the recommended guidelines, including those set for physical education classes (NASPE, 2002). This was confirmed in a 1997 study of third-grade students in four states that reported “a substantial proportion of the population obtained less than recommended levels of activity” (Symons et al., 1997, p. 224), and little has changed since then.

A study that examined whether the benefits of early childhood moderate to vigorous physical activity on fitness are sustained throughout childhood (Janz, Kwon, & Letuchy, 2009) found that every additional ten minutes of moderate to vigorous physical activity at age five resulted in one third pound less body fat at age 11, regardless of whether the activity level had been maintained. Researchers called it the “banking effect” indicating that small changes now may result in meaningful differences later on. This supported the CDC (2008) promotion of “10 minutes at a time is fine” to get the recommended 60 minutes of daily physical activity for children. The CDC goes so far as to say that “no period of activity is too
short to count toward the guidelines.” It is best to spread activity out during the week, and it can be broken up into smaller chunks of time during the day.

The physical activity guidelines for children focus on three types of activity: aerobic, muscle-strengthening, and bone-strengthening, with each type having important health benefits. Youth should be encouraged to participate in activities that are age appropriate, enjoyable, and offer variety. All three types of physical activity can be performed in the classroom setting. In-class aerobic activity could include brisk running in place. Muscle strengthening activities should work major muscle groups of the body such as legs, hips, back, abdomen, chest, shoulders and arms. In-class activities could include resistance exercises using resistance bands, curl-ups or crunches. Bone strengthening activities produce a force on the bones that promotes bone growth and strength through impact with the ground. Activities in class could include hopping, skipping and jumping.

The ACEI (2007) suggested that pre-service teachers have adequate training experiences to better understand how positive healthy behaviors affect the quality of life. They argued that pre-service teachers should learn how to present the best learning experiences that will maintain children’s intellectual, emotional, social, physical, and artistic growth. NCATE (2007) suggested that future teachers comprehend and utilize physical activity as a basis for encouraging active, healthy lifestyles and improved quality of life for elementary students. The current study confirms that elementary teachers use physical activity in the classroom, endorse the benefits, and are willing to use more. With focused professional development targeting specific aerobic, muscle-strengthening and bone-strengthening activities that can be used in the classroom, even more health benefit may be
attained. This contributes to the extant literature by spotlighting where the emphasis needs to be.

Mason (1996) reported that educators seemed to be most perplexed about how to integrate mathematics across the curriculum. Ironically, Christie (2000) countered that math is “arguably the most readily adaptable subject area for Topic Teamwork “(p. 30). Topic Teamwork refers to a school-wide collaborative model focused on integrating physical education into other disciplines. The teachers in this study concurred with Christie. Both the K-2 and the 3-5 groups selected math as the area of study where they included the most physical activity in their lessons.

Research Question Two

Do elementary teachers differ in the amount of physical activity embedded in the classroom based on the teachers’ perceived level of personal fitness (e.g., Excellent, Fair, or Poor)?

The findings resulting from research question two revealed some evidence for a positive relationship between teachers’ personal fitness levels and the amount of physical activity they reported including in the school day. The majority of teachers rated themselves to have average levels of personal fitness, yet there was relatively high variability in the standard deviation among the levels of fitness. This indicated significant differences between the groups that were supported by the ANOVA. The post hoc revealed that teachers with poor and average fitness levels spent equal amounts of time on physical activity in the classroom. Furthermore, teachers who reported average and excellent fitness levels reported spending equal amounts of time on physical activity. This confound of having the average
group no different than the other two groups was a statistical outcome. Basically there was not enough precision to properly place the average group.

The strongest conclusion was that the teachers with a perceived fitness level of excellent devote more time to physical activity than the teachers who perceived their fitness level as poor. The Pearson correlation was not large enough to indicate practical significance. Although the statistical significance means that the observed mean differences were not likely due to sampling error, it did not appear that the difference was large enough to be of value in a practical sense. The literature review did not reveal any studies that examined this relationship.

Research Question Three

What academic and/or behavioral benefits related to embedding physical activity in the classroom are endorsed by teachers?

Based on the current administration of the survey instrument, teachers supported academic and behavioral benefits consistent with existing literature on the subject. The literature supported the findings of this study with higher levels of achievement being associated with higher levels of fitness (California Department of Education, 2002; Keays & Allison, 1995; Robert Wood Johnson Foundation, 2003). Physical education and physical activity may strengthen academic achievement, self-esteem, and mental health, all leading to stronger student performance (Cooper & Taras, 2003; Keays & Allison, 1995; Sallis et al., 1999; Shephard, 1996). Etnier et al.’s 1997 meta-analysis confirmed a correlation between physical activity and cognition. She and Sibley (Sibley & Etnier, 2003) conducted another meta-analysis in 2003 again supporting a positive association with physical activity and
cognition. Then in 2006, she and colleagues published yet another meta-analysis that found minimal support for aerobic fitness as a mediator of the effect of physical activity on cognition (Etnier et al., 2006). The authors purported that there are too many other variables that could cause changes in cognition. Catherine Davis and her colleagues conducted a randomized controlled trial supported by the National Institute of Health to determine if physical activity improved academic achievement (Davis et al., 2007). No effect was found on reading, but significance was found for math achievement and executive function.

The systematic literature review spearheaded by William B. Strong, M.D. et al. (2005) identified 850 articles to review the effects of physical activity on health and behavior outcomes and to develop evidence-based recommendations for physical activity in youth. Researchers overwhelmingly agreed that school-age youth should participate daily in 60 minutes or more of moderate to vigorous physical activity that is developmentally appropriate, enjoyable, and involves a variety of activities. They supported a positive association between academic performance and physical activity. Furthermore, results demonstrated that physical activity had a positive influence on concentration, memory, and classroom behavior (Strong et al., 2005). The 2007 study led by Darla Castelli was part of a recent and growing movement in science showing that physical activity may be related to academic performance (Castelli et al., 2007). Results of her study showed that students with the fittest bodies were the ones with the fittest minds, even when factors such as socioeconomic status were taken into consideration (Castelli et al., 2007).

The participants in this study endorsed the notion that regular physical activity is good for students and view it as a vital component of the school day. They further endorsed
that when teachers include physical activity in the classroom, it has the potential to improve activity in other environments. This coincided with Dale et al.'s (2000) assertion that students are more likely to be active during their leisure time if they participated in physical activity that day at school. These participants supported a positive relationship between physical activity and student achievement. The teachers agreed that their students performed better academically when they were physically active. They appeared willing to take ownership for including physical activity in the classroom. The majority of teachers were either unsure about or endorsed the positive connection between physical activity and attendance. A consistent overwhelming majority ranging between ninety-two percent and ninety-eight percent of participants endorsed the behavioral benefits of including physical activity. They agreed that there was increased student attention and more participation in lessons when physical activity was included.

These results are important because a wide range of stakeholders maintain a vested interest in the topic and will be interested to know how teachers distribute themselves along the continuum of support. The high degree of agreement among participating teachers regarding the benefits of including physical activity during the school day was evident.

*Research Question Four*

*What support systems do teachers need to incorporate physical activity into their teaching and learning strategies?*

Participants in this study identified more facilitating factors, those things that are helpful to teachers as they incorporate physical activity, (i.e., more ideas and activities, training, and support) than they did inhibiting factors, those things that impede incorporating physical activity (i.e., not enough time, not enough space, emphasis on curriculum
standards). Based on previous studies and reports (Buschner, 1985; Faucette et al., 1990; Faucette et al., 2002; Faulkner & Reeves, 2000), it was expected that teachers would identify more inhibiting factors. Instead, they wanted focused ideas and activities and support from administration. This is encouraging in light of the concentration on academics in schools. There was an implied belief that physical activity can be incorporated as an enhancement to instruction in core academic subjects. According to one teacher, “I just need to focus on it more and make it a priority.” Another teacher stated, “All I need is quick, easy ways to add physical activity to already planned lessons.”

The literature reported that school administrators are reluctant to intervene since most school emphasis is on academic performance. One teacher stated, “The administration needs to understand that kids need to move, touch, wiggle and jiggle.” Another teacher stated, “I need administrative support……..that it’s acceptable to include it as part of our instructional time.” These attitudes regarding administration’s lack of support persist even though research indicates that increased activity levels may have favorable effects on a students’ academic achievement (Sallis et al., 1999). This may be a part of the problem. School administrators may not be aware that reallocating curricular time towards physical activity does not negatively impact academic achievement and may in fact improve academic performance (Sallis et al., 1999; Shephard, 1997). Although some teachers found physical activity too difficult to include due to perceived limitations, they valued the idea. One teacher commented, “Our school system has mandated that we only give the students 15 minutes of physical activity daily. I try to keep them out extra time and have been written up for that.”
The literature review identified inhibiting factors of time, resources/professional development, and who is responsible for implementation. This sample of teachers clearly identified with the perceived inhibiting factor of time; but, they are willing to take responsibility for implementation and do not perceive that physical educators should be responsible for all of the physical activity offered to students during the school day. They wanted assistance from the physical educators though. One teacher stated, “I wish that my school system would be able to hire physical education teachers at the primary level in order to assist with physical activity ideas for the classroom.” Another teacher stated, “I would like to have more information about different ways to incorporate physical activity into everyday lessons.”

This study revealed that participating teachers were more interested in solutions than problems when it comes to embedding physical activity during the school day. This was supported by the qualitative data that emphasized teachers wanted more ideas and activities along with more training and support. They recognized that physical activity is an important aspect of the school day. This has the potential to mitigate the inhibiting factors such as “not enough time” and “not enough space” that may discourage the inclusion of physical activity. Professional development represented a major tool teachers would use to increase their knowledge of physical activity in the classroom. One common theme among teachers was the lack of professional development experiences designed specifically for embedding physical activity. By contrast, districts often offer professional development specifically for core subjects such as mathematics and reading which are assessed on the SOLs. Through targeted professional development, teachers may come to realize that physical activity can enhance
instruction and that no additional space is needed to incorporate physical activity in the classroom.

The Surgeon General’s Report on Health and Physical Activity recommended a shift from previous guidelines designating intense, regular exercise periods, to participation in any form of moderate physical activity for at least 30 minutes a day (USDHHS, 1996). The NASPE (2002) guidelines reinforced this stance, recommending that elementary aged children engage in a minimum of 60 minutes of activity, accumulating several hours of age appropriate activity in 10 to 15 minute sessions on all or most days of the week. School leaders who emphasize a “can do” attitude by providing more ideas and activities associated with embedding physical activity will assist in meeting these recommendations.

Factor Analysis

The original factors were labeled physical health benefits, mental health benefits, student engagement benefits, student achievement benefits and barriers. The primary factors that emerged from the factor analysis were related to academic and behavioral benefits and were labeled accordingly for the data analysis. The five constructs that surfaced from the literature could actually fall under the two broader constructs of academic and behavioral benefits. The discrepancy between the factors that emerged and the originally identified factors could speak to the interaction between the respondent and the instrument. It could point to the idea that the literature is in its infancy and only speculative at this time. Lastly, there could be differences in interpretation in the inherent meanings of the constructs.

Although much research exists on general physical activity and health aspects of physical activity, relatively little research has been undertaken on systematically embedding
physical activity throughout the school day. This clearly points to a need to learn more about the factors that contribute to successful implementation and how they can be potentially beneficial to student achievement and student behavior along with improving children’s health in the school setting.

A closer examination of the item loadings revealed that contextual factors irrelevant to the intended themes of the items may have influenced the initial factor structure. Contextual factors written with the items also may be more confounding than originally expected. While an effort was made during item development to keep the items relatively broad-based, some context was included so that teachers’ responses would reflect their actual perceptions as much as possible. This context made clarifying groupings of items more difficult. For example, items about physical health benefits tended to group together whether they were intended to measure achievement, engagement, mental health benefits or physical health benefits.

Another possible explanation for the degree of unexplained variance was that the constructs of physical health benefits, mental health benefits, student engagement, student achievement, and barriers are more complex than originally conceived in this study. There may be additional sub groupings within each construct that were unaccounted for in this study. For example, while the definition of student engagement was multifaceted (i.e., attention, attendance, and behavior) and items were written to reflect its multidimensionality, a subscale was expected that would treat engagement as a unitary construct. It is possible that these different dimensions of student engagement function differently for teachers and do not operate in a similar enough fashion to load together in a factor analysis. In addition, the
factors may overlap. For example, teachers may not distinguish between physical and mental health benefits of physical activity.

Lastly, the model itself may be flawed. Four of the initial factors addressed positive aspects of including physical activity in the classroom and one factor concerned barriers. In effect, it is possible that the perception of barriers drives teachers' perceptions about benefits. A restructuring of the instrument could address the relationship between the barriers and the other constructs.

Implications for Practice

School/Home/Community Collaboration

Collaboration between schools, families and the community related to children’s physical development has become increasingly important as childhood obesity rates continue to rise. Much of the focus on family-school collaboration in the educational literature is related to promoting children’s academic and social development (Christenson, 2004). Home-school collaboration focused on promoting children’s physical health has received less attention, yet may be just as important. The gap related to the promotion of increased physical activity remains an important topic for families and schools given that physical health is a pre-requisite for learning. Given the current obesity epidemic (USDHHS, 2003), it is now more important than ever for families and schools to collaborate in physical activity promotion. Both home and school settings influence children’s physical activity levels, so consistent messages across these settings are important.

It is understood that “multiple factors influence learning and behavior” (Allensworth, 1993) and that schools are not solely responsible for addressing the issues of children and
youth. Schools must remain focused on their institutional mission of teaching and preparing young people for a productive role in society. It may not be possible for every elementary classroom teacher to incorporate all of the recommended 60 minutes of physical activity (CDC, 2008) during the school day. However, schools can accept the responsibility of convening the broader community to jointly address the determinants of a child’s development. We can promote partnerships among schools, families, and communities.

“Schools, by themselves, cannot and should not be expected to address the nation’s most serious health and social problems” (Kolbe et al., 1997). The integration of the community is essential to the development of a health-promoting culture and, ultimately, to the accomplishment of a school’s institutional mission. Together schools, families, and communities must work toward a common vision and mission, ensuring that children have access to achieve recommended physical activity levels to improve their health.

*Connection between School and Health*

Schools have long realized the impact of health status on student learning. We have required immunizations against communicable diseases prior to enrollment. Periodic vision and hearing screenings are in place. Special medical conditions such as epilepsy, diabetes, and asthma have been addressed. In practice, schools’ attention to health has been relegated to the absence of disease, illness or physically debilitating conditions; but we can no longer afford to center our attention solely there. We can and should promote the importance of physical activity to enhance health and learning.

Although school physical education has been identified by the CDC (1997) and the Surgeon General (USDHHS, 1996) as a primary vehicle to address children’s activity levels,
physical education programs cannot achieve the goal of increasing children’s activity levels in isolation from the rest of the curriculum. Instructional time allotted to physical education is not sufficient to meet children’s recommended physical activity levels. Physical educators have written a great deal about the possibilities of including classroom concepts in physical education, but they have published very little about the contributions physical education could make to other subjects (Placek & O’Sullivan, 1997). Integrating movement into academic lessons at the elementary level has the potential to increase children’s activity levels, but it appears this strategy has not been widely used.

**Implementation Process**

The information garnered provides a basis for initiating dialogue about where to begin the implementation process. Consistent with the current Surgeon General’s guidelines, Bar-Or (2000) emphasized that, “It is the total energy expenditure, rather than the intensity of the activity that matters” (p. 55). A serious commitment to increasing daily activity by multidisciplinary personnel in schools could have a positive effect on the health status of the nation’s children (Bandura, 1997). That is, classroom teachers can contribute to increasing children’s health status with movement. An assortment of classroom learning experiences can be incorporated into academics that involve movement as part of the learning process. Even though classrooms may not be ideal settings for incorporating movement activities into lessons, it is possible to do so (Cone et al., 1998; Pangrazi, 2001). Children can move while learning concepts. Incorporating movement such as games and relays into classroom lessons should not hinder learning and may even increase knowledge (Weinstein & Rosen, 2000).
Although a rationale has been presented that classroom teachers can integrate movement into their learning activities, the increases in childhood obesity attributed to lack of physical activity suggest that, by and large, teachers are not encouraging their students to be active. If schools are to play an important role in increasing children’s activity levels, then it is essential that classroom teachers be involved in this process.

Teachers must become more adept at implementing physical activity throughout the entire cycle of instruction: planning, teaching, and assessment. This aspect is critical. Most teachers report the use of physical activity, but there is no indication that it is systematically embedded throughout the curriculum. This outcome is not due to teacher indifference to physical activity or complacency but lack of understanding that this is necessary. Teachers must also strive to balance the inclusion of physical activity. That is not to say every subject should receive equal amounts of physical activity. However, physical activity should be included in short bursts throughout the school day to include the recommended 60 minutes of physical activity by the CDC.

Helping teachers incorporate more physical activity throughout the cycle of instruction is contingent upon teacher motivation. Internally motivated teachers are more likely to and incorporate knowledge which improves instruction and learning. Therefore, availability and access to information about using physical activity in the classroom is critical. For externally motivated teachers, incorporating more physical activity throughout the cycle of instruction is more difficult. These teachers may require external pressure from administrators or colleagues in order to change. It is difficult to elevate instruction to a new level when some teachers are not “on board.”
When more physical activity is incorporated throughout the day, children may learn to value what it offers. Teachers can become more knowledgeable, comfortable, confident, and insightful in their practice of teaching with a physical activity component, prompting school administrators to seek ways to help teachers improve instruction. Providing teachers with time to plan, work, and share resources and knowledge as a group, as well as time to evaluate collective efforts, is crucial to the successful implementation of more physical activity. Administrative support is a necessary factor for sustained implementation efforts to succeed.

Leadership

Leadership is critical in order to obtain staff commitment. Those planning to initiate school-wide inclusion of physical activity are wise to recognize the importance of faculty and staff buy-in. Ensuring that practitioners recognize physical activity implementation as a systems approach to improving academic and health outcomes for children and not simply an "add-on" is vital. Embedding physical activity must become "the way things are done" thereby becoming part of the culture within the school.

Another implication associated with facilitating the inclusion of physical activity has to do with recognizing that systems change requires time and communication. There needs to be systematic planning, monitoring, analyzing, evaluating, and adjusting. Furthermore, it is highly recommended that school-based leaders adopt or design program evaluation tools which enable them to measure their progress toward the goals established regarding inclusion of physical activity.
This study supported the notion that fitter teachers use more physical activity in their classrooms. Teachers are role models for children, and their level of activity may influence the activity of the children in their care. This has implications for staff wellness initiatives in schools.

Students, parents and community members are encouraged to be involved in their local school’s delivery of daily physical activity. Support can include having a committee of students to decide on activities. Parents should hold school district officials accountable for providing the necessary resources for teachers to incorporate physical activity in instruction. By making suggestions or lodging complaints to the school board or the State, real change can be enacted. Parents and community members can model daily physical activity in the home and community, provide opportunities for students to stay active outside of school, and create community environments that support physical activity. This may, in turn, have further implications for better communication and use of community facilities along with increased sharing of resources. This research may have implications for how schools are designed in terms of space and equipment to support the inclusion of more physical activity.

The findings of this research study also impact teacher educators. Higher education institutions should include instruction on how to incorporate physical activity in teacher lesson plans. By requiring that higher education faculty address the physical activity component in planning, teaching, and assessment, appropriate physical activity practice can be modeled for future teachers. One of the most powerful influences upon the future instruction of teaching candidates is how they were taught. By the power of example, higher education faculty can demonstrate proper physical activity implementation.
With further refinement, the instrument developed for this study could be a foundation for a more robust research instrument to investigate the use of physical activity in school classrooms. The instrument could also be used in practice to help administrators identify areas for training programs and other interventions.

Physical activity and academics are parts of a complete curriculum. Findings from research in this area have implications for both micro and macro levels of practice. Micro levels include lesson content, frequency and quality of physical activity; and macro levels include national, state and district policy implementation.

Recommendations for Further Research

Following are recommendations for further research:

1. Present empirical evidence concerning the impact of current interventions on children’s activity levels. It is important in this line of research to investigate student variables since their perceptions, their intentions to be active, and outcome variables related to physical activity need to be assessed to determine the effectiveness of these programs.

2. The finding of a relationship between teacher personal fitness level and amount of physical activity used in the classroom suggests that further study be conducted around ways to promote school staff fitness.

3. Participants in this study were elementary school teachers. Elementary school age children are by their developmental nature more physically active than their counterparts in middle and high school. An obvious extension of this research would be not only to include middle and high schools but also to
conduct further analysis based on school level. Research regarding the use of physical activity at the higher grades may provide data to improve health outcomes for those age groups. Many high schools use block scheduling which keeps children in one class for approximately 90 minutes. The use of physical activity in the classroom during those long stretches of instruction may boost student attention and improve academic outcomes.

4. Future research is necessary to better determine the role that physical activity has on academic performance. Physical activity and academics are parts of a complete curriculum. They are compatible and need each other in the process of improving classroom practices.

5. Additional study needs to be done on how to monitor the amount of daily physical activity students receive during the school day.

6. The unexplained variance in the current version of the instrument should be further researched. Although Physical Activity in the Classroom demonstrates face and content validity, construct validity is lacking. Future research should concentrate on improving the measure to include additional factors to explain more of the variance and be predictive of teacher readiness to include physical activity within the school day and classroom curricula.

One issue impacting the results of this study was related to the size of the sample. Although over 2,000 classroom teachers were invited to participate, the return rate was just under one-quarter of those contacted. More participation would increase the reliability of the findings. It should be mentioned that there were roadblocks to more participation. Students
and other researchers are forced to follow cumbersome procedures to gain permission to conduct studies. Although this practice is understandable in terms of protecting school-based personnel from a myriad of surveys and interviews, it makes conducting research rather difficult. Future researchers interested in a broader and more comprehensive scope of participants need to be aware of local policies and procedures with regard to obtaining permission to conduct studies in local school districts.

Conclusions

This research adds to the body of literature on the status of physical activity in elementary school classrooms. The study supported the notion that elementary teachers in Virginia are willing to incorporate more physical activity in their classrooms with supports in place. Although the amount of physical activity these teachers reported is consistent with the amount reported in other studies, this is not enough based on recommendations from the USDHHS and the CDC.

The tipping point is that moment when an idea, trend, or social behavior crosses a threshold, tips, and spreads (Gladwell, 2000). A small but precisely targeted push may cause a change in the way teachers use physical activity in their classrooms. Gladwell argues that minor alterations can produce major consequences. According to his theory, the immediate environment influences the way people behave. When we try to make an idea tip, we try to change our audience in some small, yet critical respect. This can be done through the influence of special kinds of people, people of extraordinary personal connection. Another way it can be done is by changing the content of communication; by making a message so memorable that it sticks in someone's mind and compels them to action. When we see
Michele Obama, the First Lady, on television announcing her “Let’s Move: America’s Move to Raise a Healthier Generation of Kids” initiative to combat childhood obesity through a comprehensive approach that builds on effective strategies and mobilizes public and private sector resources, is that a tipping point? When we hear trusted sources confirm that the children of this generation are not expected to live as long as their parents due to lack of physical activity, adult health problems, and poor nutrition, is that a tipping point? Or can the tipping point come from our school buildings with teachers and other instructional leaders becoming willing participants in the initiative to incorporate physical activity throughout the school day?

Despite the supposed promotion of lifelong physical activity and the focus in school reform on educating the “whole child,” students today remain less active in school than they were in the past. Schools are obligated to teach academic skills to students and also to support and reinforce the development of the whole child. Evidence suggests that including physical activity throughout the day can result in positive outcomes for students, teachers, schools, and the community. Our knowledge of the potential benefits of physical activity is advanced and appears robust enough to warrant including it as a vital component of the educational process.
Appendix A

Physical Activity in the Classroom Survey

Default Section

By selecting "Next," I agree to participate in a study regarding physical activity in the classroom. My participation involves the completion of this anonymous online survey. I retain the right to refrain from answering any questions without penalty. I understand that I have the right to refuse to participate in the survey at any time without consequence.

If I have questions regarding the study, I may contact Gail Elmakis at 757-874-7441 or gxelma@wm.edu or the project advisor, Dr. James Strange, at 757-221-2339 or jhstro@wm.edu

THIS PROJECT WAS FOUND TO COMPLY WITH APPROPRIATE ETHICAL STANDARDS AND WAS EXEMPTED FROM THE NEED FOR FORMAL REVIEW BY THE COLLEGE OF WILLIAM AND MARY PROTECTION OF HUMAN SUBJECTS COMMITTEE (PHONE 757-221-3966) ON 2009-08-03 AND EXPIRES ON 2010-08-03.
## Likert Scale Survey Questions

Following are statements regarding physical activity in the classroom. Please rate according to your level of agreement with the statement.

1. Please rate the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular physical activity has beneficial effects on aspects of health such as muscular strength, aerobic/cardio fitness, bone and body mass, and blood pressure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students get enough physical activity during the school day and do not need additional physical activity in core curriculum classes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular physical activity reduces student anxiety.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular physical activity reduces student stress.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular physical activity increases student self-esteem.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical activity incorporated into activities within the classroom helps students reduce stress.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical activity incorporated into activities within the classroom helps increase student attention.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student perform better academically when they are physically active.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A short stretch or activity break boosts student attention.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical activity incorporated into activities within the classroom improves school attendance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My students would be interested in having physical activity incorporated.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throughout the day, physical activity is important to the teaching/learning process.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Physical activity incorporated into activities within the classroom helps improve student behavior.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>One of my responsibilities as a teacher is to see that my students are physically active.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>There is enough time during the teaching day to incorporate physical activity.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Physical activity should be an integral part of the class schedule.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>I feel prepared to integrate physical activity into daily classroom lessons.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Classroom teachers do not need to embed physical activity/movement throughout the school day, because that is the physical educator's responsibility.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>An increase in physical activity in the classroom translates to an increase in student achievement.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Student ability to recall information is enhanced by embedding physical activity throughout the curriculum.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Increased physical activity reduces obesity.</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
<tr>
<td>Increased physical activity in...</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
<td>![Symbol]</td>
</tr>
</tbody>
</table>
classroom translates to increased physical activity in other locations. Physical activity embedded throughout the school day improves students' general physical health.

2. Estimate how much time during the school day you currently devote to including physical activity in your academic classroom lessons. This does not include recess or physical education classes. Make one selection.

☐ More than 30 minutes each day
☐ Between 16 minutes and 30 minutes each day
☐ Between 1 minute and 15 minutes each day.
☐ None

3. Which subjects do you currently teach with a physical activity component? Choose all that apply.

☐ Math
☐ Reading
☐ Science
☐ Social Studies
☐ Language Arts
☐ Other
☐ None

4. Are you willing to incorporate more physical activity during the school day?

☐ Yes
☐ No

5. What supports do you need to incorporate physical activity in your teaching and learning strategies?
Demographic Data

6. Grade level I currently teach. Please select only one.
   - [ ] K
   - [ ] 1
   - [ ] 2

7. My personal fitness level is.
   - [ ] Excellent
   - [ ] Average
   - [ ] Poor
Appendix B

Invitation to Participate in Study

To: [Email]
From: gxelma@wm.edu

Subject: College of William and Mary - Williamsburg, VA

Body: I am a doctoral candidate at the College of William and Mary and need your input on my survey about using physical activity in the classroom. It can be completed in 10 minutes or less. My primary concern is that American children may be the first generation in modern history to live shorter lives than their parents!

You were randomly selected from teachers throughout Virginia. All survey responses will remain anonymous. Your responses will assist in providing helpful information to university programs and in planning staff development programs.

The survey is available at:
http://www.surveymonkey.com/s.aspx

Please do not forward this message as it will invalidate the survey.

You are invited to email gxelma@wm.edu indicating your completion of the survey to be included in a drawing for a $25 gift certificate to your choice of Bed, Bath & Beyond, Target, Starbucks, or Dick's Sporting Goods (3 winners). An executive summary is available upon request.

Call 757-874-7441 or email gxelma@wm.edu with any questions.

Please accept my sincere appreciation in advance for your assistance with this important research project.

Sincerely,
Gail Elmakis, Doctoral Candidate

(THE FOLLOWING PARAGRAPH IS TO BE READ ONLY IF YOU ENCOUNTER A PROBLEM ACCESSING THE SURVEY.)

If you are not able to access the link, please highlight it, click Control C, move the cursor to the address section of your browser (where it says “html://”), and then click, Control V. In other words, copy and paste the link. Then you should be set to go.

If you want to opt out of the survey, click the link below:

http://www.surveymonkey.com/optout.aspx
Appendix C

Reminder to Participate in Study

To: [Email]
From: g excelma@wm.edu

Subject: College of William and Mary - Williamsburg, VA

Body: I sent you an email last week requesting help with my dissertation. Please consider responding. The survey is available until Wednesday, September 9th.

As a reminder, I am a doctoral candidate at the College of William and Mary and need your input on my survey about using physical activity in the classroom. It can be completed in 10 minutes or less. My primary concern is that American children may be the first generation in modern history to live shorter lives than their parents!

You were randomly selected from teachers throughout Virginia. All survey responses will remain anonymous. Your responses will assist in providing helpful information to university programs and in planning staff development programs.

The survey is available at:
http://www.surveymonkey.com/s.aspx

Please do not forward this message as it will invalidate the survey.

You are invited to email g excelma@wm.edu indicating your completion of the survey to be included in a drawing for a $25 gift certificate to your choice of Bed, Bath & Beyond, Target, Starbucks, or Dick's Sporting Goods (3 winners). An executive summary is available upon request.

Call 757-874-7441 or email g excelma@wm.edu with any questions.

Please accept my sincere appreciation in advance for your assistance with this important research project.

Sincerely,
Gail Elmakis, Doctoral Candidate

(The following paragraph is to be read only if you encounter a problem accessing the survey.)
If you are not able to access the link, please highlight it, click Control C, move the cursor to the address section of your browser (where it says "html:/"), and then click, Control V. In other words, copy and paste the link. Then you should be set to go.

If you want to opt out of the survey, click the link below.
http://www.surveymonkey.com/optout.aspx
<table>
<thead>
<tr>
<th>Researchers/Institution</th>
<th>Literature Analysis</th>
<th>Factors Identified</th>
<th>Embedding Physical Activity Throughout the School Day</th>
<th>Research Matrix</th>
<th>Appendix D</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Department of Education (2001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carlson, S. (2005)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Department of Education (2001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coleh, &amp; Brown (2007)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Department of Education (2001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carlson, S. (2005)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Department of Education (2001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coleh, &amp; Brown (2007)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix E

Revised Physical Activity in the Classroom Survey

<table>
<thead>
<tr>
<th>Physical Activity in the Classroom-Revised</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Default Section</strong></td>
</tr>
</tbody>
</table>

By selecting "Next," I agree to participate in a study regarding physical activity in the classroom. My participation involves the completion of this anonymous online survey. I retain the right to refrain from answering any questions without penalty. I understand that I have the right to refuse to participate in the survey at any time without consequence.

If I have questions regarding the study, I may contact Gail Elmakis at 757-874-7441 or gixelma@wm.edu or the project advisor, Dr. James Stronge, at 757-221-2339 or jhstro@wm.edu

THIS PROJECT WAS FOUND TO COMPLY WITH APPROPRIATE ETHICAL STANDARDS AND WAS EXEMPTED FROM THE NEED FOR FORMAL REVIEW BY THE COLLEGE OF WILLIAM AND MARY PROTECTION OF HUMAN SUBJECTS COMMITTEE (PHONE 757-221-3966) ON 2009-08-03 AND EXPIRES ON 2010-08-03.
Physical Activity in the Classroom-Revised

Likert Scale Survey Questions

Following are statements regarding physical activity in the classroom. Please rate according to your level of agreement with the statement.

1. Please rate the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity supports learning core curriculum subjects.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Physical activity incorporated into activities within the classroom helps students reduce stress.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My students would be interested in having physical activity interspersed throughout the day.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Physical activity should be an integral part of the class schedule.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Physical activity is important to the teaching/learning process.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Student ability to recall information is enhanced by embedding physical activity throughout the curriculum.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>A short stretch or activity break boosts student attention.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>One of my responsibilities as a teacher is to see that my students are physically active.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Physical activity incorporated into activities within the classroom helps increase student attention.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>An increase in physical activity in the classroom translates to an increase in student achievement.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
2. Estimate how much time during the school day you currently devote to including physical activity in your academic classroom lessons. This does not include recess or physical education classes. Make one selection.

- [ ] More than 30 minutes each day
- [ ] Between 16 minutes and 30 minutes each day
- [ ] Between 1 minute and 15 minutes each day.
- [ ] None

3. Which subjects do you currently teach with a physical activity component? Choose all that apply.

- [ ] Math
- [ ] Reading
- [ ] Science
- [ ] Social Studies
- [ ] Language Arts
- [ ] Other
- [ ] None

4. Are you willing to incorporate more physical activity during the school day?

- [ ] Yes
- [ ] No

5. What supports do you need to incorporate physical activity in your teaching and learning strategies?
Demographic Data

6. Grade level I currently teach. Please select only one.

☐ K
☐ 1
☐ 2

7. My personal fitness level is.

☐ Excellent
☐ Average
☐ Poor
References


California Department of Education. (2002). Department pamphlet.


