5-2014

Using the Theory of Planned Behavior to Explain Physical Activity Among College Students

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USING THE THEORY OF PLANNED BEHAVIOR TO EXPLAIN PHYSICAL ACTIVTY AMONG COLLEGE STUDENTS

A Thesis
Presented to
The Faculty of the Department of Public Health
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Master of Public Health

By
Ese B. Aghenta

May 2014

USING THE THEORY OF PLANNED BEHAVIOR TO EXPLAIN PHYSICAL ACTIVTY AMONG COLLEGE STUDENTS

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This thesis is dedicated to my parents, Prof. Joseph and Pharmacist Regina Aghenta, my role models who set me on the path of pursuit of knowledge. Also, I dedicate this work to my siblings Patrick, Tony, Emmanuel, Josephine and Austin without whom my graduate education would not have been possible.

ACKNOWLEDGMENTS

This dissertation would not have been possible without the guidance and support of my committee members, encouragement from friends, and support from my family. Foremost, my parents have been a continuous support system for me. In the midst of everything their support and endless prayers have helped guide me throughout my life. Their advice has not fallen on deaf ears. The decision to pursue an education outside of my homeland was difficult, because I knew I was ultimately leaving my family for an extended period of time. One thing that brought me comfort with this decision was the reminder that my parents instilled in me to follow my dreams and believe that all things were possible through hard-work and dedication. My siblings have been simply wonderful; they have provided me with encouragement and resources that have made my dreams achievable. Their contributions to my success will never be forgotten. My brother, Tony, seems to be the one whose footsteps I follow; starting from medical school, to a master's degree in public health, and now to residency. His encouraging words have kept me going through the challenges I have encountered.

To my classmates, Aida Memhmedovic, Usonwanne Nwosu and Mackenzie Perkins, thank you for being there for me without needing to be asked. To my best friend, Kwasi Boateng, who has always managed to calm me down when things became tough, I truly appreciate everything you have done. I credit you in many ways for helping me become a more mature woman and providing me with the tools to manage stressful times. I am grateful for his patience.

I would like to express my deepest appreciation to my supervisor and committee chair, Dr. Macy. It has been an amazing experience working as her graduate assistant.

Her presence and encouragement is what ultimately started my journey. Looking back, I remember the initial question that started it all, "Research is you wanting to know something, so what do you want to know?" She has been a constant presence since I started my education at Western Kentucky University, as a teacher, advisor, supervisor and most of all as a friend. Without her supervision and constant help this dissertation would not have been possible.

I would also like to thank Dr. Darlene Shearer and Dr. Grace Lartey for serving on my thesis committee and for guiding my research. They have provided me with support, guidance and knowledge that can come only with experience. Dr. Shearer has been my advisor since I arrived at Western Kentucky University, she has seen me grow from a naïve physician who had a difficult time incorporating the practice of medicine and uses of public health practice, to a physician who is equipped with the skills and knowledge to not only one day treat disease, but hopefully prevent the onset of those illness. Thank you to Dr. Grace Lartey for guiding, supporting, and providing necessary feedback through each stage of this research process. Dr. Lartey's office is continually besieged by students seeking for advice that ranges from course advisement, educational issues to personal issues. She is a confidant for many who have left homes and families in pursuit of education and in the process have lost people to confide in. She has brought her wealth of research experience and knowledge of statistics to bear on my thesis, and her contribution has been extremely valuable.

The professors at the Department of Public Health have been nothing but wonderful. The knowledge gained from each and every one of them served me immensely when working on this thesis.

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The health benefits of physical activity include improved cardiovascular health, reduced rates of diabetes and other metabolic diseases, weight maintenance and improved bone and mental health (United States Department Health & Human Services (2008). According to the American College Health Association National College Health Assessment (ACHA-NCHA, 2013), only 20.0% of college students in the United States meet this recommendation. The Theory of Planned Behavior (TPB) attempts to explain the intention to perform behaviors that are not under an individual's complete volitional control and has been highly utilized in predicting intention and performance of physical activity (Courneya, Nigg & Estabrooks, 1998). This study aimed to understand the behavior and intentions of WKU students towards physical activity using the Theory of Planned Behavior as a guiding framework. This study utilized the TPB as a framework to examine health promoting and health inhibiting factors impacting participation in physical activity among college students. The study was a one-time, cross-sectional survey administered to students in a Personal Health (PH 100) course. Institutional Board Review (IRB) approval was obtained for the study. Information was collected on demographic variables and other factors influencing physical activity behavior among PH-100 students. Statistical analysis was conducted on the data collected to determine the associations between the TPB constructs and intentions to perform physical activity. About 38% of participants were classified as having BMI greater than 25, classifying

them as overweight or obese. Males were found to be more likely to be overweight or obese than females. A total of 54.6% of participants met the current American College of Sports Medicine (ACSM) recommendations for physical activity. Lack of time and lack of energy were the most significant perceived barriers. Attitudes and perceived behavioral control (PBC) were found to significantly impact intention to perform physical activity. In conclusion, the current levels of physical activity among college students can still be improved. The TPB provides a useful framework for predicting intentions to perform physical activity in college students. It can also serve as a useful guide for the development of programs geared toward increasing rates of physical activity among students.

Chapter 1

Introduction

During college, many students live alone and begin to make decisions concerning dietary habits and exercise for the first time (Gropper, Simmons, Gaines, et al. 2009; Wengreen & Moncur, 2009). This period, spanning from late adolescence to early adulthood, is a crucial period when behaviors carried into adulthood are formed (US Department of Health and Human Services (USDHHS), 2010). Unfortunately, poor dietary habits and declining levels of physical activity are paramount at this time (Keating, Guan, Pinero, & Bridges, 2005; Kolodinsky, Harvey-Berino, Berlin, Johnson, & Reynolds, 2007; Larson, Neumark-Sztainer, Hannan, & Story, 2007). Furthermore, decisions made by college students during this period often lead to the adoption of unhealthy practices that continue into adulthood (Melnyk, Kelly, Jacobson, Arcoleo & Shaibi, 2013; Wengreen & Moncur, 2009). However, with behavior change promotion, healthy dietary habits and physical activity is possible during this stage (Silliman, Rodas-Fortier & Neyman, 2004).

Improper dietary habits and inadequate physical activity can result in overweight and obesity which increase the risk of chronic diseases such as diabetes, high blood pressure, high cholesterol and heart disease (National Heart, Lung, and Blood Institute (NHLBI) Expert Panel on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults, 1998).The American College Health Association National College Health Assessment (ACHA-NCHA, 2013), a national college survey conducted two times yearly, showed that 21.9% of college students are overweight, while 11.8% are obese. Therefore, about 1 in 3 college students in the United States is either overweight

or obese. Research indicates that a significant amount of weight gain occurs in college. A study by Gropper, Simmons, Gaines et al. (2009) showed an average weight gain of six pounds in college freshmen. These findings were the result of a study that was conducted over one school year spanning from fall semester, 2007 to spring semester, 2008. Study participants were 240 incoming freshmen. Nelson, Kocos, Lytle, and Perry (2009), found that students gain an average of 2-7 pounds within 3 to 4 months of starting college. Several reasons have been cited for the weight gain experienced in college, such as access to unhealthy food, excessive eating as a result of boredom and stress, snacking and reduced time for physical activity (Nelson et al., 2009; Greaney et al., 2009).

Physical Activity

The health benefits of physical activity are well documented. These include improved cardiovascular health, reduced rates of diabetes and other metabolic diseases, weight maintenance and improved bone and mental health (US Department Health & Human Services, 2008).

The American College of Sports Medicine (ACSM) currently recommends at least 30 minutes of moderate-intensity physical activity daily on 5 days each week, or at least 20 minutes of vigorous-intensity physical activity on 3 days each week, for adults aged 18-65 years. Adults can also meet the guidelines when adequate amounts of moderate and vigorous intensity physical activity are combined (Haskell et al., 2007). The ACSM guidelines are similar to the U.S. Department of Health and Human Services (USDHHS) Physical Activity Guidelines for Americans (2008) which advocates for least 150 minutes of moderate-intensity physical activity (MPA) per week. This can be 30 minutes of moderate-intensity aerobic activity on at least 5 days in one week; or 75 minutes per week of vigorous-intensity physical activity (VPA); or a combination of

moderate and vigorous physical activity (MVPA). Findings from the 2013 National College Health Assessment survey indicate that less than half (48.8%) of students are meeting these guidelines (ACHA-NCHA, 2013). Furthermore, declining levels of physical activity have been reported in students after commencing college (Leslie et al., 1999; Bray & Born, 2004). The reasons for the significant reductions in physical activity in this population need to be investigated. It is important to identify the factors resulting in reduced physical activity in college students compared to their rates in high school (Bauman, Sallis, Dzewaltowski, & Owen, 2002). This can be done by using a health behavior theory to examine the constructs and determinants that predict physical activity (Baranowski, Anderson, & Carmack, 1998). The information obtained may help guide interventions by school authorities and public health practitioners to increase physical activity among college students.

Perceived Barriers

Studies have shown the importance of perceived barriers when studying physical activity behavior in college students (Nelson et al., 2009; Grubbs & Carter, 2002; Greaney et al., 2009; Lartey, Mishra, Odonwodo, Chitalu and Chafatelli, 2009). Significant barriers that have been identified include time constraints (Nelson et al., 2009; Grubbs & Carter, 2002), heavy school workloads (Lartey et. al., 2009) and Lack of motivation (Greaney et al., 2009; Silliman, et al., 2004). Based on previous findings, it was deemed appropriate to identify barriers hindering WKU students from engaging in exercise and significance of barriers in predicting physical activity in addition to the constructs of the TPB.

Theory of Planned Behavior

The Theory of Planned Behavior (TPB) derives from an earlier theory, the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975).The TRA was based on the assumption that intentions are the driving force behind behaviors. However, the TRA was limited to predicting behavior under complete volitional control. This limitation led to the addition of the construct perceived behavioral control (PBC) to the TRA. With the addition of perceived behavioral control, a new theory, TPB, originated which could explain behavior under circumstances that people do not have complete control over (Ajzen, 2012).

The TPB is made up of three constructs: attitude, subjective norms and perceived behavioral control. Attitude is the individual's affective perception of a behavior; it is an assessment of the positive or negative outcome of performing a behavior (Azjen, 1991). According to Azjen, attitude is a strong determining factor of intention. Attitude, in turn, is controlled by the determinants, behavioral beliefs and evaluation of outcome. Behavioral beliefs are the individual's beliefs of the potential result of a behavior, while the evaluation of outcome is the value that an individual places on the outcome. The higher the value an individual places on the outcome of performing a behavior, the stronger the positive attitude and the more likely a behavior is likely to be carried out (Glanz, Rimer & Viswanath, 2008).

Subjective norms are the individual's perceptions of societal pressures to execute behavior (Azjen, 1991). Subjective norms is determined by normative beliefs, which are the individual's perceptions of the attitudes of significant others towards a behavior; and motivation to comply, that is the degree to which the individual feels compelled to

conform to what their significant others expect. When an individual thinks that significant others approve of a behavior and that individual feels it is important to act in line with beliefs of others, a positive subjective norm develops. The stronger the subjective norms, the more likely an individual is going to perform a behavior. (Glanz, et al., 2008).

Perceived behavioral control, is "the perceived ease or difficulty of performing the behavior," Ajzen (1991). It is a reflection of an individual's ability in addition to his or her intention to perform a behavior (Glanz, et al., 2008). It is largely based on Bandura's self-efficacy, which "refers to beliefs in one's capabilities to organize and execute courses of action required to produce given attainments" (Bandura, 1997). Thus in the setting of constraints to perform a behavior, individuals with intentions and higher levels of perceived control will be more likely to perform he behavior than individuals with lower levels of perceived control (Ajzen, 2012). Perceived behavioral control takes into account the belief in the abilities, resources and opportunities of the person (Ajzen, 1991). Perceived behavioral control is determined by control beliefs and perceived power (Glanz, et al., 2008). Control beliefs are the individual's perception of his or her ability to perform a behavior. It is the perception of the presence or absence of barriers and enablers that affect the ability to perform behavior. Perceived power is the perception of the individual's opportunities to perform a behavior. It is a perception of the degree to which these factors will enable or prevent the performance of the behavior (Glanz, et al., 2008).

Intentions are explained by attitudes, subjective norms and perceived behavioral control. The central theme of TPB is that intention drives a behavior. Intention is an

assessment of an individual's motivation to perform a behavior. The stronger the intention the more likely it is for an individual to carry out a behavior (Azjen, 1991).

The TPB has been used in several studies to predict behaviors such as condom use (Albarracin, Johnson, Fishbein, and Muellerleile; 2001; Bosompra, 2001), HIV risk behaviors (Bandawe and Foster, 1996), fruit and vegetable consumption, alcohol use, and diet dietary habits (Conner & Armitage, 1998). Other applications include smoking, alcohol consumption, utilization of health services and mammography utilization, sun protection, breastfeeding, substance abuse, and use of safety helmets and seatbelts (Glanz et al, 2008). The TPB has been highly utilized and validated in predicting physical activity (Courneya, Nigg & Estabrooks, 1998).

Purpose of the Study

It is necessary to increase the prevalence of healthy lifestyle behaviors among adolescents and young adults in order to control the rates of chronic diseases as this population grows older. There are several programs that have been designed to increase weight loss and the adoption of healthy dietary habits and physical activity among the age group. In spite of these interventions, rates of obesity, as well unhealthy lifestyle behaviors continue to dominate. Pooblan, Aucott, Precious, Crombie & Smith (2010) conducted a meta-analysis on weight loss interventions in young adults aged 18–25 years. Their findings indicated that weight loss interventions targeted at this age group were successful in achieving weight loss, increasing self-efficacy, the desire to control weight and increasing self-esteem among participants. However, the authors noted that these interventions have poorer attendance and more attrition by young adults (18-25 years). Therefore, the authors advocate for more research to identify the behavioral attitudes and beliefs of college students towards exercise and possible barriers in order to create

healthy lifestyle interventions directed at this population. Consequently, this study aims to understand the behavior and intentions of college students towards physical activity using the theory of planned behavior. This study aims to utilize the TPB as a framework, to examine factors impacting participation in physical activity among college students at a college in Southern Kentucky.

Hypothesis

HO_1: There are no gender differences in Body Mass Index.

HO_2: Attitudes, subjective norms and perceived behavioral control are not significant predictors of students' intentions to be physically active.

HO_3: There is no relationship between perceived barriers and the students' intention to exercise.

Chapter 2

Literature Review

Body Mass Index (BMI) is the unit of measurement for assessing overweight and obesity (Centers for Disease Control and Prevention (CDC), 2011). It is a reliable and easy method to assess body fat content that is comparable to other direct assessments of body fat content such as underwater weighing and dual energy x-ray absorptiometry (DXA) (Mei et al., 2002). BMI is calculated using the individual's weight and height with the following formula:

Weight (in pounds) / [Height (in inches)] 2 x 703.

Overweight is defined as BMI between 25 and 29.9; obesity is having a BMI of 30 or higher (CDC, 2011).

The prevalence of overweight and obesity in the United States has increased compared to previous years (Lloyd-Richardson, Bailey, Fava & Wing, 2009). Ogden et al. (2006) report a twofold increase in adult obesity between 1980 and 2002 with 66.3% of adults considered as overweight and obese in 2003–2004 compared to 64.5% in 1999–2000. According to the Behavioral Risk Factor Surveillance System (BRFSS; 1991–1998), individuals aged 18 to 29 year old and people with a college education have had the highest increase in weight compared to other groups, an increase of 7.1% to 12.1% and 10.6% to 17.8% respectively (Mokdad et al., 1999). Students are especially at risk of weight gain because during the transition from high school to university they begin to make decisions regarding eating, physical activity and other health behaviors for the first time (Gropper, Simmons, Gaines et al., 2009; Wengreen & Moncur, 2009). Some of the

decisions made often lead to the adoption of unhealthy behaviors such as improper dietary habits, lack of physical activity, and alcohol use (Keating et al., 2005; Kolodinsky et al., 2007; Larson et al., 2007; Wengreen & Moncur, 2009). Unfortunately, these behavior patterns have a high likelihood of being carried into adulthood (Melnyk et al., 2013).

Silliman et al. (2004) conducted a study on 471 college students. The study design was a stratified random sample of general education classes. Study findings indicated that 69% of participants were normal weight. However, as much as 1 in 3 students were classified as having BMIs' of >25 with 25% classified as overweight (BMI 25 – 29.9) and 6% as obese (BMI > 30). Brunt, Rhee and Zhong (2008) reported similar findings in their study on 557 students. In their study, 25.6% of participants were classified as overweight and 8.1% were classified as obese. The American College Health Association National College Health Assessment (ACHA-NCHA) collects data on college students' sexual health, weight, nutrition, physical activity and alcohol, tobacco, and drug use. Sexual health, weight, nutrition, and physical activity are also assessed. In spring 2013, the ACHA-NCHA survey was conducted on 123,078 students across 153 schools in the United States. Results from this national survey showed that 21.9% of college students are overweight, 11.8% are obese and a total of 33.7% of participants classified as either overweight or obese. A total of 61.0% of participants classified as normal weight. These findings are in contrast to the study by Wengreen and Moncur (2009) who carried out a study on 186 college freshmen in the western region of the United States. These authors reported lower prevalence rates of overweight and obesity than the National survey. They

reported that 14% of participants were overweight with 6% being obese, a total of 20% who were either overweight or obese.

Research has shown a trend of weight gain during four years of college (Gropper, Simmons, Connell and Ulrich 2012; Racette, Deusinger, Strube, Highstein, & Deusinger (2008). A study was conducted by Racette et al. (2008) on 244 students to assess changes in BMI and other health behaviors from the beginning of freshman year to the end of senior year. The authors reported that in freshman year 80% were normal weight, and 15% were overweight or obese, which was lower than the ACHA-NCHA survey. However, by the end of senior year, the 23% of participants were reported to be overweight or obese. These findings indicate a 4-year weight gain of 2.5 kg (5.5 lbs) and BMI gain of 0.7 $kg \cdot m^{-2}$, among participants. Higher estimates of weight and BMI changes were reported by Gropper, Simmons, Connell et al. (2012) in a study conducted on 131 students during a four year period. They found significant ($p < 0.0001$) changes in weight of 3.0 ± 5.0 kg (6.7 ± 11.1 lbs). They also reported an average BMI gain of 1.0 ± 1.7 kg•m–2 from 23.2 ± 4.9 kg•m–2 (range from 15.2 to 50.7 kg•m–2) to 24.1 ± 4.9 kg•m–2 (range of 16.7 to 53.4 kg•m–2). In this study the researchers reported an under–normal weight category of 82% and overweight–obese category of 18% in freshman year, whereas by the end of the senior year these percentages were 69% and 31%, respectively, which is comparable to findings in the national survey.

Gender and BMI

Gender appears to play a significant role in obesity prevalence. Studies have shown males are more likely to be overweight or obese than females. For example, Huang et al. (2003) conducted a study on 738 college students aged 18 to 27 years to

assess overweight, obesity, dietary habits, and physical activity. The authors found that men were more likely than women to be overweight but not obese. Similar findings were reported by Silliman et al. (2004) in their study on 471 college students to assess diet and exercise habits and perceived barriers to following a healthy lifestyle. They reported that males (40%) were two times more likely to be overweight or obese than female participants (20%). In addition, Brunt et al. (2008) conducted a study on 585 students' health behaviors in college students. In their study, three times as many males (55%) were overweight or obese compared to females (22%). More males (40.7%) were overweight than females (17.3%) and also more males (14.5%) were obese compared to 3.8% of females. Similar findings were reported by Harring, Montgomery and Hardin (2011), which suggested that males were more likely than females to be overweight. This is in contrast to findings by Wengreen and Moncur (2009), who assessed changes in weight, diet, and other health-related behaviors among 186 freshmen. The latter, unlike the former found no association between gender and BMI.

Physical Activity

The benefits of physical activity cannot be overemphasized. Jung, Bray and Martin (2008) followed a group of female freshmen (n=101) over the course of 12 months and tracked their dietary habits and physical activity. The researchers noticed that females who maintained the same physical activity levels that they had prior to college along with decreased caloric intake, lost weight. Women who reduced their physical activity levels compared to levels before starting college gained weight regardless of reduced caloric intake. In addition, students reporting one or more days of physical activity were less likely to have feelings of depression and also less likely to consider

attempting suicide. However, approximately one out of four students who did not partake in any physical activity reported more feelings of depression (Elliot, Kennedy, Morgan, Anderson & Morris, 2012).

Despite these benefits, the rates of students engaging in physical activity are low (CDC, 2003). The American College of Sports Medicine (ACSM) currently recommends at least 30 minutes of moderate-intensity physical activity daily on 5 days each week, or at least 20 minutes of vigorous-intensity physical activity on 3 days each week, for adults aged 18-65 years. The recommendation can also be met if proportionate amounts of moderate and vigorous intensity physical activity are combined (Haskell et al., 2007). Lowry et al. (2000) analyzed data from the 1995 National College Health Risk Behavior Survey (NCHRBS) to assess the effect of physical activity and dietary habits on weight management among students. Their study was conducted on 4609 undergraduates. Only 19.5% of students reported participating in 30 minutes of moderate physical activity on 5 or more days per week and 37.6% participated in vigorous physical activity on 3 or more days per week. Burke, Carron and Eys (2005) conducted a study on 594 students to assess if performing physical activity in different contexts resulted in higher rates of meeting ACSMs' guidelines. In their study, less than half of participants (42.6%) met the ACSM Guidelines. In addition, the ACHA-NCHA annual survey of 123,078 college students revealed that only one out of five students (20.0 %) performed moderate-intensity cardio or aerobic physical activity for at least 30 minutes for 5 to 7 days. Males were more likely to undertake physical activity, with 22.6% of males exercising on 5 to 7 days compared to 18.6% of females. More than half (56.6%) of students undertook moderate-intensity cardio or aerobic physical activity for at least 30 minutes on 1 to 4

days. Altogether, 48.8% of college students met the current federal guidelines for aerobic physical activity recommendations for moderate-intensity cardio or aerobic exercise, or vigorous-intensity cardio or aerobic exercise for at least 20 minutes on 3 or more days per week or a combination of both (ACHA-NCHA, 2013).

The ACHA Healthy Campus 2020 objectives outline a target of 53.5% for college students to meet the federal guidelines (ACHA, 2014). These objectives provide a health status goal for universities nationwide to attain. Currently, findings from the 2013 National College Health Assessment survey indicate that less than half (48.8%) of students are meeting these guidelines (ACHA-NCHA, 2013). Some studies have shown a decrease in physical activity from high school to college. Leslie et al. (1999) showed that over one-third of college students reduced rates of physical activity after starting college. Bray and Born (2004) compared physical activity of students in the last two months of high school to their first two months at a university. They observed significant reductions in the frequency and duration of vigorous physical activity, with as much as 50% of participants who had met the federal physical activity recommendations in high school falling below the recommendations within their first year at a university.

Gender and Physical Activity

Studies have consistently shown that males engage in more vigorous physical activity than females. The United States Department of Health and Human Services (USDHHS, 2010) reported that males not only engage in more vigorous physical activity compared to females, they are also more likely to take part in strength training and resistance exercise. Males were also have higher rates of walking and bicycling than females. Grubbs and Carter (2002) reported that more males (92%) engaged in regular

physical activity than females (63.8%). Lowry, et al. (2000) carried out a study on 4,838 college students using the National College Health Risk Behavior Survey. The researchers reported that males were more likely than females to engage in vigorous activities (43.7% and 33% respectively). In addition, they found that males were more likely than females to perform strength training physical activities (33.9% and 26.8% respectively). Although, males engage in more vigorous and strengthening activities than females, there appears to be no difference in moderate physical activity between the sexes. Greaney et al. (2009) found no significant difference between genders in terms of walking and moderate physical activity. Lowry et al. (2000) also reported no differences between males and females in terms of engaging in moderate physical activities such as walking or cycling.

Barriers to Physical Activity

Perceived benefits of physical activity increase the likelihood of participation in physical activity, while perceived barriers decrease the likelihood of performing physical activity (Buckworth and Dishman, 1999). Perceived barriers are impediments that could prevent individuals from performing a health behavior such as physical activity (Brown, 2005). Barriers can have a negative effect on likelihood of participation in a new activity and can also prevent the commitment to an existing regimen (Pender, 1996). It is therefore important to identify potential barriers to engaging in physical activity among college students in order to guide the development of interventions (Brown, 2005).

One of the most frequently cited barriers to performing physical activity include time constraints (Nelson et al., 2009; Grubbs & Carter, 2002), heavy school workloads (Lartey et. al., 2009) and Lack of motivation (Greaney et al., 2009; Silliman, et al., 2004).

College students often have busy schedules that require balancing school work, jobs, and leisure activities. This may lead to prioritization of activities and the use of leisure time for activities resulting in minimal exertion such as sleeping, thus excluding physical activity, (Nelson et al., 2009). In a qualitative study involving 50 undergraduate students, some students stated that it was difficult to exercise because due to limited time they had to place other school or work related activities as higher priorities than physical activity. Grubbs and Carter (2002) assessed exercise habits, perceived benefits and barriers towards exercise in a study of 147 undergraduate students. They divided the students into exercisers and non-exercisers based on whether the participants reached recommended levels of PA. The authors reported that among non-exercisers, time constraints were the most significant perceived barriers. Other barriers identified among non-exercisers were embarrassment and family responsibilities. The study revealed that among all participants (that is both exercisers and non-exercisers), the major barriers which affect regular exercise were physical exertion, time constraints and lack of family support. Individuals who reported engaging in physical activity regularly reported significantly lower perception of barriers than those who did not (Grubbs and Carter, 2002).

Lartey, et al. (2009) conducted a study on factors influencing the health behaviors of international students at a United States university. The authors assessed exercise behavior using the constructs of perceived barriers and perceived benefits from the health belief model (HBM). Participants knew the benefits of physical activity and identified examples such as weight control (95%) and decreased risk of cardiovascular diseases (74%). Commonly identified barriers to exercise included heavy school workloads (70%) and cold weather (56%). Unlike other studies, unfamiliarity with the exercise equipment,

distance to the exercise facility and schedule of the facility did not negatively affect their taking part in physical activity.

Greaney et al. (2009) assessed barriers on the interpersonal and environmental level in 174 full-time students' aged18-24 years old. The study was conducted as a series of on-line focus groups was in 8 universities from 8 states. One of the interpersonal barriers identified was lack of motivation to exercise; the environmental factor was time constraints. Cost was also identified as a barrier because it was expensive to join a gym or pay fees for a campus fitness center. Furthermore, Nelson et al. (2009) identified negative experiences using campus facilities with some undergraduates regarding it as "intimidating", "crowded", and "confusing". Lack of motivation and social support were also identified as barriers. Silliman, et al. (2004) conducted a survey on 471 college students during the spring semester 2002. They authors reported similar barriers such as "lack of time", "lack of motivation" and "lack of willpower".

Daskapan, Tuzun and Eker (2006) categorized barriers differently from Greaney et al. (2009) by using internal and external barriers .Their study was conducted on 303 Caucasian undergraduate students in Turkey. Barriers to physical activity were assessed using a 12 item questionnaire. Internal barriers included lack of energy, lack of motivation and lack of self-efficacy. External barriers had 3 categories: lack of resource, lack of social support and lack of time. External barriers were found to have more significant impact than internal barriers. Lack of time was found to be the most significant external barrier, while lack of energy was the internal barrier that had the most impact on whether the student took part in PA. Kulavic, Hultquist and McLester (2013) attempted to identify perceived barriers to physical activity among traditional and

nontraditional college students. Their study included 746 students using the 21– item Barriers to Being Active Quiz. Overall, both traditional and nontraditional students reported lack of time, lack of energy, and lack of willpower as barriers to exercise. Fear of injury, lack of skill and lack of resources were significantly different between these two populations with these barriers being higher among non-traditional students. People are less likely to partake in physical activity if they lack the skills required to perform the activity. This lack of skills may also contribute to fear of being injured (Kulavic et al., 2013).

Theory of Planned Behavior and Physical Activity

Several studies have demonstrated the usefulness of the Theory of Planned Behavior (TPB) in predicting physical activity. Hagger, Chatzisarantis and Biddle (2002) conducted a meta-analysis of 72 studies on physical activity to examine the relationship between the constructs of TPB and their ability to predict intentions and behavior. They found that attitudes, subjective norms and perceived behavior control (PBC) accounted for as much as 44.50% of the variance in intention. Attitudes (β =.40) and PBC (β =.33) were the most significant predictors of intentions, while subjective norms (β = .05) were also significant predictors of intentions but had a lower prediction rate. Intentions (β = .51) and PBC (β = .51) were noted to have significant impacts on physical activity behavior. These findings were similar to those from a cross-sectional study by Hagger, Chatzisarantis and Biddle (2001), which showed attitudes and PBC were significant predictors of physical activity intentions, with subjective norms being a weaker predictor. In the study by Brickell, Nikos and Chatzisarantis (2006), college students' attitudes and PBC accounted for 36% of the variance in intention to exercise, but subjective norms were not significant.

Kwan, Bray and Martin Ginis (2009) carried out a study on first semester college students, to assess the TPB's ability to explain intentions and behavior to perform physical activity. The authors demonstrated that the TPB constructs explained 37% of the variance in intention. The Theory of Planned Behavior is a significant predictor of intentions to perform physical activity; however, in this study neither intentions nor PBC could significantly predict physical activity behavior (Kwan, Bray and Martin Ginis, 2009).

Chapter 3

Methods

This chapter describes the procedures undertaken to understand students' physical activity behaviors and the barriers to engaging in physical activity.

Participants

The study was carried out at a university in South Central Kentucky. Study participants were undergraduate students enrolled in a Personal Health 100 (PH 100) for the spring semester of 2014. Personal Health 100 is an introductory course to public health that provides health education for college students on a variety of health behaviors and factors influencing health. Inclusion criteria were all undergraduate students enrolled in PH 100 classes on the main college campus.

Instrument and Measures

The data collection instrument was a 58-item questionnaire consisting of items obtained from previously validated surveys on physical activity and the theory of planned behavior. The validated surveys included the 2011-2012 National Health and Nutrition Examination Survey (NHANES), the fall 2012 American College Health Association-National College Health Assessment, a validated survey developed by Blanchard, Fisher, Sparling, Nehl, Rhodes, Courneya et al. (2010) and the CDCs' Barriers to Being Physically Active Quiz.

Demographic measures

The first 9 items of the survey tool assessed demographic information. Age was measured as a continuous variable. Gender was a categorical variable assessed as male and female. School year was measured with 5 items as follows, freshman (less than 30 credits), sophomore (greater than 30 but less than 60 credits), junior (5-6semesters),

senior (7-8 semesters) and others. Race and ethnicity were measured with two questions. The first question categorized race as "Caucasian", "African-American", "Asian", "Biracial or Multiracial" and "others" and the second question "Are you Hispanic or Latino" assessed ethnicity. Residence was measured by asking participants if they lived in on-campus residence halls, Greek housing, other on-campus residence, off-campus, at home or other. Whether an individual was a domestic or international student was also assessed.

Body Mass Index (BMI)

Two questions measured self-reported height and weight respectively. These items were used to estimate Body Mass Index (BMI) category based on the formula below:

$$\text{BMI (lbs/inches}^2\text{)} = \frac{\text{(weight in pounds x 703)}}{[\text{height (in inches)}]^2}$$

BMI percentiles for age were recoded into categories as defined by CDC as follows, underweight (below 18.5), normal weight (18.5 – 24.9), overweight (25.0 – 29.9) and obese (30.0 and above).

Weight Perception and Weight Behaviors

Weight perception of participants was measured with two items. The first question asked students to describe their weight. The response categories were "very underweight," "slightly underweight," "about the right weight," "slightly overweight" and "very overweight." Additionally, one item measured whether students were trying to change their weight or maintain the same weight. A third item (yes/no question)

measured self-reported weight gain when comparing current weight with weight during the last year of high school. Finally, an open ended item was used to assess the amount of weight gained.

Sedentary Activity

Five questions adapted from the NHANES 2011-2012 questionnaire assessed sedentary behavior. Participants were asked to indicate the amount of time spent sitting and watching television within the last 30 days. The use of computer for leisure time activities and for work was also assessed with two separate questions. Lastly, the amount of time spent riding in a vehicle was also assessed. All items had 6 responses: "less than 1 hour," "1 hour," "2 hours," "3 hours," "4 hours" and "5 hours or more."

Physical Activity

Physical activity levels in the past week were measured with three items. One item each assessed moderate-intensity physical activity, vigorous-intensity physical activity and strength training exercises such as resistance weight machines for 8 to 12 repeats. The measurement scales for these items ranged from 0 days to 5 days or more. These items were derived from the ACHA-NCHA (2012). For consistency, physical activity levels assessed with the TPB constructs used the definition of moderate physical activity on at least 5 days per week in accordance with American College of Sports Medicine (ACSM) guidelines. Current guidelines encourage at least 150 minutes of moderate-intensity physical activity (MPA) per week, which can be 30 minutes of moderate-intensity aerobic activity on at least 5 days in one week; or 60 minutes/week of vigorous-intensity physical activity (VPA), which can be 20 minutes of vigorous-intensity physical activity on at least 3 days per week. A combination of moderate-intensity and vigorous-intensity physical activity can also be used to meet the guidelines.

For example 2 days each of moderate-intensity and vigorous-intensity physical activity can be combined to meet the guidelines (Haskell et al., 2007). In this study the total number of participants meeting the ACSMs' guidelines for physical activity (for individuals aged 18-65years) was computed by adding the number of individuals who met the guidelines for moderate-intensity physical activity, vigorous-intensity physical activity or a combination of both.

Theory of Planned Behavior

Attitude

Attitude was measured with 6 questions using a 7-point bipolar adjectival scale. The scales were harmful-beneficial, bad-good, useless-useful, unpleasant-pleasant, boring-fun, and unenjoyable-enjoyable. The following statement preceded each adjectival scale: "For me to do 30 minutes of medium-strength exercise at least 5 days over the next week would be …." These items were taken from the study by Blanchard et al. (2010). The scores from each item were combined to create a scale called "Attitudes toward exercising" with higher scores indicating a more positive attitude toward exercising.

Subjective Norm

The construct of subjective norms was measured with 6 items. Three items each assessed the two determinants of subjective norms: normative beliefs and motivation to comply. The item statements for normative beliefs were: "Most people who matter to me think I should do 30 minutes of medium strength exercise at least 5 days during the next week," "Most people who matter to me, support me in doing 30 minutes of medium strength exercise at least 5 days during the next week," and "Most people who matter to me think I should do 30 minutes of medium strength exercise at least 5 days during the next week." The three items measuring normative beliefs were taken from Blanchard,

Fisher, Sparling, Nehl, Rhodes, Courneya, and Baker (2010). Three items measuring motivation to comply were created for this survey based on Ajzen's guidelines for constructing a theory of planned behavior questionnaire (Ajzen, 2011). The following item statements measured motivation to comply: "When it comes to doing 30 minutes of medium-strength exercise at least 5 days during the next week, I want to do what most people who matter to me think I should do," "I want to be like my friends who do 30 minutes of medium-strength exercise at least 5 days a week," and "In terms of doing 30 minutes of medium-strength exercise at least 5 days during the next week, I want to have the consent of most people who matter to me." The response scale for all six items were a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. All items operationalizing subjective norms were combined to create a scale called "subjective norms toward exercising" with higher scores indicating higher subjective norms toward exercising.

Perceived Behavioral Control

Six items were used to measure perceived behavioral control with three of them measuring control beliefs drawn from the study by Blanchard et al. (2010). The first item "During the next week, how sure are you that you can do 30 minutes of medium-strength exercise on at least 5 days," was rated on a 5-point scale, (1) not at all confident to (5) very confident. A second item "During the next week, for me to do 30 minutes of medium-strength exercise on at least 5 days will be…" was measured with the 5-point scale, (1) very difficult to (5) very easy. The third item that measured control beliefs was the statement "During the next week, how much control do you believe you have to do 30 minutes of medium-strength exercise?" This was measured on a scale ranging from 1(extreme lack of control) to 5 (extreme control).

Perceived power was measured with new item statements created for the study based on Ajzen's guidelines for constructing a theory of planned behavior questionnaire (Ajzen, 2011). They are as follows: "During the next week, I will have the chance to do 30 minutes of medium-strength exercise on at least 5 days," "I have access to facilities where I can do 30 minutes of medium strength exercise" and "I believe I have all the things I need to do 30 minutes of medium-strength exercise." All three items were rated on a 5-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. The scores from each item were combined to create a scale called "perceived behavioral control toward exercising" with higher scores indicating a greater perception of ability to engage in physical activity.

Intention

One item, derived from the study by Blanchard et al. (2010), was used to assess intention. The statement was "During the next week, I intend to do 30 minutes of medium-strength exercise on at least 5 days." It was anchored by responses ranging from (1) strongly disagree to (5) strongly agree. Higher scores on this question indicated higher intentions to perform physical activity.

Barriers to Physical Activity

The Barriers to Being Physically Active quiz (CDC, 1999) is a 21-item quiz consisting of 7 major barriers: Lack of time, social influence, lack of energy, lack of willpower, fear of injury, lack of skill and lack of resources. Each of the 7 major barriers were measured by 3 items. The three items that constituted the social influence barrier were similar to the survey items measuring subjective norms. These items were removed from the survey instrument to avoid redundancy and duplication. Furthermore, three items measured fear of injury namely: "I'm getting older so exercise can be risky," "I

know of too many people who have hurt themselves by overdoing it with exercise" and "I'm afraid I might injure myself or strain my heart" appeared to express the fears of an older age group than our target audience. These three items were also removed. This resulted in a total of 15 questions in the survey instrument that assessed barriers to physical activity. The barriers were measured on a 4-point scale ranging from 0 (very unlikely) to 3 (very likely) according to CDC's instructions. Three items were summed to represent each barrier. According to the instructions, a score of 5 and above in any category is a significant barrier which may be important for the individual to overcome. Participants were assessed for potential perceived barriers in their environment that prevented them from participation in physical activity. Participants were categorized as having significant barriers to physical activity if they had a score of 5 and above after summing up the three items.

Administration

This study was a one-time only cross-sectional design administered to students in PH100 classes. The Simplified Measure of Gobbledygook (SMOG) analysis yielded an approximate reading level of 9.0 which should be easily read by participants. To measure readability, words with three or more syllables were substituted for words with two or less syllables. For example, moderate-intensity was substituted with medium-strength and vigorous-intensity with high-strength. Also the word "extremely difficult" was replaced with "very difficult". However, some words could not be simplified further to prevent misinterpretation among participants. For instance physical activity was interchanged with exercise instead of work-out, in order to prevent confusion and misinterpretation of physical activity as only occurring in the gym.

The 7-point semantic scales utilized in Blanchard et al.'s (2010) study on the theory of planned behavior and physical activity were reduced to a 4-point and 5-point semantic scales. This was to reduce the amount of difficulty participants could face in selecting two similar but slightly different options. Prior to the commencement of the study, approval was obtained from the university's Institutional Review Board (IRB), after which a pilot study was conducted.

Pilot Study

The pilot study was conducted in the fall semester of 2013 to ensure feasibility of the research and to determine justification of utilization of a 4 or 5-point Likert scale. A convenience sample of students enrolled in the HED100 class (an equivalent personal health course) at the university's satellite campus took part in the pilot study. Two survey instruments were used in the pilot study: a 4 point and a 5 point semantic scale instrument to select the best scale to determine the efficiency and accuracy of results. Twenty-five students each filled out the 4-point and 5-point questionnaires.

To estimate reliability of each of the scales, a Cronbach's alpha test was analyzed for the pilot. The results are presented in the table.

Table 3.1.

Table showing test of reliability (Cronbach's alpha)

Characteristic	4-point Likert Scale (α)	5-point Likert Scale (α)
Attitudes	0.89	0.89
Subjective Norms	0.37	0.52
Perceived Behavioral Control	0.38	0.76
Intention	0.64	0.57
Barriers	0.82	0.95

Based on the higher individual scale reliabilities of the 5-point scale on subjective norms, perceived behavioral control, and perceived barriers, this semantic scale was chosen for the final survey questionnaire.

Implied Consent

Prior to administering each survey, the principal researcher explained the purpose of the study in the face-to-face Personal Health 100 classes. The researcher also provided information on the procedures, potential benefits of the study, and harm. Participants were informed that their participation was voluntary and refusal to participate would not result in penalty. Subsequently, each participant was provided with a consent form before completing the survey. The consent form contained information explaining the purpose of the study and assurance on confidentiality of the survey information. Consent was implied by agreeing to participate in the study.

Main Study

Study participants were students taking the Personal Health 100 course offered by the Department of Public Health in spring 2014. Surveys administration was conducted over 2 weeks beginning in early February. The study was administered in the face-to-face classes.

Prior to completing the survey, each participant was provided with a consent form that contained information explaining the purpose of the study. Students were informed that their participation was voluntary and refusal to participate would not result in penalty. There was no personal identifying information on the questionnaires. Surveys were distributed to participants who agreed to complete the survey. Survey administration lasted between 15-20 minutes. Upon completion, the principal researcher collected materials and returned them to the Department of Public Health where the questionnaires were safely kept in a locked cabinet.

Data Analysis

Data were entered into and analyzed using the Statistical Package for the Social Sciences (version 20; SPSS). Descriptive statistics was conducted by running frequencies on all variables. Measures of central tendency were also conducted on continuous variables such as age, and Body Mass Index. Chi-square analysis, T-tests and tests of ANOVA were run where appropriate. All tests were considered significant at or below the 0.05 alpha level.

Chapter 4

Results

A total of 328 students participated in the survey. Data were analyzed descriptively and inferentially to test 3 hypotheses.

Demographic Characteristics.

The mean age of participants was approximately 20 years (SD= 3.30) as shown in Table 4.1. The majority of participants were Caucasian (64.8%), followed by African-Americans/Blacks (17.7%) and Asian (9.5%). Gender distribution was equal, with the proportion of males and females each making up 50% of the total. Most (57.2%) of the participants were freshmen. In regards to residence, just over half (53.4%) of participants resided in campus residence halls, 28% lived in other-off campus housing and 14% lived at home. Only 2.8% of respondents were Hispanic. Majority of participants (84.7%) were domestic students.

Table 4.1.

Demographic Characteristics of Participants

Characteristics	n	(%)
Age		
20 years and under	238	72.8
21 to 24 years	73	22.3
25 years and older	16	4.9
Gender		
Male	163	50.0
Female	163	50.0
School Year		
Freshman	187	57.2
Sophomore	59	18.0
Junior	48	14.7
Senior	31	9.5
Others	2	0.6
Race		
Asian	31	9.5
Black or African-American	58	17.7
Caucasian	212	64.8
Biracial or Multiracial	12	3.7
Others	14	4.3
Ethnicity		
Hispanic	9	2.8
Non-Hispanic	317	97.2
International Student		
Yes	50	15.3
No	276	84.7
Residence		
Campus Residence Hall	175	53.4
Greek House	3	0.9
Other University Housing	5	1.5
Home	46	14.0
Other off campus Housing	92	28.0
Other	7	2.1

Weight Status and Weight Perception

The average BMI of all participants was 24.81 (SD=5.27). As noted in Table 3, a slight majority (52.9%) were classified as normal weight, while as much as 37.8% were either overweight or obese (shown in Table 4.2.). The proportion of participants who perceived their weight to be normal (55.8%) was similar to the actual proportion of people who were classified as normal weight (52.9%). Twice as many participants (10.4%) perceived they were slightly or very much underweight as opposed to the participants who were actually classified as being underweight based on BMI (5.2%). In addition, three times as many people said they were trying to gain weight when only 5% were classified as underweight. Almost half of the participants (48.9%) reported they were trying to lose weight, this was in contrast to the smaller proportion of participants (33.7%) who were actually overweight or obese based on BMI classification.

Table 4.2.

Weight Status and Weight Perception

Characteristic	n	%
BMI		
Underweight	16	5.2
Normal weight	175	57.0
Overweight	70	22.8
Obese	46	15.0
Weight Perception		
Very much underweight	7	2.1
Slightly underweight	27	8.3
About the right weight	182	55.8
Slightly overweight	88	27.0
Very much overweight	22	6.7
Trying to do something about weight		
Doing nothing	39	11.9
Trying to stay the same	71	21.7
Trying to lose weight	160	48.9
Trying to gain weight	57	17.4
Weight Gain Between High School and College		
Yes	187	57.0
No	141	43.0

Null Hypothesis #1:

There are no gender differences in Body Mass Index.

T-test and chi-square analysis compared BMI and BMI categories respectively with gender, to identify any impact gender had on the weight status of participants. There were significant differences between BMI and gender (Table 4.3.). Furthermore, a significantly higher proportion of females were normal weight (66.4%, χ^2=4.78, p<0.029), while more males were in the overweight and obese category (46.2%) than females (33.6%). Although males were found to have a higher likelihood of being overweight or obese, females were more likely to perceive themselves as overweight or obese (39.3%, χ^2=7.67,

p=0.022). In addition, females also more likely to attempt losing weight (68.1%, χ^2=62.33, p=0.000) than males. In contrast, more males reported trying to gain weight (30.2%, χ^2=62.33, p=0.000) than their female counterparts.

Table 4.3.

BMI Classification and Gender

	Male		Female		χ^2
	n	%	n	%	
BMI category					
Normal Weight	77	53.8	97	66.4	4.78*
Overweight and Obese	66	46.2	49	33.6	
Weight Perception					
Underweight	23	14.3	11	6.7	7.67*
Normal Weight	93	57.8	88	54.0	
Overweight and Obese	45	28.0	64	39.3	
Trying to do Something about Weight					
Not Trying	26	16.0	13	8.0	62.33***
Stay the Same	38	23.5	33	20.2	
Lose Weight	49	30.2	111	68.1	
Gain Weight	49	30.2	6	3.7	

Note. *** p<.001 * p<.05

Sedentary Behavior

Students answered questions about the frequency of television viewing, playing video games or use of computer for leisure and amount of time spent sitting at work, school, home or riding in a vehicle. The information provided an estimate of the amount of time spent in a sedentary position during a 24-hour period within the past 30 days. The majority of students (68.4%) spent 2 hours or less watching television, similarly about 1 in 3 students (68.8%) spent 2 hours or less playing video games or using computer for leisure. As much as half (51.0%) spend 5 or more hours sitting in a 24 hour period (Shown in Table 4.4.).

Table 4.4.

Sedentary Behavior in the past 30 days (n=326-327)

Characteristic	n	%
TV Watching		
Less than 1 hour	78	23.9
1 hour	68	20.9
2 hours	77	23.6
3 hours	53	16.3
4 hours	16	4.9
5 or more hours	34	10.4
Video games or computer for Leisure		
Less than 1 hour	103	31.5
1 hour	59	18.0
2 hours	63	19.3
3 hours	40	12.2
4 hours	24	7.3
5 or more hours	38	11.6
Computer for Work or School		
Less than 1 hour	23	7.0
1 hour	71	21.7
2 hours	110	33.6
3 hours	67	20.5
4 hours	28	8.6
Sitting Time		
Less than 1 hour	6	1.8
1 hour	7	2.1
2 hours	29	8.9
3 hours	68	20.9
4 hours	82	25.2
5 or more hours	134	41.1

Current Physical Activity Levels

Physical activity levels were assessed using the American College of Sports Medicine (ACSM) guidelines for adults aged 18-65years. These guidelines advice at least 30 minutes of moderate-intensity physical activity daily on 5 days each week, or at least 20 minutes of vigorous-intensity physical activity on 3 days each week. The recommendation can also be met if proportionate amounts of moderate and vigorous intensity physical activity are combined (Haskell et al., 2007). As much as 1 in 5 participants (20.7%) reported not engaging in moderate physical activity within the last month, while 1 in 3 participants (31.9%) did not engage in vigorous physical activity within the last month (Table 4.5.). Only one-fifth (19.5%) of participants met the recommended levels of moderate-intensity physical activity and one-third of participants (31.0%) met recommended levels of vigorous-intensity physical activity. Participants were classified based on whether they met ACSM's physical activity guidelines of 30 minutes of moderate physical activity on 5 or more days, 20 minutes of vigorous physical activity on 3 or more days or a combination of both. Whether a participant met the ACSM recommendation was calculated by adding the number of participants who met the guidelines by their levels of moderate-intensity physical activity alone, or vigorous-intensity physical activity alone or who as a result of combining both moderate-intensity and vigorous intensity levels met the guidelines. For instance, individuals who carried out 30 minutes of moderate-intensity physical activity on 2 days and 20 minutes of vigorous-intensity physical activity on 3 days were classified as meeting the guidelines. Slightly more than half of participants (54.6%) met these recommendations (See Table 4.5.). About half of the participants stated that their levels of exercise had decreased between

high school and college. The current recommendation for muscle-strengthening activity are 8-12 repetitions of a resistance exercise on two or more non-consecutive days (Haskell, 2007). Only 38.7% of participants met this recommendation.

Table 4.5.

Exercise Behavior

Characteristic	n	%
Moderate-intensity Cardio or Aerobic Exercise		
0 days	68	20.7
1 day	45	13.7
2 days	55	16.8
3 days	59	18.0
4 days	37	11.3
5 days or more	64	19.5
Vigorous-intensity Cardio or Aerobic Exercise		
0 days	104	31.9
1 day	68	20.9
2 days	53	16.3
3 days	101	31.0
Strength Training		
0 days	163	49.7
1 day	38	11.6
2 days	46	14.0
3 days	28	8.5
4 days	18	5.5
5 days or more	35	10.7
Exercise Reduction between High School and College		
Yes	163	50.2
No	162	49.8
Meeting Physical Activity ACSM Guidelines		
Yes	179	54.6
No	149	45.4

Theory of Planned Behavior

Null Hypothesis #2:

Attitudes, subjective norms and perceived behavioral control are not significant predictors of students' intentions to be physically active.

Independent t-test analysis compared the means of the theory of planned behavior construct scales (attitude, subjective norms and perceived behavioral control with intention) in order to identify whether the constructs significantly predicted college students' intention to perform physical activity. Each of the 3 constructs had a significant impact on students' intention to perform physical activity (Shown in Table 4.6.). Students with intentions to perform physical activity had higher mean scores on attitudes ($\bar{x}$=30.69, SD=5.65, t-test=7.39, p-value 0.000), subjective norms ($\bar{x}$=15.53, SD=3.26, t-test=3.45, p-value=0.001) and PBC scores ($\bar{x}$=19.47, SD=3.61, t-test=14.03, p-value=0.000) than students with no intentions to perform physical activity.

Table 4.6.

Theory of Planned Behavior Constructs Based on Intention to Perform Physical Activity

	Intention		No intention		t-test
Characteristic	$\bar{x}$	SD	$\bar{x}$	SD	
Attitude	30.69	5.65	23.23	7.56	7.39***
Subjective Norms	15.53	3.26	13.90	3.33	3.45***
Perceived Behavioral Control	19.47	3.61	14.03	3.72	10.22***

Note. *** p<.001 * p<.05

Intention

About 1 in 3 students were identified as having the intention to exercise in response to the question, "During the next week, I intend to do 30 minutes of medium strength exercise on at least 5 days"(Table 4.7.).

Table 4.7.

Intention

Characteristic	n	%
Intention to Exercise		
Yes	159	69.4
No	70	30.6

Binary logistic regression identified PBC as the highest predictor of intention to perform physical activity (OR= 1.47, 95% CI=1.29-1.69, p=0.000) (Shown in Table 4.8.). Therefore, students with higher levels of confidence and more opportunities for physical activity were 1.4 times more likely to intend to perform physical activity. Attitude (OR=1.15, 95% confidence interval=1.06-1.25, p-value=0.000) predicted intention to perform physical activity. This means that students with more positive attitude towards exercising were more likely to intend to perform physical activity. Subjective norms, age, BMI, race, school year, residence and being an international or domestic student did not significantly predict intention to perform physical activity. This means that subjective norms were unable to predict the likelihood of intention to perform physical activity.

Table 4.8.

Using the Theory of Planned Behavior to Predict Intention to Perform Physical Activity

Predictors	OR	[95% CI]
Attitude	1.15	(1.06-1.25)***
Subjective Norms	1.06	(0.90-1.25)
PBC	1.47	(1.29-1.69)***
Age		
20 years and older	1.00	(0.10-2.64)
21 to 24 years	0.50	(0.25-36.46)
25 years and above	3.02	
Gender		
Male	1.00	
Female	1.73	(0.68-4.40)
BMI		
Normal weight	1.00	
Overweight and Obese	1.13	(0.23-5.54)
School Year		
Freshman	1.00	
Sophomore	0.80	(0.25-2.60)
Junior	1.13	(0.23-5.54)
Senior	0.95	(0.12-7.52)
Race		
Caucasian	1.00	
Non Caucasian	1.99	(0.68-5.80)
International Student		
Yes	1.00	
No	4.77	(0.71-31.89)
Residence		
On campus	1.00	
Off campus	1.06	(0.33-3.39)

Note. *** p<.001 * p<.05

Potential differences in demographic variables between participants with and without intention to participate in physical activity, were identified using independent t-tests to analyze the continuous variables (age and BMI), while chi-square analysis was conducted on the categorical variables. There were no differences on intention to perform physical activity based on age, BMI, gender, school year, race, residence, being a domestic or international student and having intention to perform physical activity (Shown in Table 4.9.).

Table 4.9.

Students Intention to Perform Physical Activity Based on Demographic Characteristics

	Intention		No intention		χ^2
	n	(%)	n	(%)	
Age					
20 years and older	117	74.1	50	71.4	0.42
21 to 24 years	33	20.9	15	21.4	
25 years and above	8	5.1	5	7.1	
Gender					
Male	74	55.1	38	46.8	1.30
Female	84	44.9	31	53.2	
BMI					
Normal weight	98	65.3	35	58.3	0.90
Overweight and Obesity	52	34.7	25	41.7	
School Year					
Freshman	91	57.2	34	49.3	1.29
Sophomore	30	18.9	16	23.2	
Junior	21	13.2	10	14.5	
Senior	17	10.7	9	13.0	
Race					
Caucasian	100	62.9	49	70	1.08
Non-Caucasian	59	25.8	21	30	
International Student					
Yes	27	17.1	8	11.4	1.20
No	131	82.4	62	88.6	
Residence					
On campus	88	5.3	38	54.3	0.2
Off campus	71	44.7	32	45.7	

Note. * $p<.05$

Using chi-square analysis, a statistically significant difference (χ^2=47.08, p=0.000) was found between current physical activity levels and intention to perform physical activity within the next 5 days (Shown in Table 4.10.). The majority of students who were currently meeting the ACSM's physical activity guidelines (n=125) reported intentions to perform physical activity. Furthermore, the majority of participants who were not currently meeting the physical activity guidelines (68.6%) did not report intentions to perform physical activity within the next 5 days.

Table 4.10.

Students Intention to Perform Physical Activity Based on Intention (n=229)

	Physically Active (ACSM Guidelines)				
Intention	Meets Guidelines		Does not meet guidelines		χ2
	n	%	n	%	
					χ^2=47.08**
Yes	125	78.6	34	21.4	
No	22	31.4	48	68.6	

Note. ** p<.001 * p<.05

Barriers to Physical Activity

According to the *Barriers to Being Active Quiz* from the US Department of Health and Human Services (USDHHS), a score of 5 or more indicates a significant barrier for the individual to overcome. Lack of willpower was the most frequently identified (51.7%) barrier to overcome (Shown in Table 4.11.). Lack of energy (50.8%) and lack of time (48.5%) were also frequently identified barriers. Cronbach's alpha analysis for the scale was 0.908 indicating a high scale reliability.

Null Hypothesis #3:

There is no relationship between perceived barriers and the students' intention to exercise.

Chi-square analysis revealed a statistically significant difference between 4 out of 5 perceived barriers to physical activity. Lack of time (p=0.000), lack of energy (p=0.000) lack of willpower (p=0.000) and lack of skill (p=0.007) had statistically significant differences between participants who had the intention to participate in physical activity and those that did not (Shown in Table 4.12.). Binary logistic regression revealed that lack of time, (OR=0.477, 95% CI=0.230-0.992, p-value=0.047) and lack of energy (OR=0.381, 95% CI=0.183-0.790, p-value=0.010) were the only significantly predictive barriers associated with intentions to perform physical activity or not (Shown in Table 4.13.). Those students reporting lack of time or energy as significant barriers were less than half as likely to have intentions to perform physical activity.

Table 4.11.

Frequency of Barriers to Physical Activity

Characteristic	**n**	**%**
Lack of Willpower		
Significant Barrier	171	51.7
Not a Barrier	153	47.2
Lack of Energy		
Significant Barrier	164	50.8
Not a Barrier	159	49.2
Lack of Time		
Significant Barrier	157	48.5
Not a Barrier	167	51.5
Lack of Resources		
Significant Barrier	61	18.8
Not a Barrier	263	81.2
Lack of Skill		
Significant Barrier	68	20.9
Not a Barrier	258	79.1

Table 4.12.

Students Perceived Barriers to Perform Physical Activity Based on Intention

	Intention		No Intention		$\chi 2$
	n	%	n	%	
Lack of time					
Not a Barrier	107	67.7	24	34.8	21.35***
Significant Barrier	51	32.3	45	65.2	
Lack of Energy					
Not a Barrier	109	68.6	24	35.3	21.72***
Significant Barrier	50	31.4	44	64.7	
Lack of Willpower					
Not a Barrier	101	63.9	23	33.3	18.13***
Significant Barrier	57	36.1	46	66.7	
Lack of Skills					
Not a Barrier	139	87.4	51	72.9	7.30**
Significant Barrier	20	12.6	19	27.1	
Lack of Resources					
Not a Barrier	135	85.4	55	78.6	1.65
Significant Barrier	23	14.6	15	21.4	

Note. *** p<.001 ** p<.01 * p<.05

Table 4.13.

Perceived Barriers Affecting the Intention to Perform Physical Activity

Predictors	OR	95% CI
Lack of Time		
Not a Barrier	1.00	
Significant Barrier	0.48	[0.23-0.99]*
Lack of Energy		
Not a Barrier	1.00	
Significant Barrier	0.38	[0.18-0.79]**
Lack of Willpower		
Not a Barrier	1.00	
Significant Barrier	0.58	[0.28-1.20]
Lack of Skills		
Not a Barrier	1.00	
Significant Barrier	0.74	[0.32-1.70]
Lack of Resources		
Not a Barrier	1.00	
Significant Barrier	1.65	[0.69-3.95]

Note. OR=odds ratio; CI= confidence interval.

* *p < .01 *p < .05

Chapter 5

Discussion

This study examined factors influencing the intentions of college students to perform physical activity, by utilizing the theory of planned behavior (TPB) as a framework. The study determined if the TPB constructs predict the students' intention to perform physical activity. Barriers to physical activity were also assessed to get a better understanding of the impact of various factors on the perceived ability of students to achieve adequate levels of physical activity. Furthermore, current BMI status of students and the relationship between gender and BMI were assessed.

Body Mass Index

The proportion of normal weight individuals and those who were either overweight or obese appear to be consistent with the national rates from the ACHA-NCHA survey (2013). Although the rates of normal weight individuals were higher than those who were either overweight or obese, the prevalence of overweight and obesity identified in this study remains a cause for concern. This is a substantial number of students with elevated risk of chronic diseases associated with overweight and obesity. Furthermore, this study showed a significant association between BMI and gender. Males had significantly higher mean BMI compared to females and were also more like to be overweight and obese than females. The findings of this study are consistent with previous research by Huang et al. (2003); Brent et al. (2008); Harring, et al. (2011) who found that males were more likely to be overweight or obese than females. However, it is in contrast to Wengreen and Moncur (2009) who found no significant relationship between BMI and weight. No explanation was given for the gender disparities noted in these studies. BMI is an indicator for weight problems; however there are some variations

that may occur as a result of gender and muscle mass. Women have been shown to have greater body fat content than their male counterparts with the same BMI (Gallagher et al. (1996). Similarly, individuals with a higher muscle mass have been noted to have higher BMIs than individuals with a lower muscle mass. Therefore, a possible explanation for the gender disparities in BMI may be as a result of males having a larger muscle mass than females. Findings in support of this explanation are that although more males classified as being overweight or obese than females, they were more likely to perceive themselves to be underweight or normal weight. In addition, females were more likely to perceive that they were overweight or obese. Similarly, females were more likely to being trying to lose weight since they perceived themselves as overweight or obese, while males were more likely to be attempting to gain weight. These findings may also be attributed to body image issues that could be related to the way society defines ideal body image. Further research may be warranted to assess gender differences in body fat composition among students as well as environmental factors that could play a role in individual self-perception.

Physical Activity Behavior

The American College of Sports Medicine (ACSM) current recommendations for adults aged 18-65 years are at least 30 minutes of moderate-intensity physical activity daily on 5 days each week, or at least 20 minutes of vigorous-intensity physical activity on 3 days each week (Haskell et al., 2007). The recommendation can also be met if proportionate amounts of moderate and vigorous intensity physical activity are combined. The proportion of students in this study who reported meeting the recommended levels of vigorous-intensity physical activity were higher than those meeting the recommendations for moderate-intensity physical activity. These findings are consistent with the 1995

National College Health Risk Behavior Survey (NCHRBS) (Lowry et al., 2000). A possible explanation for the low rates of reported moderate-intensity physical activity may be the definition for moderate-intensity and vigorous-intensity physical activity used in the survey. Participants were given one example of moderate-intensity physical activity which was walking, while the example used for vigorous-intensity physical activity was running. Although, this study did not assess students' knowledge of moderate-intensity and vigorous-intensity physical activity, it is possible that participants' knowledge of physical activity is with regards to vigorous-intensity physical activity. Further research may be needed to assess students' knowledge about the current physical activity guidelines and types of physical activity. Another explanation for the lower rates of moderate-intensity physical activity compared to vigorous-intensity physical activity among students could be because the survey was conducted in winter when students may have preferred to engage in physical activity within a closed facility. There is also a shuttle service in the university with students may prefer to ride on instead of walking while on campus. Further research is necessary to identify reasons for the use of the shuttle services as opposed to walking among students.

Overall, half of the participants (54.6%) in this study were estimated to have met the federal guidelines when moderate-intensity, vigorous-intensity and combinations of both were analyzed. The number of participants meeting the recommended levels of physical activity in this study is higher than the 42.65% reported by Burke et al. (2005) and 48.8% reported in the national survey from ACHA (2013). This is a surprising finding given the low rates of physical activity noted in the state. This could be related to the higher Caucasian population in this study compared to the national study that may

have had a more diverse population. Also, this study was conducted prior to spring break which students try to get in shape for. Therefore, there may have being an increase in physical activity levels compared to other periods in the school year. Unfortunately, is difficult to detect this change with a one-time cross-sectional survey. Although more than half of the students were identified as meeting the ACSM guidelines, there is still a need to increase the rates of physical activity among college students. The study was a cross-sectional survey conducted before spring break. It is possible that more students engaged in physical activity to be in better shape for spring break activities.

Barriers to Physical Activity

Lack of willpower was the most frequently reported barrier to physical activity. Analysis showed, lack of time and lack of energy were the most significant perceived barriers among participants. The current findings are consistent with previous studies (e.g., Grubbs & Carter, 2002; Greaney et al., 2002; Nelson et al., 2009) that have identified lack of time to be one of the most significant barriers to performing physical activity. It is assumed that busy schedules call for time management, unfortunately students may choose to prioritize course work and related activities as being more important than physical activity. Healthy habits may be deemed time consuming by students and are often the first things students push aside to the detriment of their health. Students may have the notion that physical activity is exerting and therefore feel that they have no energy to engage in physical activity. This could also influence students to sedentary leisure activities which require little or no physical input over exercise. Lack of resources was not identified as a significant barrier in this study. This may be because the university where this study was carried out has a well-equipped fitness center with fitness instructors and is free to all full-time students. Therefore, students may be aware of the

availability and accessibility of the resources but still chose not to exercise because of greater perceived barriers.

Theory of planned behavior

Logistic regression analysis showed that attitudes and perceived behavioral control (PBC) significantly impacted intention to perform physical activity. Thus, participants with more positive attitudes toward physical activity were more likely to report intention to exercise than those participants with less positive attitudes toward exercise. Also, participants who felt confident they could exercise and would have the opportunity to exercise were more likely to report intention to exercise than those participants who lacked confidence and opportunities to exercise. However, subjective norms and demographic factors were not found to be significant predictors of intentions to perform physical activity. In the framework for the theory of planned behavior, attitude, subjective norms and PBC impact intention, however, studies have shown that subjective norms have a lower predictive value than attitude or PBC. The findings in this study are supported by the meta-analysis by Hagger et al. (2002) who found that even though attitudes and PBC were strong predictors of intentions, subjective norms had a lower prediction rate. Similarly Hagger et al. (2001) found subjective norms to be a weaker predictor than attitudes and PBC, while Brickell et al. (2006) found that the relationship between subjective norms and intention to perform physical activity were not significant. Azjen (1991) states that attitudes, perceived behavioral control and subjective norms may have variable effects on intention with regards to different behaviors and situations. Thus, although all three TPB constructs impact intentions in some situations one or more constructs may be found to have higher predictive values than others. Godin and Kok (1996) found that subjective norms were lower when predicting physical activity

and dietary behaviors than when predicting automobile-related and oral hygiene behaviors. The ability of subjective norms to predict intentions has not been satisfactory (Conner & Armitage, 2001). Hagger et al. (2002) stated that subjective norms has a lower predictive value for exercise behavior after adjusting for attitude and PBC. Trafimow and Finlay (1996) argued that the subjective norms may have a lower predictive value depending on the degree to which an individual responds to social influence and also to the type of behavior involved. So, although individuals may feel that their significant others would like them to perform a certain behavior, these individuals are under no obligation to comply with these wishes. Based on these findings it is likely that while more positives attitudes, confidence and opportunities drive students' physical activity behavior, social influence may not be a major deciding factor on students' decisions to exercise. Perceived behavioral control has been shown to be one of the most important factors that play a role in behavior. In this study it was the strongest predictive factor. The implication of this is that students may not be confident enough to operate the equipment at the fitness center. Another explanation is that similar to findings about differences between body weight perception and actual BMI classification, students may not feel confident enough to exercise in a facility with their peers.

Findings from this study indicate that those participants with more positive attitudes and higher perceived behavioral control had greater intentions to engage in physical activity. The main principle of TPB is that intention drives behavior. This means that individuals have to be motivated in order for them to perform a behavior. To investigate whether this principle applies to students' physical activity behavior, further analysis was conducted to examine the relationship between participants' intentions and

their current levels of physical activity. Findings indicate that students with intention to exercise were more likely to meet the ACSM's recommendations for physical activity than those with no intention to exercise. Based on these findings it appears that only individuals who are motivated are currently engaging in recommended levels of physical activity. This supports the TPB framework where intentions drive behavior. Therefore, it is also likely that the participants with high intentions, who are currently meeting recommended levels of physical activity, will continue to perform physical activity in the future. Further research can be conducted to assess future participation in physical activity among respondents. It was also noted that there were more students with intention to exercise than students who were currently meeting ACSM's physical activity guidelines. A possible explanation for this is that it is difficult to assess the true extent of people's motivation. An individual may indicate having the intention to perform physical activity but may never get around to it. It could also be due to the perceived barriers that prevent motivated individuals from carrying out their intentions.

Conclusion

Majority of the leading causes of death are preventable by lifestyle modification. In spite of this knowledge, the rates of risk factors such as poor dietary habits and inadequate physical activity continue to rise resulting in obesity and its complications. College students are at a time and place in their lives where behaviors adopted will lay the foundation for future behaviors (Sparling & Snow, 2002). Therefore is important that this population begin to live healthier lives to ensure their health in years to come. Several lifestyle modifying interventions such as programs to increase levels of physical activity have been directed at college students. However, rates of physical activity remain low, while rates of overweight and obesity remain high. This study provides support for

the evidence of low physical activity levels and elevated levels of overweight and obesity. A large number of participants were identified did not meet the recommended levels of physical activity as outlined by the American College of Sports Medicine (ACSM). In addition, many students were identified as being overweight or obese. For this reason, this study aimed to identify factors that motivate and hinder college students from performing physical activity behavior. The study utilized the TPB framework to examine the behavior and intentions of college students towards physical activity.

This study identified potential environmental and interpersonal barriers such as lack of time and energy that prevent students from performing physical activity. These barriers will continue to prevent students from engaging in physical activity regardless of knowledge about its benefits. These findings provide useful information for future planning and implementation of physical activity interventions for students because these barriers need to be addressed to if there is going to be an increase in the rates of students engaging in recommended levels of physical activity.

The Theory of Planned behavior attempts to explain behavior that is not under an individuals' complete control (Ajzen, 2012). This study provides support for the existing literature regarding the predictive value of the TPB in impacting physical activity behavior. The constructs, perceived behavioral control and attitudes, were found to significantly influence intentions to perform physical activity. However, subjective norms did not show any significance. The implication of this is that when designing interventions, more emphasis needs to be placed on increasing individuals' abilities and opportunities for physical activity. In addition, students should be educated on the benefits of physical activity especially with respect to increasing academic performance.

This will enable them place higher premium on physical activity and thus lead to higher rates of students meeting recommended levels of physical activity.

This study has supported arguments about the troubling issue of obesity and inadequate physical activity levels in college students. It has also provided useful insights into the hindrances that contribute to the continued distressing levels of physical activity. In order to increase the rates of physical activity the TPB framework can serve as a useful guide for the implementation of programs geared towards increasing physical activity among students.

Recommendations

The implications of this study suggest that students with stronger abilities and opportunities to exercise, as well as students with more positive attitudes are more likely to have intentions to exercise. Findings also identified that students who are motivated to exercise were more likely to have met recommended physical activity guidelines compared to those who are not motivated. The implications of this study suggest students may have sufficient motivation to perform physical activity, but may have difficulty placing physical activity as a top priority due to coursework demands or other perceived barriers. Interventions aimed at increasing physical activity among college students should:

1. Educate students on the use of the exercise facilities during student orientation and address body image issues in order increase students' confidence toward physical activity by building skills and knowledge related to physical activity.
2. Increase students' knowledge on the benefits of physical activity which include making them healthy and better able to handle the demands of college.

Emphasis should be made on the benefits of physical activity related to improving academic performance because this is the primary aim of college students. This will result in more positive attitudes and thus increase students' intentions to perform physical activity.

3. Interventions should increase accessibility to physical activities that can be done in short intervals to overcome time constraints. Interventions should try to include activities that can be done with daily chores. For example, engaging in physical activity while watching commercials and listening to recorded lecture notes while taking a walk.
4. Increase students' knowledge that physical activity can increase energy levels especially when maintained over time. Similarly, advocating for a combination of both moderate-intensity and vigorous-intensity physical activity. Students can be advice to walk to and from classes on most days and then perform vigorous-intensity activities on other days.
5. Campus activity centers can increase motivation and participation in physical activity by offering incentives to encourage students to increase physical activity levels. Incentives offered should be proven methods of increasing students' motivation. Also academic scholarships can be offered to encourage students to associate physical activity with academic pursuits.
6. This study lays the groundwork for more research to be conducted on body image in relation to weight related behaviors and physical activity behavior.

Limitations

There are several limitations encountered while conducting this study. One of the limitations of the current study relates to the sampling methods. The study was a cross-

sectional survey of a convenience sample of students in a general health education class. Although majority of the students in the university have the option of choosing this class, it is possible that the sample may not be truly representative of the student population at this university.

Another limitation of this study was the use of self-reported height and weight in the calculation of BMI. BMI is a reliable screening tool, but as stated earlier, it may be not take into account differences in body fat composition based on gender. Further research may be necessary to analyze body fat composition of subject participants. The data on physical activity behavior was also self-reported. It is possible that participants did not accurately report their exercise patterns or weight and height.

Thirdly, attitudes, perceived behavioral norms, subjective norms and demographic variables were only analyzed and reported with respect to intentions to perform physical activity and not the actual physical activity behavior. Although, intentions are useful for predicting behavior, it is difficult to measure an individuals' motivation. Regardless of whether a person states that they are motivated there is no real way to tell if this is true.

Delimitations

Certain delimitations were placed on the study because of time constraints. The analysis was confined to examining the relationship between weight and weight perception and gender only without including other demographic variables.

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