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The Impact the Amount of High School Physical Education Has on the Physical Activity Habits of Traditional College Freshmen

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THE IMPACT THE AMOUNT OF HIGH SCHOOL PHYSICAL EDUCATION HAS ON THE PHYSICAL ACTIVITY HABITS OF TRADITIONAL COLLEGE FRESHMEN

Doctoral Dissertation Research

Submitted to the
Faculty of Argosy University, Phoenix Campus
College of Education

In Partial Fulfillment of
the Requirements for the Degree of

Doctor of Education

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Michael Marrapodi, Ed.D.

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ABSTRACT

Many states have reduced or eliminated high school physical education classes due to budget cuts and the passage of No Child Left Behind. The purpose of this quantitative study was to examine the relationship between the number of years of physical education students received in high school and the traditional college freshmen's current level of physical activities. The short form of the International Physical Activity Questionnaire and additional demographic questions were used electronically to collect cross-sectional PA data from traditional college freshmen at a private Christian liberal arts university in the Midwest. After cleaning and processing the collected data, the sample consisted of 155 participants. Correlational analysis included Pearson Chi Square, One-Way ANOVA, and Two-Way ANOVA statistical tests utilizing SPSS software. Results of the study found that students who received seven or eight semesters of high school physical education were the most physically active, and students who received no high school physical education were the least physically active. However, no significant relationships were found between the amount of high school physical education received and physical activity habits. Significant relationships were found between gender, race, and those who participated on an interscholastic varsity sport and those who did not. Significant relationships were not found between commuter and residential students and students who received an exemption and/or substitution from physical education and those who did not. Future studies should expand the scope of the existing study by examining nontraditional college students, individuals who entered the workforce right after high school, and attitudes towards physical activity.

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DEDICATION

I dedicate this dissertation to my wife, Dawn, whose continuous love and support helped bring this educational journey to an end. I look forward to many more journeys with you my love (3%)!

I also dedicate this dissertation to all of my past, current, and future physical education teacher candidates. Go out and make a difference. God has great plans for you!

CHAPTER ONE: INTRODUCTION

Each fall, millions of college students enroll at institutions of higher learning across America. In the fall of 2013, an estimated record of 21.8 million college students were enrolled at public and private American colleges or universities, which is an increase of over six million since 2000 (National Center for Educational Statistics, 2013). The data published by the National Center for Educational Statistics (2013) revealed that just over 13 million of these students were considered traditional college students. The National Center for Educational Statistics also projected about 3.3 million first-time freshmen were enrolled in the fall of 2013. These college freshmen make independent choices that affect their immediate and future health in a new environment.

One important independent choice college students will make is what, if any, physical activity (PA) habits will be established during their freshmen year. Research has found that college students who do participate in PA are motivated to participate for multiple reasons (Kilpatrick, Hebert, & Bartholomew, 2005; Melton, Hansen, & Gross, 2010). Studies have also found that PA habits established during college have long-term influences on PA habits as an adult (Xiaofen, Guan, Pinero, & Bridges, 2005). Unfortunately, some college students choose to live sedentary lifestyles and do not engage in PA (Dhurup, 2012), even though increased PA is directly connected to improved health status (McLachlan & Hagger, 2011; National Association for Sport and Physical Education, 2011; Partridge, King, & Bian, 2011).

High school physical education classes are one subject area where future PA habits can be taught. The professional body of physical educators, The National Association for Sport and Physical Education, strongly advocates physical education

classes at all K-12 levels. The National Association for Sport and Physical Education (2011) affirmed, "The goal of physical education is to develop physically educated individuals who have the knowledge, skills, and confidence to enjoy a lifetime of physical activity" (para. 6). When physical education is cut or eliminated less time is devoted to achieving this goal.

The Problem

States have reduced or eliminated physical education classes at the high school level (Institute of Medicine of the National Academies of Science, 2013). When school districts look to reduce or balance their budgets, physical education is one of the curriculum areas that is considered for reduction (National Association for Sport and Physical Education, 2013b). Another reason physical education has been reduced or eliminated is due to the secondary effects of the No Child Left Behind (NCLB) Act passed by Congress in 2001 and signed into law in early 2002 by President George W. Bush. NCLB does not consider physical education to be a core academic subject, and, as a result, schools have eliminated physical education to obtain extra time and money in order to focus on NCLB core subjects, math and reading (Cook, 2005). A recent report found that 44% of American K-12 schools have eliminated physical education and recess time to focus on math and reading since NCLB was passed (Institute of Medicine of the National Academies of Science, 2013).

States across the United States have many different physical education requirements. The most recent *Shape of the Nation* report, released in 2012, reported on many of these differences. There are 44 states that require some sort of high school physical education, but the differences among these requirements are vast (National

Association for Sport and Physical Education & American Heart Association, 2012). The added component of exemptions and/or substitutions for physical education classes means that the actual amount of high school physical education that takes place may be much worse than what initially existed in the report. *The Shape of the Nation Report* makes it clear that many high school students are not getting the recommended amount of 225 minutes of physical education per week (National Association for Sport and Physical Education & American Heart Association, 2012).

A meta-analysis that examined the PA habits of college students discovered that between 40 and 50% are physically inactive (Xiaofen et al., 2005). The National College Health Assessment completed by the American College Health Association every semester reported 22.9% of college students in the spring of 2013 completed no moderate PA and 37.2% completed no vigorous PA in the seven days prior to the survey being administered (American College Health Association, 2013). The greatest decline in PA habits seems to happen between late adolescence and early adulthood (National Association for Sport and Physical Education, 2007). Physical inactivity has been found to increase the risks for many health issues, such as multiple types of cancer, high blood pressure, osteoporosis, obesity, diabetes, and heart disease (American Cancer Society, 2012).

Problem Background

Both the American Heart Association and the American College of Sports Medicine has recommended that adults obtain 150 minutes of moderate to vigorous physical activity each week (American College of Sports Medicine, 2013; American Heart Association, 2013). Individuals can split the 150 minutes into three to five days of

exercise. The American Heart Association and the American College of Sports Medicine (2013) also indicated that PA can be broken into 10 to 20 minute sessions several times a day. Research has demonstrated that PA is an important factor in disease prevention and improved health (McLachlan & Hagger, 2011; National Association for Sport and Physical Education, 2011; Partridge et al., 2011). The problem is many Americans are not meeting the PA recommendations (United States Department of Health and Human Services, 2013). Adding to this problem is physical education, a class that can teach proper PA habits, has been reduced or eliminated in many school districts across the nation (Institute of Medicine of the National Academies of Science, 2013).

Physical activity: Healthy People, a report issued every 10 years by the United States Department of Health and Human Services, tracks many of the nation's health habits and makes recommendations based on the collected data (United States Department of Health and Human Services, 2013). *Healthy People 2020,* the latest report to be released, found that only 48.8% of American adults participated in 150 minutes of moderate PA or 75 minutes of vigorous PA each week, or an adequate combination of both (United States Department of Health and Human Services, 2013). *Healthy People 2020* also found that 31.6% of adults participated in no PA each week, and only 20.8% of Americans meet the objectives of *Healthy People 2020* for aerobic and muscle strengthening PA activities each week.

Physical inactivity among Americans has many negative impacts. In 2012, a comprehensive meta-analysis titled *Designed to Move* was released. It examined dozens of studies and found some alarming statistics. Following are some of the key conclusions

from American College of Sports Medicine, Nike, and International Council of Sport Science and Physical Education (2012):

- By 2030, if the continued projections remain the same, people in the United States will be 46% less physically active than they were in 1965.
- The indirect and direct medical cost of physical inactivity will increase over two-fold by 2030.
- For the first time in history, a child born today may die five years younger than their parents, due to diseases connected to physical inactivity.

Two of the recommendations from the report were that (a) physical education needs to be designed for positive experiences and (b) PA needs to be built into the daily environment (American College of Sports Medicine, Nike, & International Council of Sport Science and Physical Education, 2012). When physical education is eliminated from the high school curriculum, these two recommendations become much harder to meet.

Physical Education

Every few years, The National Association for Sport and Physical Education in partnership with the American Heart Association (2012) releases the *Shape of the Nation* report that provides a detailed overview of the state of physical education in the American educational system. They noted in their 2012 report that the District of Columbia is considered a state in the report, so all data were based on 51 states. The following statistics provide a clear picture of the absence of high school physical education across the nation:

- 44 states require some form of high school physical education;
- 10 states have required minutes of physical education per week;

- 28 states provide exemptions or waivers for physical education credit requirements;
- 33 states permit schools to substitute other classes for physical education classes or graduation requirements;
- three states mandate a minimal amount of weekly PA time for high school students; and
- only one state requires that a certified physical educator serve as a physical education coordinator for the district (National Association for Sport and Physical Education & American Heart Association, 2012).

Purpose of the Study

The purpose of this quantitative study was to examine the relationship between the number of years of physical education students receive in high school and the traditional college freshmen's current level of physical activities.

Need for Study

Students who are physically inactive do not meet the recommended PA standards. Lack of PA is a major health problem that university students face (Pauline, 2013) and obesity is estimated to cost the United States an estimated $344 billion by 2018 (National Association for Sport and Physical Education, 2013b). The link between PA and obesity is undeniable (Garber et al., 2011). These links provide strong arguments for the need for physical education programs. Xiaofen et al. (2005) also reported that research on the PA habits of college students has been neglected. Pate, O'Neill, and McLver (2011) in a recent study reported that the available literature focusing on the public health effects of physical education classes is limited; the authors recommended that the study of the

short- and long-term effects on fitness from exposure to physical education classes needs to be examined.

Knowledge, attitudes, and behaviors towards PA are influenced by the various experiences within a physical education program (Darst, Pangrazi, Sariscsany, & Brusseau, 2012). If a student receives a reduced amount of physical education or no physical education at all, the chances that attitudes or behaviors influencing physical education may be limited. One of the goals of physical education is to provide students with the knowledge, skills, and goals for a lifetime of PA (National Association for Sport and Physical Education, 2011). There are studies that have demonstrated positive benefits between physical education and such things as weight status, musculoskeletal pain, balance, and PA levels; but the effect of physical education on future PA outcomes is poorly understood (Pate et al., 2011). A review of the research literature has found no studies that specifically examine the relationship between the amount of high school physical education that was received and the PA habits of traditional college freshmen. The Institute of Medicine of the National Academies of Science (2013) reported that there is a need to study the effects of various amounts of physical activity in the school environment. This study helped disclose some of the existing gap by examining the short-term relationships that the amount of high school physical education has on the PA habits of traditional college freshmen.

Theoretical Framework

Parish and Treasure (2003) found that there are multiple reasons for inactivity, with one possible reason being the student's lack of motivation. In physical education, increased PA is connected to increased intrinsic motivation (Liukkonen, Barkoukis, Watt,

& Jaakkola, 2010). In the 1980s, researchers Edward Deci and Richard Ryan established the self-determination theory (SDT) that describes the path by which teachers move the students from a motivational state established by an external factor to a motivational state that is self-determined by the students themselves (Haichun & Chen, 2010). An example of this path could be an external factor, such as a high school physical education class to a path of internal self-determination as a college freshman when it comes to PA habits.

The SDT contains three states: (a) amotivation, (b) extrinsic motivation, and (c) intrinsic motivation (Perlman, 2011). Sun and Chen (2010) defined *amotivation* as a state in which the person is neither intrinsically or extrinsically motivated; *extrinsic motivation* as a state regulated by outside factors; and *intrinsic motivation* as a state where motivation comes from the satisfaction and attraction of the activity rather than from any outside factors. Another component of the SDT known as internalization implies that people advance from low levels of motivation to higher levels of motivation (Kilpatrick, Hebert, & Jacobsen, 2002). One example of the concept of internalization is that individuals initially may not like PA, but after some external condition, such as taking a physical education class, affects them they start to participate in regular PA. Eventually, through regular participation in PA, internalization occurs, and the individual develops an intrinsically motivated attitude towards PA.

The SDT was used as the theoretical framework for this study. Physical education classes taken in high school represented the second stage of the SDT, which is extrinsic motivation; and the PA habits of college freshmen represented the final stage in the SDT, which is intrinsic motivation.

Research Question

The following research question guided this correlational study: *What is the relationship between the number of years of physical education that college students receive in high school and their current physical activity habits?* The following hypotheses were formulated in conjunction with the research question:

H_0: There is no statistically significant correlation between the number of years of physical education that college students receive in high school and their physical activity habits.

H_1: There is a statistically significant correlation between the number of years of physical education that college students receive in high school and their physical activity habits.

The study also examined the following subquestions within the scope of the main research question.

- What is the difference between male and female participants?
- What is the difference between participants who participated on a varsity interscholastic sport in high school and participants who did not?
- What is the difference between the races in the study?
- What is the difference between commuter and residential students?
- What is the difference between a participant who received an exemption, waiver, and/or substitution for physical education credit and a participant who did not?

Nature of Study

The researcher for this dissertation research utilized a quantitative correlational research design that collected cross-sectional data. Creswell (2009) stated that

quantitative research allows the researcher to test objective theories and examine the relationships between variables. Quantitative research starts with the test of a theory and is best suited when a theory is being tested (Creswell, 2009). This study examined the theory that greater amounts of high school physical education positively affect the PA habits of traditional college freshmen. The survey used for the study collected data on multiple variables that were examined for relationships through the use of statistical testing.

The research was completed at a liberal arts university in the Midwest that offers both undergraduate and graduate programs in over 120 different areas of study. A random sample was used to collect data from all full-time residential and commuter traditional college freshmen who were at least 18 years of age. Access was obtained by receiving approval from the Dean of Student Development at the location, the Institutional Review Board (IRB) at Argosy University, and the IRB at the location used in the study. An expedited Internal Review Board (IRB) review was granted. Access to the sample participants' email addresses was granted by the Dean of Student Development at the location site. The researcher was a faculty member at the institution.

The quantitative data was collected via an online survey that the participants accessed through their university issued email account. Key demographic data and data on the PA habits of the participants were collected. The self-response short form of the International Physical Activity Questionnaire (IPAQ) was used to collect data on the PA habits of the participants. The IPAQ allowed the participants to record their PA during the previous seven days. A thorough analysis was completed on the independent,

dependent, and covariate variables using a variety of statistical tests. The analysis was completed in a way that produces both valid and reliable data.

Limitations and Delimitations

One limitation was sample size. Low response rates are a concern that many researchers have when using surveys; with the increased use of surveys in research the attitudes towards surveys may be unfavorable (Sheehan, 2001). A sample size that is too small can make it challenging to analyze for significant relationships between variables. A second limitation in the study was data analysis using a correlational study that was completed. Correlational studies can be easily misinterpreted, because a significant correlation does not always mean a positive correlation (Alreck & Settle, 2004). Response bias was another limitation in the study. Social desirability bias happens when the participants answer their questions based on what is socially responsible (Alreck & Settle, 2004). PA could be considered a socially responsible habit by the participants. Not knowing the answer to some of the survey questions is another form of response bias. To reduce this bias in the study only the PA habits in the seven days immediately prior to the survey were reported.

One delimitation of the study was location. The location was chosen so a sample could be obtained from several states that have different high school physical education requirements. Most of the sample came from three or four Midwestern states. Location made it more difficult to generalize the results of the study, due to the demographic make-up of students in the Midwestern United States versus a region such as the Southwestern United States. A future study could replicate this study in another region and university that has a different demographic make-up. Another delimitation in this

study was that only the number of years of physical education that was completed in high school was examined. This made the study very limited in scope. A future study could also incorporate the quality or curriculum of the high school physical education classes and not just the number of years received.

Definitions

The following working operational definitions were used during the research.

Physical activity: The World Health Organization (2013) defined PA as "any bodily movement produced by skeletal muscles that requires energy expenditure" (para 1).

Light physical activity: PA that does not make your heart beat much faster than normal (United States Department of Agriculture, 2013).

Metabolic equivalent (MET): Indicates the ratio of the energy expended by the body during a PA, compared to energy expended for an equal time at rest (American College of Sports Medicine, 2014).

Moderate physical activity: PA that makes your heart beat faster than normal and the individual can talk, but not sing (United States Department of Health and Human Services, 2008).

Vigorous physical activity: PA that increases your heart rate significantly and the individual cannot say more than a few words without pausing for a breath (United States Department of Health and Human Services, 2008).

Traditional college freshman: A college student between the ages of 18 and 24 years old (National Center for Educational Statistics, 2013).

Importance of Study

There are multiple entities that can benefit from this study. Professional organizations, policy makers, and physical educators are discussed.

Professional Organizations

The National Association for Sport and Physical Education (NASPE), which is under the umbrella of the American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD), could benefit from this study. NASPE, the professional body for physical educators, sets the national education standards for physical educators and strongly advocates against elimination of physical education classes at the national, state, and local levels. AAHPERD publishes a number of professional journals that provide members with an opportunity to contribute to the advancement of knowledge in the field of physical education. One of the goals of the American Alliance for Health, Physical Education, Recreation, and Dance (2013) is to disseminate member research through scientific congresses, conferences, and published materials. In 2014 NASPE and the other suborganizations under AAHPERD unified into one new organization; AAHPERED changed its name to Society of Health and Physical Educators (SHAPE America). Another organization that can benefit from this research is the American Heart Association (AHA). The AHA, along with NASPE, produces the *Shape of the Nation* report. The AHA and AAHPERD annually sponsor Jump Rope for Heart and Hoops for Heart, two programs which seven million children participate in every year during physical education class (American Alliance for Health, Physical Education, Recreation, and Dance, 2014). The AHA is devoted to fight heart disease and stroke (American Heart Association, 2013). The AHA uses research to develop advocacy positions. With

increased PA lessening the risk for heart disease and stroke, any valid and reliable research that can be used for advocacy positions in these areas would be useful.

Policy Makers and Physical Educators

Policy makers, such as state and federal legislators (national, state, and local boards of education) and physical educators could all benefit from this research. Federal legislators and the Office of the Secretary of Education pass laws, set regulations, and designate funds for education. Any research in the area of physical education that would be useful when decisions are being made would be significant. State legislators and state boards of education have a large amount of influence on physical education programs (J. A. Carlson et al., 2013). These legislative bodies mandate physical education requirements, provide exemptions from physical education, set state standards in physical education, and, therefore, strongly influence how important physical education is within each particular state. Research on physical education can help these legislative bodies pass legislation that support physical education. Physical educators are strong advocates for the profession at the district level. Current research is useful for these individuals who are fighting against the elimination of physical education in their own districts.

Organizations such as SHAPE America and the AHA advocate for increased PA. Le Masurier and Corbin (2006) felt quality physical education classes taken as a child can promote lifelong fitness as an adult. Combined with the current state of PA levels of Americans, health issues connected with physical inactivity, and the national and state legislative decisions that affect physical education, there is a clear need for this study. Professional organizations, policy makers, and physical educators benefit when new research is added to fill the gaps.

Summary

Sedentary lifestyles are becoming more common for many people in America. Over time, physical inactivity increases the risk of sickness and disease and lowers life expectancy (American College of Sports Medicine, Nike, & International Council of Sport Science and Physical Education, 2012). PA habits, both healthy and unhealthy, established as a college student can be carried into life after college. Many times, components of the PA habits that are established during college were learned in physical education classes in high school. When school districts eliminate physical education to save money or make more time for other subjects, less time, if any time at all, is spent teaching PA habits that will be needed throughout life to facilitate improved health status.

This research examined the relationship between the number of years of physical education that college students receive in high school and their current PA habits. The study was completed at a private liberal arts university located in the Midwest. The representative sample included full-time traditional college freshmen. The research participants completed an online survey that utilized the short form of the IPAQ. The IPAQ measures PA levels in individuals. The results of this study could be useful to professional bodies, policy makers, local school districts, and physical educators. Understanding how to improve the PA habits of individuals may help deal with the current trend toward physical inactivity in America. Chapter 2 includes a review of the relevant literature for this study.

CHAPTER TWO: REVIEW OF THE LITERATURE

Physical activity (PA) and physical education have been widely studied. Studies on PA (Brunet & Sabiston, 2011; Egli, Bland, Melton, & Czech, 2011; Martin, 2012) and physical education (Hill & Quam, 2003; Pate et al., 2011; Timpka, Petersson, Rylance, Kedza, & Englund, 2012) have been completed from many different perspectives. Several studies have also examined the relationship between physical education and PA motivation and PA experiences later in life (O'Rourke, 2011; Trudeau, Laurencelle, & Shephard, 2004), but gaps do remain in the literature. This proposed study examined the relationship between the number of years of physical education students receive in high school and the traditional college freshmen's current level of PA. The primary purpose of Chapter 2 is to focus on both historical and current scholarly literature related to the proposed study. Research surrounding the proposed study was examined under four major topic areas. These four topic areas include PA, physical education, motivation, and the measurement of PA. Scholarly information obtained for the review of literature was found in professional journals, publications from professional organizations, national assessment reports on PA and physical education, and textbooks.

Physical Activity

The definition of PA has not changed over the last three decades. Caspersen, Powell, and Christenson (1985) defined PA as any movement of the body produced by the skeletal muscles that requires energy to be used. The World Health Organization (2013) defined PA the same. What has changed over the last four decades are the recommendations for PA guidelines for individuals to follow. Currently, exercise scientists categorize PA by type and intensity (Institute of Medicine of the National

Academies of Science, 2013). The three intensity categories commonly used are light PA, moderate PA, and vigorous PA (United States Department of Agriculture, 2013; United States Department of Health and Human Services, 2008). A fourth classification is used for individuals who do not participate in PA. These individuals are considered to be sedentary or inactive (United States Department of Health and Human Services, 2008). Moderate and vigorous PA levels are considered health enhancing PA that results in many health benefits (Institute of Medicine of the National Academies of Science, 2013).

PA intensity can also be measured in metabolic equivalents (METs). One MET equals the amount of energy expended at rest (American College of Sports Medicine, 2014). Table 1 displays the intensity categories of PA and their relationship to METs.

Table 1

Metabolic Equivalents (METs)

Physical activity level	METs
Physical inactivity/sedentary	0 to 1.1
Light physical activity	1.1 to 2.9
Moderate physical activity	3.0 to 5.9
Vigorous physical activity	Greater than 6.0

Note. Adapted from *2008 Physical Activity Guidelines for Americans,* by United States Department of Health and Human Services, 2008. Retrieved from http://www.choosemyplate.gov/physical-activity/what.html

When using METs to measure energy expended, two important concepts must be understood. First, different agencies and research classify MET levels and their related PA intensity levels a little differently, although all are fairly consistent. The United States Department of Health and Human Services' (2008) classifications, shown in Table

1, represent one position on METs. Secondly, it should be understood that the use of METs to measure intensity of PA can be misleading in some cases. Older and/or unfit individuals can be in the moderate and vigorous categories at a lower MET than a younger and/or fit individual (Institute of Medicine of the National Academies of Science, 2013).

The purpose of this section of the literature review is to examine the recommended guidelines for PA participation, the three intensity categories of PA, as well as physical inactivity, effects of physical inactivity and benefits of PA on the body, and the PA habits of Americans. This section also specifically examines the PA habits of college students.

Guidelines for Physical Activity

Guidelines from the major professional organizations for PA participation have changed over the past 40 years. The debate over how much PA, intensity levels of PA, and type of PA to best improve health status has led to different recommendations from the different professional organizations (Blair, LaMonte, & Nichaman, 2004). Some of the inconsistencies between PA recommendations exist due to uncertainties of biomedical science, methodological differences between research, and the specific focus of the different groups making the recommendations (Blair et al., 2004). The inconsistencies and debate have led to several leaders in the area of PA to publish slightly different recommendations. Blair et al. (2004) found that PA guidelines have been published by The American College of Sports Medicine (ACSM), American Heart Association (AHA), Centers for Disease Control (CDC), which is operated by the United States Federal Government, and The Institute of Medicine.

The ACSM has been a consistent leader in PA recommendations. The ACSM first published specific PA recommendations in 1975 and has updated these recommendations several times since (Blair et al., 2004). The most current PA recommendations for adults by the ACSM were released in 2011 and provide guidelines in four categories (Garber et al., 2011): aerobic exercise, muscular strength and endurance exercise, flexibility exercise, and neuromotor exercise.

Early recommendations are different than current recommendations. Early recommendations by the ACSM in the mid 1970s, based on research current at the time, put an emphasis on higher intensity exercises (Blair et al., 2004). High intensity exercises can also be classified as vigorous exercise. As research methodology changed, so did the recommendations. Blair et al. (2004) found that research prior to the ACSM's first recommendations in 1975 concluded that the greatest improvements in fitness were as a result of high intensity exercises. This is still true today when examining current recommendations from the United States Department of Health and Human Services (2008), but research done in the late 1980s and early 1990s found that moderate intensity PA can also lead to substantial improved health status (Blair & Connelly, 1996). These studies in the late 1980s and early 1990s started to create a paradigm shift from recommendations centered on vigorous intensity, performance-related fitness to more moderate intensity, health-related recommendations (Blair et al., 2004).

This paradigm shift was evident by the new recommendations that began to be released by other organizations. In 1992, the AHA released updated recommendations in their position statement in which Fletcher et al. (1992) stated that low to moderate intensity exercise can have health benefits when performed regularly. The position

statement also stated that dynamic exercise of the large muscle groups for 30 to 60 minutes, three to four days a week, is recommended for health promotion (Fletcher et al., 1992). In 1995, the ACSM and the CDC released updated recommendations aligned with the paradigm shift. The ACSM and the CDC recommended that adults participate in at least 30 minutes of moderate intensity physical activity regularly (Pate et al., 1995). In 2005, the IOM recommended that adults get at least 60 minutes of daily moderate PA or 30 minutes of vigorous PA (Institute of Medicine of the National Academies of Science, 2005). Although both ACSM/CDC's and IOM's recommendations demonstrate the benefits of moderate PA, the IOM report called for twice as much time at 60 minutes. Blair et al. (2004) found that the IOM report underestimated the health benefits of 30 minutes of moderate PA, leading to a recommendation of 60 minutes. The paradigm shift in the 1990s towards a focus on moderate intensity PA is still in place in the most current PA recommendations.

In 2008, the United States Department of Health and Human services released their most current PA guidelines:

- For ample health benefits, adults should complete 150 weekly minutes of moderate PA or 75 weekly minutes of vigorous PA, or an adequate combination of both.
- For extensive health benefits, adults should complete 300 weekly minutes of moderate PA or 150 weekly minutes of vigorous PA, or an adequate combination of both.
- Adults should complete muscular strength and endurance activities involving the major muscle groups at least two days a week.

Some of the most current PA recommendations for adults were published by the ACSM in 2011. The key PA recommendations from the ACSM include the following guidelines:

- At least 150 minutes of moderate intensity cardiorespiratory exercise each week, which can be broken up into a combination of moderate and vigorous sessions of at least 10 minutes at a time;
- two to three days of resistance training each week;
- two to three days of flexibility training each week;
- two to three days of neuromotor exercise each week; and
- sedentary behavior should be avoided even when the other PA recommendations are met. (Garber et al., 2011)

The most current PA recommendations from the American Heart Association (2013) are very similar to the PA recommendations of the most current ACSM position. The American Cancer Society's most recent PA recommendations are also similar to the ACSM (American Cancer Society, 2012). Two newer emphases in both the American Heart Association and ACSM recommendations are that PA sessions can be broken into segments of 10 to 20 minutes and individuals who meet the PA guidelines still need to avoid sedentary behavior during other times when PA is not taking place (American Heart Association, 2013; Garber et al., 2011). Sedentary activities, such as watching television and other digital screen-based activities, have been linked to numerous health issues (Ingelsson, Arnlov, Riserus, Michaelsson, & Byberg, 2009; Katzmarzke, Janssen, & Ardern, 2003).

Physical Inactivity

Physical inactivity can also be known as sedentary behavior. Physical inactivity is defined as PA that involves very little additional activity beyond that of sleeping (Institute of Medicine of the National Academies of Science, 2013). The United States Department of Health and Human Services (2008) stated that people who are physically inactive participate in no activity beyond what is needed to perform their daily activities. Some examples of physical inactivity include sitting and watching television or other forms of screen-based entertainment, and lying down (American Cancer Society, 2012; Institute of Medicine of the National Academies of Science, 2013).

Besides sleeping, resting, and recovering from illnesses or injury, physical inactivity should be avoided. Physical inactivity has been connected to multiple health risks. One of those health risks is shortened life expectancy (Katzmarzyk, 2006; Katzmarzyk et al., 2003; Matthews et al., 2012). A meta-analysis of over 60 studies that examined physical inactivity and mortality determined that physical inactivity is independently associated with an increased risk of mortality (Katzmarzyk et al., 2003). One independent study of Canadian citizens concluded that physical inactivity can shorten life expectancy by about seven months in males and one year in females (Katzmarzyk, 2006).

Sedentary behavior can even be a health risk for individuals who do partake in some levels of moderate or vigorous PA. Matthews et al. (2012) found that even individuals who report some levels of moderate to vigorous PA, but watch higher levels of television have a greater risk of shorted life expectancy, due to conditions such as cardiovascular disease. This study demonstrated that even individuals who are physically

active should still be concerned with the amount of time they spend participating in screen-based sedentary activities. Another study using health data from 2008 concluded that 6 to 10% of the major non-communicable diseases worldwide are related to physical inactivity, and life expectancy in the United States is reduced by about one year due to physical inactivity (Lee et al., 2012). When examining physical inactivity one must examine the literature even further to see what is exactly causing decreased life expectancy. Heart disease, cancer, and diabetes are three of the top causes of death in the United States (Centers for Disease Control and Prevention, 2013).

There are many factors that contribute to heart disease. Research has found physical inactivity to be one of those factors (American Heart Association, 2013; Lee et al., 2012). The American Heart Association (2013) stated that physical inactivity increases the risk of heart disease due to decreased blood circulation. Lee et al. (2012) found that an estimated 6.7% of all coronary heart rate deaths in the United States could be eliminated if individuals became physically active. In 2009, coronary heart disease killed about 385,000 people (Kochanek, Xu, Murphy, Minino, & Kung, 2011). Using the data from Lee and colleagues and the national statistics on coronary heart disease, it can be estimated that about 26,000 Americans die every year of coronary heart disease due to physical inactivity.

Like heart disease, there are multiple factors that can contribute to type 2 diabetes, including physical inactivity being one of the factors (Ingelsson et al., 2009; Lee et al., 2012). Research conducted by Ingelsson et al. (2009) found that physical inactivity is a key contributor to insulin resistance, which can eventually lead to type 2 diabetes. Another study conducted by Lee et al. (2012) found that 10% of all type 2 diabetes cases

worldwide can be linked to physical inactivity. Breast and colon cancer have also been connected to physical inactivity (Lee et al., 2012). The latest estimates from the American Cancer Society (2014) predicted that colon cancer will be the third leading cause of death among males and females and breast cancer will be the second leading cause of death among females in 2014. Many more individuals beyond those who die will also be diagnosed with breast or colon cancer.

With the high number of individuals who will experience health issues such as heart disease, cancer, type 2 diabetes, and/or shortened life expectancy, understanding the relationship between physical inactivity and these conditions is important. Individuals who choose to lower their health risks and participate in PA will be physically active within one or more of the three classified PA categories. The next section of the literature review briefly examines the three PA categories and their health benefits and risks.

Light Physical Activity

Light PA is the lowest level of PA. The United States Department of Agriculture (2013) defined light PA as PA that does not make your heart beat much faster than normal. Light PA is activity that people participate in on a daily basis to perform various tasks. Light PA can be done on the job, at home, or in an individual's free time. Examples of light PA include walking slowly and light household chores (Institute of Medicine of the National Academies of Science, 2013). With the early PA recommendations in the 1970s focusing only on the health benefits of vigorous PA, light PA was thought to have no health benefits in many scientific reports and official recommendations (Institute of Medicine of the National Academies of Science, 2013).

Research has now confirmed that individuals who are sedentary or inactive and replace this inactivity with just light PA will see some health benefits, even if these individuals continue not to engage in moderate or vigorous levels of PA (Grontved & Hu, 2011; Matthews et al., 2012).

Several studies have demonstrated this. In a meta-analysis completed by Grontved and Hu (2011) it was demonstrated that individuals who watch at least two hours of television a day increase their likelihood of developing fatal cardiovascular disease, type 2 diabetes, and lower life expectancy. These risks increased as the amount of time watching television increased. Replacing television time, even with light PA, can decrease these risks. A study by Matthews et al. (2012) also examined television viewing and overall sitting time. Their research found that individuals are at an increased risk of heart disease and cancer when they watch three to four hours of television a day; those risks increase significantly when they watch seven or more hours of television a day (Matthews et al., 2012). When sitting time instead of television viewing was examined by Matthews and colleagues, the results were very similar. Individuals who watched seven or more hours of television a day and lowered that amount to three or four by replacing it with some light PA reduced health risks. This positive health trend would continue if television viewing time was reduced even more.

An older study demonstrated the same results. Katzmarzyk, Church, Criag, and Bouchard (2009) found that high amounts of any sitting time were positively associated with annual death rates in the various age categories, meaning high amounts of sitting time causes higher rates of mortality and is also associated with cardiovascular disease. This study was important because it suggested that limiting sitting time can lead to

improved health status, even when sitting time is replaced by light PA. Individuals who replace sedentary activities with light PA will still not meet the current recommended PA guidelines set by the ACSM or the AMA, which recommends moderate and/or vigorous PA. Moderate and vigorous PA is recommended due to the substantial health gains that can be achieved (Garber et al., 2011; Pate et al., 1995).

Moderate and Vigorous Physical Activity

The second and third levels of PA are moderate and vigorous PA. Moderate PA is defined as PA that makes your heart beat faster than normal, and you can talk but not sing (United States Department of Health and Human Services, 2008). Examples of moderate PA are activities that require the effort of a brisk walk, push-mowing the lawn, leisurely bicycling, roller skating, and canoeing (American Cancer Society, 2012). Vigorous PA is defined as PA that increases the heart rate significantly and an individual cannot say more than a few words without pausing for a breath (United States Department of Health and Human Services, 2008). Examples of vigorous PA are heavy manual labor, running, swimming, circuit weight training, and aerobic dance (American Cancer Society, 2012).

The current PA recommendations from the ACSM call for 150 minutes of moderate PA or 75 minutes of vigorous PA each week, or an adequate combination of both. Meeting current PA recommendations can provide many health benefits as well as a few health risks (Garber et al., 2011; Institute of Medicine of the National Academies of Science, 2005). Some of the health risks found by Institute of Medicine of the National Academies of Science (2005) include injuries to muscles, bones, and joints. Garber et al. (2011) found that these musculosketal injuries were the most common.

Cardiac events are another risk of PA, especially when individuals participate in high intensity activities that their bodies are not used to (Garber et al., 2011; Institute of Medicine of the National Academies of Science, 2005). Hypothermia due to physical activity outside, dehydration, and the female athlete triad are three more health risks of high intensity PA (Institute of Medicine of the National Academies of Science, 2005). Understanding these risks will allow individuals to take proactive steps to reduce these risks while participating in PA. Even with these risks, the health benefits of moderate and vigorous PA far outweigh the health risks.

There are many health benefits when individuals participate in moderate or vigorous PA. Some of these include increased cardiovascular and muscular fitness (Garber et al., 2011), healthier body mass index (BMI; Katzmarzke et al., 2003; Sharpe, Granner, Hutto, Ainsworth, & Cook, 2004), and the reduction in risks for non-communicable diseases, such as heart disease and type 2 diabetes (Lee et al., 2012). Determining what specific baseline dose of PA to recommend for the increased health benefits has been difficult, but research has found that more is better and PA in the moderate category can provide substantial health benefits, whereas PA in the vigorous ranges seems to provide the greatest health benefits (Blair et al., 2004; Garber et al., 2011).

One research study found that more individuals who just meet the ACSM/CDC PA recommendations, which call for 30 minutes of moderate PA five days a week or three days of vigorous PA, were more likely to have a higher body mass index than those who meet the more intense IOM recommendations (Sharpe et al., 2004). Nearly 30% of obese individuals and 37.5% of overweight individuals in the study reported meeting the

weekly ACSM/CDC recommendations, while only 8% of obese individuals and 9% of overweight individuals reported meeting the more intense IOM recommendations (Sharpe et al., 2004). A high body mass index is associated with excess adiposity, which is connected to premature mortality (Katzmarzke et al., 2003). Examining both of these studies seems to support the assertion that more PA is better to achieve maximum health gains.

Not all individuals will be able to be physically active at a vigorous pace, and the health benefits of moderate PA should never be underestimated. More may be better, but moderate PA has been shown to create substantial health benefits (Blair et al., 2004; Garber et al., 2011). Education on proper PA habits and physical examinations to reduce the risks of moderate or vigorous PA should be included as strategies that individuals can use when completing moderate and vigorous PA (Garber et al., 2011). The next section of the literature review examines the current PA habits of American adults.

Physical Activity Habits of American Adults

One of the most comprehensive reports on America's health status is *Healthy People*. First released in 1990 and then every ten years, *Healthy People* gathers data from a diverse group of individuals and organizations to report on the current health status of Americans and uses the collected data to create health objectives and provide recommendations for the next ten years (United States Department of Health and Human Services, 2011). The most current report, *Healthy People 2020,* was released on December 2, 2010, and provides a detailed overview of the PA habits of Americans. In 2011, some of the PA data was updated in *Healthy People 2020.* The most current PA data from *Healthy People 2020* will be reported on.

Following are some of the key data findings from the United States Department of Health and Human Services (2013) on the PA habits of American adults:

- In 2011, 31.6% of adults engaged in no leisure time activity; the percentage of adults breaks down to 33.1% females and 29.8% males.
- In 2011, 48.8% of adults met the current aerobic PA guidelines of 150 weekly minutes of moderate PA or 75 weekly minutes of vigorous PA.
- In 2011, 33.1% of adults completed 300 weekly minutes of moderate aerobic activity or 150 weekly minutes of vigorous aerobic activity.
- In 2011, 24.2% of adults completed muscular strength and endurance activities two or more days per week.
- In 2011, 20.8% of adults completed the recommended amounts of aerobic and muscular strength and endurance activities.

The above data also confirmed that males, Whites, and individuals with higher levels of education participated in greater amounts of aerobic and muscle strengthening PA, were more likely to meet the current PA recommendations (United States Department of Health and Human Services, 2013), and it was also found that the PA habits of American adults have slightly moved in a positive direction over the last four years when examining the key data presented above. The slightly positive move in the PA habits of American adults is a promising trend if it continues; however, the data reveals that many individuals are not physically active each week and do not meet current PA guidelines set by the various professional organizations, and are thus at a higher risk of diseases and conditions shown to be connected to physical inactivity. *Healthy People*

2020 also broke down PA data by age groups. One of those subgroups was individuals in the 18- to 24-year-old range.

Physical Activity Habits of College Students

The PA habits of American college students were examined from two perspectives. First, individuals within the 18- to 24-year-old range were examined. This data, *Healthy People 2020,* provided by the United States Department of Health and Human Services (2013) does not specify whether these individuals are college students or not. Secondly, data from the most current National College Health Assessment (NCHA) survey were examined. The American College Health Association (ACHA) collects data every semester using the NCHA survey on a variety of health issues related to college students. This data, which can be accessed from the ACHA website, can then be used by professionals for a variety of research and educational reasons. The ACHA has been collecting this data since the spring of 2000 (American College Health Association, 2013). The most current NCHA data was collected during the spring of 2013. A third independent study on college student PA was also examined.

Healthy People 2020. *Healthy People 2020* published PA data for individuals who fall within the traditional college age of 18 to 24 years old. It is not known how many of these individuals are students enrolled in college. The following are some of the key data findings as to 18- to 24-year-old age range from the United States Department of Health and Human Services (2013):

- In 2011, 23.2% of 18 to 24 years olds participated in no leisure time PA.
- In 2011, 61.2% of 18 to 24 years olds met the current aerobic PA guidelines of 150 weekly minutes of moderate PA or 75 weekly minutes of vigorous PA.

- In 2011, 45.1% of 18 to 24 year olds completed 300 weekly minutes of moderate aerobic activity or 150 weekly minutes of vigorous aerobic activity.
- In 2011, 32.9% of 18 to 24 year olds completed muscular strength and endurance activities two or more days per week.
- In 2011, 30.2% of 18- to 24-year-olds completed the recommended amounts of aerobic and muscle strengthening activities.

When comparing data within *Healthy People 2020,* individuals in the 18- to 24-year-old category were more physically active than individuals in other age categories (United States Department of Health and Human Services, 2013).

National College Health Assessment. In the spring of 2013, the American College Health Association collected detailed health data on a variety of topics, including PA, from undergraduate students who represented 172 public and private and two-year and four-year higher education organizations across the United States. The 172 colleges and universities were representative of region and size, located in small rural areas to large metropolitan areas, and represented all categories on the Carnegie classification system. Over 96,000 students completed the NCHA, which included 65% female and 33.8% male respondents (American College Health Association, 2013). The NCHA participants were 90.7% full-time students and 8.7% part-time students. The ethnic breakdown of the NCHA included 67.4% Whites, 15.2% Hispanics, 12.1% Asians, 7% Blacks, 4.3% biracial or multiracial, 1.8% American Indian, and 3.3% other (American College Health Association, 2013).

The NCHS asked three key PA questions based on the respondents previous seven days of PA. The first question looked at moderate PA, the second question examined

vigorous PA, and the last question examined strength training exercises (American College Health Association, 2013). The NCHS found that 53.3% of college students participated in at least 30 minutes of moderate PA two or less days per week and 67.5% of college students participated in 30 minutes of vigorous PA two or less days per week (American College Health Association, 2013). The largest percentage of these students participated in no moderate or vigorous PA during the week. The NCHS also found that 72.4% of college students participated in eight to ten strength training exercises two or less days per week, with nearly half of all college students participating in no strength training exercises each week (American College Health Association, 2013). This data substantiated that many college students do not meet the recommended current PA guidelines set by the ACSM, IOM, or the AHA for aerobic and resistance activity. The more current NCHS data corroborated that the number of college students reported in the meta-analysis by Xiaofen et al. (2005), which was in the 40 to 50% range of being physically inactive, has improved. This move in a positive direction towards increased PA would also be in agreement with the data reported over a four-year period from *Healthy People 2020* (United States Department of Health and Human Services, 2013).

An independent study in 2010 examined the PA habits of undergraduate Black college students at a small rural historical Black college. This study had 106 participants chosen through a convenience sample and found that 35.8% of the students participated in no vigorous PA and 22.6% of the students participated in no moderate PA (Kemper & Welsh, 2010). Kemper and Welsh also found that an even greater percentage of students did not meet the recommended quantity of moderate and vigorous PA. The two national assessment reports on PA and the independent study on the PA habits of Black college

students confirmed that many college students are physically inactive. This physical inactivity will put them at risk for the multiple health risks that have been connected to physical inactivity.

Healthy People 2020 and the NCHA reports did not report on why people choose to be physically active. Further research on the PA habits of college students and what factors may be related to why college students choose to be physically active will help fill the void. One of these factors could be secondary physical education.

Physical Education

Physical education has a lengthy history in the United States. Physical education has been part of the American school curriculum since the beginning of the 1800s in one form or another (Pate et al., 2011). Gymnastics was a central part of early physical education classes, due to the influence from the Germans and Swedes (Institute of Medicine of the National Academies of Science, 2013). In fact, it was in Germany where school-based physical education had its beginnings in the latter half of the 1700s (Cazers & Miller, 2000). In 1825, Charles Beck became the first physical education teacher in the United States (Siedentop, 2009). With urbanization and the development of sport within the United States, the focus of physical education began to change (Siedentop, 2009). The National Education Association first recognized physical education as a curriculum field in 1891 (Siedentop, 2009). Movement and fitness education also became the focus of physical education in these early days (Institute of Medicine of the National Academies of Science, 2013).

Throughout the 1900s, physical education continued to take shape. Events such as World War I, World War II, the Great Depression, and intellectual debate within the

profession helped form the physical education profession (Siedentop, 2009). Professional organizations in the physical education area also began to emerge with the establishment of the Association for the Advancement of Physical Education in 1903, which would later be identified as the American Alliance of Health Physical Education Recreation and Dance (AAHPERD) in 1979 (Siedentop, 2009). AAHPERD is the largest professional organization for physical educators with over 20,000 members (American Alliance for Health, Physical Education, Recreation, and Dance, 2014a). In the latter half of the 20th century, physical education continued to change as various curriculum models were added. During the last decade many physical education programs have been eliminated or reduced due to budget restraints and the passing of No Child Left Behind in 2002 (Institute of Medicine of the National Academies of Science, 2013). In the fall of 2013, members of AAHPERD voted to reorganize and change the professional organization's name to the Society of Health and Physical Educators, otherwise known as SHAPE America (American Alliance for Health, Physical Education, Recreation, and Dance, 2014a). The purpose of the name change was to focus on a standard of excellence in the health and physical education field and influence policy in that arena.

The purpose of this section of the literature review was to define the purpose and goals of physical education, provide a current status of physical education within the United States, describe the benefits and need for physical education, and discuss the research on physical education and experiences later in life.

Purpose of Physical Education

Physical education has evolved over the years, but one emphasis that has stayed the same is the focus on physical fitness. During the early years when gymnastics was

the focus of the curriculum, physical fitness was strongly emphasized (Cazers & Miller, 2000). Standard 3 in the most recent national physical education standards released in 2013 by the American Alliance for Health Physical Education, Recreation, and Dance (AAHPERD) states, "The physically literate individual demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness" (2013c, para. 11). Another purpose of physical education is to promote educational objectives through PA; physical education is uniquely positioned to teach students the skills that will be needed to be independently active as adults (Le Masurier & Corbin, 2006). Physical education is also uniquely connected to the whole child approach. The National Association of Sport and Physical Education (2011) stated that physical education is vital in the education of the whole child.

One of the organizations supporting the whole child approach is ASCD. In 2007, ASCD launched a new whole child initiative. One of the six tenets of this approach is "each student enters school healthy and learns about and practices a healthy lifestyle" (ASCD, 2014b, para. 5). ASCD stated that physical education schedules, curriculum, and instruction should encourage healthy habits by teaching lifetime fitness while fostering knowledge, attitudes, skills, and behaviors in this area (ASCD, 2014a). The most current overall goal of physical education aligns with the ASCD tenet: "The goal of physical education is to develop physically literate individuals who have the knowledge, skills, and confidence to enjoy a lifetime of healthful physical activity" (American Alliance for Health, Physical Education, Recreation and Dance, 2013b, para. 1). The Institute of Medicine of the National Academies of Science (2013) stated that physical education is "a planned sequential K-12 standards-based curricula and instruction designed to develop

motor skills, knowledge, and behaviors of healthy active living, physical fitness, sportsmanship, self-efficiency, and emotional intelligence" (p. 18).

Whether it is ASCD, SHAPE America, or other stakeholders in the physical education field, the purpose remains virtually the same: develop individuals who promote fitness from within and who leave high school with the ability, cognitive knowledge, and behaviors to enjoy PA throughout their lives. The purpose of physical education can best be understood by examining the five new national standards, which are found in Table 2. The national physical education standards provide guidance to individual states that mandate their own physical education standards and physical educators.

Table 2

National Standards for K-12 Physical Education

Standard 1	The physically literate individual demonstrates competency in a variety of motor skills and movement patterns.
Standard 2	The physically literate individual applies knowledge of concepts, principles, strategies and tactics related to movement and performance.
Standard 3	The physically literate individual demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness.
Standard 4	The physically literate individual exhibits responsible personal and social behavior that respects self and others.
Standard 5	The physically literate individual recognizes the value of physical activity for health, enjoyment, challenge, self-expression and/or social interaction.

*Note***.** Adapted from American Alliance for Health, Physical Education, Recreation and Dance. (2013a). *National standards for K-12 physical education*. Retrieved from http://www.aahperd.org/whatwedo/upload/National-Standards-Flyer.pdf Reprinted with permission from the American Alliance for Health, Physical Education, Recreation and Dance, 1900 Association Drive, Reston, VA 20191, www.aahperd.org

The five new national standards incorporate cognitive, affective, and psychomotor educational domains. The incorporation of the three educational domains allows for another connection to the ASCD whole child approach. The five new national standards align with the main goal of AAHPERD, to develop physically literate individuals who practice a lifetime of PA. Even with a national professional organization providing

national standards to guide physical educators and researched-based recommended weekly minute amounts of physical education at all grade levels, the status of physical education varies greatly among local school districts and states.

Status of Physical Education in the United States

Ultimately, physical education requirements are established by each individual state. No federal law currently requires physical education in school, and no federal incentives are offered to schools or states that require physical education (National Association for Sport and Physical Education & American Heart Association, 2012). NASPE does recommend and advocate for physical education guidelines that each state can follow. The current guidelines from NASPE recommend that elementary schools provide 150 minutes of instructional physical education per week and middle and high schools provide 225 instructional minutes of physical education per week (American Alliance for Health, Physical Education, Recreation and Dance, 2014b). Whatever physical education guidelines are set by each state, local school districts are left many times to decide whether to implement the minimal guidelines or go beyond.

No Child Left Behind (NCLB) has had a major effect on physical education programs across the country. NCLB linked federal funding to a school district's adequate yearly progress in reading and mathematics. Due to this, a scenario has been created in some school districts that view physical education as a nonessential subject (Trost & Mars, 2010). This assertion was confirmed in 2007 when an independent nonprofit organization called the Center for Education Policy completed a comprehensive evaluation of 349 school districts across the nation and found that 62% increased time spent on reading and math and 44% reduced time spent in the areas of social studies,

physical education, art, and music (Center on Education Policy & McMurrer, 2007). The Institute of Medicine of the National Academies of Science (2013) also found that many school districts have reduced physical education due to the secondary effects of NCLB. Lack of funding has also caused some school districts to eliminate physical education (Cook, 2005; National Association for Sport and Physical Education, 2013). A parent teacher association (PTA) representative in one Oregon school district stated that fundraisers were previously used to purchase extras for the school; but the budget was in such terrible shape, the PTA was raising money to fund a physical education teacher for the school year (Cook, 2005).

The most comprehensive report on the current status of physical education across America is the *Shape of the Nation Report,* which examines the status of physical education in all 50 states and the District of Columbia. The report is compiled by the National Association for Sport and Physical Education and the American Heart Association. *Shape of the Nation* was first released in 1987, and the most current version was released in 2012. The data are collected from the physical education coordinators in all 50 states and the District of Columbia through an online survey and follow-up phone calls and emails to create individual state profiles. To ensure accuracy, the National Association for Sport and Physical Education and the American Heart Association release the report to each state for confirmation of the information within; corrections are made, if necessary, before the official release to the public. Some of the key aspects of the report examine physical education expenditures, mandates and time requirements, substitutions, exemptions and waivers, standards and assessment, and teacher certification requirements. The report details findings at all K-12 levels, but, for the

purposes of this literature review, most of the findings presented focus on high school physical education. In the data analysis, the District of Columbia is counted as a state, so all reported percentages and state numbers are out of 51 states.

Expenditures

Physical education teachers rely on various types of equipment to implement their lessons. Palmer and Bycura (2014) found that one of the identified barriers to PA outside of the school environment is broken or inadequate equipment. Although Palmer and Bycura referred to PA outside of school, Matanin and Longmuir (1996) stated that small or no budgets for physical educators make it challenging to create motivating units. These are units that could promote PA within the physical education classroom. The National Association for Sport and Physical Education and American Heart Association (2012) found that the annual median physical education budget is $764.00 and that high school physical education programs have the largest budgets at $1,370.00, followed by middle schools at $900.00, and elementary schools at $460.00. Overall, 61% of physical educators have budgets under $1,000.00 and 15% have budgets over $2,000.00. It was also found that grants and parent teacher organizations provide some of the physical education funding (National Association for Sport and Physical Education & American Heart Association, 2012).

Mandates and Time Requirements

States have a variety of mandates and time requirements for physical education. Eighty-six percent, or 44 out of the 51 states, require some form of secondary physical education, which was a drop from 46 states in the previous report released in 2012 (National Association for Sport and Physical Education & American Heart Association,

2012). Some states require as little as one semester of high school physical education, while others require physical education all four years. Only three states reported that they require the NASPE recommended 225 minutes a week of instructional physical education time at the secondary level, although it should be noted that only 10 states reported this specific piece of data (National Association for Sport and Physical Education & American Heart Association, 2012). Knowing though that the National Association for Sport and Physical Education and American Heart Association found that only six states require daily physical education from kindergarten to Grade 12, it can be concluded that the majority of states are not meeting the recommended amount of 150 minutes per week of instructional time at the elementary level or 225 minutes per week of instructional physical education time at the middle and high school levels. This conclusion was also confirmed by Perna et al. (2012) who found that only 8.5% of elementary, middle schools, or high schools nationally provide the recommended amount of physical education class time each week.

One of the six states that mandate daily physical education is the state of Illinois (National Association for Sport and Physical Education & American Heart Association, 2012). Illinois, along with Indiana, Michigan, and Wisconsin provided a majority of the sample for this proposed study. Among these four states, Michigan requires the least amount of secondary physical education at one semester or .5 credits; Wisconsin requires three semesters or 1.5 credits of physical education that must be obtained over three school years, and Indiana requires two semesters or 2.0 credits of secondary physical education. This data demonstrates that Illinois would be the only state of these four meeting the recommended amount of 225 minutes of secondary physical education each

week. It must be noted, though, that physical education class time does not always translate into actual physical activity minutes, an important aspect of a quality physical education program (Perna et al., 2012).

Research on the effectiveness of mandates and laws was also completed. Even with mandates, J. A. Carlson et al. (2013) found that many states do not monitor their policies, aside from school self-reports that could be biased. When policies are not monitored by states, an accurate picture cannot be obtained. A study by Perna et al. (2012) examined whether states with specific requirement laws average more physical education minutes per week than states with nonspecific requirements or no laws. These results revealed that states with weekly minute requirement laws for physical education were associated with 27 more minutes of elementary physical education and 60 more minutes of middle school physical education than states with nonspecific laws regarding minutes (Perna et al., 2012). The data on high schools did not demonstrate any significant association, but data analysis was challenging due to lack of variability among respondents (Perna et al., 2012). A complete understanding of the current physical education status cannot be obtained when only examining state mandates or physical education requirements to graduate from high school without first understanding how substitutions, exemptions, and/or waivers can affect the current physical education status in any given state.

Substitutions, Exemptions, and Waivers

More than half of the states allow school districts to provide substitutions and/or exemptions and waivers for physical education credit requirements (National Association for Sport and Physical Education & American Heart Association, 2012). The National

Association for Sport and Physical Education and American Heart Association (2012) found that common substitutions were Junior Reserve Officer Training Corps, interscholastic athletic participation, marching band, cheerleading, and community sports, while common exemptions or waivers allowed were health, physical disability, religious beliefs, and early graduation. Illinois, Indiana, Michigan, and Wisconsin all allow for various substitutions for physical education; Illinois, Michigan, and Wisconsin also provide exemptions and waivers for physical education (National Association for Sport and Physical Education & American Heart Association, 2012). Indiana does not allow for exemptions or waivers for physical education credit.

The overall understanding of physical education requirements change when examining substitutions and exemptions combined with individual state mandates. For example, Illinois does require daily secondary physical education, but allows school districts to provide substitutions if they choose. So a student in Illinois could participate in a marching band for four years and never take a physical education class if the local school district allows for the marching band substitution. Students in Wisconsin can substitute part of their physical education requirements for interscholastic sports participation. Gathering data from individual students is needed to show a more detailed and accurate picture of how much physical education high school students are actually receiving.

Standards and Assessments

Standards guide physical educators in curriculum development. The National Association for Sport and Physical Education and American Heart Association (2012) found that 98% or 50 out of the 51 states (District of Columbia is counted as a state in the

report) have adopted their own state standards in physical education, but only 76% require local districts to actually comply with their state standard. When examining Illinois, Indiana, Michigan, and Wisconsin, all have established state standards in physical education, but Wisconsin does not require local school districts to comply (National Association for Sport and Physical Education & American Heart Association, 2012). Assessments allow physical educators to evaluate the effectiveness of their curriculum and delivery. Twenty-six states require some form of assessment in physical education, which is an increase from 19 states in 2010 (National Association for Sport and Physical Education & American Heart Association, 2012). The National Association for Sport and Physical Education and American Heart Association found that assessment varies from physical fitness testing, knowledge of physical education content, PA participation outside of the classroom, valuing PA, and performance of motor and/or movement skills.

Formal assessments are many times used to issue grades to students. The National Association for Sport and Physical Education and American Heart Association (2012) found that 26 states or 53.1% require that physical education grades be incorporated in the students' grade point average calculation. Nine states require local school districts to collect body mass index (BMI) on each student; seven of these send this data on to their respective state departments of health, and five of these send the BMI information home to parents (National Association for Sport and Physical Education & American Heart Association, 2012). The National Association for Sport and Physical Education and American Heart Association found that between Illinois, Indiana, Michigan, and Wisconsin, only Michigan requires student assessment in physical

education. This is an interesting fact, considering Michigan mandates the smallest amount of physical education at the secondary level among the four states.

Teacher Certification

Most states mandate that physical education teachers be certified; however, certification in each state varies. The National Association for Sport and Physical Education and American Heart Association (2012) found that 90.2% or 46 states require that physical education teachers be licensed at the high school level. Illinois, Indiana, Michigan, and Wisconsin all require their high school physical education teachers to be certified. Over 70% of the states also require teachers to continue professional development to renew certification, but only 19.6%, or 10 states, provide funding for professional development (National Association for Sport and Physical Education & American Heart Association, 2012). The National Association for Sport and Physical Education and American Heart Association also found that 60.8%, or 31 states, support physical education teachers trying to obtain national board certification.

The *Shape of the Nation* report provided a detailed picture of physical education policies at the state level. It did not provide a clear district level view, as exemptions, waivers, substitutions, local budgets, and policies all affect the status of the physical education program. The *Shape of the Nation* report also does not account for the actual amount of time students are engaged in each local physical education program. The Institute of Medicine of the National Academies of Science (2013) stated that the actual amount of local physical education time remains undocumented due to physical education classes that were cancelled or shortened because of assemblies, other school events, or changes in the school schedule. What is clear, though, is that many physical

education programs do not meet the minimum recommended guidelines set by NASPE (National Association for Sport and Physical Education & American Heart Association, 2012). Whether it is lack of budget (Cook, 2005) or NCLB (Trost & Mars, 2010), some physical education programs have faced cuts and these cuts have eliminated or weakened physical education programs across the country. In order for physical education professionals to advocate against these cuts, there must be research-based evidence that confirms the benefits of physical education within the school curriculum.

Benefits of Physical Education

Increased amounts of research continue to verify the benefits of physical education. The National Association for Sport and Physical Education (2013) stated that research demonstrates that physical education makes essential contributions to physical fitness, health, and academic performance, and that reducing physical education programs has a negative impact on the student. These immediate and short-term positive impacts on the student could lead to more sustained long-term impacts. The National Association for Sport and Physical Education (2013) went on to state that physical education can have a positive effect on the nation's economic health. This next section of the literature review examined some of the recent research on physical education and its benefits.

Physical Fitness and Health

One consistent argument for the benefit of physical education has been in the areas of physical fitness and health. Regular PA promotes growth and development and benefits physical, mental, and psychosocial health that contribute to learning (Institute of Medicine of the National Academies of Science, 2013). The educational value of fitness

and exercise, which is a product of a physical education class, began to be accepted and recognized back in the early 20th century (Siedentop, 2009). One health benefit of physical education is the physical activity time that can be obtained during physical education class (Pate et al., 2011). Increased PA that physical education classes can provide is a public health strategy to fight childhood obesity (National Association for Sport and Physical Education, 2013). Research has varied on the actual amount of physical activity time that is provided during physical education classes. One large study collected data on the amount of moderate to vigorous physical activity (MVPA) obtained by middle school students during physical education classes at 24 different middle schools in Southern California (McKenzie, Marshall, Sallis, & Conway, 2000). The research found that students, on average, spent 16.5 minutes of class time, or about 48.5%, in the MVPA zone, and larger classes and females spent less time in the MVPA zone (McKenzie et al., 2000). Another large study on middle school students explored the effects of professional development sessions on how much activity time increased in those teachers' classes. The intervention increased MVPA in the experimental groups in both years of the study, and MVPA levels stayed the same in the control groups (McKenzie et al., 2004). Students in the control groups were in the MVPA zone about 48% of the time, and students in the experimental groups were in the MVPA zone about 52% of the time (McKenzie et al., 2004).

A third smaller study found that 119 boys, all of whom participated in youth sports outside of school, spent 12 minutes or about 40% of physical education class time in the MVPA zone during a 30-minute physical education class (Wickel & Eisenmann, 2007). These studies and other studies demonstrated that, overall, students do not get the

NASPE recommended amount of 50% of class time in the MVPA zone (Pate et al., 2011). Even with students not being in the MVPA zone for the recommended time during physical education classes, students are getting into the MVPA zone for extended periods of time. A study by Pate, Ward, O'Neill, and Dowda (2007) found that 8th, 9th, and 12th grade girls participating in physical education were more physically active over a three-day time period than girls who were not participating in physical education. Girls participating in physical education classes obtained the MVPA zone 12% to 32% more often and were in the vigorous physical activity (VPA) zone 33% to 60% more often (Pate et al., 2007). If no physical education class was provided, then students would have fewer and less ideal opportunities during the school day to get into the MVPA and VPA zones. Physical education has also been found to provide short-term health benefits (Pate et al., 2011).

A study in 2009 examined over 9,000 seventh and ninth graders in California. The study found that students who self-reported at least 20 minutes of exercise in physical education had lower body mass index (BMI) levels (Madsen, Gosliner, Woodward-Lopez, & Crawford, 2009). Individuals with lower BMI have been found to be at a lower risk for health conditions, such as cardiovascular disease and cancer (Katzmarzke et al., 2003). Physical education has also been found to improve mental health (Brosnahan, Steffen, Lytle, Patterson, & Boostrom, 2004). A cross-sectional study examined the affects of PA and physical education attendance on mental health in 1,870 high school students. Brosnahan et al. (2004) found that students who participated in physical education three to five days a week reported to be less sad than students who participated in physical education zero to two days per week. The study also found that

students who participated in higher vigorous levels of PA, strength exercises, and greater amounts of overall PA were less likely to plan suicide than those who participated in the lowest levels of PA (Brosnahan et al., 2004). When students are emotionally and physically healthy, they miss less classes, are less likely to participate in risk behaviors, and perform better in school (National Association of Sport and Physical Education, 2011).

Academic Performance

With the adverse affects of NCLB on physical education programs, researchers have turned their attention to the effect physical education has on academic achievement. Some schools have viewed physical education as secondary to their educational mission, but studies have confirmed that time spent in physical education classes does not harm academic performance, and increased time in physical education may, in fact, improve academic performance (Trost & Mars, 2010). The growing body of evidence linking academic achievement to the PA time that takes place in physical education classes has led the state of Illinois to recommend updated physical education learning standards and enhanced physical education strategies for physical educators. There is now considerable evidence demonstrating the relationship between PA, fitness, and cognitive functioning (Illinois Enhanced Physical Education Task Force, 2013). The Illinois Enhance Physical Education Task Force (2013) stated that the goal of enhanced physical education is to increase the quantity of time students spend in the MVPA zone during class time in order to promote better classroom behavior and promote academic achievement on standardized tests and other class room assessments. Two new learning standards were also recommended by the Illinois Task Force. One of the recommended standards is

23.D, which states, “Describe and explain the structures and functions of the brain and how they are impacted by different types of physical activity and levels of fitness” (Illinois Enhance Physical Education Task Force, 2013, p. 7).

The Illinois Task Force based learning standard 23.D on the current neuroscience research. This neuroscience research examines the effects PA has on the brain. A first of a kind study in Texas, which used data from a representative sample of 2.4 million third through twelfth graders, found that students who were more physically fit were more likely to do well on the state standardized tests, have better school attendance, and receive fewer disciplinary referrals (Texas Education Agency, 2009). The study compared FitnessGram data against standardized test scores, attendance records, and discipline records. All of these students had physical education classes, and the correlations found were between physical fitness and not physical education class attendance, but Bailey (2006) and the National Association of Sport and Physical Education (2011) stated that the physical education class teaches students how to improve physical fitness through PA.

Another study in Massachusetts examined 311 fourth graders at two similar schools with similar physical education curriculums and teachers with 14 years of experience. The researchers compared the amount of physical education time received versus their test scores on the Massachusetts Comprehensive Assessment System (MCAS; Tremarche, Robinson, & Grahm, 2007). The researchers found that the students at the school who received twice as many physical education hours per year achieved significantly higher scores on the English and language arts portion of the MCAS but not significantly higher scores on the math portion of the MCAS test (Tremarche et al.,

2007). A study on 232 ninth graders in Sweden examined correlations between PA levels over four consecutive days and the students' school grades. Two significant correlations were found. Kwak et al. (2009) found that girls who participated in the greatest amount of vigorous PA were associated with academic achievement; for the boys; physical fitness was connected with academic achievement. Kwak et al. did not examine physical education participation, but the previous research discussed supports the notion that physical education can provide time in the vigorous PA zone (McKenzie et al., 2000; McKenzie et al., 2004).

A study by S. A. Carlson et al. (2008) did examine time spent in elementary physical education classes and academic achievement. The S. A. Carlson et al. study analyzed data from 19,173 students in the *Early Childhood Longitudinal Study* in kindergarten through fifth grade. The research found that overall girls who received the lowest amount of weekly physical education had the lowest Item Response Theory (IRT) scores in math and reading, although the lower scores were only at the significant level in kindergarten and first grade for both math and reading, and fifth grade for reading only. There were no significant findings for boys (S. A. Carlson et al., 2008). It was also noted that, overall, increased amount of physical education did not negatively affect academic achievement when no positive significant findings were found (S. A. Carlson et al., 2008). The United States Department of Health and Human Services completed a meta-analysis on 50 studies related to PA, physical education, and academic achievement. Fourteen of these studies examined physical education and academic achievement specifically. Eleven of these studies found positive significant associations between physical education and academic achievement, three found no significant associations,

and none of the studies found a negative association between physical education and academic achievement (Centers for Disease Control and Prevention, 2010).

Academic performance is a benefit of physical education. The Robert Wood Foundation (2009), a research-based organization, found the following academic benefits of physical education:

- Eliminating or reducing physical education for increased classroom time does not improve the academic performance of the students.
- Students who are more physically active usually perform better academically.
- Students who are physically fit are more likely to perform better academically.

Physical education benefits students in the areas of fitness, health, and academic achievement (National Association of Sport and Physical Education, 2011; Robert Wood Foundation, 2009). The next section examines whether or not these immediate- and short-term benefits carry over into experiences later in life.

Physical Education and Experiences Later in Life

Making a lifelong impact on a student is an effort that many educators strive to achieve. Promoting lifelong PA habits and healthy choices is one area of emphasis where physical educators can make this lifelong impact (American Alliance for Health, Physical Education, Recreation and Dance, 2013b). As people age, though, the research has found that the amount of PA they regularly participate in steadily declines (Haskell et al., 2007). A number of studies have examined motivation for PA, but few have looked at the long-term effects that physical education has had on future life experiences. The few studies that have examined this have had mixed results. One of these studies examined the

relationship between low performance in physical education classes and increased risk of health impairment during middle age (Timpka et al., 2012).

This study was completed in Sweden. Over 1,700 students who graduated between 1974 and 1976 were followed in a cohort study that lasted over 30 years and used available records on grades received in physical education and municipal data on the number of visits to primary care physicians, hospital stays, and sick days used at work (Timpka et al., 2012). It should be noted that this personal municipal data seemed to be much more readily available to researchers in Sweden than it would be here in America. Timpka and colleagues (2012) did state that the individuals in the sample were contacted and allowed to drop out of the study if they wanted. After data analysis, the researchers concluded that women who received a low grade in physical education had a greater number of primary care physician visits and sick days used (Timpka et al., 2012). There were no relationships between men and women who received high grades in physical education and any of the three identified health impairments used in the study (Timpka et al., 2012).

A study in Finland examined adolescent PA experiences and their effects on adult leisure time PA. Both direct and indirect effects were examined. The study included 4,500 participants aged 25 to 64 (Makinen et al., 2010). The current PA data of the participants was collected by utilizing a 12-month recall questionnaire; questions about their attitudes towards physical education were also included. It should be noted that having such a large time span to recall PA could be a form of response bias (Alreck & Settle, 2004). Makinen et al. (2010) found a direct correlation between adult leisure time activity and greater amounts of exercise as adolescents that was indirectly correlated with

positive opinions towards physical education in highly educated individuals. Participation in competitive sports instead of positive opinions towards physical education had a direct effect on adult leisure time PA in lower educated individuals (Makinen et al., 2010). Lower educated individuals were defined as individuals who spent 12 years or less in school, and highly educated individuals were defined as spending 12 or more years in school within the Finnish educational system (Makinen et al., 2010). Highly educated individuals would qualify as an undergraduate or graduate college student within the American system. This study demonstrated that participation on interscholastic or other competitive sports teams should also be examined when trying to understand the effects physical education may have on adult PA.

Studies have also found no correlation between K-12 PA and adult PA. A study in Australia found no significant correlations between the PA time obtained during primary and secondary school and PA and fitness levels and BMI status 20 years later as an adult (Cleland, Dwyer, Blizzard, & Venn, 2008). This study involved over 6,400 participants who were classified into three categories based on the amount of weekly physical education and sport they received in primary and secondary school. The original data were collected when the participants were school aged and the follow-up data was collected 20 years later when the participants were 26 to 36 years old (Cleland et al., 2008). The follow-up data was collected using the International Physical Activity Questionnaire (IPAQ) survey tool, pedometers, and clinical analysis. Cleland et al. (2008) stated the only significant differences in the study were between the amounts of PA time the participants received while they were school age. The low category received less than 100 minutes per week of elementary PA and less than 150 minutes a week of

secondary PA; whereas, the high category received greater than 150 minutes a week of elementary PA and greater than 190 minutes a week of secondary PA (Cleland et al., 2008). Participants in the high category of this study may not have received the NASPE recommended 225 minutes per week of secondary physical education, but this study did suggest that the amount of time in physical education classes did not affect long-term PA habits, levels of fitness, or BMI status.

These studies looked for relationships between physical education experiences and health status including PA habits many years after the completion of secondary school. The current study examined a more short-term relationship of just a year or two and examined only PA habits. Motivation for PA is another key area that must be understood when completing research on PA habits. These studies on physical education and its connection to later life experiences did not focus on motivation. The next section of the literature review focuses on the "why" factor in an effort to understand why individuals, including college students, are motivated to be physically active.

Motivation

Motivation within the educational context is widely discussed, and a large amount of research has been completed on the topic of motivation across the educational spectrum. Physical educators want to know how they can better motivate their students to be physically active throughout their lives. Brunet and Sabiston (2011) stated that identifying the reasons adults are motivated to be physically active throughout their lives can guide professionals when implementing and promoting strategies to promote PA. Increased PA in physical education is connected to increased intrinsic motivation (Liukkonen et al., 2010), and increased intrinsic motivation in physical education is

connected to such things as the social climate (Garn, Ware, & Solmon, 2011), the students' emotional experiences (Liukkonen et al., 2010), climate of the PE classroom, and the students' perceived ability of themselves (Parish & Treasure, 2003). Several theories on human motivation have been developed; one of the theories is the Self-Determination Theory (SDT).

The SDT was used as the theoretical framework for this proposed study. The SDT was established in the 1980s by researchers Edward Deci and Richard Ryan (1985). The possibility of applying the SDT in physical education could give physical educators the means to guide their students from a psychological condition of "having to" be physically active to a condition of "wanting to" when it comes to a physically active life (Sun & Chen, 2010). Guiding students from a condition of "having to" be physically active to a condition of "wanting to" be physically active involves moving students through the various states of the SDT. These three states are amotivation, extrinsic motivation, and, finally, intrinsic motivation (Perlman, 2011). To understand the SDT, one must ask the following question: What motivates someone to be physically active and engage in exercise? The purpose of this section of the literature review was to discuss the SDT and examine why students are motivated as adults to be physically active in a physical education class. Finally, this section examined why college students choose and/or are motivated to be physically active.

Self-Determination Theory

Research on motivation has a long history. Deci and Ryan (1985) stated that in the 1890s William James was one of the first researchers to discuss motivation. From there, various other theories on motivation developed and eventually led to the

development of the SDT in the 1980s by Edward Deci and Richard Ryan. Ntoumanis and Standage (2009) stated that the SDT is one of the most widely used theoretical frameworks to study motivation in physical education. The SDT provides an explanation for why individuals persist in behaviors (Berghe, Vansteenkiste, Cardon, Kirk, & Haerens, 2014). The SDT allows teachers to move their students from an external motivational state controlled by something, such as a rule or grade, to a motivational state that is intrinsically self-determined by the student (Sun & Chen, 2010).

Various states have been identified within the SDT. The three states of the SDT are (a) amotivation, (b) extrinsic motivation, and (c) intrinsic motivation (Perlman, 2011). Sun and Chen (2010) defined *amotivation* as a state in which the person is neither intrinsically or extrinsically motivated, *extrinsic motivation* as a state regulated by outside factors, and *intrinsic motivation* as a state where motivation comes from the satisfaction and attraction of the activity, rather than any outside factors. Deci and Ryan (1985) stated, "To be truly intrinsically motivated, a person must also feel free from pressures, such as rewards or contingencies" (p. 29). The SDT suggests that all people have three basic needs: the need for autonomy, competence, and relatedness (Kilpatrick et al. 2002). Kilpatrick et al. (2002) defined *autonomy* as an internal focus of control freely chosen by the individual, *competence* as a sense of accomplishment and the awareness of being successful in the tasks completed, and *relatedness* as the fulfillment of attainment from our connection with the social world. Strong links have been found between intrinsic motivation and fulfillment of the need for autonomy and competence in individuals who are intrinsically motivated only for activities that have intrinsic value to them (Ryan & Deci, 2000). Research has demonstrated that an autonomous classroom environment is

one that includes student choice and occasions during class for self-direction (Sun & Chen, 2010). Competence could be the ability to understand how to use fitness equipment and put together a personal workout plan, key components in the development of a physically active lifestyle. Sun and Chen stated that competence is one of the main goals of the education process. The possibility could exist that greater amounts of physical education received in high school encourage students to be more autonomous and competent, therefore participating in greater amounts of PA in college.

As students move into a more autonomous state, they must advance through the various motivational levels of the SDT. Kilpatrick et al. (2002) stated that people advance from low levels of motivation to higher levels of motivation through the process known as internalization. Ryan and Deci (2000) stated that as individuals experience internalization, they begin to experience greater levels of autonomy. Autonomy is a key component of the SDT and intrinsic motivation. Under the component of internalization, individuals initially may not like PA, but after some external condition such as taking a physical education class affects them, they start to participate in regular PA. Eventually, through regular participation in PA, internalization occurs and the individual develops an intrinsically motivated attitude towards PA. Sun and Chen (2010) stated that the possibility of applying SDT in a physical education class could give physical educators the means to guide students from a psychological condition of "having to" be physically active to a condition of "wanting to" when it comes to a physically active life. Berghe et al. (2014) believed autonomously motivated young people are more likely to engage in PA outside of school.

Several strategies have been suggested that could be used to promote PA in physical education within the SDT. Kilpatrick et al. (2002) suggested seven strategies for physical educators to use to promote PA within the SDT: (a) give positive feedback, (b) promote process goals, (c) promote moderately difficult goals, (d) provide choices for activities, (e) provide a rationale for activities, (f) promote a development of social relationships, and (g) utilize rewards carefully and sparingly. Greater amounts of physical education received possibly could allow more time for physical educators to incorporate these strategies, which could allow for the process of internalization to take place. Research needs to be completed to see if greater amounts of physical education received in high school using the SDT as a framework can promote intrinsic motivation or internalization for PA during their freshmen year of college. Research on environments that promote positive human potential has significance because it can contribute to the understanding of human behavior and the design of social environments that optimize an individual's development, performance, and well-being (Ryan & Deci, 2000).

Motivation for Physical Activity

Within the framework of the SDT there can be numerous reasons why individuals are extrinsically and intrinsically motivated. Many times, these extrinsic reasons facilitate the individual to move into the more intrinsic or self-determined state of motivation through the process of internalization. McLachlan and Hagger (2011) found that some of the extrinsic reasons for PA include weight loss, physical attractiveness, winning awards, or impressing others; and some of the intrinsic reasons for PA include

physical fitness, enjoyment, social interaction, and reducing stress. These reasons for PA motivation can change as we age (Brunet & Sabiston, 2011).

The next section of the literature review examines why individuals are motivated to be physically active within a physical education setting and then as adults be motivated to be physically active. Motivation for PA within the physical education setting is important because Pangrazi and Beighl (2013) found that adolescents who are physically active are more likely to be physically active adults. Bevans, Fitzpatrick, Sanchez, and Forrest (2010) stated that second only to the students' families, the most important and influential system to establish a physically active lifestyle are physical education classes.

Motivation within physical education. There could be multiple reasons students in a physical education class choose to be less active than their peers. Parish and Treasure (2003) found that one possible reason for being less active in physical education is the student's lack of motivation. Barkoukis, Taylor, Chanal, and Ntoumanis (2014) found that lack of autonomous or intrinsic motivation has been found to be associated with lower grades in physical education. Motivation in physical education classes has been connected to the social climate, emotional experiences, environment of the classroom, the students' perception of themselves, and parental and teacher influence (Garn et al., 2011; Liukkonen et al., 2010; McDavid, Cox, & Amorose, 2012; Parish & Treasure, 2003). These factors can also be referred to as situational motivation, which is defined as the motivation individuals experience when they participate in PA (Guay, Vallerand, & Blanchard, 2000). As these various situations change due to circumstances such as a getting older, different physical education teachers, and new friends or new schools, the levels of motivation within the student could fluctuate.

One of the motivational factors is the students' perceptions of themselves. In a study completed by Parish and Treasure (2003), over 430 middle school students from 24 physical education classes were studied to examine how the motivational climate and perceived ability influence PA. During the study, no formal instruction from the physical education teacher took place to eliminate the influence of the physical education teacher's instructional strategies on the students (Parish & Treasure, 2003). This allowed all data to be collected during the activity portion of the classes, in which all 24 classes participated in ultimate football (Parish & Treasure, 2003). Parish and Treasure found that students who had a perception that they could master the skills needed to participate in the game had higher levels of self-determined or intrinsic motivation and were more physically active; whereas, students who felt like they would not perform well had lower levels of self-determined motivation and PA levels. A more recent larger study involving over 2,000 students from 22 schools also found that perceived competence was strongly correlated with higher PA levels and engagement in physical education class (Bevans et al., 2010). The perceived confidence of the students seems to be higher in a mastery physical education climate rather than a performance-oriented climate (Wang, Liu, Chatzisarantis, & Lim, 2010). A mastery physical education climate would facilitate the development of the students' skills, therefore allowing the students to feel like they can perform well during game play.

Another motivational factor in a physical education class is the social climate. Many social dynamics develop within educational settings and the specific nature of physical education classes allows for numerous interactions with peers. The numerous social interactions are due to the differences in administrative structure and classroom

dynamics in a physical education class compared to the traditional classroom (Garn et al., 2011). Garn et al. (2011) investigated the relationship between social motivation and effort by students in a secondary physical education class. The results of the study demonstrated that when the students have a positive social status within the class and when the students feel socially successful there are significant positive benefits on the students' efforts within the physical education class (Garn et al., 2011). Garn et al. did note that the size of the study was small at 105 students from one school and was not a representative sample, so researchers should be careful not to generalize the positive benefits identified. Another larger study that surveyed 593 middle school students found that lack of social support by peers was a predictor of low motivation in physical education class (Zhu & Chen, 2013). These studies demonstrate that social interactions in physical education class can motivate or cause students to be unmotivated, depending on the interaction with their peers.

The emotional state of the student can also affect motivation in a physical education class. In physical education, anxiety and enjoyment are some of the emotions that affect PA levels (Liukkonen et al., 2010). Enjoyment leads to increased PA, and anxiety leads to decreased PA (Liukkonen et al. 2010). Results of the Liukkonen et al. study were very similar for the 338 males and females in the study and concluded that a motivational climate in physical education that fosters self-determination within the students was associated with high enjoyment, low anxiety, and increased PA. Research by Bevans et al. (2010) found that perceived body image of oneself was moderately related to increased engagement in physical education, which was linked to greater amounts of PA. In both of these studies, the survey tools were administered only one

time. Liukkonen et al. suggested that future studies should be completed with the survey tools being administered at multiple points in time across several school years to better understand the emotional states of students and motivation in physical education classes.

Parental influence and the environment the physical education teacher creates also affect student motivation. A small study completed by McDavid et al. (2012) examined the role parents and physical education teachers have on self-determined motivation for PA of middle school students. Results of the study concluded that there was a small, but significant relationship between support from the mother, father, and physical education teacher and self-determined motivation for leisure time PA (McDavid et al., 2012). The study also found that self-determined motivation had a moderate to strong relationship on actual PA behavior (McDavid et al., 2012). McDavid et al. noted that their study was the first study to examine the relationship between the physical education teacher and leisure time PA within the SDT context and the first study to demonstrate the importance of physical education teacher involvement and modeling leisure-time PA for adolescents. Parts of the McDavid et al. study supported results from an earlier study completed by Hagger et al. (2009) with 404 high school students in Europe. Results of this study demonstrated that perceived autonomy support from physical education instructors had a significant positive direct effect on autonomous motivation in physical education class, and the autonomous motivation in physical education class had a significant positive direct effect on autonomous motivation for leisure time PA outside of physical education class (Hagger et al., 2009).

A key connection in all of these studies was the SDT and the internalization or intrinsic motivation that occurred. Ryan and Deci (2000) stated that intrinsically

motivated behaviors stem from self and are completely authentic. The students experienced autonomous or self-determined motivation due to the direct effects of the factors discussed. The research demonstrated that physical education teachers and the social and emotional environment that exists within the physical education classroom can shift students to a more self-determined state of motivation. This self-determined or autonomous motivation can then carry over into leisure time PA outside of the physical education classroom. The question then becomes *Can this self-determined or autonomous motivation transfer into adulthood and motivation for PA in college and beyond?*

Motivation as adults. With all of the research and information available to the public on the positive benefits of PA and improved health, one would think that all adults would be physically active. The evidence says otherwise. Brunet and Sabiston (2011) found that as an individual ages, the amount of PA he or she participates in decreases and the motivating reasons for PA also change. This pattern of decreasing PA also has been found to be more prevalent in females (Casebolt, 2009). Several studies have examined adult PA motivation. In one study, 547 participants, ages 18 to 64, completed a self-reported questionnaire about their motivation towards PA (Brunet & Sabiston, 2011). Four common motivational factors among all age levels that Brunet and Sabiston found were personal values, goals, individual needs, and enjoyment of PA. It should be noted that PA motivating factors as to personal values, goals, individual needs, and enjoyment of were lower in the 45 to 64 age range and highest in the 18- to 24-year-old age range (Brunet & Sabiston, 2011). Another aspect of this study examined autonomous motivation. Brunet and Sabiston found that autonomous motivation for PA was higher

among 18- to 24-year-olds who were more physically active and extrinsic motivation for PA was higher among 18- to 24-year-olds who were less physically active. In the 25 to 44 age group and the 45 to 64 year old age group autonomous motivation was strongly correlated with increased PA, but extrinsic motivation was not negatively associated with PA as it was in the 18- to 24-year-old age group (Brunet & Sabiston, 2011). Some of the extrinsically motivating factors identified by Brunet and Sabiston were desired physical appearance and body shape. This supports the notion that individuals who are only experiencing extrinsic motivation have not yet internalized the motivation for PA and reached the autonomous state within the SDT.

Studies have also examined relationships between childhood physical education and PA and adult PA. One study examined the relationship between the amount of weekly PA minutes participated in at ages 10 through 12 and then again at age 35 (Trudeau et al., 2004). The data analysis did show statistical significance, but the correlations between childhood PA and adulthood PA were weak (Trudeau et al., 2004). The weak correlations found by Trudeau and colleagues (2004) were that male and female adults who currently exercised three or more times per week spent more time in organized vigorous PA as children and males who currently exercised three or more times a week also spent more time in light organized PA as children. The Trudeau et al. study did not specifically examine motivational factors for PA as an adult, just relationships among PA. One could ask the question: *If the increased PA times as a child allowed for internalization to take place and more autonomous forms of motivation to develop, could it then carry over into adulthood 20 years later?*

A second study examined this relationship over a longer timeframe. A study in Sweden that lasted from 1968 to 2007 examined adult PA in 1,518 individuals over the course of 38 years to see if there was any relationship to adolescent PA experiences (Engstrom, 2008). The study started in 1968 with 2,464 participants who were 15 years of age. These participants were then contacted every five years. By 2007, the number of participants, who were now 53-years-old, had dropped to 1,518. The study examined for relationships within nine leisure time PA variables and five school-based PA variables (Engstrom, 2008). Weak positive correlations at the $p < .05$ level were found by Engstrom (2008) between memberships in a sports club, track, and field leisure time participation, attitude toward physical education as an adolescent and adult PA. Engstrom found moderate positive correlation at the $p < .01$ level between skiing, gymnastics, greater number of leisure time activities participated in, attitude toward physical exertion as an adolescent and adult PA. Strong positive correlations at the $p < .001$ level were found between grade in physical education at the age of 15 and adult PA (Engstrom, 2008). The research by Engstrom also found no correlations between experience in individual or team games, swimming, walking or cycling, attitudes towards participating in team or individual games as an adolescent, and adult PA.

Negative experiences in physical education can also influence PA participation later in life. A study completed by Cardinal, Yan, and Cardinal (2013) examined how negative experiences in physical education affected PA participation later in life. The 293 college students reported on their current PA habits using the Godin and Shephard questionnaire and if they had ever experienced one or more of three possible previously identified negative experiences in physical education class when they were younger

(Cardinal et al., 2013). One of the three negative experiences was significantly associated with current PA habits after data analysis. Cardinal et al. (2013) found that students who said they had been picked or chosen last for a team during physical education class reported 7.7 fewer MET units of exercise per week than students who had not been picked or chosen last. Within the Godin and Shephard questionnaire, 7.7 MET units per week equals about one less mild and one less moderate exercise session per week (Cardinal et al., 2013). Even though the Cardinal et al. study examined negative experiences, one could suggest, based on the analysis, that past experiences in physical education classes could be a factor in motivation for PA as an adult.

Motivation for College Student Physical Activity

The current proposed study focused on the PA habits of traditional undergraduate college students. This section of the literature review examined the factors that have been found to motivate college students to be physically active. Some of these factors included appearance, weight management, and improving health, strength, and endurance (Egli et al., 2011), social factors (Ullrich-French, Smith, & Cox, 2011), sports participation in the 12th grade (Horn, O'Neill, Pfeiffer, Dowda, & Pate, 2008), and the structure of a formal college class (Sailors et al., 2010). It has also been found that feeling positive about PA does not necessarily mean the college student will meet the recommended PA guidelines (Kemper & Welsh, 2010). One longitudinal study examined the predictors of PA among females in the first year after graduating from high school (Horn et al., 2008). It should be pointed out that 25% of the sample in the Horn et al. study were not college students, but, instead, were employed full, part-time, or unemployed. Participants completed a survey and PA questionnaire during their 12th

grade year and again 11.5 to 17.5 months after high school graduation (Horn et al., 2008). The research by Horn et al. (2008) demonstrated that school-based or non school-based sports participation during the 12th grade and current employment were the only two significant predictors of current PA. It was also found that increased moderate to vigorous PA in the 12th grade and race predicted borderline significance of current PA (Horn et al., 2008).

An experimental study explored the effects of exposing college students to exercise training. Over a five-year period, 1,567 university students aged 18 to 35 were exposed to a 30-week formal exercise program that consisted of three weekly exercise sessions that lasted for at least 40 minutes, with participants required to get their heart rates into a target zone of 65 to 85% of their maximum heart rate for at least 25 minutes (Sailors et al., 2010). The participants were given college credit if they stayed in the study the entire time. One of the key findings from the heart rate data demonstrated that individuals who completed the entire 30-week, two semester study and did not remove themselves from the study exercised at a significantly higher exercise intensity and spent additional time in their identified target heart zones (Sailors et al., 2010). A follow-up survey done by Sailors et al. (2010) four weeks after any participant dropped out, found that 61% were still regularly exercising three days a week. This study could provide evidence that formal exercise programs at the college level can promote PA and provide some level of motivation for PA. What levels of motivation the participants experienced in the studies (Horn et al., 2008; Sailors et al., 2010) are unknown, but these identified predictors do suggest some level of PA motivation did exist.

A third study specifically examined college students and their motivation for PA. Students from 156 different courses at a midsize university were asked to complete the Exercise Motivation Inventory (EMI), which is comprised of 51 possible motivators for PA; in return the students were given some bonus points in the course for participating (Egli et al., 2011). Approximately 43% of the possible sample or 2,214 students completed the EMI with an almost even split between males and females (Egli et al., 2011). Results of the data analysis completed by Egli et al. (2011) found that overall positive health, ill-health avoidance, appearance, strength and endurance, and weight management were the top five motivating factors. Health pressures, social recognition, and affiliation were the least important overall motivational factors (Egli et al., 2011). When the data were broken down between genders, Egli and colleagues found that males were more motivated by intrinsic factors; whereas, females were more motivated by extrinsic factors. Very few differences were found between those who were younger than 20 and those who were older than 20 but significant differences did exist between races for exercise motivation (Egli et al., 2011). For example, Egli et al. found that Whites were more motivated by stress, revitalization, enjoyment, and weight management; Blacks were more motivated by health pressures, ill-health avoidance, and nimbleness and the other race category were more motivated by revitalization, enjoyment, social recognition, affiliation, weight management, health pressures, and nimbleness. A similar but much smaller earlier study also utilized the EMI and only examined differences between genders. Kilpatrick et al. (2005) concluded that overall intrinsic factors were (a) positive health and strength, (b) endurance, and the (c) extrinsic factor of appearance were the top three motivating factors for college students' PA. Similar to the Egli et al.

study, Kilpatrick and colleagues found that weight management was not a significant motivating factor to exercise for males, but was for females. The Kilpatrick and colleagues' study also found that participants were more intrinsically motivated to participate in sports but more extrinsically motivated to participate in exercise.

Social factors were another researched aspect of motivation. Ulrich-French et al. (2011) stated that within the SDT, social factors can have both positive and negative effects on motivation. The Egli et al. (2011) study concluded that social recognition was not a significant motivational factor for college student PA. A study completed by Ulrich-French et al. (2011) found that social factors were a significant motivator for college student PA. The Ulrich-French et al. study consisted of 1,110 mostly White participants made up of 66% females and 34% males. The collected data and analysis was quite extensive, as four different established survey questionnaires were used. The questionnaires used were the Inventory of Parent and Peer Attachment (IPPA), Psychological Need Satisfaction in Exercise Scale (PNSE), Exercise Motivation Scale (EMS), and the Leisure-Time Questionnaire (LTQ; Ullrich-French et al., 2011). One of the findings were that friends played a significant role in perceptions, motivation, and behavior in the physical domain; the researchers suggested that additional research be completed in this area (Ullrich-French et al., 2011). The study by Ullrich-French et al. was in line with the SDT of Deci and Ryan (1985), which suggested social factors influence motivation.

Research has demonstrated various motivational factors for PA and that the various motivation factors can change due to age, environment, and experiences. The SDT theory is one of the most common theoretical frameworks used in the study of PA

motivation. The current proposed study did not specifically examine motivation for PA, but examined any possible relationships that may exist between the amount of physical education received in high school and the current PA habits of traditional college students. The study also examined some of the established predictors of PA such as sports participation in the 12th grade (Horn et al., 2008), and differences between genders (Egli et al., 2011). The SDT provided the theoretical framework for the proposed study. Measuring PA at any age level has it challenges. The next section of the literature review discusses those challenges and some of the available tools available for PA surveillance.

Measuring Physical Activity

From surveys to research instruments, many research strategies have been used to measure PA. Measuring or, as some call it, surveying PA does provide several important benefits. Galuska and Fulton (2009) stated that PA surveillance can be used to monitor progress toward national health objectives, monitor whether certain populations are meeting national or professional organization recommendations, identify high risk populations for possible interventions, and can be used to assess population level interventions. The acquired surveillance data can also be used to support the position of advocates or provide accountability (Galuska & Fulton, 2009). This proposed study examined whether or not college students in the sample are meeting the current PA recommendations set by organizations such as the ACSM, IOM, AHA, ACS, or the Centers for Disease Control. The study could also be used by professional organizations such as SHAPE America to support and advocate for increased physical education time received in high school.

Many PA surveillance tools currently exist. Short and long self-reported questionnaires, tools such as pedometers and accelerometers, direct surveillance, and newer digital technologies such as the GPS are some of the available surveillance tools (Pratt & Fulton, 2009). The increased amount of valid and reliable surveillance tools have helped overcome some of the challenges of PA surveillance (Pratt & Fulton, 2009). The current study utilized a short form, self-reported questionnaire. This section of the literature review examined the challenges to PA surveillance and the different tools that can be used to collect data on PA habits.

Challenges

Historically, PA surveillance has created some research challenges and, even with the increased amount of quality surveillance tools, challenges still exist. One historic challenge is the ability to use PA surveillance tools globally. Pratt and Fulton (2009) stated that PA surveillance tools are usually created to guide policies at the national and subnational level and usually favor in-country textualization. Therefore, a PA surveillance tool designed in the United States may not be easily taken and used for a study in a European or Asian country. This could also become a challenge in countries like the United States with diverse populations who may not understand all of the textualization within the surveillance tool.

Another challenge is the difference between subjectively collected self-reported data and objectively collected data from a tool such as an accelerometer. Research has found differences between these two methods in experimental studies (Slootmaker, Schuit, Chinapaw, Seidell, & Mechelen, 2009). In the Slootmaker and colleagues' (2009) study, 236 adolescent participants and 301 adult participants self-reported PA for

the previous seven days and wore accelerometers for those same seven days. The purpose of the study was to compare the time spent in the moderate and vigorous PA zones between the two types of collected data and examine the differences between the four subgroups in the study (Slootmaker et al., 2009). The results demonstrated that time spent in moderate PA, vigorous PA, and moderate to vigorous PA was higher on the self-reported questionnaire than the data collected from the accelerometers in all subgroups of adolescents and adults (Slootmaker et al., 2009). Slootmaker et al. also stated that both the self-reported PA questionnaire and the accelerometer have weaknesses, so comparisons between these surveillance instruments can only be relative. Accelerometers' weaknesses are that they tend to poorly measure such activities as cycling and many times cannot be worn in water, which means they are of no use to individuals who incorporate swimming into their PA (Slootmaker et al., 2009).

The use of self-reported questionnaires also creates several challenges. These challenges are important to note, as self-reported questionnaires have been reported to be the most widely used type of PA surveillance tool (Sallis & Saelens, 2000). Research completed by various individuals (Sallis & Saelens, 2000; Shephard, 2003; Wolin, Fagin, Ufere, Tuchman, & Bennett, 2010) have documented these challenges. The Sallis and Saelens (2000) study examined 17 self-reported questionnaires for youth, seven for adults, and four for older adults. The literature for adult self-reported questionnaires, the age group of the current proposed study, demonstrated greater maturity and reliability than the other two age groups (Sallis & Saelens, 2000). Reliability of the questionnaire reflects that the survey tool will generate the same results when applied a second time (Shephard, 2003). Other challenges do exist, though, for self-reported questionnaires

used for adults. Sallis and Saelens (2000) reported that they do not commonly measure type of PA and duration. The inclusion of type and duration would allow additional data analysis that could allow researchers to gain a better understanding of PA. Shephard (2003) stated that even though PA questionnaires have been in use for a number of decades, attempts to obtain detailed analysis in terms of exercise quantity and the resulting health benefits present challenges. The researcher also stated that PA questionnaires do have value when monitoring changes in population activity (Shephard, 2003). Another challenge with the use of self-reported questionnaires is their use within diverse populations. Wolin and colleagues (2010) reported that few studies have validated the use of PA questionnaires among Blacks and only a few of the PA self-reported surveys have been validated for use with Black populations. One of the tools that has been validated for Black populations is the IPAQ (Wolin et al., 2010). The IPAQ was the self-reported survey used for this proposed study. Even with these challenges, a number of tools to measure PA do exist and can provide valuable data to researchers.

Tools Used

A variety of research instruments, interview surveys, and self-reported questionnaires have been developed for the collection of PA data. These tools are placed into two main categories. Objective measurement devices, such as pedometers and accelerometers, collect and store data that can be downloaded into a computer for analysis (Troiano et al., 2008). Objective measures tend to not be connected to reporting bias or recall issues that subjective measures are connected to (Trost & O'Neil, 2014). Subjective measurement devices, such as interviews and self-reported questionnaires,

acquire data based on the responses of the participants. Both objective and subjective tools have their strengths and weaknesses. This section of the literature review briefly discusses several of these tools and how they are used.

Objective measurement tools. Three commonly used tools to objectively measure PA are pedometers, accelerometers, and heart rate monitors. Accelerometers are worn over the hip and measure energy expenditure (Troiano et al., 2008) and have become one of the most common objective ways to measure PA (Trost & O'Neil, 2014). When using accelerometers, strict protocols for use, such as wearing them on the right hip and taking them off during showers or water sports, must be followed (Slootmaker et al., 2009). These protocols allow for the data to be reliable and valid. The most current accelerometers, which can also transmit data wirelessly, such as the ActiGraph GT3X-BT, can measure sleep/wake measurements, acceleration, energy expenditure, MET rates, steps taken, physical activity intensity, subject position, and sleep time (ActiGraph, 2014). Pedometers are another tool used to objectively measure PA. Trost and O'Neil (2014) stated that pedometers are a cost-effective alternative to accelerometers. Pedometers allow people to track the number of steps that have been taken during the day and are usually worn on the midline of the thigh (Rider, Bassett, Thompson, Steeves, & Raynor, 2014). Pedometers are limiting, though, because, unlike accelerometers, pedometers cannot measure the intensity of the movement, meaning they measure a walking or running step on a level or inclined surface exactly the same (Trost & O'Neil, 2014). Pedometers cannot be used during swimming and do not accurately measure PA on wheels (Pangrazi & Beighl, 2013). The data collected from the pedometer can be downloaded onto a computer for analysis.

Heart rate monitors can also be used to objectively measure PA. Heart rate monitors give the researcher the ability to measure minute by minute heart rate data that can be stored for days by the device, and then the collected data can be downloaded onto a computer for analysis (Trost & O'Neil, 2014). Like pedometers and accelerometers, heart rate monitors also have their weaknesses. Heart rate monitors are of little use during periods of inactivity; heart rates of individuals tend to lag behind the actual changes in movement (Trost & O'Neil, 2014). When researchers cannot utilize objective measures of PA due to cost or research design, they commonly turn to subjective measuring tools.

Subjective measurement tools. Two commonly used subjective measurement tools are interviews and surveys using physical activity questionnaires (PAQs). Helmerhorst, Brage, Warren, Besson, and Ekelund (2012) stated that PAQs are the most feasible tool available for PA research due to lower cost and ease of use. PAQs are prone to error due to response biases. Dozens of PAQs exist for researchers to choose from; Van Poppel, Chinapaw, Mokkink, Mechelen, and Terwee (2010) believed there was a lack of standardization in the PAQs, thus resulting in the many different PAQs. One review of 76 PAQs examined validity and reliability. Van Poppel et al. (2010) found that 23 of the 76 PAQs were adequate for the PA that the PAQ was designed to measure. The review also found that the IPAQ seemed to be the most widely used PAQ and the most widely validated PAQ (Van Poppel et al., 2010).

Another meta-analysis of PAQs examined 96 existing PAQs for reliability and validity in youth, adults, and the elderly. Helmerhorst et al. (2012) found that all PAQs for adults in the review were in the acceptable or high reliability categories. The PAQs

with the highest reliabilities were the Flemish Physical Activity Questionnaire (FPACQ), short and long versions of the IPAQ, Jackson Heart Physical Activity Cohort, and the Kaiser Physical Activity Survey (Helmerhorst et al., 2012). When Helmerhorst et al. examined validity, correlations in the PAQs all demonstrated low validity, although some were still in the acceptable range, except for the FPACQ which demonstrated high validity. Of the 96 PAQs examined, only the short version of the IPAQ, FPACQ, and the Previous Day Physical Activity Recall demonstrated acceptable to good correlations for reliability and validity (Helmerhorst et al., 2012).

With so many PAQs to choose from, researchers need to choose carefully. Van Poppel and colleagues' (2010) review of PAQs concluded that not one PAQ can be considered to be the best and that the researcher needs to determine which PAQ best fits the purpose of the study. The researcher must also determine whether to administer the PAQ in the form of an interview or as a paper or online survey. For this proposed study, the short version of the IPAQ was administered online and best fit the purpose of the research. Challenges exist for all forms of PA surveillance, but these challenges can be overcome and are outweighed by the benefits that research on PA can provide.

Summary

The purpose of this review of literature was to examine current PA guidelines and types and to report on the current PA habits of Americans, including college students. The data demonstrated that a majority of American adults (United States Department of Health and Human Services, 2013) and many college students (American College Health Association, 2013) do not meet the current recommended PA guidelines (Garber et al., 2011) even though the amount of PA Americans are participating in has increased over

the last few years (United States Department of Health and Human Services, 2013). The literature review also included the current status of physical education in the United States, what the purpose and benefits of physical education are, and what relationships physical education has to experiences later in life. The collected literature found that many physical education programs have been reduced or eliminated due to the secondary effects of NCLB (Institute of Medicine of the National Academies of Science, 2013), and budget cuts (National Association for Sport and Physical Education, 2013). Studies on PA and physical education as a child and the relationship to PA as an adult have demonstrated mixed results (Cleland et al., 2008; Timpka et al., 2012).

The literature review also included the existing challenges researchers face when completing research on PA and some of the subjective and objective PA surveillance tools that are currently used. One of these subjective tools, a self-reported questionnaire called the IPAQ, was used for this proposed study. Motivation for PA using the SDT as the theoretical framework was also discussed. The research demonstrated that, overall, there are many extrinsic and intrinsic reasons for PA motivation (McLachlan & Hagger, 2011) as an adult and as a college student (Egli et al., 2011). This proposed study sought to expand on these previous studies and examined if there was any relationship between the amount of physical education received in high school and the PA habits of traditional college freshmen. The next chapter discusses the research methodology that was used during the study.

CHAPTER THREE: METHODOLOGY

Chapter 3 includes the research methodology that was used in this study, which allowed the researcher to achieve the purpose of the study: to examine the relationship between the number of years of physical education students receive in high school and traditional college freshmen's current levels of physical activity. Chapter 3 specifically discusses the research design, selection of subjects, instrumentation, assumptions, procedures, and data processing and analysis.

Research Design

This dissertation research utilized a quantitative correlational research design. Creswell (2009) stated that quantitative research allows the researcher to test objective theories and examine the relationships between variables. Quantitative research starts with the test of a theory and is best suited when a theory is being tested (Creswell, 2009). This study examined the theory that greater amounts of high school physical education positively affect the PA habits of traditional college freshmen.

The survey used for the study collected data on multiple variables that were examined for relationships through the use of statistical tests. When measuring the relationship between variables, a correlation design is appropriate (Alreck & Settle, 2004). In this study, the relationship between the numbers of years of high school physical education received was measured for a relationship with the current PA habits of the traditional college freshmen. Correlation design is also appropriate when the collected data is from ordinal scales (Alreck & Settle, 2004). In this case, some of the data were ordinal data. Correlation design is also valuable when the variables cannot be

manipulated. In experimental designs manipulation of the variables occurs; however, variables could not be manipulated in this study.

One disadvantage found by Alreck and Settle (2004) is that correlation design does not necessarily mean that one variable is causing another. This disadvantage is due to the researcher not being able to completely eliminate the possibility of an unknown factor influencing the relationship. Correlation design does not allow the researcher to come to any conclusions about cause and effect (Alreck & Settle, 2004).

This correlation study included cross-sectional data, which is data collected at one point in time (Creswell, 2009). The cross-sectional data was collected from the participants via an online survey. Quantitative survey research is best suited when the researcher seeks to understand trends, attitudes, or opinions of a given population while testing a theory (Creswell, 2009). In some cases, the results can also be generalized to a larger population. The information being sought by the research questions, which in the case of this study were PA habits and other demographic data, could best be gathered through the use of a survey.

Research Questions

The following research question guided this correlational study: *What is the relationship between the number of years of physical education that college students receive in high school and their current physical activity habits?* The following hypotheses were formulated in conjunction with the research question:

H_0: There is no statistically significant correlation between the number of years of physical education that college students receive in high school and their physical activity habits.

H_1: There is a statistically significant correlation between the number of years of physical education that college students receive in high school and their physical activity habits.

The study also examined the following subquestions within the scope of the main research question.

- What is the difference between male and female participants?
- What is the difference between participants who participated on a varsity interscholastic sport in high school and participants who did not?
- What is the difference between the races in the study?
- What is the difference between commuter and residential students?
- What is the difference between a participant who received an exemption, waiver, and/or substitution for or from physical education credit and a participant who did not?

The choice of a research method centers on whether or not the intent of the research is to specify information that will be gathered in advance of the study or let the information emerge during the study (Creswell, 2009). In this case, the information that was gathered had been predetermined so a survey instrument collecting the quantitative data was best suited for this research design.

Selection of Subjects

The research took place during the fall of 2014 at the main campus of a liberal arts university in the Midwest that offers both undergraduate and graduate programs in over 120 different areas of study. The university is a denominational sponsored private, four-year, Christian university. The main campus is attended by mostly traditional

students at the undergraduate level. *U.S. News and World Report's* (2013) most recent data shows that the university has 3,196 undergraduate students and a 250 acre main campus where the undergraduate students attend. The undergraduate population consists of 36.1% male students and 63.9% female students (*U.S. News and World Report,* 2013). The university has seen steady growth in enrollment over the last 15 years. A majority of the undergraduate students are residential students who live in campus dormitories and apartments. The university attracts students from over 40 states and 10 countries, but a majority of the students come from four Midwestern states. The university enrolls over 725 freshmen each year.

The university has facilities and programs that provide students with opportunities to be physically active. Recreation facilities at the university consist of two racquetball courts, two swimming pools, a fitness center, spinning studio, climbing wall, field house, and open outdoor space that includes a walking or running path. The campus recreation facility also offers various fitness classes. The university also has a thriving intramural program that provides many opportunities for students to participate in organized, competitive activities both indoors and out. Students voluntarily participate in fitness classes and intramurals. The local community also has outdoor and indoor recreational spaces that could be used by the students.

A random sample was used to collect the data. When random sampling is used the sampling error is reduced, so researchers should strive to utilize a random sample (Alreck & Settle, 2004). In a random sample, everyone in the population has an equal chance of being selected (Alreck & Settle, 2004). In this research, in the fall of 2014, all 785 freshmen at the university, most of who were residential students, received an

invitation to participate in the study. The participants included full-time residential and commuter traditional college freshmen. All participants had a university issued email account. No data were collected from students who were 17 years old or younger. By not including any freshmen who still were minors and using a population sample that was not considered sensitive, an expedited Internal Review Board (IRB) review was obtained.

The data collected from the sample was post-screened to eliminate biases. Alreck and Settle (2004) stated that post-screening the sample involves checking key questions on the survey to determine qualification in the sample. Data were originally collected from freshmen who were not of the traditional age and were older. There was a very small percentage of non-traditional freshmen at the university who were used in the research population. Age was one of the demographic questions on the survey, so data from nontraditional freshmen could be exempted from analysis. Data collected from participants who were currently in a course that required PA, participated on an intercollegiate sports team, or were members of the Reserved Officers' Training Corps (ROTC) were also exempted from analysis. Data identifying them as such was obtained from the demographic data in the survey. The data collected from these individuals would skew the PA data in a positive direction and would produce unreliable results. Intercollegiate athletes practice almost daily; ROTC candidates participate in required physical training multiple days a week. Students in one of the required general education courses at the location site were required to work out in the fitness center two days a week for the lab portion of the course. All these individuals would report high levels of PA on the survey tool. All participants were also required to provide an electronic informed consent to participate before they were able to proceed to the survey.

Sample size can be calculated using sample size calculators. The ideal sample size for the proposed study was calculated using the online Raosoft sample size calculator (Raosoft, 2004). Larger samples create greater reliability, a smaller standard error number, and a narrower confidence interval (Alreck & Settle, 2004). The total population was 785, but the eligible anticipated population was about 550; however, the exact number was unknown. With the confidence level set at 95% and the margin of error set at 5%, the recommended sample size was 259 for a population of 785 and 227 for a population of 550 (Raosoft, 2004). Sample sizes below these levels would lower the confidence level and increase the margin of error.

Instrumentation

The short form of the IPAQ (see Appendix A) and additional demographic questions (see Appendix B) were used in the research. The research used the self-reported short form of the IPAQ, which is a publicly available, open access survey tool that requires no formal permission for use (International Physical Activity Questionnaire, n.d.). Permission is granted to all researchers on the IPAQ website (see Appendix C). The IPAQ can be downloaded in multiple languages and formats from the IPAQ website. Detailed instructions for cleaning and processing the data collected with the IPAQ are available on the IPAQ website. Development of the tool began in 1998; research in 12 countries took place that demonstrated reliability and validity (International Physical Activity Questionnaire, n.d.). The IPAQ asked the participants to record their PA during the previous seven days.

Three types of data analysis were utilized during the reliability and validity testing of the IPAQ. Reliability assessment, concurrent validity, and criterion validity took place

(Criag et al., 2003). To complete the research, various participants in multiple countries completed the short form and long form of the IPAQ and wore an accelerometer during the seven-day period that recorded their PA. Both forms of collected data were then used for the analysis of reliability and validity. Reliability assessment for the short form of the IPAQ, which was completed by 1,974 people, found that repeatability was at an acceptable level with 75% of the correlation coefficients observed above 0.65, with the range being from 0.88 to 0.32 (Criag et al., 2003). The research completed by Criag and colleagues also found that the concurrent validity between the short and long forms of the IPAQ demonstrated reasonable agreement. The current study used only the short form of the IPAQ.

The study also examined criterion validity of the IPAQ. Criag et al. (2003) found that criterion validity of the short form IPAQ demonstrated fair to moderate agreement between the two measures. Analysis of the 781 participants in the study showed $N = 781$, $p = 0.30$, 95% CI 0.23-0.36 (Criag et al., 2003). Results of this study and other studies indicated that the IPAQ can be used to study PA levels for individuals aged 15 to 69 (International Physical Activity Questionnaire, n.d.). Bauman et al. (2009) stated that the short form of the IPAQ should only be used for population level surveillance and not intervention studies. The current study is a correlation study and not an intervention study, which means it will fit within the recommended guidelines for use. Due to previous studies on the IPAQ and the results that demonstrated validity and reliability, no pilot study was needed (Bauman et al., 2009; Criag et al., 2003).

When completing the short form of the IPAQ, participants reported their PA levels on the previous seven days. Participants responded to six multifaceted questions.

Questions regarding the amount of vigorous PA, moderate PA, walking, which would be considered light PA, and sitting which could be considered physical inactivity, were on the survey. Additional demographic data including age, gender, race, commuter or residential student, amount of physical education taken in high school, athlete status in high school, high school physical education credit given for enrollment in another course, and other current relevant demographic data were collected. Some of this demographic data was used to post-exempt some of the participants, due to the bias they brought to the study. The demographic data also provided the additional variables needed to complete the research.

SurveyMonkey

SurveyMonkey, a commercial product, was used to collect the data electronically. SurveyMonkey is the most popular online survey software that is used (SurveyMonkey, 2014). SurveyMonkey, created in 1999, enables the researcher to create his or her own surveys using custom templates and post them on websites or email them to participants to complete (Creswell, 2009). The survey was emailed to all participants in the study.

SurveyMonkey can generate some results and allows the researcher to download the collected data into a database for analysis (Creswell, 2009). Before completing the survey, the participants electronically signed an informed consent form. The informed consent form was accessed by clicking on the link in the email. Once consent was granted, the participants began the survey. Use of the self-reported short form IPAQ and a survey administered online created several assumptions during the research process.

Assumptions

Research projects are bound by limitations and delimitations, otherwise known as assumptions. Several limitations and delimitations existed in this study. Limitations are biases that the researcher cannot control, but could have an impact on the study (Price & Murnan, 2004). One limitation was sample size. Low response rates are a concern that many researchers have when using surveys and with the increased use of surveys in research the attitudes towards surveys may be unfavorable (Sheehan, 2001). A second limitation in the study was data analysis. A correlational study was completed. Correlational studies can be easily misinterpreted because a significant correlation does not always mean positive correlation and correlation studies do not explain cause and effect (Alreck & Settle, 2004). Response bias was another limitation in the study. The IPAQ is a self-reported survey tool. Research on self-reported survey tools has demonstrated that self-reported surveys are prone to error due to response bias (Helmerhorst et al., 2012). Social desirability bias happens when the participants answer their questions based on what is socially responsible (Alreck & Settle, 2004). PA could have been considered a socially responsible habit by the participants. Not knowing the answer to some of the survey questions is another form of response bias. To reduce this form of response bias in the study, only the PA habits in the seven days immediately prior to the survey were reported in the survey. The subjective format of the IPAQ also created a limitation. Some research completed on self-reporting PA questionnaires has found that the respondents over report their PA (Slootmaker et al., 2009).

One delimitation of the study was location. Delimitations are bias intentionally introduced by the researcher (Price & Murnan, 2004). The location was chosen so a

sample could be obtained from several states that have different high school physical education requirements. Most of the sample came from three or four Midwestern states. The location of the site makes it more difficult to generalize the results of this study due to the demographic make-up of students in the Midwestern United States versus a region such as the Southwestern United States. A future study could replicate this study in another region. Another delimitation is that the study only examined traditional college freshmen. Future studies could examine nontraditional college freshmen or any of the other three academic classifications for undergraduate students. A third delimitation in this study was that only the number of years of physical education that was completed in high school was examined. This made the study very limited in scope. A future study could also incorporate the quality or curriculum of the high school physical education classes and not just the number of years received. One way assumptions were reduced in this research was to carefully follow planned procedures.

Procedures

Approval from the IRB at Argosy University and the research site were obtained. To obtain approval from the IRB at Argosy and the research site, first, approval for the study was obtained from the Dean of Student Development at the research site (see Appendix D). Formal request through electronic communication with the Dean was used. The IPAQ tool and demographic questions used in the study to collect data were also sent to the Dean per his instructions. To obtain approval from the IRB at Argosy University, the steps of the dissertation guide were followed. The key to approval was to completely and accurately complete the IRB application. To obtain approval from the

IRB board at the research site, the IRB application was completely and accurately completed and submitted to the chair of the IRB.

As a faculty member at the location of the study, the researcher already had access to email accounts of all students. Once permission from both IRBs was obtained, the researcher was able to ethically use this access for the purposes of the research. Any clarifications that needed to be made on the freshmen status of a particular student was done by contacting the Registrar's Office. Prior to the survey being sent out electronically, information advertising the study was sent out through campus mail and electronically to all freshmen approximately a week before (see Appendix E). A study completed by Kaplowitz, Hadlock, and Levine (2004) found that when self-response surveys are being administered electronically, response rates can be increased by sending out an advanced notification through mail.

The quantitative data was collected via an online survey that the participants could access through their university-issued email account. The participants received an email soliciting their participation in the research study. The email also provided basic information about the research, including the purpose, request to participate, contact information if they had questions regarding the research, and the process to request that their responses not be included in the research if they change their minds after they have started or completed the electronic survey. The email also provided a link to SurveyMonkey to read the online informed consent form (see Appendix F). One additional email was sent out approximately one week later to increase the response rate.

Once informed consent was given, the survey opened. The participants then completed the survey electronically. The collected data was then transferred from Survey

Monkey into Excel for cleaning and processing, and then into SPSS, which is computer software that can analyze quantitative data. Key demographic data and data on the PA habits of the sample from the short form of the International Physical Activity Questionnaire (IPAQ) were collected.

Data Processing and Analysis

A thorough analysis was completed on the independent, dependent, and covariate variables using a variety of statistical tests. The analysis was completed in a way that produced both valid and reliable data. After data collection was completed, the data were first post-screened to eliminate the participants who had biases or limitations previously discussed. The remaining collected IPAQ data from the participants was then cleaned and processed. The cleaned and processed data allowed the researcher to convert vigorous PA, moderate PA, and walking into MET-minutes per week for each of these dependent variables. International Physical Activity Questionnaire (2005) stated that these three variables must be analyzed as continuous data using median values when possible. The cleaning and processing of the IPAQ data allowed for two additional dependent variables to be created: MET-minutes per week and PA classification. MET-minutes per week must also be analyzed as continuous data using median values when possible. The PA classification was analyzed as categorical data. The participants were classified in the low, moderate, or high PA category based on the scoring protocol for the IPAQ (International Physical Activity Questionnaire, 2005). The one independent, six dependent, and five covariate variables are displayed in Table 3.

Table 3

Variables

Independent	Dependent	Covariate
Number of Years of High School Physical Education Received	Vigorous PA MET-minutes	Gender
	Moderate PA MET-minutes	Athletic Status in High School
	Walking MET-minutes	Ethnicity
	Sitting	Residential or Commuter Student
	[a]MET-Minutes a Week	Exemption, Substitution, and/or Waiver for Physical Education Credit in High School
	[a]Physical Activity Category	

[a]These two dependent variables were created after the IPAQ data was processed.

A 95% confidence interval was set for all statistical tests that were conducted. The analysis first focused on developing a descriptive picture of the collected data. The descriptive picture allowed the researcher to see if any data were missing, how the data might be skewed, expected outcomes and correlations, and, additionally, a summary of the data in table form. The specific statistical tests that were conducted to examine the descriptive picture of the data included frequencies, descriptions, and crosstabs.

After the descriptive analysis was completed, statistical tests were conducted to examine if there were any correlations between the key independent variable and the dependent variables. The correlation analysis allowed the researcher to specifically examine the main research question and hypotheses and to analyze the differences between the subgroups in the study. A few different types of correlation analysis were conducted in order to thoroughly examine the data. These included Pearson Chi Square

and a One-Way ANOVA statistical analysis. Finally, a general linear model analysis was completed. This allowed the researcher to see what correlation, if any, the amount of physical education had within the covariate variables within the study. The specific general linear model statistical test that was conducted was a univariate analysis of variance, otherwise known as a two-way ANOVA.

Summary

Chapter 3 includes the methodology used for the research that took place during the fall of 2014. The study took place at a private liberal arts university in the Midwest. The representative sample consisted of residential and commuter traditional college freshmen at least 18 years old. Demographic data and data on the PA habits of the participants were collected via SurveyMonkey. The short form of the IPAQ, which is a publically available self-response validated survey, was used to collect the PA data on the participants. Strict procedures for data collection and data analysis were followed. Chapter 4 includes the results of the study.

CHAPTER FOUR: FINDINGS

Chapter 4 includes the research findings from the analysis of the quantitative data collected in the study. The data were collected electronically with SurveyMonkey, downloaded into Microsoft Excel for cleaning and processing, and then imported into SPSS software for analysis. Specifically, the cleaning and processing of the collected data are discussed; secondly, the sample is described; thirdly the findings for the main research question and hypothesis are discussed; and finally, the findings for each of the five subquestions are examined.

Restatement of Purpose

The purpose of this quantitative correlational study was to examine the relationship between the number of years of physical education students received in high school and the traditional college freshmen's current level of physical activities.

Cleaning and Processing of the IPAQ Data

The guidelines for cleaning and processing the data collected from the short form of the IPAQ were strictly followed. The guidelines were accessed from the IPAQ website (International Physical Activity Questionnaire, 2005). The cleaning of the IPAQ data first required that all the students in the sample who did not qualify based on their responses in the demographic section were eliminated from analyses. The eliminated students included those who were intercollegiate athletes, members of the ROTC, and students enrolled in a physical activity lab. These individuals would have biased the PA data in a positive direction. Students who were 24 years old or older were also eliminated, as they were not traditional college freshmen. The remaining data were then cleaned further. Cases in which the respondents failed to answer how much physical

education they received in high school were eliminated. Without this information, data analysis on the main research question could not be completed. Next, any cases where the students answered "Don't know" or skipped any of the physical activity questions in the IPAQ were eliminated. Responses to the number of days of PA and daily PA time were required to process the IPAQ data (International Physical Activity Questionnaire, 2005). After cleaning all the data as described above, the data could be processed. Processing of the data was done in Microsoft Excel.

First, the duration of PA time in hours and minutes was converted into total minutes in each PA category. For example, a response of one hour and 30 minutes was converted into 90 minutes. The data were then examined for outliers, which were eliminated from analysis or recoded per the guidelines set forth in the IPAQ guidebook (International Physical Activity Questionnaire, 2005). The remaining data were then ready to be processed and converted into usable dependent variables. To process the IPAQ data, all PA data was converted into MET-minutes per week. Table 4 shows how MET-minutes per week were calculated using the collected data.

Table 4

MET-minutes Per Week Calculations

IPAQ physical activity level	Calculation Formula Used
Walking	3.3 * Total Minutes * Days
Moderate PA	4.0 * Total Minutes * Days
Vigorous PA	8.0 * Total Minutes * Days

Note. Information cited from International Physical Activity Questionnaire, 2005.

Once the MET-minutes per week were calculated in each PA category, the sum of all three categories was calculated. This created a new dependent variable known as total MET-minutes a week. Finally, a categorical score per the International Physical Activity Questionnaire (2005) guidelines was assigned to each case based on the total MET-minutes a week and the number of days and minutes of PA in each category. Each case was assigned to the low, moderate, or high PA category. This categorical data allowed for another dependent variable to be created and used for analysis. After the cleaning and processing was completed, the data were ready for analyses. The completed data were then uploaded into SPSS. A visual inspection of the two files was completed to make sure the data uploaded correctly.

The Sample

A total of 785 emails were sent to individuals asking for their participation in the study. The survey link was open for two weeks. A reminder email was sent one week into data collection. A total of 324 (41.3%) agreed to participate in the study by clicking on the consent and continue button after reading the electronic informed consent. Two (.006%) of these 324 cases were eliminated due to age. Another 22 (6.7%) of the 324 were removed because they did not complete any of the survey after clicking on the consent and continue button. Two (.006%) more of the 324 were removed because they did not answer the key independent variable question. A total of 126 (38.9%) athletes, ROTC students, and students enrolled in a PA lab of the 324 were removed due to the PA bias they would create in the data analysis. An additional 16 (4.9%) of the 324 were removed due to incomplete IPAQ data. Finally, one case (.003%) of the 324 was removed because it qualified as an outlier per the IPAQ protocol. This left 155 cases in

the sample that could be analyzed for results. This represented 19.7% of the total 785 freshmen students or 47.8% of the 324 respondents. A descriptive picture of the sample was first developed.

Tables 5 and 6 provide the frequencies of the collected data that were used to examine the subquestions in the study. The sample consisted of 45 males (29%) and 110 females (71%). Residential students were 93.5 % (*n* = 145) of the sample and commuter students were 6.5% (*n* = 10) of the sample. Whites were 84.5% (*n* = 131) of the sample, while Hispanics were 6.5% (*n* = 10) and Blacks were 5.2% (*n* = 8) of the sample. Asians and students who marked other were the smallest portion of the sample. Both represented 1.9% (*n* = 3) of the sample. Table 5 provides the gender, student status in college, and racial demographic data.

Table 5

Demographic Data

		Frequency	Percent	Valid percent	Cumulative percent
Gender	Male	45	29.0	29.0	29.0
	Female	110	71.0	71.0	100.0
	Total	155	100.0	100.0	
St. Sta.	Commuter	10	6.5	6.5	6.5
	Residential	145	93.5	93.5	100.0
	Total	155	100.0	100.0	
Race	Asian	3	1.9	1.9	1.9
	Black	8	5.2	5.2	7.1
	Hispanic	10	6.5	6.5	13.5
	White	131	84.5	84.5	98.1
	Other	3	1.9	1.9	100.0
	Total	155	100.0	100.0	

Note. *N* = 155

The data in Table 6 shows that 47.7% (*n* = 74) of the students in the sample participated in a varsity interscholastic sport during high school, while 52.3% (*n* = 81)

did not. Table 6 also shows that 31% (n = 48) of the sample received an exemption and/or substitution for physical education credit in high school and 69% (n = 107) did not. Finally Table 6 shows the frequencies for the independent variable. Nine students received no high school physical education. The largest numbers of students in the sample, 46, received seven or eight semesters of high school physical education, while 40 students received just one or two semesters of high school physical education. Thirty-two students received three or four semesters of physical education in high school, while 28 students completed five or six semesters of high school physical education.

Table 6

High School Demographic Data

		Frequency	Percent	Valid percent	Cumulative percent
Var. Sport	Yes	74	47.7	47.7	47.7
	No	81	52.3	52.3	100.0
	Total	155	100.0	100.0	
Ex./Sub.	Yes	48	31.0	31.0	31.0
	No	107	69.0	69.0	100.0
	Total	155	100.0	100.0	
PE	No PE	9	5.8	5.8	5.8
	1 or 2 Semesters	40	25.8	25.8	31.6
	3 or 4 semesters	32	20.6	20.6	52.3
	5 or 6 semesters	28	18.1	18.1	70.3
	7 or 8 semesters	46	29.7	29.7	100.0
	Total	155	100.0	100.0	

Note. N = 155

Table 7 shows that after processing the IPAQ data per the IPAQ protocol, 11% (n = 17) of the sample were classified in the low PA category, 33.5% (n = 52) were

classified in the moderate PA category, and 55.5% (*n* = 86) were classified in the high PA category.

Table 7

IPAQ Physical Activity Category

		Frequency	Percent	Valid percent	Cumulative percent
IPAQ	Low physical activity	17	11.0	11.0	11.0
	Moderate physical activity	52	33.5	33.5	44.5
	High physical activity	86	55.5	55.5	100.0

Note. $N = 155$

Table 8 shows the frequencies for the calculated MET-minutes per week in each PA category. The median values were reported per the guidelines set forth in the IPAQ protocol. All MET-minute categories were positively skewed. Interquartile ranges showed that most students reported at least walking each week, while a higher number of students reported no moderate or vigorous PA. The standard deviation is large in all four categories, but that was expected due to some individuals reporting no PA and some individuals reporting very high levels of PA. The IPAQ protocol for converting MET-minutes per week also created a wide range of processed data.

Table 8

IPAQ MET-minutes Frequencies

		VPA METs per week	MPA METs per week	Walking METs per week	Total METs all PA
N	Valid	155	155	155	155
	Missing	0	0	0	0
Median		480.00	360.00	1188.00	2916.00
Std. deviation		1595.93	1215.12	1352.139	3057.147
Skewness		2.14	1.804	.658	1.427
Std. error of skewness		.195	.195	.195	.195
Range		8640	5040	4158	16398
Minimum		0	0	0	0
Maximum		8640	5040	4158	16398
Percentiles	25	.00	.00	412.50	1325.00
	50	480.00	360.00	1188.00	2916.00
	75	1560.00	1200.00	2772.00	5466.00

Note. VPA = Vigorous physical activity; MPA = Moderate physical activity, $N = 155$

The overall descriptive analysis found that no data were missing and that the MET-minutes per week were positively skewed in all four PA categories. After the descriptive picture of the data was established, correlation analysis was completed. The correlation analysis specifically examined the research question. A 95% confidence interval was set for all statistical analysis.

Research Question 1

The following research question was examined: *What is the relationship between the number of years of physical education that college students receive in high school and their current physical activity habits?* The researcher hypothesized that there was a statistically significant correlation between the number of years of physical education that students received in high school and their physical activity habits as traditional college freshmen. Research Question 1 was examined from two different angles. First, a crosstab with Pearson Chi-Square was completed on the IPAQ PA categorical variable

and the number of years of high school physical education received variable. Secondly, a one-way ANOVA using Levene test of Homogeneity was completed on the four PA MET-minute level variables and the number of years of high school physical education received. In both of these analyses, the number of years of physical education completed was the independent variable. Table 9 shows the crosstab analysis.

Table 9

IPAQ PA Category: Physical Education Received in High School Crosstabs

		Physical education taken in high school					
		No PE	1 or 2 semesters	3 or 4 semesters	5 or 6 semesters	7 or 8 semesters	Total
IPAQ PA category	Low physical activity	1	4	8	1	3	17
	Moderate physical activity	4	12	9	13	14	52
	High physical activity	4	24	15	14	29	86
Total		9	40	32	28	46	155

Note. $N = 155$

The crosstab analysis in Table 9 does show a slight positive trend towards greater amounts of physical education received and a higher physical activity category, but not at a significant level. A Chi-Square test was performed and no significant relationship was found between the number of years of high school physical education received and the PA category of the students, X^2 (8, $N = 155$) = 11.67, $p = .17$. The null hypothesis was retained. In order for the relationship to be significant, a p value of .05 or less would have been needed to be obtained. There is an 83% chance that a relationship exists, but there is also a 17% chance that it does not. The Chi-Square test is shown in Table 10.

Table 10

IPAQ Category: High School Physical Education Received Chi-Square Test

	Value	*df*	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.67[a]	8	.167
Likelihood ratio	10.64	8	.223
Linear-by-linear association	1.05	1	.305
N of valid cases	155		

Note. 6 cells (40.0%) have expected count less than 5.
[a]The minimum expected count is .99.

Table 11 shows the descriptive picture of the one-way ANOVA.

Table 11

IPAQ Met-minutes: High School Physical Education Received

						95% Confidence Interval for Mean			
		N	Mean	Std. dev.	Std. error	Lower bound	Upper bound	Min.	Max.
VPA	No PE	9	586.67	624.82	208.3	106.39	1066.95	0	1440
	1 or 2 Semesters	40	1195.00	1538.0	243.2	703.11	1686.89	0	6720
	3 or 4 semesters	32	1006.25	1715.4	303.2	387.79	1624.71	0	8400
	5 or 6 semesters	28	1077.14	1284.7	242.8	579.00	1575.28	0	4800
	7 or 8 semesters	46	1359.13	1857.8	273.9	807.42	1910.84	0	8640
	Total	155	1148.13	1595.9	128.2	894.89	1401.36	0	8640
MPA	No PE	9	895.56	699.4	233.1	357.94	1433.17	180	1920
	1 or 2 Semesters	40	1109.00	1501.0	237.3	628.96	1589.04	0	5040
	3 or 4 semesters	32	470.00	693.4	122.6	220.01	719.99	0	2880
	5 or 6 semesters	28	747.14	1086.0	205.2	326.04	1168.25	0	5040
	7 or 8 semesters	46	1125.65	1318.3	194.4	734.18	1517.13	0	5040
	Total	155	904.26	1215.1	97.6	711.45	1097.07	0	5040

Table 11 continues on next page

Table 11 (continued)

IPAQ Met-minutes: High School Physical Education Received

						95% Confidence Interval for Mean			
		N	Mean	Std. dev.	Std. error	Lower bound	Upper bound	Min.	Max.
Walk	No PE	9	907.50	880.8	293.6	230.5	1584.53	0	2772
	1 or 2 semesters	40	1760.14	1430.6	226.2	1302.6	2217.66	0	4158
	3 or 4 semesters	32	1427.77	1386.4	245.1	927.9	1927.60	0	4158
	5 or 6 semesters	28	1737.21	1293.8	244.5	1235.5	2238.91	33	4158
	7 or 8 semesters	46	1620.59	1365.6	201.4	1215.1	2026.12	0	4158
	Total	155	1596.45	1352.1	108.6	1381.9	1811.01	0	4158
Total METS	No PE	9	2389.72	1345.3	448.5	1355.6	3423.84	471	4692
	1 or 2 semesters	40	4064.14	3528.9	558.0	2935.5	5192.74	99	15918
	3 or 4 semesters	32	2904.02	2705.2	478.2	1928.7	3879.35	0	10542
	5 or 6 semesters	28	3561.50	2526.9	477.5	2581.7	4541.32	248	9918
	7 or 8 semesters	46	4105.37	3303.8	487.1	3124.3	5086.47	248	16398
	Total	155	3648.84	3057.2	245.6	3163.8	4133.93	0	16398

Note. $N = 155$

Table 11 shows that the mean Met-minutes per week in the vigorous, moderate, walking, and total PA categories was higher for students who received seven or eight semesters of physical education compared to those who received no physical education. Students who received one or two semesters of physical education reported higher mean MET-minutes than those who received three or four semesters or five or six semesters of physical education in all of the PA categories.

The mixed results within the descriptive picture of the MET-minutes per week led to no significant results being found in any of the PA categories. The results of the one-way ANOVA analysis can be found in Table 12. A one-way ANOVA on the vigorous

PA MET-minutes and the amount of physical education received in high school was calculated. The analysis was not significant, $F(4, 150) = 0.56$, $p = .69$. A one-way ANOVA on the moderate PA MET-minutes and the amount of physical education received in high school was calculated. The analysis was not significant, $F(4, 150) = 1.84$, $p = .12$. A one-way ANOVA on the walking MET-minutes and the amount of physical education received in high school was calculated. The analysis was not significant, $F(4, 150) = 0.93$, $p = .45$. A one-way ANOVA on the total MET-minutes and the amount of physical education received in high school was calculated. The analysis was not significant, $F(4, 150) = 1.31$, $p = .27$. In all four PA MET-minute categories, the null hypothesis was retained.

Table 12

ANOVA: PA MET-minute Category–High School Physical Education Received

		Sum of squares	*df*	Mean square	*F*	Sig.
VPA MET	Between groups	5758270.77	4	1439567.69	.559	.693
	Within groups	3.865E8	150	2576527.24		
	Total	3.922E8	154			
MPA MET	Between groups	10657905.59	4	2664476.40	1.844	.123
	Within groups	2.167E8	150	1444845.89		
	Total	2.274E8	154			
Walking MET	Between groups	6835761.83	4	1708940.46	.933	.447
	Within groups	2.747E8	150	1831462.57		
	Total	2.816E8	154			
Total MET	Between groups	48720582.87	4	12180145.72	1.314	.267
	Within groups	1390586294.01	150	9270575.29		
	Total	1439306876.87	154			

Note. $N = 155$

All five subquestions were examined from multiple angles. First, the researcher examined for significant differences in all PA MET-minutes levels and PA IPAQ category levels between all demographic subgroups in the study. Secondly, the effect that the number of years of high school physical education received had on the subgroups was also examined for significant relationships. To complete this, a two-way ANOVA statistical test was used to examine this effect within the PA MET-minute categories. Levenes's Test of Equality of Error and the Tukey post-hoc were utilized during the two-way ANOVA to examine for reliability of the data. Since the IPAQ PA variable was categorical data, it was not analyzed during the two-way ANOVA tests. A two-way ANOVA should not be used to analyze dependent categorical data (George & Mallery, 2010).

SubQuestion A

Subquestion A asked, *What is the difference between male and female participants?* A Chi-Square test was performed and no significant relationship was found between gender and the IPAQ PA category of the students, X^2 (2, N = 155) = 5.34, p = 0.07. The Chi-Square test can be found in Table 13.

Table 13

Chi-Square Tests: Gender–IPAQ PA Category

	Value	*df*	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.34[a]	2	.07
Likelihood ratio	6.73	2	.04
Linear-by-linear association	4.24	1	.04
N of valid cases	155		

Note. 1 cells (16.7%) have expected count less than 5.
[a]The minimum expected count is 4.94.

A one-way ANOVA on gender and the vigorous PA MET-minutes was calculated. The analysis was significant, $F(1, 153) = 14.50$, $p = .000$, $r = .29$. Males participated in more vigorous PA MET-minutes ($M = 1880$, $SD = 2219.93$) than females ($M = 848.73$, $SD = 1139.12$). A one-way ANOVA on gender and moderate PA Met-minutes were calculated. The analysis was not significant, $F(1, 153) = .71$, $p = .40$. A one-way ANOVA on gender and walking PA MET-minutes were calculated. The analysis was not significant, $F(1, 153) = .061$, $p = .81$. A one-way ANOVA on gender and total PA MET-minutes were calculated. The analysis was significant, $F(1, 153) = 5.70$, $p = .02$, $r = .19$. Males participated in more total PA MET-minutes ($M = 4551.97$, $SD = 3908.23$) than females ($M = 3278.38$, $SD = 2562.07$). Results of the one-way ANOVA can be found in Table 14.

Table 14

ANOVA: Gender–MET-minute Per Week Categories

		Sum of squares	*df*	Mean square	*F*	Sig.
VPAMETs	Between groups	33964135.601	1	33964135.60	14.50	.000
	Within groups	358273221.818	153	2341655.05		
	Total	392237357.419	154			
MPAMETs	Between groups	1056422.405	1	1056422.41	.714	.399
	Within groups	226328367.273	153	1479270.37		
	Total	227384789.677	154			
Walking METs	Between groups	112806.384	1	112806.38	.061	.805
	Within groups	281442340.300	153	1839492.42		
	Total	281555146.684	154			
Total METs	Between groups	51718628.214	1	51718628.21	5.703	.02
	Within groups	1387588248.664	153	9069204.24		
	Total	1439306876.877	154			

Note. N =155

A two-way ANOVA was completed on vigorous PA MET-minutes per week, and no significant interaction was found between gender and physical education received in

high school $F(4,145) = 1.62$, $p = .17$. However, there was a significant difference in main effect one, gender and vigorous PA, $F(4,145) = 7.37$, $p = .007$. The results can be found in Table 15.

Table 15

Tests of Between-Subjects Effects: Gender, PE, Vigorous PA

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.	Partial eta squared
Corrected model	52348847.68[a]	9	5816538.63	2.48	.012	.133
Intercept	1.275E8	1	1.275E8	54.38	.000	.273
Gender	17282971.392	1	17282971.39	7.37	.007	.048
PE	7542122.863	4	1885530.72	.81	.524	.022
Gender PE	15212283.902	4	3803070.98	1.62	.172	.043
Error	3.399E8	145	2344058.69			
Total	5.966E8	155				
Corrected Total	3.922E8	154				

Note. Dependent variable: VPA METs per week.
[a]*R* Squared = .133 (Adjusted *R* Squared = .080)

A two-way ANOVA was completed on total PA MET-minutes per week and no significant interaction was found between gender and physical education received in high school $F(4,145) = 0.606$, $p = .66$. The results can be found in Table 16.

Table 16

Tests of Between-Subjects Effects: Gender, PE, Total METs

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.	Partial eta squared
Corrected Model	1.111E8	9	12343797.72	1.35	.218	.077
Intercept	1.088E9	1	1.088E9	118.80	.000	.450
Gender	29705383.480	1	29705383.48	3.24	.074	.022
PE	33776064.160	4	8444016.04	.92	.453	.025
Gender PE	22218852.165	4	5554713.04	.61	.659	.016
Error	1.328E9	145	9160087.568			
Total	3.503E9	155				
Corrected total	1.439E9	154				

Note. Dependent variable: Total METs all physical activity.
[a]*R* Squared = .077 (Adjusted *R* Squared = .020)

Subquestion B

Subquestion B asked, *What is the difference between participants who participated on a varsity interscholastic sport in high school and participants who did not?* A Chi-Square test was performed and a significant relationship was found between those who participated on a varsity interscholastic sport in high-school and those who did not, $X^2(2, 155) = 8.63$, $p = .01$. Students who participated in an interscholastic sport during high school were more likely to be in a higher PA category than those who did not. Results of the Chi-Square test can be found in Table 17.

Table 17

Chi-Square Test: Varsity Sport in High School–IPAQ Physical Activity Category

	Value	*df*	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.63[a]	2	.013
Likelihood ratio	8.76	2	.013
Linear-by-linear association	8.01	1	.005
N of valid cases	155		

Note. 0 cells (.0%) have expected count less than 5.
[a]The minimum expected count is 8.12.

A one-way ANOVA on varsity interscholastic participation and vigorous PA MET-minutes per week was calculated. The analysis was significant $F(1, 153) = 8.59$, $p = .004$, $r = .23$. Individuals who participated in varsity interscholastic sports participated in more vigorous PA MET-minutes ($M = 1531.89$, $SD = 1749.30$) than those who did not ($M = 797.53$, $SD = 1364.14$). A one-way ANOVA on varsity interscholastic participation and moderate PA MET-minutes per week were calculated. The analysis was not significant $F(1,153) = .32$, $p = .58$. A one-way ANOVA on varsity interscholastic participation and walking PA MET-minutes per week were calculated. The analysis was not significant $F(1,153) = 1.40$, $p = .24$. A one-way ANOVA on varsity interscholastic participation and total PA MET-minutes per week were calculated. The analysis was not significant $F(1,153) = 3.26$, $p = .07$. The results can be found in Table 18.

Table 18

One-way ANOVA: Met-minutes Per Week: Varsity Interscholastic Participation

		Sum of squares	*df*	Mean squares	*f*	*Sig*
VPA METS	Between groups	20854716.11	1	20854716.11	8.60	.004
	Within groups	371382641.31	153	2427337.53		
	Total	392237357.42	154			
MPA METS	Between groups	468202.62	1	468202.62	.316	.575
	Within groups	226916587.05	153	1483114.95		
	Total	227384789.68	154			
Walking METS	Between groups	2544115.94	1	2544115.94	1.39	.239
	Within groups	279011030.75	153	1823601.51		
	Total	281555146.69	154			
Total METs	Between groups	30002694.963	1	30002694.96	3.26	.073
	Within groups	1409304181.914	153	9211138.44		
	Total	1439306876.877	154			

Note. $N = 155$

A two-way ANOVA was completed on vigorous PA MET-minutes per week and no significant interaction was found between varsity interscholastic sport and physical education received, $F(4,145) = 1.04$, $p = .39$. However, there was a significant difference in main effect one; individuals who participated on a varsity sport in high school and those who did not $F(1,145) = 5.12$, $p = .025$. The results can be found in Table 19.

Table 19

Tests of Between-Subjects Effects: Varsity Sport, PE, Vigorous PA

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.	Partial Eta Squared
Corrected model	39679390.53[a]	9	4408821.17	1.81	.070	.101
Intercept	1.233E8	1	1.233E8	50.73	.000	.259
PE	8668828.71	4	2167207.18	.89	.471	.024
InterPart	12440644.19	1	12440644.19	5.12	.025	.034
PE InterPart	10103826.990	4	2525956.75	1.04	.389	.028
Error	3.526E8	145	2431434.25			
Total	5.966E8	155				
Corrected Total	3.922E8	154				

Note. Dependent Variable: VPA METs Per Week.
[a]*R* Squared = .101 (Adjusted *R* Squared = .045)

A two-way ANOVA was completed on total PA MET-minutes per week and no significant interaction was found between varsity interscholastic sport and physical education received $F(4,145) = 1.67$, $p = .16$. The results can be found in Table 20.

Table 20

Test of Between-Subjects Effects: Varsity Sport, PE, Total METs

Source	Type III sum of squares	*df*	Mean Square	*F*	Sig.	Partial eta squared
Corrected Model	1.503E8	9	16700553.99	1.88	.059	.104
Intercept	1.233E9	1	1.233E9	138.67	.000	.489
PE	65779358.10	4	16444839.52	1.850	.122	.049
InterPart	17362076.73	1	17362076.73	1.953	.164	.013
PE InterPart	59414786.34	4	14853696.58	1.671	.160	.044
Error	1.289E9	145	8889668.21			
Total	3.503E9	155				
Corrected Total	1.439E9	154				

Note. Dependent variable: Total METSs per-week.
[a]*R* Squared = .104 (Adjusted *R* squared = .049)

SubQuestion C

Subquestion C asked, *What is the difference between the races in the study?* A Chi-Square test was performed and a significant relationship was found between races in the study, $X^2(2, 155) = 24.85$, $p = .002$. Results of the Chi-Square can be found in Table 21.

Table 21

Chi-Square Test: Race–IPAQ PA Category

	Value	*df*	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.85[a]	8	.002
Likelihood ratio	21.95	8	.005
Linear-by-linear association	6.24	1	.013
N of valid cases	155		

Note. 11 cells (73.3%) have expected count less than 5.
[a]The minimum expected count is .33.

A one-way ANOVA on race and vigorous PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = .51$, $p = .73$. A one-way ANOVA on race and moderate PA MET-minutes per week were calculated. The analysis was significant, $F(1,153) = 2.82$, $p = .03$, $r = .13$. Hispanics participated in ($M = 316$, $SD = 542.49$) moderate MET-minutes per week, while Asians ($M = 480$, $SD = 415.69$), Whites ($M = 904.73$, $SD = 1198.54$), Blacks ($M = 1050$, $SD = 1189.24$), and those who marked other ($M = 2880$, $SD = 2435.73$) participated in more moderate MET-minutes per week. A one-way ANOVA on race and walking PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = .87$, $p = .49$. A one-way

ANOVA on race and total PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = 1.17$, $p = .33$. The results can be found in Table 22.

Table 22

One-way ANOVA: MET-minutes Per Week–Race

		Sun of squares	*df*	Mean square	*F*	*Sig.*
VPA METs	Between groups	5290622.76	4	1322655.69	.513	.726
	Within groups	386946734.66	150	2579644.90		
	Total	392237357.42	154			
MPA METs	Between groups	15881084.03	4	3970271.01	2.816	.027
	Within groups	211503705.65	150	1410024.70		
	Total	227384789.68	154			
Walking METs	Between groups	6355947.59	4	1588986.90	.866	.486
	Within groups	275199199.09	150	1834661.31		
	Total	281555146.68	154			
TotalMETs All PA	Between groups	43681141.49	4	10920285.37	1.174	.325
	Within groups	1395625735.38	150	9304171.57		
	Total	1439306876.87	154			

Note. $N = 155$

A two-way ANOVA was not completed on race due to the low numbers of individuals in the sample from the various races represented. Whites represented 84.5% ($n = 131$) of the sample.

SubQuestion D

Subquestion D asked, *What is the difference between commuter and residential students?* A Chi-Square test was performed and no significant relationship was found between residential and commuter students, $X^2(2, 155) = .893$, $p = .64$. Results of the Chi-Square can be found in Table 23.

Table 23

Chi-Square Test: Student Status–IPAQ PA Category

	Value	*df*	Asymp. Sig. (2-sided)
Pearson Chi-Square	.893[a]	2	.640
Likelihood ratio	.750	2	.687
Linear-by-linear association	.480	1	.488
N of valid cases	155		

Note. 2 cells (33.3%) have expected count less than 5.
[a]The minimum expected count is 1.10.

A one-way ANOVA on student status and vigorous PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = .98$, $p = .32$. A one-way ANOVA on student status and moderate PA MET-minutes per week was calculated. The analysis was not significant, $F(1,153) = 2.58$, $p = .11$. A one-way ANOVA on student status and walking PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = .02$, $p = .89$. A one-way ANOVA on student status and total PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = .003$, $p = .96$. The results can be found in Table 24.

Table 24

One-way ANOVA: MET-minutes Per Week–Student Status

		Sum of squares	*df*	Mean square	*F*	*Sig.*
VPA METs	Between groups	2502780.87	1	2502780.87	.983	.323
	Within groups	389734576.55	153	2547284.81		
	Total	392237357.42	154			
MPA METs	Between groups	3774973.13	1	3774973.13	2.58	.110
	Within groups	223609816.55	153	1461502.07		
	Total	227384789.68	154			
Walking METs	Between groups	34542.26	1	34542.26	.019	.891
	Within groups	281520604.43	153	1840003.96		
	Total	281555146.68	154			
Total METs	Between groups	30644.45	1	30644.45	.003	.955
	Within groups	1439276232.43	153	9407034.20		
	Total	1439306876.88	154			

Note. $N = 155$

A two-way ANOVA was completed on vigorous PA MET-minutes per week and no significant interaction was found between student status and physical education received, $F(4,145) = 2.24$, $p = .09$. The results can be found in Table 25.

Table 25

Test of Between-Subjects Effects: Student Status, PE, Vigorous PA

Source	Type III sum of squares	*Df*	Mean square	*F*	Sig.	Partial eta squared
Corrected Model	25286077.59 [a]	8	3160759.70	1.26	.270	.064
Intercept	70273953.24	1	70273953.25	27.96	.000	.161
PE	22648403.13	4	5662100.78	2.25	.066	.058
StuSta	4670135.91	1	4670135.91	1.86	.175	.013
PE StuSta	16855048.09	3	5618349.36	2.24	.087	.044
Error	3.670E8	146	2513364.93			
Total	5.966E8	155				
Corrected Total	3.922E8	154				

Note. Dependent Variable: VPA METs per week.
[a]*R* Squared = .064 (Adjusted R Squared = .013)

A two-way ANOVA was completed on total PA MET-minutes per week and no significant interaction was found between student status and physical education received, $F(4,145) = .43$, $p = .74$. The results can be found in Table 26.

Table 26

Tests of Between-Subjects Effects: Student Status, PE, Total METs

Source	Type III sum of squares	*df*	Mean square	*F*	Sig.	Partial eta squared
Corrected model	60789918.20[a]	8	7598739.78	.805	.599	.042
Intercept	4.536E8	1	4.536E8	48.043	.000	.248
PE	43544042.090	4	10886010.52	1.153	.334	.031
StuSta	300146.76	1	300146.76	.032	.859	.000
PE StuSta	12064202.02	3	4021400.67	.426	.735	.009
Error	1.379E9	146	9441896.98			
Total	3.503E9	155				
Corrected Total	1.439E9	154				

Note. Dependent Variable: Total METs per week.
[a]*R* Squared = .042 (Adjusted R Squared = -.010)

Subquestion E

Subquestion E asked, *What is the difference between a participant who received an exemption, waiver, and/or substitution for or from physical education credit and a*

participant who did not? A Chi-Square test was performed and no significant relationship was found between participants who received an exemption, waiver, and/or substitution from physical education and participants who did not, $X^2(2, 155) = 1.80$, $p = .41$. Results of the Chi-Square can be found in Table 27.

Table 27

Chi-Square Test: Exemption/Substitution From PE–IPAQ PA Category

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.78[a]	2	.407
Likelihood ratio		2	.408
Linear-by-linear association	.009	1	.926
N of valid cases	155		

Note. 0 cells (.0%) have expected count less than 5.
[a]The minimum expected count is 5.26.

A one-way ANOVA on exemption and/or substitution from physical education and vigorous PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = .00$, $p = .98$. A one-way ANOVA on exemption and/or substitution from physical education and moderate PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = .004$, $p = .95$. A one-way ANOVA on exemption and/or substitution from physical education and walking PA MET-minutes per week were calculated. The analysis was not significant, $F(1,153) = .001$, $p = .98$. A one-way ANOVA on exemption and/or substitution from physical education and total PA MET-minutes per week were calculated. The analysis was not significant $F(1,153) = .000$, $p = .98$. The results can be found in Table 28.

Table 28

One-way ANOVA: MET-minutes Per Week–Exemption/Substitution from PE

		Sum of squares	*df*	Mean square	*F*	Sig.
VPA METs	Between groups	1091.69	1	1091.69	.000	.984
	Within groups	392236265.73	153	2563635.72		
	Total	392237357.42	154			
MPA METs	Between groups	5435.39	1	5435.40	.004	.952
	Within groups	227379354.28	153	1486139.57		
	Total	227384789.68	154			
Walking METs	Between groups	1557.40	1	1557.40	.001	.977
	Within groups	281553589.28	153	1840219.54		
	Total	281555146.68	154			
Total METs	Between groups	4529.55	1	4529.54	.000	.983
	Within groups	1439302347.33	153	9407204.89		
	Total	1439306876.88	154			

Note. $N = 155$

A two-way ANOVA was not completed on exemption and/or substitution from physical education, physical education taken in high school, and PA. This would not be valid data to use as individuals who received an exemption and/or substitution from physical education may have less years of physical education than those who did not.

Sitting

Data on sitting was also collected. After cleaning this data, the total number of sitting minutes per week was available for analysis. The sitting data could be another indicator of time spent in sedentary activity, but was not used as a part of any score on PA within the short form of the IPAQ (International Physical Activity Questionnaire, 2005). The researcher can use the sitting data as needed. Traditional college students spend numerous hours sitting in class and studying, and this was evident in the sitting

data collected. In the case of this study, the sitting data was not useful and did not provide any type of useful correlation analysis with the research question and subquestions. This data could be useful for a nontraditional student population that does not have sitting built into their daily schedules or when utilizing the long form of the IPAQ.

Summary

Chapter 4 presents the results of the data collection and analysis of this quantitative correlational study completed at a university in the Midwest. A total of 324 freshmen participated in the study by completing the online survey. After cleaning and processing the data per the procedures set forth in the study and the IPAQ protocol, 155 cases were left and could be used in the analysis. Analysis of the data was completed on SPSS. The researcher hypothesized that there was a statistically significant correlation between the number of years of physical education that college students receive in high school and their physical activity habits. After analyzing the data from multiple PA angles, including walking, moderate, and vigorous PA; and the processed IPAQ PA category data, the null hypothesis was retained in all four of these instances. An additional five subquestions were also examined within the scope of the main research question and several significant findings were found. A significant difference was found between genders and vigorous PA Met-minutes. A second significant difference was found between individuals who participated in a varsity sport in high school and those who did not and the IPAQ PA category. A third significant difference was found between those who participated on a varsity sport in high school and those who did not and vigorous PA Met-minutes. A fourth significant difference was found between race

and the IPAQ PA category. Finally, a significant difference was found between race and moderate PA Met-minutes. Chapter 5 includes a discussion of the study.

CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECCOMENDATIONS

The primary purpose of this quantitative correlational study was to examine the relationship between the number of years of physical education students received in high school and the traditional college freshmen's level of physical activity at the time of the study. This was completed by analyzing cross-sectional PA data collected with the IPAQ survey tool and additional demographic data collected from the participants. Secondly, the study examined the data for relationships within five subquestions, under the scope of the main research question. This was completed by analyzing the IPAQ PA data and additional demographic data. The purpose of Chapter 5 is to summarize this study, discuss conclusions of the data analysis, discuss implications for practice, and make recommendations for future research.

Summary

Physical education requirements in high school are established by each individual state. The most recent *Shape of the Nation Report* found that 86% of states do require some form of high school physical education, but most states do not require the recommended instructional 225 minutes per week (National Association for Sport and Physical Education & American Heart Association, 2012). The review of literature also found that many school districts have reduced or eliminated physical education, due to budget restraints and the passage of NCLB, which was signed into law in 2003 (Institute of Medicine of the National Academies of Science, 2013).

Both the American Heart Association (2013) and the American College of Sports Medicine (2013) recommend that adults accumulate 150 minutes of moderate to vigorous PA each week. Since the inception of physical education in America, movement and

fitness education have been a focal point (Institute of Medicine of the National Academies of Science, 2013). One of the current goals of physical education is to provide students with the knowledge and skills to be physically active throughout their lives (National Association of Sport and Physical Education, 2011). Research has found that knowledge, behaviors, and attitudes towards PA can be influenced by the various experiences students have within physical education classes (Darst et al., 2012). If adults are going to meet the recommended amounts of weekly PA, and physical education can teach proper PA habits, then the impact of the amount of physical education received needed to be examined.

Lack of PA is a major health problem. Physical inactivity has been linked to multiple negative health risks, including reduced life expectancy due to diseases such as heart disease and diabetes (Katzmarzyk et al., 2003; Katzmarzyk, 2006; Matthews et al., 2012). Research has also found that when individuals are physically active, substantial health benefits can be obtained (Blair et al., 2004; Garber et al., 2011). The most recent PA data collected by the American College Health Association (2013) on college student PA behaviors found that many college students do not meet the recommended PA guidelines of 150 minutes of moderate to vigorous PA per week. The review of the literature established that there was a need to study the short-term relationships physical education has on future PA behaviors (Institute of Medicine of the National Academies of Science, 2013; Pate, O'Neill, & McLver, 2011).

This study examined the relationship between the number of years of physical education students receive in high school and the traditional college freshmen's current level of physical activities. This study utilized cross-sectional data. The IPAQ survey

tool was used to collect the students' PA data during the previous seven days. The amount of physical education the students received in high school was also collected. The sample for this study was 155 traditional college freshmen from a private Christian liberal arts university in the Midwest. This location mainly enrolls students from four states, with each state having different time-mandated requirements for secondary physical education. The collected data were then examined for correlations. Data analysis found that individuals who received the greatest amount of physical education in high school participated in the greatest amounts and intensities of PA as traditional college freshmen, but, overall, the results were not significant when examining PA using five different analyses. When examining the subquestions within the scope of the main research question, five significant correlations were found. The conclusions from the main research question and subquestions follow.

Conclusions

The study had one main research question and five subquestions. The main research question asked, *What is the relationship between the number of years of physical education that college students receive in high school and their current physical activity habits?* It was hypothesized that there would be a statistically significant correlation between the number of years of physical education that college students receive in high school and their physical activity habits. The null hypothesis was retained; students who received more high school physical education were not significantly more physically active as traditional college freshmen. The results of the study indicated that no significant relationships were found between the amount of physical education received in high school and the assigned IPAQ PA category or weekly vigorous, moderate,

walking, and total MET-minutes obtained. However, there was a trend towards increased PA and physical education received. This was similar to the study completed by Cleland et al. (2008), which found no significant correlations but saw a trend when examining time in physical education and PA behaviors 20 years later. The results from the current study were different than the results of a study by Trudeau et al. (2004), which found weak correlations between childhood PA at ages 10 through 12 and adult PA at age 35.

Students who received the most physical education in this study were the most active in the IPAQ PA category, vigorous, moderate, and total accumulated MET-minutes per-week variables. However, students who received only one or two semesters of physical education were the most active in the accumulated walking MET-minutes per-week variable and the second most active in all other PA variables. When not examining students who completed one or two semesters of physical education, there was a consistent connection between more physical education received and increased PA. Another finding was that students who received no physical education in high school were the least active in all PA categories except accumulated moderate MET-minutes per week.

Almost all students in the sample, regardless of the amount of high school physical education received, reported high levels of walking MET-minutes per week, which had the highest median value when examining the four individual MET-minute variables. This led some students to be placed in the IPAQ moderate PA category that otherwise would have been in the IPAQ low PA category. Correlation analyses on the assigned IPAQ category data demonstrated that there was no significant correlation between physical education received and current PA habits. Had all students not reported

a high level of walking MET-minutes per week, then a significant correlation may have existed, as more students would have been assigned to the low IPAQ PA category.

Another conclusion was that about 25% of the students in the study participated in no moderate or vigorous PA in the previous seven days, which was very similar to the most recent data from the National College Health Assessment (American College Health Association, 2013) and *Healthy People 2020* that reported PA data on all 18-to-24 year olds (United States Department of Health and Human Services, 2013). Five subquestions were also examined under the scope of the main research question.

SubQuestion A

Subquestion A examined the differences between male and female participants. No significant relationships were found between gender and the IPAQ PA category and accumulated moderate and walking MET-minutes per week. A significant relationship was found between gender and accumulated vigorous and total MET-minutes per week. Males were more likely than females to participate in more vigorous PA and accumulate more total MET-minutes per week. Egli et al. (2011) found that males were more likely to be intrinsically motivated towards PA; whereas, females were more likely to be extrinsically motivated; intrinsic motivation has been connected to increased amounts of PA (McDavid et al., 2012). These results were also similar to the National College Health Assessment and *Healthy People 2020*, which also found that males participated in more vigorous PA than females (American College Health Association, 2013; United States Department of Health and Human Services, 2013). The analysis found no significant relationships when examining for an interaction between gender and the amount of physical education received.

SubQuestion B

Subquestion B examined the differences between participants who participated on a varsity interscholastic sport and those who did not. Individuals who participated in a varsity interscholastic sport in high school were more likely to be in a higher IPAQ PA category. They were also more likely to participate in more vigorous MET-minutes per week. These results were similar to a study by Makinen et al. (2010), which found that low-educated individuals who participated in competitive sports as adolescents were more likely to engage in higher amounts of adult PA. In the Makinen et al. study, low-educated individuals only graduated from high school. A study by Engstrom (2008) found that adults who participated in greater amounts of PA were more likely to participate in a sports club or in track and field when they were adolescents. A study by Horn et al. (2008) found that 12th grade females who participated on an interscholastic sports team were more likely to be physically active the year following graduation from high school.

Unlike those participating in any high school class, including physical education, who are forced to participate, individuals who participated in interscholastic sports or other competitive sports as adolescents are not forced to participate. Due to this, it can be argued that these students are more intrinsically motivated because intrinsic motivation or self-determined motivation is connected to increased amounts of PA (McDavid, Cox, & Amorose, 2012; Brunet & Sabiston, 2011). When examining the affect the amount of physical education had within this subgroup, no relationships were found. The *Shape of the Nation Report* identified interscholastic sports participation as a common exemption from high school physical education (National Association for Sport and Physical

Education & American Heart Association, 2012). These results combined with past studies make it more challenging for physical educators to argue against exemptions and/or substitutions from physical education for varsity interscholastic sports participation. If individuals who participate in interscholastic athletics are more active in the short term than those who did not participate, then the argument against an exemption and/or substitution for interscholastic sports participation must focus on a different benefit of the physical education class that cannot be obtained from interscholastic sports participation.

SubQuestion C

Subquestion C examined the differences between races in the study; two significant findings were found. Due to the low number of participants from races other than Whites, the conclusions must be looked at with caution. Asians and Hispanics were more likely to be in a lower IPAQ PA category, due to participating in the lowest amount of vigorous and total MET-minutes per week. Blacks, Whites and individuals who marked *other* participated in the greatest amount of total MET-minutes per week, and therefore were more likely to be in a higher IPAQ PA category. Hispanics were less likely to participate in moderate PA when compared to all of the other races in the study. Examining for interactions with the amount of high school physical education received and making comparisons to PA data collected in *Healthy People* 2020 and the National College Health Assessment were not feasible, due to the lack of diversity in the collected race data.

SubQuestion D

Subquestion D examined the differences between commuter and residential students. This data must also be examined with caution, as the sample was made up of a majority of residential students. After examining the data, no significant relationships were found in any of the collected PA data variables and no significant relationships were found when examining for significant interactions with the amount of physical education received. Interestingly, when examining IPAQ category data and the means in all MET-minute categories, they were very similar. Commuter students participated in slightly more vigorous and walking MET-minutes per week, whereas residential students participated in slightly more moderate and total MET-minutes per week. Even though commuter students spend less time on campus, they were either continuing to use campus facilities within the time frame they were on campus for PA or finding alternative locations to participate in PA.

Subquestion E

Subquestion E examined the differences between participants who received an exemption, waiver, and/or substitution for physical education credit in high school and those who did not. After examining the data, no significant relationships were found with the IPAQ PA category variable or any of the PA MET-minute categories of variables. There was a slightly higher percentage of students who said they received an exemption, substitution, and/or waiver from physical education in the low PA category on the IPAQ scale, but there was also a slightly higher percentage of students in the high PA category on the IPAQ scale that reported they received an exemption, substitution, and/or waiver from physical education. As was already stated above, individuals who were high school

varsity athletes had significantly greater amounts of PA; the National Association for Sport and Physical Education and American Heart Association (2012) found that interscholastic athletics is a commonly granted exemption from physical education in many states. This would suggest that individuals who stated that they received an exemption, substitution, and/or waiver may be more active than those who did not, because many would be athletes. However, after examining the data, the analysis found that the sample was equally divided between those who said they were high school varsity athletes and those who were not when just examining individuals who said they received an exemption, substitution, and/or waiver from physical education. This might explain the variation in the sample, or well curve between the low and high PA categories on the IPAQ tool. Interactions with the amount of physical education received were not examined, due to the invalid results this subquestion would produce. Students with exemptions, substitutions, and/or waivers would obviously have less physical education received than those without exemptions, substitutions, and/or waivers.

Implications for Practice

One of the major roles of SHAPE America is to promote quality physical education within the K-12 setting. The Society of Health and Physical Educators (2014a) believes a quality K-12 physical education program provides the following:

- An opportunity to learn
- Meaningful content
- Appropriate instruction
- Student and program assessment

Quality physical education programs promote positive attitudes towards PA and help students acquire a cognitive understanding of health-related fitness so they can be physically competent to be physically active throughout their lives (Society of Health and Physical Educators, 2014a). To accomplish this, the Society of Health and Physical Educators (2014b) recommended secondary students receive 225 instructional minutes of physical education per week for the whole school year. Any valid research that can demonstrate that increased secondary physical education is related to increased PA behavior later in life would add value to the profession.

The current study was designed to explore relationships between the amount of high school physical education received and the PA habits of traditional college freshmen. Several trends were found after the collected data were analyzed. Overall, the participants who received seven or eight semesters of physical education were the most physically active when examining PA amounts and intensity. Participants who received no physical education were the least active when examining PA amounts and intensity. No significant relationships were found under the main research question, because participants who received one or two semesters of physical education were more physically active than all other students, except the students who received seven or eight semesters of physical education when examining PA amounts and intensity.

Even with no significant relationships found, the trends in the analyzed data still demonstrated the value of at least some secondary physical education. It was also demonstrated that physical education received during all four years of high school could be related to the greatest amounts and intensity of PA as a traditional college freshmen. It has already been found that the PA habits established during college have a long-term

impact on PA habits as an adult (Xiaofen, Guan, Pinero, & Bridges, 2005). It is recommended that the federal government, states, and local school districts mandate the weekly recommended secondary physical education instructional time of 225 minutes and provide funds for secondary physical education programs. States with weaker physical education time mandates reported in the most recent *Shape of the Nation* report, such as Michigan, which only requires one semester of secondary physical education, and Wisconsin, which requires three semesters of secondary physical education (National Association for Sport and Physical Education and American Heart Association, 2012), should consider increasing their mandated physical education time requirements. It is also recommended that state and local school districts stop reducing the amount and/or eliminating secondary physical education as a cost-saving measure and/or reason to add additional instructional minutes for other subject areas. Students who received no physical education were the least active in this study. Previous research has also established that physical education does not harm academic performance, but rather may improve academic performance (Trost & Mars, 2010) while promoting PA (National Association of Sport and Physical Education, 2011).

The five subquestions also led to several implications. Males participated in significantly more vigorous and total PA per week. Physical education time alone may not be enough to motivate females to be physically active at a vigorous level, which would impact total weekly PA. The literature review did establish that moderate intensity PA can lead to substantial health gains (Blair et al., 2004), so not being physically active in the vigorous category is not necessarily a negative. Varsity interscholastic athletes participated in significantly more vigorous PA each week and were significantly more

likely to be in the highest PA category on the IPAQ. This implies that these individuals are more self-motivated and therefore participate in more PA as traditional college freshmen. It is recommended that if states and/or local school districts must consider offering exemptions, substitutions, and/or waivers for physical education that they only consider individuals who participate in interscholastic varsity sports and not other academic content areas. It is also recommend that states and/or local school districts use other research-based arguments other than physical activity levels later in life when mandating for no exemptions, substitutions, and/or waivers from physical education for interscholastic sports participation. The current study and past research such as Engstrom (2008), Horn et al. (2008), and Makinen et al. (2010) have established a relationship between interscholastic sports participation and increased PA later in life.

There was a significant difference in PA levels in the study between races, but due to lack of diversity in the sample, the effect of secondary physical education received could not be examined. Therefore, no implications and/or recommendations can be made in the area of race, based on the available collected data. No significant relationships were found between residential and commuter students in the study in any PA category. In fact, the amount and intensity of PA was fairly even across all PA categories when examining student status. Universities that offer recreational space and/or facilities for students to be physically active in can attract students to use these areas, regardless of their residential student status. It is recommended that universities advertise these spaces with strategies that will reach both residential and commuter students. When examining exemptions, substitutions, and/or waivers no significant relationships were found in any of the PA variable categories. Without knowing every reason why a student received an

exemption, substitution, and or waiver from physical education, it is difficult and would be difficult to make any more recommendations within this subquestion, besides the one connected to varsity interscholastic sports participation already discussed. The conclusions and implications of this study also led to some recommendations for future research.

Recommendations for Research

Individuals at the federal, state, and local levels within the physical education profession continue to fight reductions and/or elimination of physical education classes, promote stronger mandates for amounts of physical education received, and promote funding and academic respect on par with other academic areas. To accomplish this, research and strategic promotion of the physical education field will be needed. The current study added to this body of research. However, the current study was limited in scope, as only the amount of secondary physical education received in high school was examined for possible correlations with PA as traditional college freshmen. Furthermore, the limited size (N = 155) of the study sample and diversity of races represented in the sample also limited the scope of the analysis. Further research expanding the scope of this study would be beneficial to the physical education profession. The following are six recommendations for future research based on the findings of this study:

1. Expand the scope of the study and collect quantitative data from traditional sophomores, juniors, and seniors as well as freshmen. This would allow for additional analysis and examine for long term relationships as well as short-term relationships.

2. Create a similar quantitative study on nontraditional college students of the same age or individuals of the same age who do not go to college, but go directly into the workforce. This would allow for similar quantitative analysis on a different population. Also, in this scenario, the amount of walking reported would most likely be reduced. As previously discussed, the large amount of walking data reported did have an impact on the IPAQ PA categorical data in the current study.
3. Complete this quantitative study at a university in a different region or at a university that has a more racially diverse student population. This would allow for similar analysis on different population.
4. Expand this quantitative study to multiple colleges and/or universities to increase the sample size and validity of the study.
5. Collect quantitative data at two different points in the semester, in the first half like this study and then again during the second half of the semester. This would allow for expanded analysis of the data. With the timetable of the current study, data collection was limited to cross-sectional collection during the first half of the semester.
6. Expand the scope of the study to include attitudes towards PA, as well as amounts and intensity in order to examine the data for correlations with the amount of high school physical education received. Also, have the participants report the reasons why they received an exemption, substitution, and/or waiver from physical education. This would provide a more detailed picture of how the amount of physical education impacted PA, which would allow researchers to better understand the impact of exemptions, substitutions, and or waivers. This

recommendation could also be applied to the previous five, expanding the scope of those recommended studies. This recommendation could be kept quantitative as research tools are available on attitudes towards PA, but it could also be completed as a mixed method study. In this case, the PA data would continue to be quantitative; the attitude towards PA could be collected qualitatively.

Chapter Summary

Chapter 5 presents a summary of the completed research, provides conclusions for the research question and five subquestions, discusses implications for the physical education profession, and provides recommendations for future research. This study examined the relationship between the number of years of physical education students receive in high school and the traditional college freshmen's current level of physical activities. The sample included 155 traditional college freshmen at a private Christian liberal arts university in the Midwest. The null hypothesis was retained; students who received more high school physical education were not significantly more physically active as traditional college freshmen. However, students who received the most high school physical education were the most active in time and intensity, and students who received no high school physical education were the least active. The study also found that males were more active than females in time and intensity and individuals who participated on a varsity interscholastic sport were more active in time and intensity than those who did not.

Even with no significant findings within the main research question, this study added to the previous body of research within the physical education field. After data analyses of examining physical education time received and PA habits as a traditional

college freshman, the positive trends in PA demonstrated value for the physical education class. It is recommended that physical education advocates continue to promote stronger physical education time requirements at the federal, state, and local school district levels. It is also recommended that physical education advocates persuade state and local school districts to reduce or even eliminate exemptions, substitutions, and or waivers for physical education credit. If exemptions, substitutions, and/or waivers must be given, then the exception should be varsity interscholastic sports participation only. Chapter 5 also includes six future research projects to expand the scope of the current study and findings.

Some state and local school districts continue to place a strong emphasis on physical education and demonstrate having strong mandates by not allowing many exemptions, but many school districts have reduced and/or eliminated physical education in the last decade (Institute of Medicine of the National Academies of Science, 2013). The physical education profession must continue to advocate for mandated physical education time requirements, funds, and respect from the educational community. To make this a reality, individual physical educators must be effective with the time they do have with students; research must continue within the physical education field that can demonstrate the value of physical education later in life from various perspectives. The effects of physical inactivity on society are well established—physical education can have a positive impact in this area.

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APPENDICES

APPENDIX A

Short Form of the IPAQ

APPENDIX A

Short Form of the IPAQ

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____ **days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

   _____ **days per week**

   ☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

   _____ **days per week**

   ☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

APPENDIX B

Demographic Questions

APPENDIX B

Demographic Questions

The following demographic questions will be asked in conjunction with the International Physical Activity Questionnaire to gather data in the doctoral dissertation research completed by Aaron Thompson. The study is titled *The Impact the Amount of Physical Education has on the Physical Activity Habits of Traditional College Freshmen*

1. Are you currently an intercollegiate varsity athlete?
    - Yes
    - No

2. Are you currently a student in the Reserved Officers Training Corps (ROTC)?
    - Yes
    - No

3. Are you currently enrolled in a physical activity lab attached to Wellness or Nutrition courses?
    - Yes
    - No

4. How old are you?
    - 18 to 23
    - 24 or older

5. What gender are you?
    - Male
    - Female

6. Are you a commuter or residential student?
    - Commuter
    - Residential

7. What race are you?
    - Asian
    - Black
    - Hispanic

- Native American
- White
- Other

8. Were you a member of a varsity interscholastic sport during high school?
    - Yes
    - No

9. How many semesters or trimesters of physical education class did you participate in during high school? Only count physical education classes actually participated in. Do not count physical education credits earned for participation in other classes or activities.
    - I participated in no physical education in high school
    - 1 or 2 semesters or 1, 2, or 3 trimesters of physical education
    - 3 or 4 semesters or 4, 5, or 6 trimesters of physical education
    - 5 or 6 semesters or 7, 8, or 9 trimesters of physical education
    - 7 or 8 semesters or 10, 11, or 12 trimesters of physical education

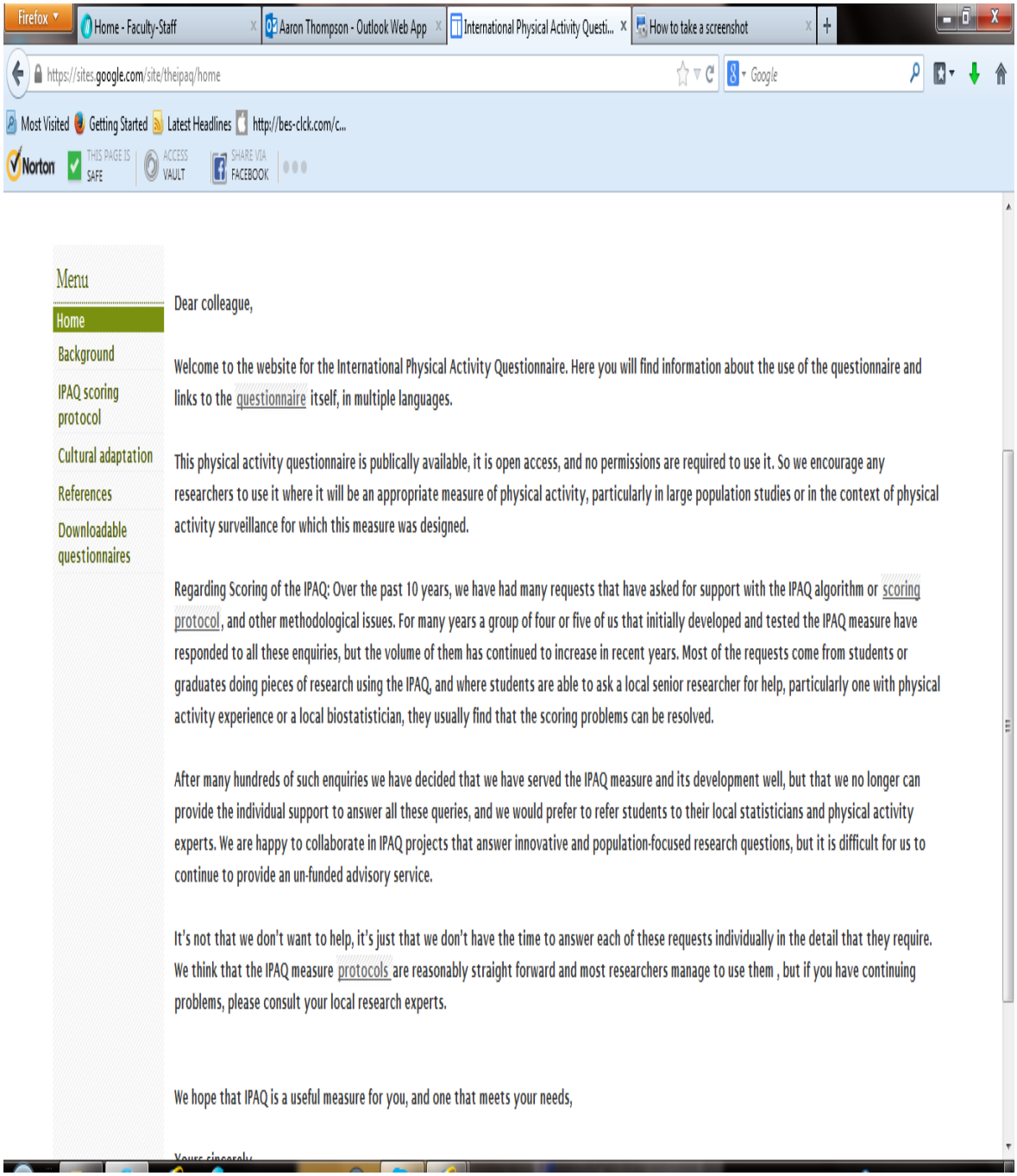
10. In high school, did you receive an exemption/substitution or waiver for physical education credit by being enrolled and/or participating in another class or activity?
    - Yes
    - No

APPENDIX C

Permission to Use IPAQ

APPENDIX C

Permission to Use IPAQ



APPENDIX D

Approval From Research Location

APPENDIX D

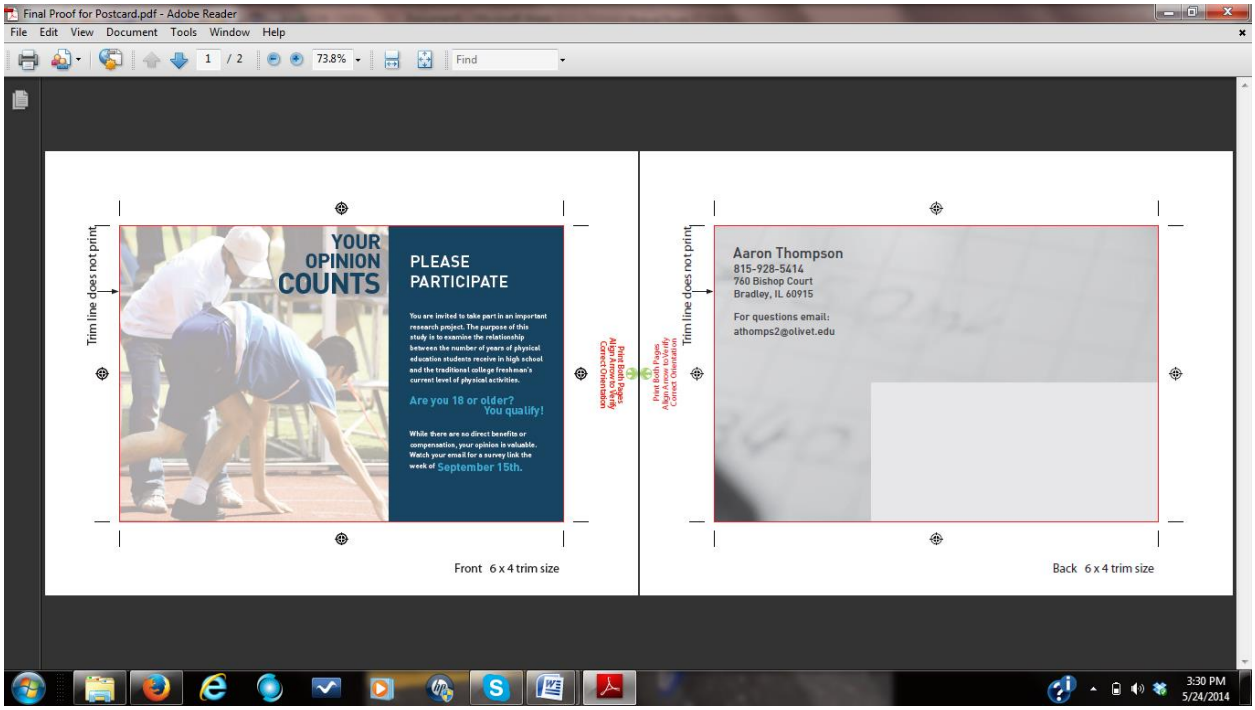
Approval From Research Location

APPENDIX E

Research Advertisement

APPENDIX E

Research Advertisement



APPENDIX F

Consent Form

APPENDIX F

Consent Form

This study is being done by Aaron Thompson who is a doctoral student in the College of Education at Argosy University-Online, working on a dissertation under the guidance of Dr. Michael Marrapodi (mmarrapodi@argosy.edu). This study is a requirement to fulfill the researcher's degree and will not be used for decision-making by any organization.

The title of this study is *The Impact the Amount of High School Physical Education has on the Physical Activity Habits of Traditional College Freshmen*

The purpose of this study is to examine the relationship between the number of years of physical education students receive in high school and the traditional college freshmen's current level of physical activities.

I was asked to be in this study because I am a freshman.

A total of 800 people have been asked to participate in this study

If I agree to be in this study, I will be asked to complete an electronic survey.

This study will take 5 to10 minutes to complete.

The risks associated with this study are negligible.

The benefits of participation are that the analyzed data could be useful to professionals in the field of physical education.

I will receive no compensation for participating in this study.

The information I provide will be treated confidentially, which means that nobody except Aaron Thompson will be able to tell who I am

The records of this study will be kept private. No words linking me to the study will be included in any sort of report that might be published.

The records will be stored securely and only Aaron Thompson will have access to the records.

I have the right to get a summary of the results of this study if I would like to have them. I can get the summary by contacting Aaron Thompson at athomps2@olivet.edu or 815-928-5414.

I understand that my participation is strictly voluntary. If I do not participate, it will not harm my relationship with Aaron Thompson. If I decide to participate, I can refuse to answer any

of the questions that may make me uncomfortable. I can quit at any time without my relations with the university, job, benefits, etc., being affected.

I can contact Aaron Thompson—who is the principal investigator at athomps2@olivet.edu, with any questions about this study.

I understand that this study has been reviewed and certified by the Institutional Review Board, Argosy University-Online. For problems or questions regarding participants' rights, I can contact the Institutional Review Board Chair, Dr. Calvin Berkey at cberkey@argosy.edu

I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study. By clicking on the consent and continue button below, I am giving my voluntarily consent to participate in the research. I understand my rights and obligations as a participant.