

A THEORY-BASED INVESTIGATION OF
LEISURE TIME PHYSICAL ACTIVITY
AMONG COLLEGE STUDENTS

by

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A DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the Department of Health Science
in the Graduate School of
The University of Alabama

TUSCALOOSA, ALABAMA

2010

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ABSTRACT

This study examined the leisure time physical activity behavior of college students using the Theory of Planned Behavior (TPB) and two constructs, descriptive norm and self-efficacy, from the Integrated Behavioral Model (IBM). A sample of college students ($n = 621$) from a large, public university in the southeastern United States participated. Data were collected via a self-report class-room based assessment battery. The assessment battery contained questions related to leisure time physical activity, TPB constructs descriptive norm and self-efficacy and demographic information.

In general, the results of this research indicate the utility of the TPB in examining leisure time physical activity among college students. In addition, this study supports the inclusion of the IBM constructs descriptive norm and self-efficacy in examining leisure time physical activity. The TPB constructs; attitude, subjective norm and perceived behavioral control were positively associated with intention to engage in leisure time physical activity among this sample of college students. The results of the final hierarchical regression model indicated that subjective norm was negatively associated with leisure time physical activity and intention was positively associated with leisure time physical activity behavior. In addition, the two IBM constructs descriptive norm and self-efficacy were positively associated with leisure time physical activity behavior. Finally, the results also found gender differences in the TPB and IBM constructs. For males, intention and subjective norm were significantly related to leisure

time physical activity. For the females, intention, attitude and self-efficacy were significantly related to leisure time physical activity.

This research has several implications for researchers and other college health professionals, with an interest in promoting leisure time physical activity. This research provides a better understanding of the leisure time physical activity behaviors of college students with regard to the TPB and IBM constructs (descriptive norm and self-efficacy). This examination of leisure time physical activity among college students should be of interest to those fostering programs, services and facilities to support this behavior, and particularly campus recreation professionals.

DEDICATION

This dissertation is dedicated to Jason and Evelyn Grace- Mommy finally finished her story.

ACKNOWLEDGMENTS

I am pleased to have this opportunity to thank my family, friends and faculty members who supported me during this endeavor. I am most grateful to Dr. Renee Umstattd, my committee chair, for her wisdom, guidance, and encouragement throughout this entire dissertation process. I am extremely thankful for committee member Dr. John Jackson for his advice, support and humor. I would also like to acknowledge and thank Dr. Lori Turner, Dr. Stuart Usdan and Dr. Brad Lian for serving on my committee. I appreciate the time, feedback and support you offered me throughout this process. I am also indebted to the many instructors who allowed me access to their classrooms in order to get my survey instruments complete.

I would not have finished this project without my family and friends who supported, encouraged, questioned, loved and believed in me throughout this experience. Finally, I would like to thank Andy for his unwavering love, support, encouragement and understanding during this seven year journey, I love you.

LIST OF ABBREVIATIONS

ACHA-NCHA	American College Health Association- National College Health Assessment
BMI	Body Mass Index
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
HBM	Health Belief Model
IBM	Integrated Behavioral Model
IRB	Institutional Review Board
<i>M</i>	Mean
SCT	Social Cognitive Theory
<i>SD</i>	Standard Deviation
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
TTM	Transtheoretical Model

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CHAPTER 1

INTRODUCTION

Purpose and Significance

Physical activity is the cornerstone of a healthy lifestyle and is cited as a key strategy for reducing the risk of chronic conditions and diseases including hypertension, coronary heart disease, diabetes, cancer and obesity (Staten, Miller, Noland, & Rayens, 2005). In addition, evidence clearly shows that regular physical activity improves physiological and psychological health (US Department of Health and Human Services, 2000). Benefits such as maintenance of ideal body weight, prevention of premature death and enhanced psychological well-being have been attributed to participation in regular physical activity (Fischer & Bryant, 2008). However, data from the 2007 Behavioral Risk Factor Surveillance System (BRFSS) indicate that approximately only 50% of US adults meet the recommendations for regular leisure time physical activity (Centers for Disease Control and Prevention [CDC], 2007c).

Recent recommendations state that in order to promote and maintain health, all healthy adults aged 18-65 years need moderate-intensity aerobic physical activity for a minimum of 30 minutes on 5 days a week or vigorous-intensity aerobic activity for a minimum of 20 minutes on three days each week (Haskell et al., 2007). The Healthy People 2010 document identifies two key objectives toward meeting the recommendations for leisure time physical activity (US Department of Health and Human Services, 2000). In addition, Healthy People 2010 cites

leisure time physical activity as a leading health indicator to be targeted by prevention programs (US Department of Health and Human Services, 2000). The need to understand physical activity behavior and implement effective intervention strategies is paramount (Rhodes & Plotnikoff, 2005).

Despite the strong evidence for the health promoting benefits of engaging in regular physical activity, participation rates have been shown to decrease over the lifespan, with the steepest decline in leisure time physical activity occurring in adolescence and young adulthood (Caspersen, Powell, & Christenson, 1985; Dishman & Buckworth, 1996; Stephens, Jacobs, & White, 1985). Epidemiological evidence indicates that levels of leisure time physical activity decline from high school to college and activity patterns in college populations are generally insufficient to improve health and fitness (Kilpatrick, Hebert, & Bartholomew, 2005). National data suggests that 42% of college students do not participate in moderate or vigorous leisure time physical activity (Douglas et al., 1997). The college years provide unique opportunities (and responsibilities) for campus communities to positively shape physical activity behaviors in their students (Leslie, Sparling, & Owen, 2001). The college environment, with its potential to reach a large audience in a relatively confined area, may be an ideal setting for disseminating information and delivering health promotion interventions (Doerksen, Umstattd, & McAuley, 2009). Data suggest that there is a need to study physical activity motivation and behavior so that researchers can develop better programs and interventions to improve the physical activity patterns of college students (Kilpatrick, Hebert, & Bartholomew, 2005). In view of the importance of leisure time physical activity regarding wellness, college and university administrators have started to pay more attention to campus recreation programs (Zhang, DeMichele, & Connaughton, 2004).

This study was performed to gain a better understanding of factors that impact the leisure time physical activity behaviors of college students with regard to the Theory of Planned Behavior (TPB) and Integrated Behavioral Model (IBM). Physical activity interventions should be based on theory to improve effectiveness (Suminski & Petosa, 2006). The Theory of Planned Behavior (TPB) is one of several motivational theories that have been employed to examine the disjuncture between awareness of the benefits of physical activity and low levels of engagement in physical activity (Okun et al., 2003). The central factor of the TPB is the person's intention to engage in a particular behavior (Ajzen, 1991). Furthermore, the TPB posits that intention is a function of three determinants; attitude, subjective norm and perceived behavioral control. The IBM includes constructs from the TPB and other influential frameworks to provide a theoretical basis from which to understand behavior and identify specific beliefs to target in intervention strategies (Montano & Kasprzyk, 2008). More specifically, the IBM includes self-efficacy, described by Bandura (1986) as one's degree of confidence in the ability to perform a behavior in the face of various obstacles or challenges (Bandura, 1986). In addition, the IBM describes the subjective norm construct as being made up of both injunctive and descriptive norms. Descriptive norms are defined as perceptions about what others in one's social or personal networks are doing in regards to a particular behavior (Montano & Kasprzyk, 2008).

The IBM has not been used in previous research targeting leisure time physical activity (Montano & Kasprzyk, 2008). Therefore, conducting a study that utilizes the constructs contained within the TPB and descriptive norm and self-efficacy from the IBM will add to the current leisure time physical activity literature. In addition, investigating college students' engagement in leisure time physical activity will provide a unique context within the current literature. The potential public health benefits of using campus settings to positively influence

the physical activity habits of young adults should not be underestimated (Leslie, Sparling, & Owen, 2001).

Findings from this research have several implications for researchers, health educators and campus recreation professionals with an interest in the leisure time physical activity behaviors of college students. This research provides a better understanding of the factors associated with college students' participation in leisure time physical activity. The current trend on college campuses of constructing and renovating large recreation facilities warrants the investigation of participation in leisure time physical activity. Thoroughly examining the leisure time physical activity behaviors of college students can facilitate the development and implementation of intervention strategies designed to increase participation in leisure time physical activity. The findings of this research will help practitioners and professionals tailor marketing and educational strategies in an attempt to engage more students in meeting established recommendations for leisure time physical activity. Application of the TPB and the two specific IBM constructs descriptive norm and self-efficacy, to investigate leisure time physical activity behaviors of college students will aid in identifying specific factors associated with students' participation. This research investigated potential differences in leisure time physical activity participation among male and female students. Identifying gender differences has practical applications for practitioners to better promote the benefits of engaging in leisure time physical activity among the students.

Research Questions

In order to examine leisure time physical activity behavior of college students, the following research questions were examined:

1. Are the TPB constructs and IBM constructs, descriptive norm and self-efficacy, correlated with each other and with leisure time physical activity?
2. Are TPB constructs related with a) intention toward participation in leisure time physical activity and b) actual participation in leisure time physical activity among college students?
3. Does the addition of the IBM-specific constructs, descriptive norm and self-efficacy, explain additional variance in leisure time physical activity behavior of the participants?
4. Are there gender related differences in the relationships between the TPB constructs and IBM constructs, descriptive norm and self-efficacy, and leisure time physical activity?

Assumptions

Aside from the general presumption that participants would answer the assessment battery honestly and completely, the research questions were based upon a series of assumptions. Those assumptions are as follows:

Assumptions of Question 1: It was assumed that the constructs of the TPB and descriptive norm and self-efficacy from the IBM would be correlated. It was further assumed that these constructs would be correlated with leisure time physical activity and have an influence on intention.

Assumptions of Question 2: It was assumed that the measures for the various constructs within the TPB and the two specific IBM, descriptive norm and self-efficacy, would be related to

a) intention toward participation in leisure time physical activity and b) actual participation in leisure time physical activity among the college students.

Assumptions of Question 3: It was assumed that the addition of the IBM-specific constructs, descriptive norm and self-efficacy, would add to the explained variance in leisure time physical activity among the participants.

Assumptions of Question 4: It was assumed that there would be gender differences in the measures of the TPB and IBM, descriptive norm and self-efficacy constructs in relation to participation in leisure time physical activity.

Limitations

There are a number of limitations that must be considered in this study. First, this study utilized the descriptive norm and self-efficacy constructs of the IBM, which to date have not been applied to college student participation in leisure time physical activity. Second, this study relied on participants to honestly self-report their leisure time physical activity behaviors. Thus there is potential for students to inflate their participation in leisure time physical activity. Another limitation is the lack of generalizability and selection bias associated with the use of convenience samples. This research used a convenience sample of college students from classes at one university in the southeastern United States. Therefore, the results may not be generalizable to other populations or other college student populations.

Delimitations

The parameters of this study consist of students at a large university in the southeastern United States. The assessment battery for this research was completed by students who

consented to participate in the study and who were present in class the day the surveys were distributed. Participants had to complete the assessment battery and be between 18-24 years old to be eligible for inclusion in this research project.

Terms

Affective Attitude. An individual's emotional response to the idea of performing a recommended behavior (Blanchard et al., 2003).

American College of Sports Medicine (ACSM). Promotes and integrates scientific research, education, and practical applications of sports medicine and exercise science to maintain and enhance physical performance, fitness, health, and quality of life (American College of Sports Medicine, 2010).

Attitude toward the behavior. The degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Ajzen, 1991).

Behavioral Risk Factor Surveillance System (BRFSS). The world's largest, on-going telephone health survey system, tracking health conditions and risk behaviors in the United States yearly since 1984 (Centers for Disease Control and Prevention (CDC), 2010b).

Body Mass Index (BMI). A number calculated from a person's weight and height that provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems (Centers for Disease Control and Prevention (CDC), 2009).

Campus Recreation. Comprehensive campus recreation programs include formal and informal recreational opportunities such as; intramural sports, fitness programs, sport clubs,

outdoor recreation, aquatics programs and aerobic dance classes (Zhang, DeMichele, & Connaughton, 2004).

Centers for Disease Control and Prevention (CDC). One of the major operating components of the Department of Health and Human Services, and is the nation's premier health promotion, prevention, and preparedness agency and a global leader in public health (Centers for Disease Control and Prevention (CDC, 2010a).

Descriptive Norm. The perceptions about what others in one's social or personal networks are doing (Montano & Kasprzyk, 2008).

Education Resources Information Center (ERIC). An online digital library of education research and information that is sponsored by the Institute of Education Sciences of the U.S. Department of Education (Education Resources Information Center, 2010).

Health Belief Model (HBM). A value-expectancy theory developed by Rosenstock and Hochbaum in the 1950's as a means to understand an individual's response to screenings for tuberculosis prevention (Glanz & Rimer, 1995).

Instrumental Attitude. Beliefs about the outcomes of behavioral performance (Blanchard et al., 2003).

Injunctive Norm. Include normative beliefs about what others think one should do and the motivation to comply with those individuals (Montano & Kasprzyk, 2008).

Integrated Behavioral Model (IBM). A framework that includes constructs from the TPB, as well as other influential theories (Montano & Kasprzyk, 2008).

Intention. Intention to perform a given behavior indicates how hard people are willing to try and how much effort they plan to exert in order to perform a behavior that is under volitional control (Ajzen, 1991).

Leisure. Viewed historically in three ways: as experience, activity or time (Kelly & Godbey, 1982).*Leisure Time Physical Activity.* Physical activity can be categorized into active leisure, which includes any volitional activity that results in energy expenditure undertaken during one's free time (Sylvia-Bobiak & Caldwell, 2006).

Leisure Time Physical Activity Recommendations. All healthy adults aged 18-65 years need moderate-intensity aerobic physical activity for a minimum of 30 minutes on 5 days a week or vigorous-intensity aerobic activity for a minimum of 20 minutes on three days each week (Haskell et al., 2007).

Obesity. A range of weight that is greater than what is generally considered healthy for a given height, an adult who has a Body Mass Index greater than 30.0 is considered obese (Centers for Disease Control and Prevention (CDC), 2007).

Overweight. A range of weight that is greater than what is generally considered healthy for a given height, an adult who has a Body Mass Index between 25.0 and 29.9 is considered overweight (Centers for Disease Control and Prevention (CDC), 2007).

Perceived Behavioral Control. The perceived ease or difficulty of performing the behavior, which reflects past experience as well as anticipated impediments and obstacles (Ajzen, 1991).

Personal Agency. Identified in the integrated behavioral model and consists of the two constructs; perceived behavioral control and self-efficacy (Montano & Kasprzyk, 2008).

Physical Activity. Physical activity has been defined as “any bodily movement produced by skeletal muscles that result in energy expenditure” (Caspersen, Powell, & Christenson, 1985).

PubMed. A service of the U.S. National Library of Medicine that includes over 19 million citations from MEDLINE and other life science journals for biomedical articles back to the 1950s (National Center for Biotechnology Information & U.S. National Library of Medicine, 2010).

Recreation. Voluntary, non-work activity that is organized for the attainment of personal and social benefits including restoration and social cohesion (Kelly & Godbey, 1992).

Self-efficacy. A person’s confidence in performing a particular behavior and in overcoming barriers to performing that behavior (Bandura, 1986).

Social Cognitive Theory (SCT). Defines human behavior in terms of a model of triadic reciprocity in which behavior, cognitive and other personal factors and environmental events all operate as interacting determinants of each other (Bandura, 1986).

Social Ecological Model (SEM). Developed by McLeroy et al. (1988), it identifies multiple levels of influence and was designed to guide researchers and practitioners to systematically assess and intervene on each level of influence (Sallis & Owen, 2002).*Subjective Norm.* The perceived social pressure to perform or not to perform a particular behavior (Ajzen, 1991).

Theory of Planned Behavior (TPB). An extension of the Theory of Reasoned Action, it includes the construct perceived behavioral control over performance of the behavior (Montano & Kasprzyk, 2002).

Theory of Reasoned Action (TRA). Asserts that the most important determinant of behavior is a person's behavioral intention and the direct determinants of behavioral intention are attitude toward performing the behavior and their subjective norm associated with the behavior (Montano & Kasprzyk, 2002).

Transtheoretical Model (TTM). The basic premise of this theory is that behavior change is a process, not an event and that individuals are at varying levels of motivational "readiness" for change (Glanz & Rimer, 1995).

CHAPTER 2

LITERATURE REVIEW

Purpose

The purpose of this chapter is to emphasize the need for a better understanding of leisure time physical activity behaviors of college students. In addition, this chapter will explore how leisure time physical activity behaviors of college students have been examined using theoretically based frameworks. Through a review of literature, one can outline what other researchers have examined, associated results and recommendations for further investigation. This chapter outlines the literature on the following topics; a) health benefits of leisure time physical activity, b) current recommendations and levels of individuals' participation in leisure time physical activity, c) college students' engagement in leisure time physical activity, d) the trend of creating state-of-the-art recreation facilities on college campuses, e) leisure and recreation frameworks for investigating leisure time physical activity, f) theoretically based investigations of leisure time physical activity and g) justification for selecting the theory of planned behavior as a theoretical framework for investigating college students participation in leisure time physical activity.

Health Benefits of Physical Activity

Physical activity, exercise and physical fitness are terms that describe different concepts, however, they are often confused with one another and the terms are sometimes used

interchangeably (Caspersen, Powell, & Christenson, 1985). The term physical activity encompasses a number of definitions that describe any bodily movement resulting in energy expenditure. To some researchers, physical activity encompasses two categories, exercise and sport (Sylvia- Bobiak & Caldwell, 2006). In addition to exercise and structured sport, physical activity can also be categorized into active leisure, which includes any volitional activity that results in energy expenditure undertaken during one's free time (Sylvia- Bobiak & Caldwell, 2006). Leisure time physical activity is exercise, sports, recreation or hobbies that are not associated with activities as part of one's regular job duties, household activities or transportation (US Department of Health and Human Services, 1996). Leisure time physical activity is part of a healthy lifestyle and has positive health effects across various age cohorts, ethnic populations and chronic diseases (Calfas et al., 1996; Crespo, Keteyian, Heath, & Sempos, 1996; Kushi et al., 1997; Pahor et al., 1994; Wagner, LaCroix, Buchner, & Larson, 1992).

It is widely accepted that regular physical activity is associated with a significant decline in all-cause mortality (Myers et al., 2002) and the prevention of numerous other disease states, such as cancer (Friedenreich & Orenstein, 2002), type 2 diabetes (Diabetes Prevention Program Research Group, 2002) and cardiovascular disease (Kohl, 2001). Physical activity is an important component of a healthy lifestyle, with implications for the prevention of chronic diseases and obesity (US Department of Health and Human Services, 1996). Regular physical activity has several benefits including enhancement of psychological well-being, assisting in maintenance of ideal body weight and preventing premature death (Fischer & Bryant, 2008). Blair et al. (1996) found lower all cause mortality rates in higher-fitness groups whether they smoked or not, had high cholesterol or not and whether or not they were healthy or unhealthy at baseline examination. The classic study of college alumni by Paffenbarger and colleagues

(1986) revealed that when life spans of active and inactive men were compared that active men lived more than two years longer. In a study of four national surveys from the United States and Canada, leisure time physical activity was positively correlated with general well-being and mood and negatively correlated with depression and anxiety. These results were found for men, women, younger adults and older adults, even after adjusting for potential confounding variables (Stephens, 1988).

Nevertheless, recent statistics indicate that most individuals in many developed countries are insufficiently physically active to obtain these health benefits (US Department of Health and Human Services, 1996). Despite strong evidence for the health-promoting benefits of engaging in regular physical activity, participation rates have been shown to decrease over the lifespan (Dishman & Buckworth, 1996). The Healthy People 2010 report cites physical activity as one of the leading health indicators to be targeted by prevention programs in the 21st century (US Department of Health and Human Services, 2000). Intervention strategies meant to promote lifetime physical activities among all Americans represent a major health priority (Crespo, Keteyian, Heath, & Sempos, 1996; Marcus et al., 2006).

Current Recommendations and Levels of Participation in Leisure Time Physical Activity

In 1995, the Centers for Disease Control and the American College of Sports Medicine released a joint recommendation regarding the amount of physical activity needed for health benefits (Pate et al., 1995). The recommendation states that adults should accumulate 30 minutes or more of moderate intensity leisure time physical activity on most, preferably all days of the week (Pate et al., 1995). In 2007, the American College of Sports Medicine and the American Heart Association released a report to update and clarify the 1995 recommendations

on the types and amounts of physical activity needed by healthy adults to improve and maintain health (Haskell et al., 2007). The updated recommendations suggest that in order to promote and maintain health, all healthy adults aged 18-65 years need moderate-intensity aerobic physical activity for a minimum of 30 minutes on 5 days a week or vigorous-intensity aerobic activity for a minimum of 20 minutes on three days each week (Haskell et al., 2007). The new report notes that a combination of moderate- and vigorous-intensity activity can also be performed to meet these recommendations (Haskell et al., 2007). Many adults, including those who wish to improve their personal fitness or further reduce their risk for premature chronic health conditions and mortality related to physical inactivity, should exceed the minimum recommended amounts of physical activity (Haskell et al., 2007). The Healthy People 2010 document identifies two major objectives for leisure time physical activity (US Department of Health and Human Services, 2000). The first is to reduce the proportion of adults who engage in no leisure time physical activity to twenty percent and the second is to increase the proportion of adults who engage regularly, preferably daily, in moderate intensity physical activity for at least thirty minutes per day (US Department of Health and Human Services, 2000).

Physical inactivity, poor dietary choices and increased caloric intake contribute to the increased weight gain and obesity in adults (CDC, 2007b). Previous research suggests that more than half of the adult population in the United States is overweight or obese, with the percentages increasing significantly over the last 15 years (Flegal, Carroll, Ogden, & Johnson, 2002; Kuczmarski, Flegal, Campbell, & Johnson, 1994). According to the Behavioral Risk Factor Surveillance System (BRFSS) 2007 data, 26.3% of adults nationwide are considered obese, with a body mass index (BMI) greater than 30.0, and 36.7% are considered overweight with a BMI between 25.0 and 29.9 (CDC, 2007a). The 2008 data from the BRFSS show a very slight

increase to 26.6% for obese and the data for overweight was 36.6% (CDC, 2008). BMI is defined as weight in kilograms divided by height in meters squared (CDC, 2009).

Physical inactivity during leisure time is often associated with obesity (G. A. King et al., 2001). Data from the 2005-2007 National Health Interview Surveys indicate that 4 in 10 adults (39.7%) engage in no leisure time physical activity (Schoenborn & Adams, 2010). This data also indicated that men (61.9%) were more likely than women (58.9%) to engage in at least some leisure time physical activity and that the percentage of adults engaging in leisure time physical activity decreased with age. The National Health Interview Surveys have been an important source of information about health and health care in the United States since it was first conducted in 1957 (National Center for Health Statistics, 2007).

To examine the prevalence of regular, leisure time physical activity, researchers at the Centers for Disease Control analyzed data from the BRFSS (CDC, 2007c). This data indicates that in 2007, the prevalence of regular leisure time physical activity was 47.0% among women and 50.7% among men. This data demonstrates that roughly half of United States adults engaged in the recommended levels of physical activity. When looking at college age adults, 18-24 years old, BRFSS data for 2007 indicated that nationwide, 59.0% met the recommendation of 30 minutes or more of moderate activity on 5 or more days a week. This data also found that 18.4% of this college age-group performed no leisure time physical activity (2007c).

College Student's Engagement in Leisure Time Physical Activity

Epidemiological evidence indicates that levels of leisure time physical activity decline from high school to college and activity patterns in college populations are generally insufficient to improve health and fitness (Kilpatrick, Hebert, & Bartholomew, 2005). The most rapid

decline in leisure time physical activity occurs in late adolescence and early adulthood (Stephens, Jacobs, & White, 1985). Many adult behaviors are established during late adolescence and early adulthood (US Department of Health and Human Services, 2000), so decline in physical activity during this specific timeframe is a disturbing trend (Calfas et al., 2000; Stone, McKenzie, Welk, & Booth, 1998).

Changes in leisure behavior are most likely to occur during periods of life transition, when individuals' roles, relationships and ecological contexts are altered (Raymore, Barber, & Eccles, 2001). Transition from high school to a college or university is a major life stressor for many students (Pennebaker, Colder, & Sharp, 1990) and is associated with an abundance of increased health risk factors including decreases in physical activity (Baranowski et al., 1997). Healthy Campus 2010 identifies physical inactivity as 1 of the 6 priority health risk behaviors for college students (American College Health Association, 2004). The freedom to exert behavioral autonomy inherent in the college context and the self-determined nature of leisure combine to suggest that college students are faced with a great deal of choice in how they spend their free time (Sylvia- Bobiak & Caldwell, 2006). Although college students have specific time constraints related to their academic schedules, they also have considerable discretionary time. The choices made about how to spend this time influence one's levels of leisure time physical activity, and various factors influence these choices (Buckworth & Nigg, 2004).

Sparling and Snow (2002) found that 84.7% of their research participants ($n = 367$) who were physically active as college students were engaging in physical activity at similar or greater levels six years after graduation (Sparling & Snow, 2002). Evidence indicates that physical activity patterns established in childhood, adolescence and young adulthood can determine quality of life in one's later years (Buckworth, 2001). An emphasis on leisure may be crucial in

helping people learn to enjoy physical movement from the time they are children into adulthood (Henderson & Bialeschki, 2005). Healthy People 2010 has identified post secondary educational institutions as settings where young adults (aged 18-24 years) should be targeted for physical activity promotion (US Department of Health and Human Services, 2000). College students are exposed to many opportunities of socialization and behavior-governing norms, thus post-secondary institutions provide a unique environment in which physical activity promotion efforts can be delivered to a large number of young adults in an effective way (Seo, Nehl, Agley, & Ma, 2007).

In addition to research suggesting a decline in leisure time physical activity during the transition to college, a greater proportion of Americans are making this transition, thus furthering the need to better understand and improve physical activity behaviors of college students. During the past three decades, the number of individuals with four or more years of higher education has nearly doubled. According to the United States Census Bureau, enrollment in two- and four-year colleges and universities in the U.S. reached 20.5 million in 2006, up 3 million since 2000 (U.S. Census Bureau News, 2008). These increases in the college population provide the opportunity to positively impact leisure time physical activity patterns of this demographic.

Results of the National College Health Risk Behavior Survey conducted in 1995 suggest that many students' behaviors increase their likelihood of experiencing adverse health outcomes (Douglas et al., 1997). In this study, only 37.6% of the students surveyed participated in vigorous physical activity for at least 20 minutes on 3 or more of the seven days preceding the survey, and 19.5% reported walking or bicycling (moderate physical activity) for at least 30 minute at a time on 5 or more of the seven days preceding the survey (Douglas et al., 1997). This survey also found that participation in vigorous activity was significantly higher among

male students compared to female students and for students aged 18-24 years compared to older students (Douglas et al., 1997). Moderate physical activity did not vary by gender or age group (Douglas et al., 1997). Unfortunately, the National College Health Risk Assessment was not repeated after the 1995 survey (American College Health Association, 2005). The absence of a consistent comparable surveillance system that gathers data on postsecondary school students has been filled by the National College Health Assessment (American College Health Association, 2005).

The American College Health Association conducts the National College Health Assessment to assist college health services providers, health educators, counselors and administrators in collecting data about their students' habits, behaviors and perceptions of the most prevalent health topics (American College Health Association, 2008). The National College Health Assessment was developed in 1998 and it now provides the largest known comprehensive data set on the health of college students (American College Health Association, 2008). Data from the fall 2007 National College Health Assessment indicated that 56.1% of male students and 62.4% of female students did not meet recommendations for leisure time physical activity behavior (American College Health Association, 2008).

The survey instrument was revised in 2008 and is referred to as the ACHA-NCHAI. Baseline data collection with the new survey began in fall 2008 (American College Health Association, 2009a). Data from the fall 2009 ACHA-NCHAI indicated that only 50.4% of male students and 39.9% of the female students met the guidelines established by the American College of Sports Medicine and the American Heart Association for moderate- and/or vigorous-intensity physical activity (American College Health Association, 2009b). These data further support the need to better understand physical activity behavior and related motivational factors,

so that researchers can develop better programs and interventions to improve the physical activity patterns of college students (Kilpatrick, Hebert, & Bartholomew, 2005). Colleges and universities have the resources (e.g., recreational facilities, student wellness programs, activity courses) to have a substantial impact on physical activity (Suminski, Petosa, Utter, & Zhang, 2002). However, given the large percentage of students who are not physically active, it would appear that these resources are not being fully used (Suminski, Petosa, Utter, & Zhang, 2002).

Campus Recreation

One significant area of recreation is the growing field of student campus recreation (Daprano, Pastore, & Costa, 2008). Comprehensive campus recreation programs include formal and informal recreational opportunities such as intramural sports, fitness programs, sport clubs, outdoor recreation, aquatics programs and aerobic dance classes (Zhang, DeMichele, & Connaughton, 2004). Campus recreation centers exist for reasons that align with overall missions of universities; namely education, enhancing the quality of student life and preparing people for the future (Weese, 1997). Over the past two and a half decades, colleges and universities have made major financial investments in recreation facilities that enrich campus life and enhance the well-being of their students (A. Cohen, 1996).

On the national level, it appears that campus recreation facility growth will continue for the foreseeable future, as an estimated 400 indoor facilities and more than 300 outdoor facilities will be built or renovated in the near future (Arterberry, 2004). According to the National Intramural-Recreational Sports Association, an estimated \$3.96 billion will be spent on new construction, renovations and expansion of campus recreation centers with an average cost of \$20.7 million from 2008-2013 (National Intramural-Recreational Sports Association, 2008).

These attractive new facilities, in addition to being a powerful recruiting tool, can also facilitate the adoption of healthy lifestyles at a time when many young adults are likely to become sedentary (Reisberg, 2001). One of the reasons for campus recreation programs is the positive impact that the use of such programs, services and facilities has on the quality of life of its users, most often students (Lewis, Barcelona, & Jones, 2001). Campus recreation has important responsibilities in terms of promoting the overall well-being of students, helping to reduce negative or destructive forms of play, extending and enriching academic learning and contributing to other college and university goals (McLean, Hurd, & Rogers, 2005). The integration of recreation services with the overall student experience has led to an increase in importance of recreation programming on college campuses (Turman & Hendel, 2004).

The physical and mental health benefits of engaging in the types of physical activity offered by campus recreation facilities are well known and strongly supported by over a half century of research (Bouchard, Shepard, Stephans, Suttons, & McPherson, 1990). Research in the past few decades has shown that participation in campus recreational programs helps with students' wellness (Ellis, Compton, Tyson, & Bohlig, 2002), student attrition (Chrurchill & Iwai, 1981), retention and recruitment (Belch, Gebel, & Maas, 2001), academic performance (Belch, Gebel, & Maas, 2001) and students' overall satisfaction with their college experience (Dalgarn, 2001). Research supports recreational sport facilities and programs as recruiting enhancements, which increase overall satisfaction with the collegiate experience and make a positive contribution to institutions' retention efforts (Banta, Bradley, & Bryant, 1991). A number of recent studies have focused on usage of campus recreation facilities as it relates to student learning, development and academic success (Artinger, Clapham, Meigs, Sampson, & Forrester, 2006; Belch, Gebel, & Maas, 2001; Bryant, Banta, & Bradley, 1995; Haines, 2001; Hall, 2006;

Lindsey & Sessoms, 2006). Given the importance of physical activity for health, the irregular pattern of college students' activity and the potential for colleges to have an effect on physical activity, including free or low-cost fitness facilities, recreation programs and exercise classes, scientific study of this behavior is warranted (Suminski & Petosa, 2002).

Ellis et al. (2002) reported findings on the frequency of participation in campus recreation services in relation to health and quality of life variables. They found significantly positive effects of frequency of participation on four variables; satisfaction with life as a whole, satisfaction with experience at the university at which they were studying, extent to which emotional health interfered with social functioning and how often the individuals felt like they had "a lot of energy" (Ellis, Compton, Tyson, & Bohlig, 2002). Another study of college freshman found that students who used the student recreation center not only persisted at a greater rate than those who did not, but also earned higher grade point averages and more credit hours at the end of their freshman year than non-users (Belch, Gebel, & Maas, 2001).

Leisure and Recreation Frameworks for Investigating Leisure Time Physical Activity

Leisure has been defined using multiple definitions as can be seen in the literature. Most inquiries into the history of thinking about leisure begin with classical Greek philosophy, specifically Aristotle (Driver, Brown, & Peterson, 1991). Aristotle defined leisure as the state of being free from the necessity of being occupied and is characterized by the performance of activity "for its own sake or as its own end" (De Grazia, 1962, p. 13). Normative denotations of leisure have traditionally been expressed in terms of free time or activity, and some scholars have added state of mind as an alternative definition of the word (Parr & Lashua, 2004). To sum up the variance in definitions, leisure has been viewed historically in three ways: as experience,

activity or time (Kelly & Godbey, 1982). Whereas, recreation is defined as voluntary, non-work activity that is organized for the attainment of personal and social benefits including restoration and social cohesion (Kelly & Godbey, 1992).

Over the past two decades, leisure research has generated a body of literature pertinent to understanding and increasing active living, including studies on time use, motivation for initiating and maintaining activity and influence of user fees and urban park use (Godbey, Caldwell, Floyd, & Payne, 2005). The evolution and importance of theory in leisure research have been recognized as essential to broaden understanding of leisure (Henderson & Bialeschki, 2005). The two dominant perspectives that have been used to predict individuals' participation in active recreation have been the preventive health and sickness avoidance perspective (e.g., the Health Belief Model and Protection Motivation Theory) and the cognitive behavioral perspective (e.g., Social Cognitive Theory, the Theory of Planned Behavior, Self-Efficacy Theory and Leisure Constraint Theory; Tsai, 2005). Social ecology and active living are the two primary foundations that guide thinking about the roles of leisure, parks and recreation in promoting health (Henderson & Bialeschki, 2005). The authors of the book *Benefits of Leisure* state that there are no theories of leisure behavior, only theories of human behavior that help explain leisure behaviors as rather generic human behaviors (Driver, Brown, & Peterson, 1991).

Literature therefore suggests that leisure and recreation professionals have accepted health behavior models as a framework for their research, where researching active lifestyles requires collaboration, partnerships and transdisciplinary approaches (Henderson & Bialeschki, 2005). Researchers studying leisure, parks and recreation have an important role to play in addressing active living and health issues (Henderson & Bialeschki, 2005). It has become

acceptable for leisure and recreation professionals to focus on the health outcomes and benefits of active living.

Perspectives presented in the leisure and recreation literature have significant ties to the literature related to health behavior. Several of the theories and frameworks presented in the leisure journals are similar to those in health behavior studies. However, one of the theories housed specifically in leisure studies is the Leisure Constraint Theory. One model of this theory was developed in 1987 by Crawford and Godbey, which centered on the construction of three models of leisure barriers: intrapersonal, interpersonal and structural (Crawford, Jackson, & Godbey, 1991) and is similarly structured to the Social Ecological Model. However, the Leisure Constraint Theory introduces the perspective of inhibiting participation or engagement. With its' initial focus on the 'problematic' aspects of initiating leisure participation, leisure constraints research seeks to understand factors that impede leisure participation and otherwise compromise the realization of leisure-related goals (Hinch & Jackson, 2000). According to Jackson, 2000:

- No constraint is experienced with equal intensity by everyone, although time and cost related constraints rank among the most widely and intensely experienced inhibitors of the achievement of leisure goals and a balanced lifestyle.
- The experience of constraints varies among individuals and groups: no sub-group of the population is entirely free from constraints and each group is characterized not only by varying intensities of the experience of each type of constraint, but also by a unique combination of constraints. Thus relatively less constrained by time, young people's leisure is typically affected by lack of partners, opportunities and costs. The transition to middle adulthood sees a decline in these types of constraints but a marked increase in time commitments.

Although constraints inhibit leisure participation, they do not necessarily prevent it (Beggs, Elkins, & Powers, 2005; Elkins, 2004; Jackson, Crawford, & Godbey, 1993). Instead, some people may negotiate through constraints and thus succeed in initiating or continuing leisure participation, albeit in a way that may differ from how they would participate if constraints were absent (Jackson & Rucks, 1995). In many instances, individuals are able to overcome or negotiate constraints in order to participate in leisure activities (Elkins, Beggs, & Choutka, 2007). Beggs et al. (2005) found that college students used different methods of negotiation in order to participate in leisure activities and that the most common negotiation methods they used were time management strategies. Understanding the distribution of constraints in society, how they affect people's lives and leisure and how people adapt to these constraints is a crucial task for leisure researchers (E. L. Jackson, 2000).

Theoretically Based Investigations of Leisure Time Physical Activity

A variety of health behavior theories and models have influenced interventions, research and writings on physical activity during the past decade (Dubbert, 2002). There are hundreds of behavioral studies on physical activity, with great diversity in research design, measurement approaches, populations studied, theories used, variables tested and physical activity outcomes (Bauman, Sallis, Dzewaltowski, & Owen, 2002). In general, theory can be used to guide the search for reasons "why" people are or are not following public health and medical advice, or not caring for themselves in healthy ways (Glanz & Rimer, 1995). Health behavior theories are extremely important to both our understanding of health behavior as well as a basis from which interventions aimed at increasing health behaviors can be developed (Noar, 2005-2006). An important starting point for the understanding and promotion of health-related exercise and physical activity is the study of theory (Biddle & Nigg, 2000). Theoretical models and

approaches enable us to systematically build knowledge and better understand how and why people might be motivated or amotivated to adopt and/or maintain exercise (Biddle & Nigg, 2000). There are theories focused on 1) beliefs and attitudes, 2) perceptions of competence, 3) perceptions of control and 4) decision-making processes (Biddle & Nigg, 2000).

In “Understanding and Influencing Physical Activity,” Sallis identifies five theories commonly found in the literature related to examining physical activity including the Health Belief Model, the Transtheoretical Model, Social Cognitive Theory, Ecological Models and the Theory of Planned Behavior (Sallis & Owen, 1999). The emphasis of most of these theories is focused on understanding the psychology of the individual, either alone or within the context of the social environment, from the point of view of motivation, intentions and behavior (Biddle & Nigg, 2000).

The theoretical literature review process for this research began by using the search engines PubMed and ERIC to identify articles related to leisure time physical activity among college students. PubMed and ERIC were selected because they contain literature related to the topic area. PubMed was used for its application to human environmental sciences, health behaviors and theoretical frameworks. ERIC was included to capture the area of college students because of its focus on education and human environmental sciences. In addition to using the search engines, articles and authors were identified in the reference lists of manuscripts located during the initial literature search. Finally, Google Scholar and Google searches were performed to ensure that saturation had occurred for the topic areas. The specific terms found in the literature with regard to ethnicity categories and types of physical activity are presented in this section.

The Health Belief Model

The Health Belief Model (HBM) was developed by Rosenstock and Hochbaum in the 1950's as a means to understand an individual's response to screenings for tuberculosis prevention (Glanz & Rimer, 1995). The HBM, which is a value-expectancy theory, has several constructs related to a specific disease, illness or condition. The constructs include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy. The HBM is an excellent framework for identifying factors related to behavior related with a particular health condition, illness and/or disease. The constructs of this model target susceptibility to a specific condition, the severity of the condition, the benefits and barriers to certain actions, cues to action and self-efficacy. Therefore, for behavior to change, people must feel threatened by their current behavioral patterns and believe that change will result in a valued outcome at acceptable costs (Janz, Champion, & Strecher, 2002).

There is considerable support for the HBM in explaining behavior pertinent to prevention and behavior in response to symptoms or a diagnosed disease (Strecher & Rosenstock, 1997). In a search of the literature through PubMed and ERIC, using "HBM" and "college students" as search terms, 19 and 16 studies, respectively, were identified. Of those studies, only one investigated physical activity (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004), in which the majority of the studies investigated college student's beliefs about sexually transmitted diseases, HIV and AIDS (Manning & Others, 1989; Mimberg & Lewis, 1994; Scandell & Wlazelek, 2002; Yep, 1993; Zak-Place & Stern, 2004) and condom use and safe sex practices (Hester & Macrina, 1985; Rehnberg & Barabasz, 1994; Winfield & Whaley, 2002)).

In the 2004 study, Von Ah et al. used the HBM with a cross-sectional sample of 161 college students. The study investigated the students responses toward five behaviors: alcohol use, smoking, physical activity, nutrition, general safety and sun-protective behaviors. The researchers investigated perceived stress, availability of and satisfaction with social support and perceived self-efficacy on these selected health behaviors. The components of the HBM: perceived susceptibility, perceived severity, perceived benefits and perceived barriers; were measured with a questionnaire consisting of 102 questions. Multiple regression analysis and structural equation modeling were used to examine the data. With respect to physical activity, results indicated higher self-efficacy and lower perceived barriers to be related with a greater likelihood of students engaging in physical activity (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004).

Transtheoretical Model

The Transtheoretical Model (TTM), developed by Prochaska and DiClemente in 1979, was originally developed for application with smoking cessation, but has been applied to a wide variety of health behaviors including physical activity (Courneya, 1995). The basic premise of this theory is that behavior change is a process, not an event and that individuals are at varying levels of motivational “readiness” for change (Glanz & Rimer, 1995). The constructs of the TTM are stages of change, decisional balance, self-efficacy and processes of change (Prochaska, Redding, & Evers, 2002). The five distinct stages of change in this model include: precontemplation, contemplation, decision, action and maintenance. When applying the TTM to physical activity, the majority of previous research of college students’ physical activity behavior focused only on identifying students’ stages of physical activity behavior (Keating, Guan, Pinero, & Bridges, 2005).

In a search of the literature through PubMed and ERIC using “TTM”, “college students” and “physical activity” as the search terms, four and three studies, respectively, were identified. When the search terms substituted “exercise” for physical activity, an additional seven studies were found through PubMed and four through ERIC. A study by Wallace in 2003 examined exercise behaviors among college students using Stages of Change, and results indicated that self-efficacy and social support were influential variables in predicting adoption, maintenance and relapse of exercise behaviors (Wallace & Buckworth, 2003).

A study by Rosen and colleagues, examined how exercise readiness (1) influenced the way sedentary college students processed exercise-related information and (2) predicted adoption of regular vigorous exercise, using the TTM, Theory of Planned Behavior and the Elaboration Likelihood Model (ELM) among a group of 147 college students (Rosen, 2000). The Stages of Exercise Behavior Questionnaire and a seven-day Physical Activity Recall Questionnaire were used to assess the college students input on vigorous exercise behavior. Vigorous exercise was defined as engaging for 20 minutes or more in any vigorous physical activity such as jogging, dancing, aerobics or playing a sport like basketball or soccer. Findings suggested that students with a neutral or mildly negative attitude processed exercise-promoting messages less thoroughly than students with a positive attitude. Researchers also found that intention was most likely to lead to regular exercise when students already exercised occasionally at baseline.

Suminski and Petosa (2002) examined the relationship between stage of change for exercise behavior and ethnicity in college students (Suminski & Petosa, 2002). The cross-sectional study design included 3,099 college students across 3 semesters of study. Through chi-square analysis, the investigators found that male and female students were distributed differently across the stages of change. More men than women were in the maintenance stage

and more women than men were in the contemplation stage. The relationship for ethnicity and stage of change was significant for women, where Asian students represented the highest percentage of precontemplators and White students were the lowest proportion in the contemplation stage and the highest in the maintenance stage. For men, Asians were least likely to be in the action stage. The highest percentage of maintainers and the lowest percentage of contemplators were African Americans. The researchers also found that Asian and Hispanic students demonstrated significantly elevated risks for being in the non-exercise stages compared with White students.

The 2003 study conducted by Wallace and Buckworth focused on examining the relationship of exercise self-efficacy, social support, sedentary behavior and longitudinal shifts in stage of exercise behavior change among a sample of college students (Wallace & Buckworth, 2003). Data were collected at baseline and follow-up in a cross-sectional study using questionnaires about demographic information, stage of exercise behavior change, exercise self-efficacy, social support and current exercise behavior patterns. The 165 participants were grouped into 4 categories based on their stage of exercise behavior and differences were analyzed among the four groups. Results indicated decreases in self-efficacy and social support for irregular exercisers, while active individuals who maintained exercise had higher social support for exercise than those exercisers who relapsed in stage. Findings indicated that self-efficacy and social support were influential variables in predicting adoption, maintenance and relapse of exercise behavior among college students.

In 2008, Fischer and Bryant used a pretest-posttest quasi-experimental design to investigate the effect of certified personal training services on the number of students exercising at or above a criterion level at the beginning of a semester compared to the end of the same

semester. Researchers used the TTM as a framework for the investigation, specifically assessing changes in cognitive and behavioral processes of change, decisional balance and coping, scheduling and three types of task-specific self-efficacy. A stratified random sample of the 312 female college students was recruited and participants were separated into experimental, those who received personal trainer services, or control groups, those who did not receive the services. Students were given a questionnaire on stage of exercise change and based on responses; students were put into one of five groups to reflect their current exercise behavior and intention to initiate exercise over the next 6 months. Results demonstrated that the experimental group reported a more positive pattern of exercise behavior. Among the control group participants, there were significant decreases in the cognitive and behavioral processes of change, decisional balance and scheduling self-efficacy. However, decreases in coping or task self-efficacy were not significant (Fischer & Bryant, 2008)

Social Cognitive Theory

Social Cognitive Theory (SCT) developed by Bandura (1986) has been used by health educators and behavioral scientists to develop interventions, procedures or techniques that influence underlying cognitive variables, thereby increasing the likelihood of behavior change (Baranowski, Perry, & Parcel, 2002). The SCT defines human behavior in terms of a model of triadic reciprocity in which behavior, cognitive and other personal factors and environmental events all operate as interacting determinants of each other (Bandura, 1986). SCT is made up of eleven constructs: environment, situation, behavioral capability, expectations, expectancies, self-regulation (self-control), observational learning, reinforcements, self-efficacy, emotional coping responses and reciprocal determinism (Baranowski, Perry, & Parcel, 2002). According to the SCT, knowledge about a health behavior and the benefits it offers increases self-efficacy, where

self-efficacy is the main determinant of whether a person will perform the given behavior (Baranowski, Perry, & Parcel, 2002). A wide range of effective cognitive behavior modification intervention approaches have been developed from the SCT (Sallis & Owen, 1999).

In a search of the literature through PubMed and ERIC using “SCT,” “college students” and “physical activity” as the search terms, five and three studies respectively were identified. When the search terms substituted “exercise” for physical activity, an additional two studies were found through PubMed and no additional studies were found using ERIC.

Petosa and colleagues (2003) conducted a study to determine if the SCT constructs of social support from family and friends, self-regulation, outcome expectancy value, self-efficacy, exercise role identity and positive exercise experience, predicted vigorous physical activity among a sample of college students. The study consisted of students ($n = 350$) enrolled in personal health classes at a Midwestern university. Over three class sessions, students completed a set of instruments measuring SCT constructs and participation in vigorous physical activity. Results indicated that over a 4 week period, 45% of the students averaged less than 1 day per week of vigorous physical activity, an additional 34% reported averaging less than 3 days per week and only 22% met the recommended standard of 3 or more days. Hierarchical regression analysis was performed to test the ability of the SCT constructs to predict vigorous physical activity. Results showed that all of the SCT constructs contributed to the variance and altogether accounted for 27.2% of the variance in vigorous physical activity participation among the sample.

In a 2005 study, Behrens et al. used the underlying tenets of the SCT to investigate college students' understanding of the definition of physical activity, the health benefits it offers

and the current public health recommendations for moderate physical activity. The study design consisted of five focus groups with six participants each ($n = 30$). Questions designed by the researchers examined students' understanding of physical activity frequency, intensity and duration necessary to achieve health benefits. In addition, questions were included to capture specific health benefits students could expect to realize from participating in moderate physical activity. Findings suggest that most students were able to define physical activity. More males than females reported that regular physical activity provides mental health benefits, males also acknowledged reduction in heart disease, and an increase in longevity. Female students most often stated that physical activity leads to decrease in fat and an increase in the number of calories burned. There was confusion among the students regarding components of the moderate physical activity recommendation, specifically frequency and duration (Behrens, Dinger, Heesch, & Sisson, 2005).

Suminski and Petosa used the SCT to test if a 9-week web-based program could enhance knowledge and use of social support, self-efficacy and self-regulation strategies for promoting physical activity among a sample of college students (Suminski & Petosa, 2006). The study included three experimental groups of students from a large, Midwestern university enrolled in health classes. The control group ($n = 178$) consisted of students enrolled in a class in which the curriculum was devoid of material related to exercise, physical activity and fitness. The comparison group ($n = 118$) were students enrolled in a fitness and exercise class that consisted of lecture and actual participation in physical activity. The intervention group ($n = 127$) students were enrolled in the same fitness and exercise class as the comparison group, but they also completed a web-based program targeting SCT variables. Results indicated that 68% of students in the intervention group found the web assignments helpful for understanding physical activity.

In addition, students in the intervention group showed significant increases in knowledge concerning SCT strategies and were more likely to use self-regulation strategies (planning, organizing and managing physical activity) than students not exposed to the web program. The other SCT variables, self-efficacy and social support, examined in the study did not significantly increase as a result of the web program.

Doerksen, Umstattd and McAuley (2009) conducted a study to determine whether the core SCT constructs of self-efficacy, outcome expectations and physical activity goals measured at the beginning of a semester predicted moderate and vigorous intensity physical activity at the end of the same semester in a sample of college freshmen ($n = 69$) at a Midwestern university. Students completed the assessment battery of demographic and social cognitive measures at the beginning of the semester. Three months later, each participant was instructed to wear an accelerometer for one week and note the day and time they started and stopped wearing it. Results showed that all of the SCT constructs were moderately to strongly correlated with each other. In addition, a regression analysis accounted for 16% of the variance in moderate physical activity, where the regression equation for vigorous physical activity was also significant. As expected, given the bivariate relationships, none of the SCT constructs at baseline were significant predictors of minutes spent in moderate physical activity at follow-up. BMI did emerge as a significant predictor of moderate physical activity, but was unrelated to vigorous physical activity. For vigorous activity, physical activity goals and self-efficacy for overcoming stressful and interpersonal barriers were significant predictors. In contrast, BMI was not related to vigorous physical activity.

Social Ecological Model

The Social Ecological Model developed by McLeroy et al. (1988) identifies multiple levels of influence and was designed to guide researchers and practitioners to systematically assess and intervene on each level of influence (Sallis & Owen, 2002). The five levels of influence include: intrapersonal, interpersonal, institutional, community and public policy (Sallis & Owen, 2002). Ecological models in health behavior are valuable because they can help shed light on the multitude of complex factors that influence and are influenced by behaviors (Staten, Miller, Noland, & Rayens, 2005).

In a search of the literature through PubMed and ERIC using “ecological model,” “college students” and “physical activity” as the search terms, three and zero studies, respectively, were identified. When the search terms substituted “exercise” for physical activity, no additional studies were found through PubMed or ERIC. A Google search using the phrase, “ecological model with college students and physical activity,” yielded two additional studies (Gyuresik, Spink, Bray, Chad, & Kwan, 2006; Staten, Miller, Noland, & Rayens, 2005).

The Social Ecological Model was used to assess college students’ physical activity behaviors among a group of college students at a university in the southeast (Staten, Miller, Noland, & Rayens, 2005). In this study, researchers identified personal, environmental and institutional factors related with physical activity participation, including campus design, opportunity for physical activity and campus emphasis on health and physical activity through education. Another research focus was information dissemination from administrators and the impact on students’ behaviors related to physical activity participation. Participation in physical activity was measured using questions adapted from the National College Health Risk Behavior

Survey (CDC, 1997) revealing that only 39% of the students participated in vigorous physical activity. Environmental factors were determined using a modification of the Pedestrian and Bicycle Audit developed by the National Center for Bicycling and Walking (Wilkinson, Eddy, MacFadden, & Burgess, 2002). Institutional policy information was gathered through key informant interviews with the Director of Campus Recreation and the undergraduate advisor for the Department of Kinesiology and Health Promotion. It was found that the campus was designed for motor traffic rather than pedestrian traffic. Specifically, there were limited bike lanes, limited availability of goods in walking distance and drivers often did not yield for pedestrians or bicyclists. In addition, researchers found that the institution had insufficient recreational facilities, no general academic requirement for physical activity and a lack of coordinated efforts to encourage physical activity. From these findings, several recommendations were offered about the needs of a campus to support and encourage students' participation in physical activity.

Gyurcsik and colleagues (Gyurcsik, Spink, Bray, Chad, & Kwan, 2006) conducted a study using an ecological framework to identify barriers to physical activity and classify them into categories (intrapersonal, interpersonal, institutional, community, public policy and physical environment). The sample included 7th graders through first-year university students ($n = 291$). Participants completed semi-structured, open-ended questions during the sixth week of classes to assess barriers, defined as anything that would stop you from doing physical activity. Overall, 882 barriers were listed by the participants and categorized by the researchers. Results from ANOVA analysis revealed that the university students listed significantly more barriers to physical activity than the younger participants. The university students cited significantly fewer intrapersonal and community barriers and significantly more physical environment barriers.

Intrapersonal barriers for the university students were different from the younger participants; lack of skill and lack of motivation were reported less frequently, whereas barriers revolving around health, injury, illness, medical condition, lack of sleep and preference for relaxation were prominent. The interpersonal barriers for the university students were also different than those identified by the younger participants. Social invitations, lack of a training partner, significant other commitments and traveling to visit family and friends were reported with the highest frequency for this category. Overall, the findings of this study suggest that as students advance through school, an increasing frequency and diversity of barriers to physical activity may be experienced.

Due to the emphasis on complexity and wide-scale systems influence, the ecological approach has often been qualified as intimidating, impractical and difficult to operationalize (Richard, Potvin, Kishchuk, Prlic, & Green, 1996). One consistent limitation of ecological models is the absence of theoretical concepts that can be used to create testable hypotheses to explain, predict and ultimately control phenomena of interest (Grzywacz & Fuqua, 2000).

The Theory of Planned Behavior

One of the most widely used frameworks for examining determinants of physical activity is Ajzen's Theory of Planned Behavior (TPB; Maddux, 1993). The TPB is an extension of the Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975). The TRA asserts that the most important determinant of behavior is a person's behavioral intention and the direct determinants of behavioral intention are attitude toward performing the behavior and their subjective norm associated with the behavior (Montano & Kasprzyk, 2002). The TPB is an extension of the TRA, necessary due to the original model's limitations in dealing with behaviors in which people

have incomplete volitional control (Ajzen, 1991). As in the original TRA, a central factor in the TPB is the individual's intention to perform a given behavior (Ajzen, 1991). Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try and how much effort they plan to exert in order to perform the behavior (Ajzen, 1991). The TPB took the TRA one step further and posited that intent is a function of three determinants: attitude, subjective norm and perceived behavioral control (Okun, Karoly, & Lutz, 2002).

The TPB postulates three conceptually independent determinants of intention. The first is attitude toward the behavior and refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question. The second predictor is a social factor termed subjective norm, and refers to the perceived social pressure to perform or not to perform the behavior. The third antecedent of intention is the degree of perceived behavioral control which refers to the perceived ease or difficulty of performing the behavior and it is understood that it reflects past experience as well as anticipated impediments and obstacles (Ajzen, 1991). Ajzen and colleagues added perceived behavioral control to the TRA in an effort to account for factors outside of the individual's control that may affect his or her intention and behavior (Montano & Kasprzyk, 2002). Much of the knowledge about the role of perceived behavioral control comes from the systematic research program of Bandura and his associates, who have shown that people's behavior is strongly influenced by their confidence in their ability to perform it (Ajzen, 1991). The TPB also postulates that perceived behavioral control is an independent determinant of behavioral intention, along with attitude toward the behavior and subjective norm (Montano & Kasprzyk, 2008). Holding attitude and subjective norm constant, a person's perception of the ease or difficulty of behavioral performance will affect his behavioral

intention (Montano & Kasprzyk, 2008). Few studies have operationalized perceived behavioral control using the underlying measures of control beliefs and perceived power; instead, researchers have mostly used the direct measure of perceived behavioral control. The TPB places the construct of self-efficacy belief or perceived behavioral control within a more general framework of the relations among beliefs, attitudes, intentions and behavior (Ajzen, 1991). The more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the more likely intention to perform the behavior will be stronger (Ajzen & Driver, 1992). As a general rule, stronger intention to engage in a behavior increases the likelihood of performance (Ajzen, 1991). The relative importance of attitude, subjective norm and perceived behavioral control in the prediction of intention is expected to vary across behaviors and situations (Ajzen, 1991).

Among the most prominent and effective theories focusing primarily on intrapersonal processes in physical activity literature are the TRA and TPB (A. C. King, Stokols, Talen, Brassington, & Killingsworth, 2002). Psychological models that emphasize the role of knowledge, beliefs, attitudes, motivations and emotions have been dominant and have inspired studies that have shown that many psychological factors influence physical activity patterns of adults and youth. The TPB is one of these models (Sallis, 1994). Support for the validity of the TPB in predicting aerobic-exercise behavior has been established across populations including older adults, college students, pregnant women, patients with cardiovascular disease, breast cancer patients and the disabled (Bryan & Rocheleau, 2002). One of the major strengths of the TPB is its emphasis on measures specific to the behavior, context and goal in question (Maddux, 1993). The theory recognizes that there are a wide variety of behaviors, including exercise, that these behaviors can be performed at various times, in various settings and that people engage in

exercise for a variety of goal-related reasons (Maddux, 1993). The TPB is one of several motivational theories that have been employed to examine the disjuncture between awareness of the benefits of physical activity and low levels of engagement in physical activity (Okun et al., 2003).

In a search of the literature through PubMed and ERIC using “TPB”, “college students” and “physical activity” as the search terms, five and two studies, respectively, were identified. When the search terms substituted “exercise” for physical activity, one additional study was found through ERIC and two additional studies were identified in PubMed. Additional authors and literature were found by reviewing reference lists of the initial studies identified by the search engines.

In 1992, Ajzen and Driver, used the TPB to predict leisure intentions and behavior among a sample of college students ($n = 146$) from the University of Massachusetts (Ajzen & Driver, 1992). Participants completed questionnaires dealing with the respondent’s views concerning a variety of outdoor leisure/recreational activities including spending time at the beach, running, boating, mountain climbing and biking. Hierarchical regression analyses revealed that for three of the five activities (spending time at the beach, mountain climbing and boating), perceived behavioral control was found to make important contributions to the prediction of the behavior, beyond the contribution of intention. These results support the use of the TPB over the original TRA. The three major predictor variables in the TPB: attitudes, subjective norms and perceived behavioral control, each contributed to the prediction of intentions to engage in recreational activities, and the combination of intentions and perceived behavioral control produced strong multiple correlations with reported behaviors.

Full-time students ($n = 114$) at the University of Bristol, UK, participated in a study to determine the predictive strength of the TPB and additional variables in relation to exercise (Bozionelos & Bennett, 1999). The participants completed questionnaires related to the TPB and other variables: exercise activity (Time 1), perceived barriers, role beliefs, personal norms, self-monitoring and sex role identity. Three weeks later, the students were asked again about their exercise activity (Time 2). Results revealed that intention correlated with all the TPB variables and with personal norms and past behavior (Time 1). With the exception of subjective norm, all the TPB variables correlated with self-reported exercise activity at Time 2. Regression analyses were performed and resulted in past behavior explaining 42% of the variance in current behavior, where perceived behavioral control explained an additional 15% and attitude an additional 4% of the variance. A second regression analysis included past behavior, perceived behavioral control and personal norms and barriers. This equation explained 63% of the variance in intention. A third analysis revealed that past behavior and intention explained 49% of the variance in current behavior. Finally, a regression analysis with personal norms and barriers in the second step and sex role and self-monitoring in the third step did not differ from the third analysis in terms of variance explained. However, intention was forced out of the equation and replaced by barriers in this model. Overall, the results provided partial support for the utility of the TPB and indicated that the consideration of additional variables is warranted.

In 2008, Blanchard et al. conducted a study to determine the utility of the TPB for explaining physical activity intentions and behavior in Caucasian and African American college students (Blanchard et al., 2008). A second purpose of the study was to determine if ethnicity moderated any of the relationships within the theory. Participants included African American and Caucasian college students at two universities in Atlanta, GA ($n = 349$). Questionnaires on

demographic data, TPB constructs and physical activity were completed. The Godin Leisure-Time Exercise Questionnaire was used to measure moderate physical activity behavior. The authors examined whether the TPB explained significant differences in physical activity intention and behavior among the diverse group of college students by using hierarchical regression analyses. Results revealed that attitudes were a significant, unique predictor of intention for both ethnic groups. Results also suggested that the attitude-intention relationship was significantly stronger for Caucasian students and the relationship between instrumental attitudes and intention was non-significant among the African American students. Perceived behavioral control had a similar significant contribution for intention among both ethnic groups. Subjective norm was not associated with intention among either ethnic group. In this investigation, researchers concluded that intention was the strongest predictor of physical activity among Caucasian students and that perceived behavioral control was the strongest predictor of physical activity among African American students.

In 2003, Blanchard et al. conducted a study to determine whether ethnicity moderated the TPB determinants and exercise intention in undergraduate students (Blanchard et al., 2003). Participants ($n = 184$) answered survey questions related to demographic information and the TPB constructs. The analysis indicated significantly higher intentions to exercise for males versus females. Results also demonstrated that instrumental and affective attitudes and perceived behavioral control were significantly and uniquely associated with exercise intention, but subjective norm was not. The TPB variables accounted for 7.07% of the variance, with affective attitude and perceived behavioral control making the largest contributions. For Caucasians, the association between affective attitudes and intention was stronger for females. However, in African Americans, this association was stronger among males. The association

between instrumental attitudes and exercise intention was stronger for Caucasian males and African American females. There were no significant associations found for ethnicity, gender or an ethnicity by gender interaction for subjective norm or perceived behavioral control.

In 2002, Bryan and Rocheleau conducted a study to test the predictive validity of the TPB for aerobic exercise versus resistance training among a group of college students (Bryan & Rocheleau, 2002). Introductory psychology students ($n = 210$) at the University of Connecticut completed initial questionnaire and responded to a phone survey three months later. Results indicated that the TPB was a valid model for predicting both aerobic exercise and resistance training among the sample. All theorized relationships among the TPB constructs and behavior were significant. Consistent with the model, attitudes, subjective norms and perceived behavioral control were strongly correlated with intentions. In addition, intentions and perceived behavioral control were predictive of actual behaviors. The findings suggest that increasing positive attitudes and subjective norms could increase exercise behavior among college students.

Three studies (Okun, Karoly, & Lutz, 2002; Okun et al., 2003; Rhodes, Jones, & Courneya, 2002) have investigated the specific construct of subjective norm with respect to college students and physical activity or exercise behavior. The construct of subjective norm has not performed well in explaining exercise intention across studies when controlling for attitude and perceived behavioral control, typically either being nonsignificant or of small significant magnitude (Rhodes, Jones, & Courneya, 2002). The measurement of subjective norm in the exercise domain has focused on an injunctive aspect, opposed to a descriptive aspect of social norms (Okun, Karoly, & Lutz, 2002). Findings suggest that it is premature to eschew using the subjective norm construct in research applying the TPB to the exercise domain (Okun, Karoly, & Lutz, 2002). In addition, descriptive norms have been found to predict leisure-time exercise

among college students (Okun et al., 2003) and further research may be warranted that includes a social support measure that follows the measurement specifications outlined in the TPB (Rhodes, Jones, & Courneya, 2002).

Integrated Behavioral Model

The Integrated Behavioral Model (IBM) includes constructs from the TPB, as well as other influential theories (Montano & Kasprzyk, 2008). As in the TPB, the most important determinant of behavior in the IBM is intention to perform the behavior. According to the IBM, a particular behavior is most likely to occur if (1) a person has a strong intention to perform it and the knowledge and skill to do so, (2) there is no serious environmental constraint preventing performance, (3) the behavior is salient and (4) the person has performed the behavior previously. According to the model, behavioral intention is determined by three construct categories: attitude toward the behavior (affective and instrumental), perceived norms (injunctive and descriptive) and personal agency (perceived behavioral control and self-efficacy).

Attitude is the person's overall favorableness or unfavorableness toward performing the behavior (Montano & Kasprzyk, 2008). The affective component is the individual's emotional response to the idea of performing a recommended behavior; those with a strong positive emotional reaction are more likely to engage in the behavior. The instrumental attitude is determined by beliefs about the outcomes of behavioral performance.

Perceived norms reflect the social pressure one feels to perform or not perform a particular behavior (Montano & Kasprzyk, 2008). Injunctive norms include normative beliefs about what others think one should do and the motivation to comply with those individuals.

Additionally, perceptions about what others in one's social or personal networks are doing (descriptive norm) may also be an important part of normative influence.

In the IBM, personal agency consists of two constructs, perceived behavioral control and self-efficacy (Montano & Kasprzyk, 2008). Perceived behavioral control is one's perceived amount of control over behavioral performance, determined by one's perception of the degree to which environmental factors make it easy or difficult to carry out the behavior. In contrast, self-efficacy is one's degree of confidence in his/her ability to perform the behavior in the face of various obstacles and challenges.

As in TPB findings, the relative importance of the three categories of theoretical constructs in determining behavioral intention may vary for different behaviors and for different populations (Montano & Kasprzyk, 2008). Thus to design effective interventions to influence behavioral intentions, it is important first to determine the degree to which that intention is influenced by attitude, perceived norm and personal agency. The IBM provides a theoretical basis from which to understand behavior and identify specific beliefs to target.

Two specific constructs within the IBM were included in this research project. Descriptive norm and self-efficacy were selected for inclusion in this project to compare findings to previous research where these constructs have been used in conjunction with the TPB constructs. The IBM is the only model to include the constructs attitude, subjective norm, descriptive norm, perceived behavioral control, self-efficacy and intention. Other researchers have incorporated the construct descriptive norm with the TPB in their investigation of leisure time physical activity (C. Jackson, Smith, & Conner, 2003; Okun, Karoly, & Lutz, 2002; Okun et al., 2003; Rhodes, Blanchard, & Matheson, 2006; Rhodes & Courneya, 2003a). In addition,

research has been conducted using self-efficacy along with the TPB constructs (C. Jackson, Smith, & Conner, 2003; Rhodes, Blanchard, & Matheson, 2006; Rhodes & Courneya, 2003a). Therefore, this research was also an attempt to determine the utility of the IBM for investigating the leisure time physical activity behaviors of college students.

No studies were returned using PubMed and ERIC for a search using the terms “IBM”, “college students” and “physical activity” or “exercise”. However, one study that acknowledged multiple components of the TPB constructs within the physical activity domain with a population of college students was identified (Rhodes & Courneya, 2003a). The multiple components for the TPB were attitude (affective and instrumental), subjective norms (injunctive and descriptive) and perceived behavioral control (self-efficacy and controllability). This study investigated the use of either two subcomponents or a general common factor for TPB construct across two populations, college students and cancer patients. The results, from a comparison of the two populations, suggest that all concepts had support for measurement distinctness. Further, both populations suggested identical models for subjective norm and perceived behavioral control, whereas different optimal conceptualizations of attitude were identified. This research supported measuring each the subcomponents of attitude (affective and instrumental), subjective norm (injunctive and descriptive) and perceived behavioral control (self-efficacy and controllability).

Conclusion

The percentage of adults who engage in regular leisure time physical activity is decreasing, causing an increase in risk for several health issues. Research indicates that the more physically active individuals are in their leisure time as adolescents and young adults, the more likely they are to remain active throughout the lifespan. The number of individuals entering the

college or university setting has continued to increase over the past decade. Institutions of higher education are supporting the construction and management of large recreational facilities on-campus for college students to use for leisure time physical activity behaviors. Many administrators are aware of the benefits of participation in leisure time physical activity among college students including: higher grades, less stress, better adjustment and higher persistence to graduation. There is a need to understand the factors that influence college students' engagement in leisure time physical activity. The TPB and the addition of descriptive norm and self-efficacy from the IBM provides a solid theoretical framework for assessing college students' intentions to engage in leisure time physical activity. Given the increase in popularity of comprehensive campus recreation programs and facilities, there is a need for theory based research to bridge the gap in assessing participation and developing intervention and educational materials to increase participation.

Therefore, the purpose of this dissertation was to examine the leisure time physical activity behavior of college students using the TPB and two constructs, descriptive norm and self-efficacy, from the IBM. More specifically, this study investigated whether the TPB and two specific IBM constructs explain a significant portion of the variance in leisure time physical activity intention of college students at a large, public institution in the Southeastern United States. In addition, this research examined potential gender differences in the TPB and two specific IBM constructs in relation to leisure time physical activity. This research targeted leisure time physical activity behavior of college students, which will provide information for recreation practitioners to help tailor marketing and educational strategies to engage more students.

CHAPTER 3

METHODOLOGY

Introduction

This study was designed to determine the influencing factors on college students' intentions to engage in leisure time physical activity utilizing the Theory of Planned Behavior (TPB) and the Integrated Behavioral Model (IBM) as conceptual frameworks. To better understand intentions among college students, a classroom assessment battery was used to collect data from a convenience sample of students enrolled in courses at the institution where the study was conducted. The assessment instrument included questions related to demographics including age, gender, year in school, ethnicity, residence (on or off campus), social fraternity/sorority (Greek) affiliation and marital status. In addition, students completed scales that address the TPB/IBM constructs: attitude toward the behavior, behavioral beliefs, subjective norm (injunctive and descriptive), perceived behavioral control, self-efficacy and intention. Participants completed a series of questions targeting their participation in leisure time physical activity. Study participants were also asked questions related to their participation in leisure time physical activity within specific campus recreation programs and services.

Purpose

The purpose of this study was to examine the leisure time physical activity behavior of college students using the TPB and two constructs, descriptive norm and self-efficacy, from the

IBM. More specifically, this study investigated whether the TPB and two specific IBM constructs explain a significant portion of the variance in leisure time physical activity intentions of college students at a large, public institution in the Southeastern United States. In addition, this research examined potential gender differences in the TPB and two specific IBM constructs in relation to leisure time physical activity. This research targeted leisure time physical activity behavior of college students, which will provide information for recreation practitioners to help tailor marketing and educational strategies to engage more students in the behavior.

Research Questions

In order to examine leisure time physical activity behavior of college students, the following research questions were examined:

1. Are the TPB constructs and IBM constructs, descriptive norm and self-efficacy, correlated with each other and with leisure time physical activity?
2. Are TPB constructs related with a) intention toward participation in leisure time physical activity and b) actual participation in leisure time physical activity among college students?
3. Does the addition of the IBM-specific constructs, descriptive norm and self-efficacy, explain additional variance in leisure time physical activity behavior of the participants?
4. Are there gender related differences in the relationships between the TPB constructs and IBM constructs, descriptive norm and self-efficacy, and leisure time physical activity?

Participants

A convenience sample of undergraduate students ($N = 775$) between the ages of 18-24 years enrolled in various academic classes housed within the Colleges of Human Environmental Sciences, Education, New College and Arts and Sciences at The University of Alabama completed the assessment battery. Specific courses included the following: HHE 270 Personal Health, NHM 101 introduction to Human Nutrition, HHE 273 Community Health, HAT 257 Introduction to Athletic Training, HAT 272 First- Aid, Safety and CPR, AAST 395 Special Topics, BCE 101 Freshman Compass Course, NEW 237 Conflict and Cooperation, SOC 315 Race and Ethnicity, CJ 303 Minorities, Criminality and Social Justice, KIN 199 Ecological Approach to Health and Fitness, HHE 370 Principles/Foundation Health Promotion, HHE 378 Drug Awareness Education, HHE 468 Practical Application of Health Communication/Promotion and HD 382 Parent and Family Development. According to university records, a total of 1,004 students were enrolled in the classes used for this research. The surveys collected represent a 77.2% completion rate of those enrolled.

Assessment Battery

In order to assess correlates of leisure time physical activity behavior among college students, the assessment instrument contained questions to capture demographics, TPB/IBM constructs, engagement in leisure time physical activity and behavioral beliefs of outcomes from participating in leisure time physical activity within campus recreation programs and facilities (see Appendix A). Select questions from the following instruments were used: the American College Health Association-National College Health Assessment II (ACHA-NCHA II), TPB questionnaire as developed by Blanchard et al. (2003) and (2008), descriptive norm and self-efficacy questions to capture the added IBM constructs (Marcus, Selby, Niaura, & Rossi, 1992;

Okun, Karoly, & Lutz, 2002), the Godin Leisure-Time Exercise Questionnaire (1985) and the Campus Recreation Student Outcomes Benchmarking Project (Moore & colleagues., 2005).

Item and measure characteristics are included in Table 1.

Demographic Variables

The *ACHA-NCHA II* is a nationally recognized research survey that includes items about college students' health habits, behaviors and perceptions (American College Health Association, 2009). The original survey, *ACHA-NCHA*, was initiated in 2000 and was used nationwide through spring 2008. The *ACHA-NCHA II* was developed following a thorough pilot testing process and incorporates several revised questions from the previous version (American College Health Association, 2008). The *ACHA-NCHA II* was first used in fall 2008 and the results provide the largest known comprehensive data set on the health of college students. In fall 2008, forty institutions participated in data collection, where 26,685 students responded via paper and web-based collection methods (American College Health Association, 2009). The research used eleven questions from the Demographic Characteristics section of the assessment. Questions included were age, gender, self-reported height and weight, year in school, ethnicity, marital status, on/off campus residence, affiliation with a social fraternity/sorority, GPA and participation in varsity, club and/or intramural sports. The *ACHA-NCHA II* is a public domain scale.

Theory of Planned Behavior and Integrated Behavioral Model

Items related to the TPB constructs were assessed using two scales developed by Blanchard and colleagues (Blanchard et al., 2008; Blanchard et al., 2003). Both scales were used independently while conducting research among undergraduate students at two universities in Atlanta, GA (Blanchard et al., 2008; Blanchard et al., 2003). The items target TPB constructs

including: attitude, subjective norm, perceived behavioral control and intention. The items for attitude, subjective norm and intention were the same for both the 2003 and 2008 studies.

Perceived behavioral control items varied slightly between the two study years. In 2003, two questions targeted ease of engaging in exercise activities and one targeted control over performing exercise activities. In 2008, the three questions for perceived behavioral control were related to control, confidence and ease of participating in physical activity. For the purposes of this research the three questions from the 2008 study were used to capture perceived behavioral control.

Attitude

Attitude can be defined as the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Ajzen, 1991). A six-item scale developed by Blanchard et al. (2003) was used to assess attitude. Based on Blanchard et al.'s approach, the following statement, "For me to participate in moderate intensity leisure time physical activity over the next week will be...", preceded the list of adjectives. Participants were then asked to rate six items related to attitude on a 7-point semantic differential adjective scale. Largely because of its ease of construction, semantic differential (Osgood, Suci, & Tannenbaum, 1957) is often the preferred method to assess attitude (Ajzen & Fishbein, 2008). This scale taps both the instrumental (harmful-beneficial, bad-good, useless-useful) and affective (unpleasant-pleasant, boring-fun, unenjoyable-enjoyable) aspects of attitude. The verbal descriptors are "extremely" (points 1 and 7), "quite" (points 2 and 6), "slightly" (points 3 and 5) and "neutral" (point 4). For example, point 1 = extremely harmful, 2 = quite harmful, 3 = slightly harmful, 4 = neutral, 5 = slightly beneficial, 6 = quite beneficial and 7 = extremely beneficial. Scale scores were formed by averaging the responses to the affective and instrumental norm questions (higher scores

indicate a more favorable attitude). Blanchard et al.'s 2008 study reported the affective attitude scale to have an internal consistency (Cronbach's alpha) of $\alpha = 0.74$ for the sample of African American students and $\alpha = 0.79$ for the Caucasian students. The instrumental attitude scale had an internal consistency (Cronbach's alpha) of $\alpha = 0.70$ for the African American students and $\alpha = 0.81$ for the Caucasian students. Reliability tests for the present study were performed and the overall attitude scale had an internal consistency (Cronbach's alpha) of $\alpha = 0.85$. The three questions targeting instrumental attitude had an internal consistency (Cronbach's alpha) of $\alpha = 0.79$ and the three questions targeting affective attitude had an internal consistency (Cronbach's alpha) of $\alpha = 0.89$.

Subjective Norm

Subjective norm is the perceived social pressure to perform or not to perform a particular behavior (Ajzen, 1991) and was measured using a three-item Likert scale rated from 1 (strongly disagree) to 7 (strongly agree). The three items for the subjective norm construct measure injunctive norms, which are the normative beliefs about what others think one should do (Montano & Kasprzyk, 2008). These items included; "Most people important to me (1) definitely think I should, (2) definitely approve of me and (3) definitely support me in engaging in moderate leisure time physical activity" (Blanchard et al., 2008; Blanchard et al., 2003). Scale scores were calculated by averaging the responses to the three questions (higher scores indicate stronger subjective norm for leisure time physical activity). Internal consistency (Cronbach's alpha) for the 3-item scale has been previously reported ($\alpha = 0.81$; Blanchard et al., 2003). Reliability tests for the present study were performed and the subjective norm scale had an internal consistency (Cronbach's alpha) of $\alpha = 0.82$.

Perceived behavioral control

Perceived behavioral control is defined as the perceived ease or difficulty of performing the behavior and it reflects past experience as well as anticipated impediments and obstacles (Ajzen, 1991). This construct was measured using a three-item scale from Blanchard et al.'s 2008 study. These items included the following: (1) "During the next week, if I wanted to I could engage in moderate leisure time physical activity" rated on a scale of 1 (strongly disagree) to 7 (strongly agree); (2) "During the next week, it would be _____ for me to engage in moderate leisure time physical activity" rated on a scale of 1 (extremely difficult) to 7 (extremely easy) and (3) "During the next week, how much control do you believe you have to engage in moderate leisure time physical activity" rated on a scale of 1 (extreme lack of control) to 7 (extreme control). Scale scores were calculated by averaging the responses to the three questions (higher scores indicate greater perceived control for leisure time physical activity). Internal consistency was not previously reported for this scale (Blanchard et al., 2008); however, reliability tests for the present study were performed and the perceived behavioral control scale had an acceptable internal consistency (Cronbach's alpha) of $\alpha = 0.75$.

Intention

Intention to perform a given behavior indicates how hard people are willing to try and how much effort they plan to exert in order to perform a behavior that is under volitional control (Ajzen, 1991). Intention toward the behavior was measured using a 3-item scale (Blanchard et al., 2008; Blanchard et al., 2003). The first two items, (1) "During the next week, I intend to engage in moderate leisure time physical activity" and (2) "During the next week, I will engage in moderate leisure time physical activity", were measured on a Likert scale from 1 (strongly

disagree) to 7 (strongly agree). The third item states, “During the next week, my goal is to engage in moderate intensity leisure time physical activity on at least __ days”. Scale scores were formed by averaging the responses to the three items (higher scores indicate a greater intention to participate in leisure time physical activity). Good internal consistency ($\alpha = 0.87$) for this scale has been previously reported (Blanchard et al., 2003). Reliability tests for this study also support strong internal consistency (Cronbach’s alpha) of $\alpha = 0.89$.

Descriptive Norm

The IBM identifies injunctive and descriptive norm within the TPB construct of subjective norm (Montano & Kasprzyk, 2008). The three-item subjective norm scale from Blanchard et al. (2008) addresses only injunctive norm and does not include items to capture descriptive norm. Therefore, a two-item scale from Okun et al. (2002) was used to capture descriptive norm. Descriptive norm is defined as perceptions about what others in one’s social or personal networks are doing (Montano & Kasprzyk, 2008). Okun and colleagues developed these items specifically for a study with college students to determine if descriptive norm was a significant and positive predictor of intention to participate in leisure time physical activity and participation in leisure time physical activity (Okun, Karoly, & Lutz, 2002). The first item asks whether most of the subjects’ family members will engage in moderate leisure time physical activity during the next week. The second asks whether or not the subjects’ friends will engage in moderate leisure time physical activity during the next week (Okun, Karoly, & Lutz, 2002).

Okun et al. (2002) measured these items on a Likert scale from 0 (strongly disagree) to 6 (strongly agree). However, for consistency of this research project with the other scales, the ability to compare means and improve understandability for the students’, both questions were measured on a scale from 1 (strongly disagree) to 7 (strongly agree). Scale scores were formed

by averaging the responses of the two questions (higher scores indicate stronger descriptive norm for leisure time physical activity). Internal consistency for this scale has not been previously reported. Reliability tests for the present study were performed and the descriptive norm scale had an internal consistency (Cronbach's alpha) of $\alpha = 0.53$.

Self-Efficacy

Self-efficacy is one's degree of confidence in the ability to perform a given behavior in the face of various obstacles or challenges (Montano & Kasprzyk, 2008). Self-efficacy for leisure time physical activity was measured using the five-item scale developed by Marcus and colleagues (Marcus, Selby, Niaura, & Rossi, 1992). This scale measures how confident participants are that they can participate in leisure time physical activity when faced with common barriers, negative affect, resisting relapse and making time for exercise. Specifically, the five questions included, "During the next week, I am confident I can engage in leisure time physical activity even when (1) I am tired, (2) I am in a bad mood, (3) I feel I don't have time, (4) I am on vacation and (5) the weather is bad. Participants' rated their confidence on a Likert scale from 1 (not at all confident) to 7 (very confident). Self- efficacy scores were calculated by summing the scores on the individual items (higher scores indicate greater self-efficacy). This scale has previously reported two-week test-retest reliability ($r = 0.90$) and internal consistency ($\alpha = 0.82$; Marcus, Selby, Niaura, & Rossi, 1992). Reliability tests for this study were performed and the self-efficacy scale had an internal consistency (Cronbach's alpha) of $\alpha = 0.81$.

Leisure Time Physical Activity

Leisure time physical activity behavior was measured using the Godin Leisure Time Exercise Questionnaire, which was developed by Godin and Shepard (1985). The questionnaire

was designed to be reliable, valid and easy to complete quickly without a need for detailed review (Godin, 1985). The questionnaire is relatively short and asks participants to recall their participation in leisure time physical activity for the past seven days. The instrument contains three open ended questions covering the frequency of mild (e.g. easy walking), moderate (e.g. fast walking) and strenuous (e.g. jogging) exercise completed during free time. As done by Rhodes and colleagues (2006), the phrase “leisure time physical activity” was substituted for “exercise” on the instrument (Rhodes, Blanchard, Matheson, & Coble, 2006). This survey instrument has been consistently used to identify engagement in leisure time physical activity and is commonly used with the college student population (Blanchard et al., 2008; Gyurcsik, Bray, & Brittain, 2004; Okun, Karoly, & Lutz, 2002; Rhodes, Blanchard, Matheson, & Coble, 2006; (Rhodes & Courneya, 2003b); Rhodes, Jones, & Courneya, 2002; Winters, Petosa, & Charlton, 2003).

An independent evaluation of this measure found it to be easily administered, brief, reliable and to possess concurrent validity based on various criteria including objective activity monitors and fitness indices (Jacobs, Ainsworth, Hartman, & Leon, 1993). This questionnaire has demonstrated a one-month test-retest reliability of $\alpha = 0.63$ and concurrent validity coefficients of $\alpha = 0.32$ with an objective activity indicator (CALTRAC accelerometer), $\alpha = 0.56$ with VO_{2max} (as measured by expired gases) and $\alpha = -0.43$ with percent body fat (as measured by hydrostatic weighing (Jacobs, Ainsworth, Hartman, & Leon, 1993). The Godin Leisure Time Exercise Questionnaire is a public domain scale. For the purposes of this research, this was analyzed as a continuous variable.

Participation in Campus Recreation

In addition, items were included regarding students' participation in campus recreation programs and services. Select items from the Campus Recreation Student Outcomes Benchmarking Project (Moore & colleagues, 2005) were included in the assessment battery. Items targeted frequency and duration of participation in specific campus recreation facilities and programs, beliefs about participation in campus recreation programs and outcome beliefs associated with participation in campus recreation programs and services. Students also rated the importance of leisure time physical activity prior to entering college and the importance leisure time physical activity will likely have after graduation. To date, approximately 70 institutions of higher education have taken part in the Campus Recreation Student Outcomes Benchmarking Project, including The University of Alabama; however, reliability and validity of the items have not been previously reported for this instrument. Internal consistency was examined in the present study. The internal consistencies (Cronbach's alpha) for the subsets of questions were: facilities used ($\alpha = 0.46$), program participation ($\alpha = 0.72$), personal beliefs ($\alpha = 0.93$) and outcome beliefs ($\alpha = 0.97$).

Table 1

Theoretical Framework and Behavioral Assessment Subscales

Reference	Scale	Variables	Validity/Reliability	Items
ACHA, 2009	Demographic Information	Age Gender Height/Weight Year in College Ethnicity Marital Status Residence Greek Affiliation GPA Sports Participation		11
Blanchard, 2003, 2008	Attitude	Attitude toward the Behavior	$\alpha = 0.70$ and $\alpha = 0.81$ $\alpha = 0.85^{**}$ overall scale $\alpha = 0.79^{**}$ instrumental scale $\alpha = 0.89^{**}$ affective scale	6
Blanchard, 2003, 2008	Subjective Norm	Injunctive Norm	$\alpha = 0.81$ $\alpha = 0.82^{**}$	3
Okun, 2002	Subjective Norm	Descriptive Norm	Not Reported $\alpha = 0.53^{**}$	2
Blanchard, 2008	Perceived Behavioral Control	Perceived Behavioral Control	Not Reported $\alpha = 0.75^{**}$	3
Blanchard, 2003, 2008	Intention	Intention to Perform the Behavior	$\alpha = 0.87$ $\alpha = 0.89^{**}$	3
Marcus, 1992	Self-Efficacy	Self-Efficacy	$r = 0.90$, $\alpha = 0.82$ $\alpha = 0.81^{**}$	5
Godin, 1985	Godin GLTEQ	Behavior (LTPA)	Validity Coefficients $\alpha = 0.32$ with accelerometer, $\alpha = 0.56$ with VO2max, $\alpha = -0.43$ with hydrostatic weighing	3
Moore, 2005	Campus Recreation Student Outcomes Benchmarking Project	Behavior (within campus recreation) and outcome belief	Not Reported $\alpha = 0.46^{**}$ facilities used $\alpha = 0.72^{**}$ program participation $\alpha = 0.93^{**}$ personal beliefs $\alpha = 0.97^{**}$ outcome beliefs	6

Note. ** Cronbach's alpha for the present study; ACHA = American College Health Association,

GLTEQ = Godin leisure time exercise questionnaire, LTPA = leisure time physical activity

Procedure

This research was approved by the Institutional Review Board (IRB) of the university in which the research was conducted (IRB# 09-OR-308; see Appendix B). Data collection occurred in November during the 2009 fall semester. At the beginning of each class, the researcher briefly explained the project to potential participants. The potential participants were informed that the research was completely anonymous, and nothing would be included that would identify them. A waiver for informed consent was approved by the IRB. In addition, potential participants were informed that participation was completely voluntary. A pilot test of the assessment battery indicated that it would take approximately 15 minutes to complete ($n = 5$). There were no incentives for students completing the assessment battery. Participating students who had completed the assessment battery in a previous class were asked to not complete the survey a subsequent time.

Statistical Analysis

A total of 775 surveys were returned. Data were entered, cleaned and analyzed using Statistical Package for the Social Sciences (SPSS) v17 (2008) statistical software. Data cleaning started by removing participants who indicated they were involved in varsity athletics based on their response to the sports participation question ($n = 75$). Next, subjects who did not complete demographic information questions were removed ($n = 22$).

Traditional undergraduate college age students are usually defined as being between the ages of 18-24 years (US Department of Health and Human Services, 2000). Thus, subjects outside the age-range of 18-24 years were excluded from the analysis ($n = 37$). Thirty-five subjects were eliminated for being older than 24 years and 2 were eliminated for stating that they

were 17 years old. Another 4 subjects were removed for indicating that they were in graduate school.

In addition, 16 subjects were removed for having incomplete subscales in the assessment battery. A subscale was considered incomplete if two or more responses were left blank (Little & Rubin, 2002). Among the wide variety of procedures to handle missing data, imputing the means for missing values is a popular strategy to dealing with missing item responses. Imputation allows the researcher to use standard complete-data methods of analysis on the filled in data (Huisman, 2000). There were 38 TPB subscales that had means inserted into one missing response. In this procedure, the mean for the specific subscale of the entire sample was inserted for the missing item. Specifically, mean imputations were made for 34 items in intention subscales and 4 items in attitude subscales. Therefore, a total of 621 participant surveys were used in the following analyses, representing 80.1% of the completion rate.

Once the data were cleaned and the final subject number determined, scores for each theoretical construct were computed. For attitude, subjective norm, descriptive norm, perceived behavioral control and intention, individual item scores were averaged to create a scale score for each construct. Self-efficacy scale scores were created by summing the five item scores.

Leisure time physical activity scale scores were created according to the Godin Leisure Time Physical Activity Questionnaire. For the questions, weekly frequencies of strenuous, moderate and light activities were multiplied by nine, five and three, respectively. Leisure time physical activity scale scores were then calculated by summing the products of the three separate components (Godin, 1985). Leisure time physical activity scores were then corrected for gross errors by Winsorizing (Kirk, 1995). The process of Winsorizing eliminates the highest or

lowest values and replaces them with the next highest or lowest values to correct large errors or large abnormalities in distributions. In this sample, several leisure time physical activity scale scores were high (n = 13), and were therefore replaced with values based on the 98th percentile value (Kirk, 1995). This method has been used previously in studies of physical activity (Umstattd, Saunders, Wilcox, Valois, & Dowda, 2006; Umstattd, Wilcox, Saunders, Watkins, & Dowda, 2008).

Responses to height and weight were used to create a new variable BMI. The following formula was used to calculate the BMI variable (Centers for Disease Control and Prevention (CDC), 2009);

$$\text{BMI} = [\text{Weight in Pounds} / (\text{Height in inches})^2] \times 703$$

In an effort to streamline the data, new categories were created for the demographic variables for use in statistical analyses. For example, year in school went from five categories to four, the fourth and fifth year students were combined into one category. Ethnicity was transformed from seven categories to three; White, Black and other. Marital status was put into two categories; single and other. Residence was transformed into two categories; on-campus and off-campus. Finally, sports participation was categorized into two categories; yes and no. New categories were created to ensure enough subjects were in each category and for a better understanding and interpretation of the findings among this sample of college students. The original categories are presented in Table 2.

Research Question 1

In order to determine if there were significant correlations among TPB/IBM constructs (intention, attitude, subjective norm, perceived behavioral control, descriptive norm and self-

efficacy) and among all constructs and leisure time physical activity (i.e., Research Question #1), TPB/IBM sum score variables were examined using Pearson correlations to determine independent bivariate associations. According to Ajzen (Ajzen, 1991) and Montano (Montano & Kasprzyk, 2008), the most important determinant of behavior is intention to perform the behavior. Correlations were used to help determine whether or not the variables related as hypothesized by the TPB and IBM.

Research Question 2

Regression analyses were conducted to determine if measures of the TPB constructs were related to intention toward and participation in leisure time physical activity among a sample of college students. Regression analyses were performed by Blanchard et al. (2008) and Okun et al. (2002) to examine the relationships between TPB variables and intention to participate in leisure time physical activity. This study used two different regression analyses to examine research question 2. First, logistic regression was used to examine the relationships between TPB constructs and whether participants had high or low intention to participate in leisure time physical activity. To create the categorical variable for intention, a sum of the subscales for intention was performed. The range for the sum of scores was 2 to 21. Therefore, scores that were equal to or less than 11 were coded as low intention and scores equal to 12 or higher were classified as high intention. The majority of the subjects ($n = 490$; 78.9%) were in the high intention category. Linear regression was used to examine the relationships between TPB constructs, including intention as an independent continuous variable, and leisure time physical activity.

Research Question 3

To determine if the IBM constructs of descriptive norm and self-efficacy explained additional variance in leisure time physical activity among the participants (i.e., Research Question #3), hierarchical linear regression analyses was performed. This analysis has previously been performed by Blanchard et al. (2008) and Okun et al. (2002) to determine which variables had significant unique contributions to intention and leisure time physical activity behaviors of the college students. Hierarchical regression was used to examine the independent relationships of sets of demographics, TPB constructs and specific IBM constructs with leisure time physical activity. For the purposes of this research, demographics, TPB constructs and finally the two IBM constructs; descriptive norm and self-efficacy, were entered in order for this analysis. The results of this analysis indicate which variables significantly contribute to the explained variance of leisure time physical activity behavior as they are added into the model. Furthermore, this analysis allowed for the examination of whether or not the addition of descriptive norm and self-efficacy explained any additional significant variance in leisure time physical activity behavior (Cohen, Cohen, West, & Aiken, 2003).

Research Question 4

To determine if there were gender related differences in the relationships of specific TPB/IBM constructs with leisure time physical activity (i.e., Research Question #4), several analyses were performed. Analysis of variance (ANOVA) and chi-square analyses were used to test for demographic differences among the gender groups. Pearson correlations were also conducted to help determine whether or not the variables related as hypothesized by the TPB/IBM among each gender. Similar methods were employed by Blanchard et al. (2008).

Specifically, TPB/IBM states that attitudes toward the behavior, subjective norm/perceived norm and perceived behavioral control/personal agency should be related to intention. Finally, linear regression analyses were conducted to determine if associations of TPB/IBM constructs with intention and leisure time physical activity behavior differed by genders. The TPB/IBM constructs intention and leisure time physical activity were all continuous variables in this analysis.

CHAPTER 4

RESULTS

Introduction

The purpose of this study was to examine the leisure time physical activity behavior of college students using the theory of planned behavior (TPB) and two constructs, descriptive norm and self-efficacy, from the integrated behavioral model (IBM). This study investigated leisure time physical activity behavior among a sample of college students ($n = 621$) from a large, public university in the southeastern United States. Data of interest was collected via a class-room based assessment battery. The assessment battery contained questions related to leisure time physical activity, TPB constructs and descriptive norm and self-efficacy constructs from the IBM.

Research Questions

In order to examine leisure time physical activity behavior of college students, the following research questions were examined:

1. Are the TPB constructs and IBM constructs, descriptive norm and self-efficacy, correlated with each other and with leisure time physical activity?
2. Are TPB constructs related with a) intention toward participation in leisure time physical activity and b) actual participation in leisure time physical activity among college students?

3. Does the addition of the IBM-specific constructs, descriptive norm and self-efficacy, explain additional variance in leisure time physical activity behavior of the participants?
4. Are there gender related differences in the relationships between the TPB constructs and IBM constructs, descriptive norm and self-efficacy, and leisure time physical activity?

Descriptive Statistics

The sample consisted of 621 undergraduate students enrolled in classes during the fall 2009 at a large, public university in the southeastern United States (see Table 2). The majority of the sample were female ($n = 421$; 67.8%). With regard to ethnicity, the sample was predominantly White ($n = 504$; 81.2%) or Black ($n = 91$; 14.7%). Only participants aged 18-24 years were included in the analyses. The mean (M) age was 20.18 with a standard deviation (SD) = 1.572. Just over a fifth of the sample reported being in their first year ($n = 130$; 20.9%), 25.9% in their second year ($n = 161$), 19.6% in their third year ($n = 122$) and 33.5% reported being in their fourth or fifth year. The majority ($n = 407$; 65.5%) reported that they were not affiliated with a Greek (fraternity or sorority) organization. For sports participation, the majority indicated they did not participate ($n = 376$; 60.5%) in Intramural and/or Club Sports. BMI, calculated from reported height and weight, had a mean of 23.51 ($SD = 4.189$). Grade point average was reported by 502 students; however, the assessment battery had a “not applicable” option for those in their first semester. The mean GPA for the 502 students who responded was 3.139 ($SD = 0.481$).

Table 2

*Demographics and Leisure Time Physical Activity Behavior of a Sample of College Students**

Characteristic	<i>n</i>	%	<i>M</i>	<i>SD</i>
Gender				
Male	200	32.2		
Female	421	67.8		
Age			20.18	1.57
BMI			23.51	4.19
GPA**			3.14	0.48
Year in School				
First Year	130	20.9		
Second Year	161	25.9		
Third Year	122	19.6		
Fourth Year	135	21.7		
Fifth Year	73	11.8		
Racial/Ethnic Group				
White	504	81.2		
Black	91	14.7		
Hispanic/Latino	5	0.8		
Asian/Pacific Islander	4	0.6		
American Indian/ Alaskan Native/ Native Hawaiian	1	0.2		
Biracial or Multiracial	15	2.4		
Other	1	0.2		
Greek Affiliation				
Yes	214	34.5		
No	407	65.5		
Sports Participation				
Club Sports	32	5.2		
Intramural Sports	192	30.9		
Club Sports and Intramural Sports	21	3.4		
None	376	60.5		
Residence				
Campus Residence Hall	168	27.1		
Fraternity or Sorority House	21	3.4		
Other College/University Housing	31	5.0		
Parent/Guardian's Home	23	3.7		
Other Off-Campus Housing	371	59.7		
Other	7	1.1		
Marital Status				
Single	594	95.7		
Married/Partnered	18	2.9		
Divorced	2	0.3		
Other	7	1.1		

Note. **n* = 621; ***n* = 502 (excludes those who answered "Not Applicable"), *n* = sample size, % = sample

percent, *M* = mean, *SD* = standard deviation, BMI= body mass index, GPA= grade point average

Theory of Planned Behavior (TPB)

Scores for attitude ranged from 1 to 7, with a mean (M) of 5.78 ($SD = 0.93$). Scores for subjective norm ranged from 1 to 7, with a mean (M) of 5.79 ($SD = 1.10$). The scores for perceived behavioral control ranged from 1.67 to 7.00, with a mean (M) of 5.79 ($SD = 1.04$). Intention scores ranged from 0.67 to 7.00, with a mean (M) of 4.76 ($SD = 1.30$).

Integrated Behavioral Mode (IBM)

Two constructs from the IBM were assessed in this research, descriptive norm and self-efficacy. The descriptive norm scores ranged from 1 to 7, with a mean (M) of 4.34 ($SD = 1.14$). Self-efficacy scores ranged from 5 to 35, with a mean (M) of 19.54 ($SD = 6.69$).

Leisure Time Physical Activity

Upon initial calculation, the scores for leisure time physical activity ranged from 0 to 340, with a mean (M) of 52.80 ($SD = 30.28$). However, due to several extremely high scores the process of Winsorizing was performed to correct for large errors or large abnormalities in the distribution (Kirk, 1995). In this sample, several leisure time physical activity scale scores ($n = 13$) were extremely high, and were therefore replaced with values based on the 98th percentile value (Kirk, 1995). After the process of Winsorizing, leisure time physical activity scores ranged from 0 to 116, with a mean (M) of 51.69 ($SD = 25.27$).

Research Question 1

1. Are the TPB constructs and IBM constructs, descriptive norm and self-efficacy, correlated with each other and with leisure time physical activity?

Pearson Product correlations were computed for the entire sample in regard to TPB constructs attitude, subjective norm, perceived behavioral control and intention; the IBM constructs descriptive norm and self-efficacy; and leisure time physical activity (see Table 3).

Table 3

Pearson Correlation Coefficients of TPB Constructs, Descriptive Norm, Self-Efficacy and Leisure Time Physical Activity of a Sample of College Students.

	Intention	Attitude	SJNorm	PBC	DSNorm	SEfficacy	LTPA
Intention	-						
Attitude	0.466**	-					
SJNorm	0.255**	0.204**	-				
PBC	0.526**	0.351**	0.217**	-			
DSNorm	0.365**	0.184**	0.272**	0.252**	-		
SEfficacy	0.681**	0.433**	0.185**	0.426**	0.316**	-	
LTPA	0.579**	0.340**	0.068	0.316**	0.284**	0.505**	-

Note. $n = 621$; TPB = theory of planned behavior, SJNorm= subjective norm, PBC= perceived behavioral control, DSNorm= descriptive norm, SEfficacy= self-efficacy, LTPA= leisure time physical activity

** p value < 0.01

All TPB/IBM constructs were significantly correlated ($p < 0.001$) with each other. In addition, with the exception of subjective norm ($r = 0.068$; $p = 0.089$) all TPB/IBM constructs were significantly correlated ($p < 0.001$) with leisure time physical activity. As hypothesized by the TPB, intention had the strongest correlation ($r = 0.579$) with leisure time physical activity behavior.

Research Question 2

2. Are TPB constructs related with a) intention toward participation in leisure time physical activity and b) actual participation in leisure time physical activity among college students?

In order to answer Research Question 2, analyses that examined the relationship between the TPB constructs, confounding variables and intention toward leisure time physical activity were performed. According to the TPB, intention toward the behavior is the strongest predictor of the behavior (Ajzen, 1991). Crosstabulations and chi-square tests were performed to determine significant relationships between potential confounding demographic variables and the dichotomized outcome of intention (high or low).

Crosstabulations: Intention (high or low) and Demographic Variables

Crosstabulations and chi-square analyses indicated that gender, ethnicity and sports participation were significantly related with intention (high) toward leisure time physical activity. Greek affiliation, marital status, year in school and residence were not significantly related with intention. In this sample ($n = 621$) of college students, there was a significant difference in intention among the three ethnicity categories ($\chi^2 = 12.686; p = 0.002$). Among White students and students self-selecting the “other” category, 81.3% and 80.8% were in the high intention category respectively. However, only 64.8% of Black students were in the high intention category. There was also a statistically significant relationship between gender and intention ($\chi^2 = 10.224; p = 0.001$), where 86.5% of the males and 75.3% of the females were in the high intention category. In addition, sports participation was significantly related with intention ($\chi^2 = 6.515; p = 0.011$), where 84.1% of those who participated in sports and 75.5% of

those who did not participate in sports were in the high intention category. However, Greek affiliation ($\chi^2 = 1.133$; $p = 0.287$), marital status ($\chi^2 = 1.235$; $p = 0.266$), residence ($\chi^2 = 0.822$; $p = 0.365$) and year in school ($\chi^2 = 5.516$; $p = 0.138$) were not significantly related with intention. All variables significantly associated with intention in bivariate analyses were included as potential confounding variables in a logistic regression model, along with TPB constructs attitude, subjective norm and perceived behavioral control, to examine their relationship with intention (high or low) toward leisure time physical activity.

Logistic Regression: Intention toward Leisure Time Physical Activity and TPB constructs

A logistic regression analysis was performed to determine the association between intention toward leisure time physical activity and attitude, subjective norm and perceived behavioral control. Intention as a categorical variable (high or low) was used as the dependent variable in this analysis. Results from the crosstabulations indicated that gender, ethnicity and sports participation were significantly associated as potentially confounding variables and therefore were included in the logistic regression analysis.

In this logistic regression model, attitude ($p < 0.001$), perceived behavioral control ($p < 0.001$) and ethnicity-black ($p = 0.020$) were significantly related with intention (high or low). Specifically, attitude and perceived behavioral control were positively related with intention and being Black was negatively related with intention (see Table 4). For every one unit increase in attitude score, the odds of being in the high intention category increased by 1.965 [CI (95%) = 1.534, 2.516]. Similarly, for every one unit increase in the perceived behavioral control score, the probability of being in the high intention category increased by 2.231 [CI (95%) = 1.780, 2.797]. However, Black students were significantly less likely to be in the high intention

category [CI (95%) = 0.281, 0.899] than the other ethnicity categories. The R^2 estimates in this model ranged from 0.216 (Cox and Snell) to 0.336 (Nagelkerke). The practical significance is that this model may predict anywhere from 21.6% to 33.6% of the variability in intention toward leisure time physical activity. The Hosmer and Lemeshow test ($X^2 = 9.198, p = 0.326$) indicated good model fit.

Table 4

Logistic Regression Model to Predict Probability of Intention toward Leisure Time Physical Activity among a Sample of College Students ($p < 0.001$).

	β	SE	Wald	df	p value	OR
Attitude	0.675	0.126	28.606	1	<0.001	1.965
SJNorm	0.198	0.101	3.820	1	0.051	1.219
PBC	0.803	0.115	48.449	1	<0.001	2.231
Gender- Male	0.504	0.288	3.054	1	0.081	1.655
Sports Participation- No	-0.148	0.266	0.311	1	0.577	0.862
Ethnicity- Other	-0.717	0.586	1.497	1	0.221	2.048
Ethnicity- Black	-0.689	0.297	5.382	1	0.020	0.502

Note. $n = 621$; β = standardized beta weight, SE = standard error, Wald = Wald statistic, df = degrees of freedom, OR = odds ratio, SJNorm = subjective norm, PBC = perceived behavioral control, Gender- female, Sports Participation- yes and Ethnicity- White are the reference categories.

Second, analyses were performed using intention as a continuous outcome variable.

One Way ANOVAs: Intention toward Leisure Time Physical Activity and Demographics

One way ANOVAs indicated that gender, ethnicity, marital status, Greek affiliation and sports participation were significantly associated with intention to engage in leisure time physical activity. However, place of residence and year in school were not significantly associated with intention. In this college sample, males ($M = 5.01$; $SD = 1.19$) had significantly higher intention scores ($F = 11.54$; $p = 0.001$) than female students ($M = 4.64$; $SD = 1.34$). The results for ethnicity showed a significant difference in intention scores ($F = 9.83$; $p < 0.001$). Post-hoc Tukey's Honestly Significant Difference (HSD) tests showed that the intention scores for the White students were significantly higher than the Black students at the 0.05 level of significance. Mean intention scores for the three ethnicity categories were, 4.87 for White students ($SD = 1.24$), 4.23 for Black students ($SD = 1.45$) and 4.52 for students who selected the "other" category ($SD = 1.49$).

Marital status was also significantly associated with intention scores ($F = 6.33$; $p = 0.012$). Single students had significantly higher intention scores ($M = 4.79$; $SD = 1.29$) than the students in the "other" category ($M = 4.14$; $SD = 1.52$). Finally, sports participation was significantly related to intention scores ($F = 15.58$; $p < 0.001$). Those who did participate in sports had statistically higher intention scores ($M = 5.01$; $SD = 1.27$) than the students who did not participate in sports ($M = 4.59$; $SD = 1.30$). There was a significant difference in intention scores ($F = 5.78$; $p = 0.017$) among the students affiliated with a Greek organization ($M = 4.93$; $SD = 1.25$) and those not affiliated with a Greek organization ($M = 4.67$; $SD = 1.32$).

However, there was not a significant difference among the intention scores ($F = 0.81$; $p = 0.370$) among the students who lived on-campus ($M = 4.82$; $SD = 1.24$) and those who lived off-campus ($M = 4.72$; $SD = 1.33$). There was also not a significant difference in intention scores ($F = 0.657$; $p = 0.579$) across different years in school; first year ($M = 4.79$; $SD = 1.26$), second year ($M = 4.86$; $SD = 1.20$), third year ($M = 4.67$; $SD = 1.37$) and fourth / fifth year ($M = 4.700$; $SD = 1.36$).

Multiple Linear Regression: Intention toward Leisure Time Physical Activity and TPB constructs

A multiple linear regression analysis was performed to determine the associations between intention toward leisure time physical activity and attitude, subjective norm and perceived behavioral control. For this analysis, intention as a continuous variable was used as the dependent variable. Results from the ANOVA analyses indicated that gender, ethnicity, marital status, Greek affiliation and sports participation were variables significantly associated with intention and therefore were included in the multiple linear regression analysis as potential confounding variables.

The multiple linear regression model examining correlates of intention to engage in leisure time physical activity included attitude, subjective norm, perceived behavioral control, gender, ethnicity, marital status, Greek affiliation and sports participation (see Table 5). Although all variables were included in the model, attitude ($p < 0.001$), subjective norm ($p = 0.001$), perceived behavioral control ($p < 0.001$), gender ($p = 0.030$) and Greek affiliation ($p = 0.002$) were the only significant variables in the model. The model was statistically significant ($p < 0.001$) and explained 40.0% of the variance in intention toward leisure time physical activity among this sample of college students. In general, results from this multiple regression analysis

indicate that male gender, being affiliated with a Greek organization, participating in sports, higher attitude scores, higher subjective norm and stronger perceived behavioral control were all positively associated with greater intention to engage in leisure time physical activity.

Table 5

Multiple Regression Model Examining Correlates of Intention to Engage in Leisure Time Physical Activity among a Sample of College Students ($R^2 = 0.400, p < 0.001$).

	β	<i>p</i> value	<i>t</i> value	Range	<i>M</i> / %	<i>SD</i>
Attitude	0.408	< 0.001	8.50	1.00 – 7.00	5.78	0.93
SJNorm	0.132	0.001	3.35	1.00 – 7.00	5.79	1.10
PBC	0.481	< 0.001	11.29	1.67 – 7.00	5.79	1.04
Gender	-0.212	0.030	-2.18		M: 32.2% F: 67.8%	
Ethnicity	-0.105	0.204	-1.27		W: 81.2% B: 14.7% O: 4.2%	
Marital Status	-0.102	0.615	-0.50		S: 95.7% O: 4.3%	
Greek Affiliation	0.283	0.002	3.18		Y: 34.5% N: 60.5%	
Sports Participation	0.092	0.320	0.99		Y: 39.5% N: 60.5%	

Note. $n = 621$; β = standardized beta weight, *M* = mean, % = sample percent, *SD* = standard

deviation, M = male, F = female, W = white, B = black, O = other, S = single, Y = yes, N = no,

SJNorm = subjective norm, PBC = perceived behavioral control.

Next, analyses were performed using leisure time physical activity as a continuous outcome variable.

One Way ANOVAs: Leisure Time Physical Activity and Demographics

One way ANOVAs indicated that gender, ethnicity and sports participation were significantly associated with leisure time physical activity. Greek affiliation, year in school, marital status and place of residence were not significantly associated with leisure time physical activity. In this college sample, males ($M = 57.26$; $SD = 25.92$) had significantly higher leisure time physical activity scores ($F = 14.63$; $p < 0.001$) than female students ($M = 49.05$; $SD = 24.54$). The results for ethnicity showed a significant difference in leisure time physical activity scores ($F = 9.69$; $p < 0.001$). Post-hoc Tukey's HSD tests showed that the leisure time physical activity scores for White students were significantly higher than Black students ($p < 0.05$). Mean leisure time physical activity scores for the three ethnicity categories were 53.68 for White students ($SD = 24.54$), 41.22 for Black student ($SD = 26.98$) and 51.69 for students selecting the "other" category ($SD = 25.27$). Finally, sports participation was significantly related to leisure time physical activity scores ($F = 20.86$; $p < 0.001$). Those who did participate in sports had higher leisure time physical activity scores ($M = 57.34$; $SD = 24.64$) than the students who did not participate in sports ($M = 48.01$; $SD = 25.03$).

There was not a significant difference in leisure time physical activity scores ($F = 0.466$; $p = 0.495$) among the students affiliated with a Greek organization ($M = 52.65$; $SD = 24.03$) and those not affiliated with a Greek organization ($M = 51.19$; $SD = 25.91$). There was not a significant difference in leisure time physical activity scores ($F = 0.567$; $p = 0.452$) among single students ($M = 51.86$; $SD = 24.88$) and students in the "other" category ($M = 48.11$; $SD = 33.02$).

There was not a significant difference for leisure time physical activity scores ($F = 0.082$; $p = 0.775$) among students who lived on-campus ($M = 52.09$; $SD = 25.00$) and those who lived off-campus ($M = 51.48$; $SD = 25.44$). There was also not a significant difference in leisure time physical activity scores ($F = 1.766$; $p = 0.152$) among the different years in school; first year ($M = 54.03$; $SD = 25.10$), second year ($M = 53.53$; $SD = 26.27$), third year ($M = 47.59$; $SD = 27.01$) and fourth / fifth year ($M = 51.20$; $SD = 23.32$).

Multiple Linear Regression: Leisure Time Physical Activity and TPB constructs

A multiple linear regression analysis was conducted to determine the association between leisure time physical activity and TPB constructs; attitude, subjective norm, perceived behavioral control and intention (see Table 6). For this analysis, leisure time physical activity was the dependent variable. Results from the ANOVAs indicated that gender, ethnicity and sports participation were significantly associated with intention and therefore were included in the multiple linear regression analysis as potential confounding variables.

The multiple linear regression model examining correlates of leisure time physical activity included attitude, subjective norm, perceived behavioral control, intention, gender, ethnicity and sports participation. Although all variables were included in the model, only attitude ($p = 0.020$), subjective norm ($p = 0.011$) and intention ($p < 0.001$) were significantly related to leisure time physical activity in the model. The model was statistically significant ($p < 0.001$) and explained 35.8% of the variance in leisure time physical activity among the sample of college students. In general, results from this multiple regression analysis indicate that higher attitude and higher intention were positively associated with greater leisure time physical activity. Subjective norm was negatively associated with leisure time physical activity among

this sample of college students, whereas having a lower subjective norm score was associated with a higher level of leisure time physical activity.

Table 6

Multiple Regression Model Examining Correlates of Leisure Time Physical Activity among a Sample of College Students ($R^2 = 0.358, p < 0.001$).

	β	p value	t value	Range	$M / \%$	SD
Attitude	2.368	0.020	2.34	1.00 – 7.00	5.78	0.93
SJNorm	-2.026	0.011	-2.55	1.00 – 7.00	5.79	1.10
PBC	0.293	0.754	0.31	1.67 – 7.00	5.79	1.04
Intention	10.364	< 0.001	12.89	0.67 – 7.00	4.76	1.30
Gender	-1.517	0.433	-0.79		M: 32.2% F: 67.8%	
Ethnicity	-2.129	0.193	-1.30		W: 81.2% B: 14.7% O: 4.2%	
Sports Participation	3.360	0.068	1.830		Y: 39.5% N: 60.5%	

Note. $n = 621$; β = standardized beta weight, M = mean, % = sample percent, SD = standard

deviation, M = male, F = female, W = white, B = black, O = other, Y = yes, N = no, SJNorm= subjective norm, PBC= perceived behavioral control.

Research Question 3

- Does the addition of the IBM-specific constructs, descriptive norm and self-efficacy, explain additional variance in leisure time physical activity behavior of the participants?

In order to answer Research Question 3, a hierarchical regression analysis was conducted to examine the independent relationships of the (a) demographic variables, (b) BMI, (c) TPB constructs and (d) the IBM constructs of descriptive norm and self-efficacy with leisure time physical activity behavior (see Table 7). Each of these sets of variables was entered, in order, into a multiple linear regression model. The results of the model showed changes in the amount of explained variance of leisure time physical activity with the addition of each set of variables (Cohen, Cohen, West, & Aiken, 2003).

The demographic variables (step 1: gender, ethnicity, age, year in school, marital status, residence, Greek affiliation and sports participation) explained 6.3% [$F(8,612) = 5.154; p < 0.001$] of the variance in leisure time physical activity among this sample of college students. In this model, gender ($p = 0.049$), age ($p = 0.033$), year in school ($p = 0.010$), ethnicity ($p = 0.014$) and sports participation ($p = 0.002$) were associated with leisure time physical activity. The second model included these demographic variables and BMI. This model explained 6.8% [$F(9,611) = 4.920; p < 0.001$] of the variance in leisure time physical activity among the college students. The additional 0.5% of variance explained in the second model from the first model was not statistically significant. In this model, gender ($p = 0.021$), age ($p = 0.026$), year in school ($p = 0.011$), ethnicity ($p = 0.031$) and sports participation ($p = 0.002$) were associated with leisure time physical activity. The third model added TPB constructs (attitude, subjective norm, perceived behavioral control and intention) to the demographic variables and BMI. This third model explained 36.5% [$F(13,607) = 26.800; p < 0.001$] of the variance in leisure time physical activity for the sample of college students. The additional 29.7% of variance explained in the third model from the second model was statistically significant ($p < 0.01$). In this model, sports participation ($p = 0.044$), attitude ($p = 0.029$), subjective norm ($p = 0.023$) and intention (p

< 0.001) were associated with leisure time physical activity. The last model added the IBM constructs descriptive norm and self-efficacy to the demographic variables, BMI and the TPB constructs. The final hierarchical regression model explained 38.7% [$F(15,605) = 25.494$; $p < 0.001$] of the variance in leisure time physical activity among this sample of college students. The 2.2% of additional variance explained by the IBM constructs descriptive norm and self-efficacy was also statistically significant ($p < 0.01$). In this model, lower subjective norm ($p = 0.005$), higher intention ($p < 0.001$), higher descriptive norm ($p = 0.008$) and higher self-efficacy ($p < 0.001$) were associated with increased leisure time physical activity.

Table 7

β Weights at Each Step in Hierarchical Regression for Leisure Time Physical Activity among a Sample of College Students. ($p < 0.001$)

	<u>Model 1</u>		<u>Model 2</u>		<u>Model 3</u>		<u>Model 4</u>	
	β	<i>t</i> value						
Gender	-4.612	-1.97**	-5.548	-2.31**	-1.343	-0.66	-1.057	-0.53
Age	2.819	2.14**	2.933	2.23**	1.520	1.39	1.501	1.39
Ethnicity	-4.929	-2.47**	-4.374	-2.17**	-1.992	-1.18	-1.723	-1.03
Yr. School	-4.767	-2.60**	-4.680	-2.55**	-2.881	-1.89	-2.933	-1.95
Greek Aff.	0.242	0.11	-0.050	-0.02	-1.608	-0.88	-1.995	-1.10
Marital	-3.856	-0.78	-3.894	-0.79	3.356	0.82	2.537	0.63
Residence	1.225	0.49	0.982	0.39	1.106	0.53	1.725	0.84
Sports	6.973	3.13**	6.798	3.05**	3.749	2.02**	2.864	1.56
BMI			-0.428	-1.71	-0.152	-0.73	-0.102	-0.49
Attitude					2.241	2.20**	1.695	1.67
SJNorm					-1.838	-2.28**	-2.251	-2.80**
PBC					0.318	0.34	-0.152	-0.16
Intention					10.353	12.73***	8.078	8.51***
DSNorm							2.121	2.64**
SEfficacy							0.617	3.61***
Intercept	13.235		22.728		-24.845		-26.885	
Increment increase in R^2			0.005		0.297*		0.022*	

Note. $n = 621$; β = standardized beta weight, BMI = Body Mass Index, SJNorm = subjective norm, PBC = perceived behavioral control, DSNorm = descriptive norm, SEfficacy = self-efficacy.

* $p \leq 0.01$; ** $p \leq 0.05$; *** $p \leq 0.001$.

Research Question 4

4. Are there gender related differences in the relationships between the TPB constructs and IBM constructs, descriptive norm and self-efficacy, and leisure time physical activity?

Pearson correlations by gender were performed with regard to the TPB and IBM constructs, descriptive norm and self-efficacy, and leisure time physical activity (see Table 8). For males ($n = 200$), the constructs attitude, perceived behavioral control, intention, descriptive norm and self-efficacy were correlated with leisure time physical activity ($p < 0.001$). However, subjective norm was not correlated with leisure time physical activity for males ($r = -0.048$; $p = 0.496$). Intention ($r = 0.459$; $p < 0.001$) had the strongest correlation with leisure time physical activity followed by self-efficacy ($r = 0.400$; $p < 0.001$). Attitude and descriptive norm ($r = 0.190$; $p < 0.001$) were the next strongest correlates of leisure time physical activity. Perceived behavioral control was the least significant correlate of leisure time physical activity among the constructs ($r = 0.185$; $p < 0.001$). For the males self-efficacy ($r = 0.699$; $p < 0.001$) was the strongest correlate for intention, followed by attitude ($r = 0.523$; $p < 0.001$).

For females ($n = 421$), all of the constructs; attitude, subjective norm, perceived behavioral control, intention, descriptive norm and self-efficacy; were correlated with leisure time physical activity ($p < 0.001$; see Table 9). Intention ($r = 0.622$; $p < 0.001$) had the strongest correlation with leisure time physical activity, followed by self-efficacy ($r = 0.535$; $p < 0.001$). attitude ($r = 0.389$; $p < 0.001$), perceived behavioral control ($r = 0.373$; $p < 0.001$) and descriptive norm ($r = 0.340$; $p < 0.001$) were the next strongest correlates of leisure time physical activity. Subjective norm was the least significant correlate of leisure time physical activity among the constructs ($r = 0.152$; $p < 0.001$). For females, self-efficacy ($r = 0.664$; $p < 0.001$)

was the strongest correlate for intention, followed by perceived behavioral control ($r = 0.562$; $p < 0.001$).

Table 8

Pearson Correlation Coefficients of TPB Constructs, Descriptive Norm, Self-Efficacy and Leisure Time Physical Activity of a Sample of Male College Students.

	Intention	Attitude	SJNorm	PBC	DSNorm	SEfficacy	LTPA
Intention	-						
Attitude	0.523**	-					
SJ Norm	0.198**	0.218**	-				
PBC	0.429**	0.291**	0.207**	-			
DSNorm	0.228**	0.093	0.154*	0.087	-		
SEfficacy	0.699**	0.447**	0.176*	0.401**	0.228**	-	
LTPA	0.459**	0.190**	-0.048	0.185**	0.190**	0.400**	-

Note. $n = 200$; TPB = theory of planned behavior, SJNorm = subjective norm, PBC = perceived behavioral control, DSNorm = descriptive norm, SEfficacy = self-efficacy, LTPA = leisure time physical activity.

** p value < 0.01 , * p value < 0.05

Table 9

Pearson Correlation Coefficients of TPB Constructs, Descriptive Norm, Self-Efficacy and Leisure Time Physical Activity of a Sample of Female College Students

	Intention	Attitude	SJNorm	PBC	DSNorm	SEfficacy	LTPA
Intention	-						
Attitude	0.431**	-					
SJ Norm	0.307**	0.228**	-				
PBC	0.562**	0.368**	0.241**	-			
DSNorm	0.427**	0.226**	0.310**	0.327**	-		
SEfficacy	0.664**	0.408**	0.232**	0.430**	0.370**	-	
LTPA	0.622**	0.389**	0.152**	0.373**	0.340**	0.535**	-

Note. $n = 421$; TPB = theory of planned behavior, SJNorm = subjective norm, PBC = perceived behavioral control, DSNorm = descriptive norm, SEfficacy = self-efficacy, LTPA = leisure time physical activity.

** p value < 0.01 .

Crosstabulations: Gender and Demographic Variables

Crosstabulation and chi-square analyses indicated significant differences in year in school ($X^2 = 11.910$; $p = 0.008$), Greek affiliation ($X^2 = 6.329$; $p = 0.012$) and sports participation ($X^2 = 93.720$; $p < 0.001$) based on gender. In this sample of college students, of the first year students, 26.0% were male and 18.5% were female, the second year students were 18.0% male and 30.0% female, the third year students were 19.0% male and 19.9% female and finally the fourth and fifth year students were 37% male and 31.8% female. Only 27.5% of the males were affiliated with a Greek organization and 37.8% of the females were affiliated with a Greek organization. For sports participation, 67% of the males participated in sports, while only 26.4% of the female

students participated in sports. Chi-square results for ethnicity ($X^2 = 3.248$; $p = 0.197$), marital status ($X^2 = 0.016$; $p = 0.898$) and residence ($X^2 = 0.149$; $p = 0.700$) did not differ by gender.

One Way ANOVAs: Age, BMI, TPB/IBM constructs and Leisure Time Physical Activity by Gender

One way ANOVAs indicated that gender was significantly related to BMI, attitude, subjective norm, intention, self-efficacy and leisure time physical activity. However, gender was not related with age ($F = 2.622$; $p = 0.106$), descriptive norm ($F = 0.902$; $p = 0.343$) or perceived behavioral control ($F = 3.705$; $p = 0.055$). In this college sample, males had significantly higher ($F = 34.52$; $p < 0.001$) BMI scores ($M = 24.92$; $SD = 4.03$) than the female students ($M = 22.84$; $SD = 4.10$). In addition, males had significantly higher ($F = 11.183$; $p = 0.001$) attitude scores ($M = 5.99$; $SD = 0.86$) than the female students ($M = 5.69$; $SD = 0.95$). Males had significantly lower ($F = 10.679$; $p = 0.001$) subjective norm scores ($M = 5.58$; $SD = 1.00$) than the females ($M = 5.89$; $SD = 1.13$). Intention scores were also significantly different ($F = 11.544$; $p = 0.001$) between the males ($M = 5.01$; $SD = 1.19$) and females ($M = 4.64$; $SD = 1.34$). Males had significantly higher ($F = 23.649$; $p < 0.001$) self-efficacy scores ($M = 21.40$; $SD = 6.46$) than the female students ($M = 18.66$; $SD = 6.63$). In addition, there was a significant difference in reported leisure time physical activity ($F = 14.627$; $p < 0.001$) between males ($M = 57.26$; $SD = 25.92$) and females ($M = 49.05$; $SD = 24.54$).

Multiple Linear Regression: Leisure Time Physical Activity and TPB/IBM constructs by Gender

A multiple linear regression analysis was conducted to determine the association between leisure time physical activity and attitude, subjective norm, perceived behavioral control, intention, descriptive norm and self-efficacy by gender. For this analysis, leisure time physical

activity as a continuous variable was used as the dependent variable. Results from the chi-squares and ANOVAs indicated that year in school, Greek affiliation, sports participation and BMI were significantly associated with leisure time physical activity and therefore were included in the multiple linear regression analysis as potential confounding variables.

The multiple linear regression model examining correlates of leisure time physical activity by gender included attitude, subjective norm, perceived behavioral control, intention, descriptive norm, self-efficacy, BMI, year in school, Greek affiliation and sports participation (see Table 10). For male students, the model was significant ($F= 6.858$; $p < 0.001$) and explained 26.7% of the variance in leisure time physical activity. Significant correlates of leisure time physical activity for male students were subjective norm ($p = 0.020$) and intention ($p < 0.001$). Specifically, for male students, the lower one's subjective norm score and the higher one's intention score, the more likely they were to participate in leisure time physical activity. No other variables were significant in this model.

For female students, the model was also significant ($F = 32.880$; $p < 0.001$) and explained 44.5% of the variance in leisure time physical activity. For female students, attitude ($p = 0.008$), intention ($p < 0.001$) and self-efficacy ($p = 0.001$) were significantly related with greater participation in leisure time physical activity. Specifically, the higher a female student's attitude, intention and self-efficacy scores the more likely she was to participate in leisure time physical activity. No other variables were significant in this model.

Table 10

Multiple Regression Model Examining Correlates of Leisure Time Physical Activity among a Sample of College Students by Gender (Males; $R^2 = 0.267$, $p < 0.001$, Females; $R^2 = 0.445$, $p < 0.001$).

	β	p value	t value	Range	$M / \%$	SD
Attitude	M: -1.502	-0.651	0.53	2.00 – 7.00	5.96	0.86
	F: 2.910	0.008	2.66	1.00 – 7.00	5.69	0.95
SJNorm	M: -3.975	0.020	-2.34	1.00 – 7.00	5.58	1.00
	F: -1.261	0.155	-1.42	1.00 – 7.00	5.89	1.13
PBC	M: -0.366	0.835	-0.21	2.00 – 7.00	5.91	1.05
	F: -0.080	0.941	-0.07	1.67 – 7.00	5.74	1.04
Intention	M: 8.296	< 0.001	4.01	1.33 – 7.00	5.01	1.19
	F: 7.990	< 0.001	7.67	0.67 – 7.00	4.64	1.34
DSNorm	M: 2.469	0.142	1.47	1.00 – 7.00	4.27	1.02
	F: 1.474	0.098	1.66	1.00 – 7.00	4.37	1.20
SEfficacy	M: 0.592	0.105	1.63	5.00 – 35.00	21.40	6.46
	F: 0.630	0.001	3.35	5.00 – 35.00	18.66	6.63
BMI	M: 0.447	0.280	1.08	16.04 – 44.91	24.92	4.03
	F: -0.451	0.054	-1.94	16.13 – 45.72	22.84	4.10
Participates in Sports	M: 1.003	0.784	0.28		67.0%	
	F: 4.002	0.057	1.91		26.4%	
School	M: -1.359	0.324	-0.99			
	F: -0.329	0.693	-0.40			
Greek Affiliated	M: -3.410	-0.898	0.37		27.5%	
	F: -1.698	-0.858	0.39		37.8%	

Note. M = Males: $n = 200$; F = Females: $n = 421$; β = standardized beta weight, M = mean, % = sample percent, SD = standard deviation, SJNorm = subjective norm, PBC = perceived behavioral control, DSNorm = descriptive norm, SEfficacy = self-efficacy, BMI = body mass index.

CHAPTER 5

DISCUSSION

Introduction

The purpose of this study was to examine the leisure time physical activity behavior of college students using the theory of planned behavior (TPB) and two constructs, descriptive norm and self-efficacy, from the integrated behavioral model (IBM). This included a sample of college students ($n = 621$) from a large, public university in the southeastern United States. Data of interest was collected via a class-room based assessment battery. The assessment battery contained questions related to leisure time physical activity, TPB constructs and descriptive norm and self-efficacy constructs from the IBM.

The central factor of the TPB is the person's intention to engage in a particular behavior (Ajzen, 1991). Furthermore, the TPB posits that intention is a function of three determinants; attitude, subjective norm and perceived behavioral control. The more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the more likely intention to perform the behavior will be stronger (Ajzen & Driver, 1992). As a general rule, stronger intention to engage in a behavior should increase the likelihood of performance (Ajzen, 1991). The IBM includes constructs from the TPB and other influential frameworks to provide a theoretical basis from which to understand behavior and identify specific beliefs to target in intervention strategies (Montano & Kasprzyk, 2008). Specific to this research, the IBM identifies descriptive norm and self-efficacy as additional constructs that

influence one's behavior. Descriptive norm includes perceptions about what others in one's social or personal networks are doing regarding a specific behavior (Montano & Kasprzyk, 2008), while self-efficacy is described by Bandura (1986) as one's degree of confidence in the ability to perform a behavior in the face of various obstacles or challenges (Bandura, 1986).

Research Questions

In order to examine leisure time physical activity behavior of college students, the following research questions were examined:

1. Are the TPB constructs and IBM constructs, descriptive norm and self-efficacy, correlated with each other and with leisure time physical activity?
2. Are TPB constructs related with a) intention toward participation in leisure time physical activity and b) actual participation in leisure time physical activity among college students?
3. Does the addition of the IBM-specific constructs, descriptive norm and self-efficacy, explain additional variance in leisure time physical activity behavior of the participants?
4. Are there gender related differences in the relationships between the TPB constructs and IBM constructs, descriptive norm and self-efficacy, and leisure time physical activity?

Discussion

Research Question 1: Are the TPB constructs and IBM constructs, descriptive norm and self-efficacy, correlated with each other and with leisure time physical activity?

The TPB constructs and IBM constructs, descriptive norm and self-efficacy, were generally correlated with each other as postulated by the theories. For the TPB, approving attitudes, stronger subjective norms and greater perceived control for leisure time physical activity were positively correlated with intention to perform leisure time physical activity. In addition, stronger descriptive norm and greater self-efficacy for leisure time physical activity were positively correlated with intentions to perform leisure time physical activity. In looking at correlations with leisure time physical activity behavior, intention had the strongest relationship, followed by self-efficacy, attitude, perceived behavioral control and descriptive norm. However, subjective norm was not significantly related with leisure time physical activity.

Previous applications of the TPB have used the construct of perceived behavioral control to capture self-efficacy (Ajzen, 1991). Whereas, the IBM uses the concept of personal agency made up of perceived behavioral control and self-efficacy as individual constructs (Montano & Kasprzyk, 2008). Studies incorporating self-efficacy and perceived behavioral control often find that they make independent contributions to the prediction of intentions and behavior (Biddle & Mutrie, 2008). In the present study, the correlation between perceived behavioral control and self-efficacy was significant, but substantially less than 1.0 ($r = 0.426$). Self-efficacy had a stronger correlation with intention to perform leisure time physical activity ($r = 0.681$) than perceived behavioral control ($r = 0.526$). In addition, self-efficacy had a stronger correlation with leisure time physical activity behavior ($r = 0.505$) than perceived behavioral control ($r = 0.316$). The findings of this study support previous research suggesting that self-efficacy and perceived behavioral control make independent contributions to intention and behavior.

Additionally, the IBM identifies perceived norm by capturing both injunctive and descriptive norms. Both of these constructs were correlated with intention to perform leisure

time physical activity. However, subjective norm was not significantly correlated with leisure time physical activity behavior. The results that subjective norm was related to intention but not to leisure time physical activity behavior has been previously reported (Bozionelos & Bennett, 1999). This finding supports the tenets of the TPB, where attitudes and subjective norm are hypothesized to influence behavior through intentions (Rhodes & Courneya, 2005). In addition, the finding that descriptive norm was related to intention and leisure time physical activity behavior is similar to previous research (Okun, Karoly, & Lutz, 2002; Okun et al., 2003). More specifically, Okun et al. (2002) measured family injunctive norm, friend injunctive norm, family descriptive norm and friend descriptive norm independently and all were significantly correlated with intention and all except family injunctive norm were related to leisure time physical activity behavior.

The present study did not differentiate between family and friend norms. Two items from Okun et al. (2002) were used to capture descriptive norm. Internal consistency for these two items was not previously reported. Reliability tests for the present study were performed and the descriptive norm scale had an internal consistency (Cronbach's alpha) of $\alpha = 0.53$. Nunnally (1978) has indicated 0.70 to be an acceptable reliability coefficient, but lower thresholds are sometimes used in the literature (Nunnally, 1978). However, the results of this research support the concept that subjective (injunctive) and descriptive norms should be measured independently. Future research should measure family and friend, subjective (injunctive) and descriptive norms, ensuring acceptable levels of reliability coefficients, independently in order to gain a better understanding of the effects of norms on intentions to perform leisure time physical activity and on leisure time physical activity behavior among college students. Having a clearer understanding of the influence of family and friends on

college students' leisure time physical activity behaviors will assist health educators and other professionals create appropriate interventions and educational materials.

Research Question 2: Are TPB constructs related with a) intention toward participation in leisure time physical activity and b) actual participation in leisure time physical activity among college students?

Gender, ethnicity, Greek affiliation and sports participation were associated with the outcome variable intention to engage in leisure time physical activity. Males in this sample were statistically more likely to intend to participate in leisure time physical activity than the female students. These findings for gender are consistent with other research that has reported higher intention for leisure time physical activity among male students (Blanchard et al., 2008). As mentioned in the previous section, the results of this study supported the hypotheses of the TPB, in that intention had the strongest correlation with leisure time physical activity behavior. Data from the 2007 BRFSS indicated that males (50.7%) participate in leisure time physical activity at a higher rate than females (47.0%; (CDC, 2007a). For college students, the findings are similar; males are more likely to participate in leisure time physical activity than female students (American College Health Association, 2009b). It is important to understand if there are gender differences from a practical standpoint. Practitioners can use this information in their strategies to increase the number of college students participating in leisure time physical activity. Knowing that females have lower intention scores and are less likely to participate in leisure time physical activity indicates that female students may need more direct efforts to get them to be active.

White students had significantly higher intention scores than Black students. Ethnic differences are also supported by the 2007 BRFSS data where 51.8% of Whites and 41.3% of

Blacks engaged in leisure time physical activity five or more days a week (CDC, 2007a). The reasons for racial/ethnic differences in leisure time inactivity remain unclear; in some cases, cultural attitudes about desirable healthy weight may influence physical activity behavior (Crespo, Smit, Carter-Pokras, & Andersen, 2001). Relationships among race/ethnicity, social class, physical activity and disease are complex, but it has been hypothesized that social class may moderate the relationship between race/ethnicity and physical activity (Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2000). It is important for practitioners to recognize potential ethnicity differences of college students in regards to leisure time physical activity intentions and behaviors and use the information from previous research. This will allow practitioners to identify better strategies for increasing the leisure time physical activity behaviors of all college students.

Those who participated in sports had higher intention for leisure time physical activity than those who did not participate in sports. It is logical that students who participate in club sports and/or intramural sports at college would have greater intentions to participate in leisure time physical activity. This group of students is easy for campus recreational professionals to target with efforts to address the importance of meeting guidelines for leisure time physical activity behavior. Finally, students who were affiliated with a Greek organization had higher intention scores for leisure time physical activity than the students who were not affiliated with a Greek organization. This finding is different than previous research which found no difference in physical activity behaviors between students associated with a Greek organization and those who were not (Scott-Sheldon, Carey, & Carey, 2008). Future research may be warranted to determine if Greek affiliation matters in the leisure time physical activity intentions of college students. Regardless of the relationship, on a college campus Greek affiliated students are

another group that would be simple for a health educator or other campus professional to target in an attempt to increase the participation in leisure time physical activity. The findings of this research, indicating higher intention scores for participation in leisure time physical activity, provide practitioners with a good starting point for developing interventions based on demographic characteristics.

The multiple linear regression model examining intention toward leisure time physical activity behavior using the TPB constructs indicated that attitude, subjective norm and perceived behavioral control were all significant positive correlates of intention to do the behavior. More specifically, a more favorable attitude, stronger subjective norms and higher perceived behavioral control were all associated with greater intention to perform leisure time physical activity. This finding provides support for the utility of the TPB in investigating intention to engage in leisure time physical activity among a sample of college students. These findings were consistent with those of other research (Ajzen & Driver, 1992; Latimer & Martin Ginis, 2005), where the TPB was used to examine intention toward physical activity. Ajzen and Driver (1992) used the TPB to predict leisure intentions and behaviors and found that attitude, subjective norm and perceived behavioral control were all significant predictors of intention toward jogging behavior. Likewise, the study by Latimer and Martin Ginis (2005) found that attitude, subjective norm and perceived behavioral control were each unique predictors of intention toward physical activity.

The multiple linear regression model predicting leisure time physical activity behavior using the TPB constructs indicated that attitude toward the behavior and intention were positively associated with leisure time physical activity, whereas subjective norm was negatively associated with leisure time physical activity. In other words, a more favorable attitude, greater

intention and lower subjective norm resulted in greater leisure time physical activity engagement. The significant relationship of subjective norm with behavior was an interesting finding. The TPB postulates that subjective norm influences behavior through intentions (Rhodes & Courneya, 2005). In previous research, subjective norm has not been a significant predictor of leisure time physical activity (Okun, Karoly, & Lutz, 2002; Okun et al., 2003). However, a similar result in which subjective norm was a significant predictor of leisure time physical activity was found among a sample of employees at a higher education college in England (C. Jackson, Smith, & Conner, 2003). The association between subjective norm and leisure time physical activity found by Jackson, et al. (2003) was also a negative relationship. The negative relationship between subjective norm and leisure time physical activity may indicate that the students are choosing to be active, even if others do not support or approve of this behavior.

The finding that perceived behavioral control was not associated with leisure time physical activity among a sample of college students is different than previous research, in which perceived behavioral control was a significant predictor of leisure time physical activity (Ajzen & Driver, 1992; Bryan & Rocheleau, 2002; Okun, Karoly, & Lutz, 2002; Okun et al., 2003). Ajzen and Driver (1992) found that intentions and perceived behavioral control made significant contributions to the prediction of the behavior while attitudes and subjective norm had no direct effects on behavior. Bryan and Rocheleau (2002) found that perceived behavioral control had a significant direct effect on the behaviors; aerobic activity and resistance training, among a group of college students. In two other studies of college students and leisure time physical activity (Okun, Karoly, & Lutz, 2002; Okun et al., 2003), perceived behavioral control and intention were significant predictors of behavior. However, other research has been conducted in which

perceived behavioral control did not emerge as a significant predictor of physical activity behavior (Bozionelos & Bennett, 1999; Latimer & Martin Ginis, 2005). In addition, Blanchard et al. (2008) found that perceived behavioral control was a significant predictor of leisure time physical activity among Black college students, but it was not significant among the White students. In this research, attitude ($r = 0.340$) and intention ($r = 0.579$) had stronger correlations with leisure time physical activity than perceived behavioral control ($r = 0.316$). The present findings could be explained by the theory itself, that intention is the strongest predictor of physical activity when individuals perceive the behavior to be under their volitional control (Ajzen, 1991). This study investigated leisure time physical activity, which by definition, indicates the students choose to participate in the activity. Therefore, suggesting that participation in the behavior is under their volitional control. These discrepancies in the significance of perceived behavioral control in relation to leisure time physical activity behavior warrant additional research. Some researchers suggest exploring alternate measures of perceived behavioral control, including incorporating self-efficacy. (Latimer & Martin Ginis, 2005).

Research Question 3: Does the addition of the IBM-specific constructs, descriptive norm and self-efficacy, explain additional variance in leisure time physical activity behavior of the participants?

In order to determine if the addition of descriptive norm and self-efficacy from the IBM explained any additional variance in leisure time physical activity, a hierarchical regression was conducted. This type of analysis has been used in previous research (Blanchard et al., 2008; Blanchard et al., 2003; Okun, Karoly, & Lutz, 2002; Okun et al., 2003). In the current hierarchical regression procedure, four sets of variables were entered into the model: (1) demographics, (2) BMI, (3) TPB constructs and (4) descriptive norm and self-efficacy from the

IBM. The results of the third step, which included the demographic variables, BMI and TPB constructs, indicated that students who participated in sports, had a favorable attitude, had lower subjective norm and higher intention were more likely to participate in leisure time physical activity. The third model explained 36.5% of the variance in leisure time physical activity.

The fourth step, which included demographics, BMI, TPB constructs and descriptive norm and self-efficacy from the IBM, resulted in four variables being significantly associated with leisure time physical activity. The findings for this model indicated that subjective norm was negatively associated with leisure time physical activity, suggesting that the students with lower subjective norm were more likely to participate in leisure time physical activity. In addition, intention, descriptive norm and self-efficacy were all positively associated with leisure time physical activity. This model explained 38.7% of the variance in leisure time physical activity among the college students. The additional variance explained by the two IBM constructs descriptive norm and self-efficacy was statistically significant. The findings of the hierarchical regression support the utility of the IBM in leisure time physical activity research. The IBM has not been used previously with this particular behavior. The significant additional variance explained by descriptive norm and self-efficacy, above the amount explained by the TPB variables, supports the concept that each construct has measurement distinctness. Additional research needs to be conducted using the IBM as a theoretical framework with leisure time physical activity among college students to confirm these findings.

The results of the hierarchical regression indicate that both subjective norm and descriptive norm are significantly associated with participation in leisure time physical activity among the college students. Similar support was noted by Rhodes and Courneya (2003a), who suggest that both injunctive norm and descriptive norm can be modeled together to represent

subjective norm and that both injunctive norm and descriptive norm represent significant components of overall perceived social pressure. Okun et al. (2002) found that friend injunctive norms did not predict leisure time physical activity, but friend descriptive norms did. With respect to leisure time physical activity, what your friends approve of appears to be much less important than what they actually do (Okun, Karoly, & Lutz, 2002). Similar findings from Okun et al. (2003) suggest that friend descriptive norm is a strong predictor of leisure time physical activity among college students, but family descriptive norm is not. The social influence of peers may exceed the social influence of parents in the physical activity domain (Okun et al., 2003). As noted previously in this chapter, future research should address family and friend influences on both injunctive and descriptive norms to capture a clearer picture of the social influences on college students' decisions to engage in leisure time physical activity.

Interestingly, in the present study, subjective (injunctive) norm was negatively associated with leisure time physical activity and descriptive norm was positively associated with leisure time physical activity. The significant relationship between subjective norm and leisure time physical activity found by Jackson and colleagues was also a negative relationship (C. Jackson, Smith, & Conner, 2003). The results of this study of college students, and those of Jackson et al. (2003) did not find a significant correlation ($r = 0.068$, $p = 0.089$) between subjective norm and leisure time physical activity behavior and therefore caution should be taken to not over-interpret this effect. However, this negative relationship may suggest that students who perceived that other people did not want them to be physically active still engaged in leisure time physical activity. College is a time period of personal growth and students are able to make their own decisions. The nature of leisure time physical activity suggests an element of personal choice. Students may choose to engage in behaviors that others who are important to them may not

approve of or support. The phrasing of the questions related to subjective norm in this study did not define specifically the referent others as family members or friends. Additional research should use distinct family and friend norm questions to investigate these findings.

In addition to differentiating between norms, the IBM uses the constructs perceived behavioral control and self-efficacy to capture the concept of personal agency (Montano & Kasprzyk, 2008). The results of the hierarchical regression show that self-efficacy was positively associated with participation in leisure time physical activity, but perceived behavioral control was not significantly related with behavior. In other studies using the TPB, perceived behavioral control has been associated with leisure time physical activity. Okun et al. (2002) found perceived behavioral control to be one of the strongest predictors of leisure time physical activity among a sample of college students. In their 2008 study, Blanchard, et al., found that perceived behavioral control was associated with leisure time physical activity among the Black students, but not the White students.

However, other studies using constructs from the TPB in addition to other frameworks have found differing results. In a hierarchical regression analysis that included attitude, intention, subjective norm, perceived behavioral control and self-efficacy, Jackson et al. (2003) found that neither perceived behavioral control nor self-efficacy were associated with physical activity among a sample of college employees. In a study of adolescent girls, Motl et al. (2005) found that self-efficacy and perceived behavioral control each had unique and independent relationships with physical activity, where self-efficacy was related to moderate and vigorous physical activity, but perceived behavioral control was only related to vigorous activity (Motl et al., 2005).

As noted previously, perceived behavioral control may not have been associated with participation in leisure time physical activity because the students perceived that behavior to be under their control, as supported by the theoretical premise of the TPB. Self-efficacy was used in this assessment to target the student's confidence to participate in leisure time physical activity when faced with common barriers, negative affect, resisting relapse and making time to be active. The results of this research indicate that confidence in the ability to participate in leisure time physical activity was more significantly related to engagement in leisure time physical activity among this sample of college students than their perceived control of the behavior. As a way to increase leisure time physical activity, practitioners may want to develop programs and materials focused on increasing confidence levels of the college students.

To better understand the relationship between perceived behavioral control and self-efficacy, Ajzen suggested a model for measuring the perceived behavioral control construct that includes two components; self-efficacy and controllability (Ajzen, 2002). The IBM framework uses perceived behavioral control and self-efficacy to measure the concept of personal agency (Montano & Kasprzyk, 2008). However, the IBM has not been used in research focused on leisure time physical activity. Given the results of this study, in conjunction with previous research findings, future studies examining leisure time physical activity among college students should consider utilizing the IBM as a theoretical framework.

Research Question 4: Are there gender related differences in the relationships between the TPB constructs and IBM constructs, descriptive norm and self-efficacy, and leisure time physical activity?

The findings of this research question indicate that there are gender differences with respect to the theoretical constructs and leisure time physical activity behavior. For male students, attitude, perceived behavioral control, intention, descriptive norm and self-efficacy were all correlated with leisure time physical activity behavior. Subjective norm was not a significant correlate of leisure time physical activity. Among the female students, all of the constructs; attitude, subjective norm, perceived behavioral control, intention, descriptive norm and self-efficacy were positively correlated with leisure time physical activity. For both genders, intention was the strongest correlate with leisure time physical activity followed by self-efficacy.

A multiple linear regression model, which included the TPB constructs, the IBM constructs descriptive norm and self-efficacy, BMI, Greek affiliation, year in school and sports participation, was conducted for each gender. The model for the male students found that only subjective norm and intention were significantly related with leisure time physical activity and accounted for 26.7% of the explained variance. The model for the female students found that attitude, intention and self-efficacy were significantly related with leisure time physical activity and accounted for 44.5% of the explained variance. These results support the assumption that there are gender differences in leisure time physical activity engagement in relation to the theoretical constructs.

The findings of this research are also consistent with previous research (Behrens, Dinger, Heesch, & Sisson, 2005; Blanchard et al., 2003; Suminski & Petosa, 2002) in that others suggest there are gender differences when it comes to leisure time physical activity among college students. Behrens et al. (2005) explored the understanding of moderate physical activity among a group of college students. Their findings suggest there are gender differences in the awareness of the definition and health benefits of physical activity and the components of the public health

recommendations for this behavior (Behrens, Dinger, Heesch, & Sisson, 2005). The study by Blanchard and colleagues (2003) found gender differences in the behavioral, normative and control beliefs among the Black students, but not the White students. Suminski and Petosa (2002) used stages of change from the Transtheoretical Model to investigate gender differences in leisure time physical activity among college students. They found that more males were in the maintenance stage and more females were in the contemplation stage (Suminski & Petosa, 2002).

Although gender is consistently related to physical activity in the literature, theoretical explanation for these associations is scant (Rhodes, Blanchard, & Blacklock, 2008). Even though theoretical frameworks may not be able to explain the gender differences that exist with regard to physical activity, they are still present. The national data consistently acknowledge that males participate in leisure time physical activity at a higher rate than females. There are several possibilities that account for the gender differences found among this population of college students. The social pressures on males and females to participate in physical activity may be different among college students (Dishman, Sallis, & Orenstein, 1985). There may be some cultural influences that perpetuate an idea that males are supposed to play sports and be active and that it is not as accepted for females to engage in this behavior (Shropshire, Carroll, & Yim, 1997). Past behavior may play an important role in explaining these gender differences (C. Jackson, Smith, & Conner, 2003). Participation in organized sport during adolescence may affect whether or not students continue to be active in college. The opportunities available to adolescents to play organized youth sports may have gender differences, where males have more opportunities than females (Vilhjalmsson & Kristjansdottir, 2003).

The practical applications of the current findings suggest that practitioners should tailor educational and promotional materials and that one format may not be appropriate for all students. More specifically, promotional material targeting male students should focus on subjective norm and intentions, the two significant predictors of leisure time physical activity among this college sample. Whereas, for the females the promotional efforts should address attitude, intention and self-efficacy, which were the significant predictors of leisure time physical activity among this sample. Given the results of this study and the potential implications for practitioners, additional research is needed to further confirm and understand these relationships.

Implications

In general, the results from these research questions support the utility of the TPB in explaining leisure time physical activity behavior among college students. TPB constructs attitude, subjective norm and perceived behavioral control were significantly associated with intention to participate in leisure time physical activity. In turn, intention to participate in leisure time physical activity was positively associated with performing the behavior. In addition, the findings of this study were consistent with results reported in other research with regard to relationships between physical activity behavior and intention (Ajzen & Driver, 1992), perceived behavioral control (Bozionelos & Bennett, 1999), descriptive norm (Okun, Karoly, & Lutz, 2002; Okun et al., 2003), subjective norm (C. Jackson, Smith, & Conner, 2003) and self-efficacy (Motl et al., 2005).

This study was unique in that it examined the relationship of the IBM constructs descriptive norm and self-efficacy regarding leisure time physical activity behavior with the TPB constructs. The IBM, and more specifically descriptive norm and self-efficacy, have not been

examined in other studies on leisure time physical activity behavior using the TPB (Ajzen & Driver, 1992; Blanchard et al., 2008; Blanchard et al., 2003; Bozionelos & Bennett, 1999; Bryan & Rocheleau, 2002). This study supported the IBM's inclusion of descriptive norm and self-efficacy in examinations of leisure time physical activity behavior among this population, as both were significantly associated with and further explained participation in leisure time physical activity. The significance of these two constructs when measured with the other TPB constructs provides support for the IBM. To date the IBM has not been used as a theoretical framework in the investigation of leisure time physical activity. The findings of this research suggest that there is utility in the IBM with this behavior.

This research has several implications for researchers and other college health professionals with an interest in promoting leisure time physical activity. This research provides a better understanding of the leisure time physical activity behaviors of college students with respect to the TPB and IBM (descriptive norm and self-efficacy) constructs. This examination of leisure time physical activity among college students should be of interest to those fostering programs, services and facilities to support this behavior, and particularly campus recreation professionals.

The findings from this research suggest that it may be advantageous to tailor educational and promotional efforts for leisure time physical activity to college students and more specifically by gender. Distinct differences exist in the correlates of leisure time physical activity between the male and female college students. Therefore, practitioners could benefit from tailoring promotional materials to address these gender differences in their efforts to increase participation in leisure time physical activity among college students.

More specifically, practitioners or college professionals could use the findings that intention was associated with leisure time physical activity to create intervention strategies. Practitioners could develop a promotional campaign for leisure time physical activity that stressed the importance of regular engagement in the behavior to target the intention construct. For example, using a campaign entitled, “Make it a Part of your Day,” could be created to remind and encourage students to participate in leisure time physical activity. Sending email reminders or announcements about different opportunities on campus to engage in leisure time physical activity would make students consider their intentions on attending these programs and opportunities. In addition, social networking sites, FaceBook or Twitter, could be used to form groups, send event invitations or make announcements about leisure time physical activity opportunities on campus.

In addition, practitioners and other college professionals could specifically target female students with the findings that attitude and self-efficacy were associated with leisure time physical activity. Reaching out to the female students in the residence halls or in the sorority houses to promote leisure time physical activity with messages related to improving attitudes toward the behavior may be an effective strategy to increase leisure time physical activity participation. Providing opportunities to enhance self-efficacy would also be beneficial. This could be done by offering group exercise classes or walking clubs through the residence hall or sorority. Engaging the female students in a smaller group, in a familiar setting may assist in increasing their confidence in performing leisure time physical activity. Campus recreation professionals could also offer weight room orientations or other small group instructional opportunities that would enhance the students comfort and confidence in using the equipment.

Using the findings from this research, which is grounded in theory, to create programs and promotional strategies should prove beneficial (see Table 11).

Table 11

Utilization of the TPB and IBM (descriptive norm and self-efficacy) Constructs to Increase Leisure Time Physical Activity among College Students

Construct	Definition	Application for increasing leisure time physical activity
Attitude toward the behavior	Degree to which a person has a favorable or unfavorable evaluation of the behavior in question	Focused messages; Provide variety of opportunities; Reinforce benefits of behavior
Subjective Norm	Perceived social pressure to perform or not perform a particular behavior	Define referent others; Promote social component; Reinforce benefits; Tailored messages to parents
Perceived Behavioral Control	Perceived ease or difficulty of performing the behavior	Promote variety of opportunities; Numerous locations; Tailored messages to overcome barriers
Intention	Indicates how hard people are willing to try and how much effort they plan to exert in order to perform a behavior	Focused messages; Social networking tools; Reinforce benefits of behavior; Goal-setting; Programs with rewards and incentives
Descriptive Norm	Perceptions about what others in one's social or personal networks are doing	Promote social component; Encourage partner opportunities
Self-Efficacy	Confidence in performing a particular behavior and in overcoming barriers to performing the behavior	Provide instructional opportunities; Small group programs/events; Focused messages; Numerous locations; Promote variety of opportunities; Skill development

Note. Adapted from Glanz, et al (2002).

Limitations

There were limitations of this research that warrant further discussion. First, this study relied on respondents to honestly self-report their leisure time physical activity behavior. Although self-reporting problems are not unique to this line of research (Blanchard et al., 2008; Blanchard et al., 2003), there was potential for students to inflate or underreport their leisure time physical activity participation, although the results support inflation. Therefore to adjust for extreme values reported, Windsorizing (Kirk, 1995) was performed to help eliminate large errors in self-reported leisure time physical activity.

Another limitation was the lack of generalizability and the selection bias associated with the use of a convenience sample. This research used a convenience sample of college students from classes at one university in the southeastern United States. Thus, the results may not be generalizable to other aged populations or even other samples of college students. However, this research attempted to minimize selection bias by using general education classes from several colleges which included students from several departments and multiple majors, thus the sample should be relatively generalizable to other students at the university in which the research was conducted. Overall, the demographic rates of this sample were fairly consistent with the entire undergraduate population of the university (Kraft, 2009), although this sample had a disproportionately higher number of females (67.8%) and Greek affiliated students (34.5%). In the fall 2009, there were 12,426 (52.4%) female students and 6,399 (27%) students affiliated with a Greek organization. In addition, this sample had a slightly lower percentage of White students (81.2%) than enrolled at the institution (82.9%), and a slightly higher percentage of Black students (14.7%) compared to the total percent (11.8%) enrolled (Kraft, 2009).

This research was also limited in that it was an exploratory cross-sectional study. A more accurate picture of leisure time physical activity could be attained through a prospective study following participants over a period of time. A prospective study would also further validate the utility of the TPB and IBM in examining leisure time physical activity behavior.

Future Research

This research added to the literature in that it measured select constructs from the TPB and IBM to examine leisure time physical activity behavior among college students. No known research published to date has used the IBM with leisure time physical activity. The findings from this research support further investigation of using the IBM as a theoretical framework to explain, predict and potentially increase leisure time physical activity. The results of the hierarchical regression analysis and the regression models by gender indicated that both descriptive norm and self-efficacy were significantly related to leisure time physical activity. Future research should be conducted to determine if these relationships are consistent.

As mentioned in the previous section, a prospective study examining leisure time physical activity behavior of college students using constructs from the TPB and IBM would provide a more thorough picture of leisure time physical activity behavior of this population. In addition, utilizing survey questions that address meeting national recommendations for the amount of leisure time physical activity performed would be beneficial. Being able to discuss the theoretical framework in relation to meeting national guidelines would be beneficial from a public health perspective, for health educators and other college professionals interested in leisure time physical activity among college students.

The findings in this study with regard to subjective norm were of particular interest, where subjective norm emerged as having a negative association with leisure time physical activity. Several researchers (Blanchard et al., 2008; Blanchard et al., 2003; Okun, Karoly, & Lutz, 2002; Okun et al., 2003; Rhodes, Jones, & Courneya, 2002) have found that subjective norm was either not significant or of small significance in predicting leisure time physical activity intentions and behaviors. The findings of this research in which subjective norm was a significant predictor, but having a positive association with intention and a negative association with leisure time physical activity behavior, warrants additional research.

Finally, campus recreation professionals may want to explore the leisure time physical activity behaviors among college students who use their programs, services and facilities. The results of this study support utility of the IBM as a theoretical framework and responses to the Campus Recreation Student Outcomes Benchmarking Project (Moore & colleagues., 2005) questions can be used to address participation in campus recreation activities. The reliability coefficients (Cronbach's alpha) for these categories of items were, facilities used ($\alpha = 0.46$), program participation ($\alpha = 0.72$), personal beliefs ($\alpha = 0.93$) and outcome beliefs ($\alpha = 0.97$). The facilities items were below the acceptable level of 0.70 (Nunnally, 1978). This set of five questions asks which specific campus facilities students use for leisure time physical activity and may need to be tailored to get to an acceptable reliability level. Campus recreation professionals have an opportunity to explore leisure time physical activity of college students using a theoretically grounded framework to better understand the influences on their behavioral decisions.

Conclusion

In general, the results of this research indicate the utility of the TPB in examining leisure time physical activity among college students. In addition, this study supports the inclusion of the IBM constructs descriptive norm and self-efficacy in examining leisure time physical activity. The TPB constructs; attitude, subjective norm and perceived behavioral control were positively associated with intention to engage in leisure time physical activity among this sample of college students. The results of the final hierarchical regression model indicated that subjective norm was negatively associated with leisure time physical activity and intention was positively associated with leisure time physical activity behavior. In addition, the two IBM constructs descriptive norm and self-efficacy were positively associated with leisure time physical activity behavior.

This research was potentially limited by selection bias and self-reported leisure time physical activity. Despite these limitations, the results of this study support the development and implementation of educational and promotional materials that target increasing college students' participation in leisure time physical activity. This research provided a better understanding of the factors associated with participation in leisure time physical activity. The findings of this research indicate that tailoring materials based on gender would also be beneficial as the results show that different constructs were significant predictors of leisure time physical activity dependent on gender.

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APPENDIXES

APPENDIX A
ASSEMENT BATTERY

This survey will ask about your beliefs regarding the health behavior of participating in **leisure time physical activity on a regular basis** and what you think about it within the context of **the NEXT week**. Leisure time physical activity are those activities performed during your free time and **do not include** those in which you receive academic credit.

Leisure time physical activity on a regular basis can be defined as **EITHER**

30 minutes of **moderate-intensity** leisure time physical activity **on at least 5 days** per week

OR **20 minutes** of **vigorous** leisure time physical activity **on at least 3 days** per week.

What is **moderate-intensity leisure time physical activity**? This includes activities such as brisk walking, tennis, easy bicycling, or dancing; such activity may work up a light perspiration but is not exhausting. To reach the 30 minutes per day standard, several shorter bouts (but not less than 10 minutes) can be accumulated. For example, two 15-minute or three 10-minute walks in a given day would meet the 30-minute standard.

Note: Typical **weight training** (free weight, weight machines) and **callisthenic**-type activities (such as push-ups, sit-ups) should be considered as **moderate-intensity** exercise. Count only the minutes that you actually do activity. For example, during a 1.5 hour workout, you may only be lifting for 30 minutes!

What is **vigorous-intensity physical activity**? This includes activities such as running, aerobics, fast bicycling, or basketball. Such activities cause significant sweating and large increases in breathing and heart rate. The 20-minute per day standard should be achieved in a single bout.

⇒ **Please take an extra minute and re-read the section above.**

**It is very important that you clearly understand the definition of
“leisure time physical activity” before you proceed with the survey.**

Instructions: These questions ask about your attitudes toward engaging in leisure time physical activity. Please **circle the number** that best represents your attitude for each statement.

For me to participate in moderate intensity leisure time physical activity over the next week will be...

	Extremely	Quite	Slightly	Neutral	Slightly	Quite	Extremely	
Harmful	1	2	3	4	5	6	7	Beneficial
Unpleasant	1	2	3	4	5	6	7	Pleasant
Bad	1	2	3	4	5	6	7	Good
Boring	1	2	3	4	5	6	7	Fun
Unenjoyable	1	2	3	4	5	6	7	Enjoyable
Useless	1	2	3	4	5	6	7	Useful

Instructions: These statements relate to what you think important people in your life think about engaging in leisure time physical activity. Please **circle a number** for each statement using the scale provided.

During the next week...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree		
most people important to me will definitely think I should... engage in moderate leisure time physical activity	1	2	3	4	5	6	7
most people important to me will definitely approve of me... engaging in moderate leisure time physical activity	1	2	3	4	5	6	7
most people important to me definitely support me in... engaging in moderate leisure time physical activity	1	2	3	4	5	6	7

During the next week...	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
--------------------------------	--------------------------	-----------------	----------------	--------------	-----------------------

most of my family members **will definitely themselves...**

engage in moderate leisure time physical activity	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

most of my friends **will definitely themselves...**

engage in moderate leisure time physical activity	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Instructions: These statements relate to your confidence and/or control over engaging in leisure time physical activity. Please **circle a number** for each statement using the scale provided.

During the next week...	Strongly disagree						Strongly agree
--------------------------------	--------------------------	--	--	--	--	--	-----------------------

if I wanted to I could...

engage in moderate leisure time physical activity	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

During the next week...	Extremely difficult						Extremely easy
--------------------------------	----------------------------	--	--	--	--	--	-----------------------

it would be _____ for me to...

engage in moderate leisure time physical activity	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

During the next week...	Extreme lack of control						Extreme control
--------------------------------	--------------------------------	--	--	--	--	--	------------------------

How much **control** do you believe you have to...

engage in moderate leisure time physical activity	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Instructions: These three statements relate to your intentions to engage in leisure time physical activity during the next week. Please **circle a number** for the first two statements and **insert a number** in the blank for the third statement.

	Strongly disagree		Disagree	Neutral	Agree		Strongly agree
During the next <u>week</u> , I intend to...							
engage in moderate leisure time physical activity	1	2	3	4	5	6	7

	Strongly disagree		Disagree	Neutral	Agree		Strongly agree
During the next <u>week</u> , I will ...							
engage in moderate leisure time physical activity	1	2	3	4	5	6	7

During the next week, my goal is to...

Engage in moderate intensity leisure time physical activity on at least *(insert a number from 0-7)* - days

Instructions: Below is a list of barriers that prevent some people from engaging in leisure time physical activity. Please indicate your confidence with each statement by **circling a number** on the scale provided.

	Not at all confident						Very confident
During the next <u>week</u> , I am confident I can engage in regular leisure time physical activity even when...							
I am tired	1	2	3	4	5	6	7
I am in a bad mood	1	2	3	4	5	6	7
I feel I don't have time	1	2	3	4	5	6	7
I am on vacation	1	2	3	4	5	6	7
The weather is bad	1	2	3	4	5	6	7

During a typical 7-Day period (a week), on average how many times do you perform the following kinds of leisure time physical activity for more than **15 minutes** (write on each line the appropriate number).

	Times Per Week
<p>a) STRENUOUS PHYSICAL ACTIVITY (HEART BEATS RAPIDLY)</p> <p>(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)</p>	_____
<p>b) MODERATE PHYSICAL ACTIVITY (NOT EXHAUSTING)</p> <p>(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)</p>	_____
<p>c) MILD PHYSICAL ACTIVITY (MINIMAL EFFORT)</p> <p>(e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)</p>	_____

Instructions: These statements relate to your participation in leisure time physical activity. Please indicate how often you engage in these types of leisure time physical activity by **circling a number** using the scale provided.

	0	1	2	3	4	5	6	7
On how many of the past 7 days did you...	days	day	days	days	days	days	days	days
Do moderate-intensity cardio or aerobic activity (caused a noticeable increase in heart rate, such as a brisk walk) for at least 30 minutes?	0	1	2	3	4	5	6	7
Do vigorous-intensity cardio or aerobic activity (caused large increases in breathing or heart rate, such as jogging) for at least 20 minutes?	0	1	2	3	4	5	6	7
Do 8-10 strength training activities (such as resistance machines) for 8-12 repetitions each?	0	1	2	3	4	5	6	7

Instructions: Please answer the following questions as it relates to participation in leisure time physical activity. **Check the appropriate answers.**

During a typical 7-Day period (a week), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)? (select one)

- Often
- Sometimes
- Rarely/Never

Do you utilize any of The University of Alabama campus recreation facilities, programs or services?

- Yes
- No

Instructions: For the following questions, please select one answer per row. **Mark the circle** to indicate your answer.

Which on-campus recreational facilities do you use?	5 or more times per week	3-4 times per week	1-2 times per week	1-2 times per month	1-2 times per semester	Never
Student Recreation Center	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aquatic Center	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fields Complex	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tennis Courts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Outdoor Pool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How often do you participate in the following activities, programs, and/or services at UA campus recreation facilities?	5 or more times per week	3-4 times per week	1-2 times per week	1-2 times per month	1-2 times per semester	Never
Intramural sports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sport Clubs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aquatics (lap swimming, swim lessons, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Instructor-led group fitness or exercise classes	<input type="radio"/>					
Weight training/lifting free weights	<input type="radio"/>					
Cardio-vascular equipment (treadmill, elliptical, stationary bike, etc)	<input type="radio"/>					
Open recreation (Basketball, track, volleyball, dodgeball, combative arts, etc)	<input type="radio"/>					
Racquet sports (racquetball, squash, badminton, tennis, etc)	<input type="radio"/>					
Outdoor Recreation activities and/or trips (hiking, climbing wall, kayaking, etc)	<input type="radio"/>					
Personal training	<input type="radio"/>					
Classes (safety classes, non-credit instruction, Discovery Series)	<input type="radio"/>					

Please rate your level of agreement with the following statements.	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	No Basis to Judge
Participating in UA Campus Recreation activities and programs has expanded my interest in staying fit and healthy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UA Campus Recreation activities and programs contribute to the quality of life at this institution.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
UA Campus Recreation offers "something for everyone."	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My recreational needs are met by UA Campus Recreation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I enjoy participating in campus recreation activities and/or utilizing facilities.	<input type="radio"/>					
Participation in recreational activities has provided me with skills/abilities that I will use after college.	<input type="radio"/>					

From your participation in UA campus recreation programs and facilities, do you feel you have increased or improved your:	Definitely	Somewhat	Not at all
Self confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sense of adventure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Athletic ability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Concentration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fitness level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Respect for others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Multicultural awareness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sense of belonging/association	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Balance/coordination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physical strength	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Problem-solving skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling of well-being	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time management skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Group cooperation skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to get a good night's sleep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leadership skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to multi-task	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Stress management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to develop friendships	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Weight control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Academic performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please complete the following questions.

1. How old are you (in years)? _____
2. What is your gender?
 Male Female
3. What is your height in feet and inches? _____
4. What is your weight in pounds? _____
5. What is your year in school?
 1st year undergraduate
 2nd year undergraduate
 3rd year undergraduate
 4th year undergraduate
 5th year undergraduate
 Graduate or professional
 Other
6. How do you usually describe yourself? (mark all that apply)
 White, non Hispanic (includes Middle Eastern)
 Black, non Hispanic
 Hispanic or Latino/a
 Asian of Pacific Islander
 American Indian, Alaskan Native or Native Hawaiian
 Biracial or Multiracial
 Other
7. What is your marital status?
 Single
 Married/Partnered
 Separated
 Divorced
 Other

8. Where do you currently live?
- Campus residence hall
 - Fraternity or sorority house
 - Other college/university housing
 - Parent/guardian's home
 - Other off-campus housing
 - Other
9. Are you a member of a social fraternity or sorority? (e.g., National Interfraternity Conference, National Panhellenic Conference, National Pan-Hellenic Council, National Association of Latino Fraternal Organizations)
- No
 - Yes
10. What is your approximate cumulative grade average? _____
- N/A (check here if you are in your first semester)
11. Within the last 12 months, have you participated in organized college athletics at any of the following levels?
- Varsity
 - Club Sports
 - Intramurals
 - None

Thank you for completing this survey instrument.

APPENDIX B
REQUEST FOR THE APPROVAL OF RESEARCH
INVOLVING HUMAN SUBJECTS

Research Project Title:

A Theory-based investigation of Leisure Time Physical Activity among College Students

Project Components:

This study consists of a survey instrument to examine leisure time physical activity behavior among college students. Students from the University of Alabama will be asked to complete self-report survey items in order to obtain descriptive information regarding their leisure time physical activity engagement and measures of potential covariates.

Background:

Physical activity is the cornerstone of a healthy lifestyle and is cited as a key strategy for reducing the risk of chronic conditions and diseases including hypertension, coronary heart disease, diabetes, cancer and obesity (Staten, Miller, Noland, & Rayens, 2005). In addition, evidence clearly shows that regular physical activity improves physiological and psychological health (US Department of Health and Human Services, 2000). Benefits including maintenance of ideal body weight, prevention of premature death and enhanced psychological well-being have been attributed to participation in regular physical activity (Fischer & Bryant, 2008). However, data from the 2007 Behavioral Risk Factor Surveillance System (BRFSS) indicate that approximately only 50% of US adults meet the recommendations for regular physical activity (Centers for Disease Control, 2007b).

The recent recommendations state in order to promote and maintain health, all healthy adults aged 18-65 years need moderate-intensity aerobic physical activity for a minimum of 30 minutes on 5 days a week or vigorous-intensity aerobic activity for a minimum of 20 minutes on three days each week (Haskell et al., 2007). The Healthy People 2010 document identifies two key objectives toward meeting the recommendations for physical activity (US Department of Health and Human Services, 2000). In addition, Healthy People 2010 cites physical activity as a leading health indicator to be targeted by prevention programs (US Department of Health and Human Services, 2000). The need to understand physical activity behavior and implement effective intervention strategies is paramount (Rhodes & Plotnikoff, 2005).

Despite the strong evidence for the health promoting benefits of engaging in regular physical activity, participation rates have been shown to decrease over the lifespan, with the steepest decline in physical activity occurring in adolescence and young adulthood (Caspersen, Powell, & Christenson, 1985; Dishman & Buckworth, 1996; Stephens, Jacobs, & White, 1985). Epidemiological evidence indicates that levels of physical activity decline from high school to college, and activity patterns in college populations are generally insufficient to improve health and fitness (Kilpatrick, Hebert, & Bartholomew, 2005). National data suggests that 42% of college students do not participate in moderate or vigorous physical activity (Douglas et al., 1997). The college years provide unique opportunities (and responsibilities) for campus

communities to positively shape physical activity behaviors in their students (Leslie, Sparling, & Owen, 2001). The college environment, due to the potential to reach a large audience in a relatively confined area, may be an ideal setting for disseminating information and delivering health promotion interventions (Doerksen, Umstattd, & McAuley, 2009). The data suggests that there is a need to study physical activity motivation and behavior so that researchers can develop better programs and interventions to better improve the physical activity patterns of college students (Kilpatrick, Hebert, & Bartholomew, 2005). In view of the importance of physical activity on wellness, college and university administrators have started to pay more attention to campus recreation programs (Zhang, DeMichele, & Connaughton, 2004).

Procedures:

Purpose:

The purpose of this study is to examine the leisure time physical activity behavior of college students using the theory of planned behavior (TPB) and two constructs from the integrated behavioral model (IBM) including; descriptive norm and self-efficacy. More specifically, this study will investigate whether the TPB/IBM constructs explain significant variation in leisure time physical activity intentions of college students at the University of Alabama. In addition, this research will examine potential gender differences in the TPB/IBM constructs in relation to leisure time physical activity. This research will target leisure time physical activity behavior of college students, which will provide information for practitioners to help tailor marketing and educational strategies to engage more students.

Design:

The proposed study will incorporate a one-time classroom survey that will be completed in fall of 2009.

A class-room based survey will be utilized to collect data from college students enrolled in at the University of Alabama. Students ($N \approx 700$) will be derived from general education classes housed within the Colleges of Human Environmental Sciences, Education, Communication, New College, and Arts and Sciences; which specifically could include the following courses: HHE 270 Personal Health, CSM 204 Introduction to Personal Financial Planning, NHM 101 introduction to Human Nutrition, HHE 273 Community Health, HHE 440 Understanding Stress management, HAT 257 Introduction to Athletic Training, HAT 272 First- Aid, Safety and CPR AAST 395 Special Topics, BCE 101 Freshman Compass Course, COM 123 Public Speaking, NEW 237 Conflict and Cooperation, SOC 315 Race and Ethnicity, CJ 303 Minorities, Criminology and Social Justice, KIN 199 Ecological Approach to Health and Fitness, NEW 222 Academic Potential, HHE 370 Principles/Foundation Health Promotion, HHE 378 Drug Awareness Education, HHE 468 Practical Application of Health Communication/Promotion and HD 382 Parent and Family Development. Participants will be asked to complete an assessment

battery consisting of 42 questions. The assessment battery will take approximately 15 minutes to complete.

Participants and Recruitment:

A convenience sample of approximately 700 students enrolled in general education classes from the University of Alabama will be asked to complete the classroom-based survey. Students will be informed that they will not be penalized for choosing not to participate in answering the survey and will be instructed to remain quiet while the other students complete the survey. Participation will be anonymous and no identifiers will be collected. We are requesting a waiver of informed consent since this research could not be carried out without the waiver of consent. We are also requesting a waiver of written documentations of informed consent for those participants who are at least 19 years of age. Each participant will receive an information sheet when the assessment is distributed. The information sheet will explain that their information is **anonymous** and will be used solely for research purposes.

Measures:

The survey to be used for this research is the product of merging existing instruments with established reliability and validity. These include measures to describe leisure time physical activity engagement, theoretical constructs of interest, participation in campus recreation programs/facilities and demographic information empirically documented as potential covariates, mediators, or moderators of leisure time physical activity behavior. Select questions from the following instruments will be used: American College Health Association-National College Health Assessment II (ACHA-NCHA II), TPB questionnaire as developed by Blanchard, et al. in 2008, descriptive norm and self-efficacy questions to capture the added IBM constructs, the Godin Leisure-Time Exercise Questionnaire and the Campus Recreation Student Outcomes Benchmarking Project.

Demographics

The **ACHA-NCHA II** is a nationally recognized research survey that includes items about college students' health habits, behaviors and perceptions (American College Health Association, 2009). The original survey, ACHA-NCHA, was initiated in 2000 and was used nationwide through spring 2008. The ACHA-NCHA II was developed following a thorough pilot testing process and incorporates several revised questions from the previous version (American College Health Association, 2008). The ACHA-NCHA II was first used in fall 2008 and the results provide the largest known comprehensive data set on health of college students. In fall 2008, forty institutions participated in data collection, where 26,685 students responded via paper and web-based collection methods (American College Health Association, 2009). The proposed research will use eleven questions from the Demographic Characteristics section of the assessment. Questions included age, gender, self-reported height and weight, year in school, ethnicity, marital status, on/off campus residence, affiliation with a social fraternity/sorority, GPA and participation in varsity, club and/or intramural sports. The ACHA-NCHA II is a public domain scale.

Variables from the Theory of Planned Behavior and Integrated Belief Model

Items related to the TPB constructs will be assessed using two scales developed by Blanchard and colleagues (Blanchard et al., 2008; Blanchard et al., 2003). Both scales were utilized while conducting research among undergraduate students at two universities in Atlanta, GA (Blanchard et al., 2008; Blanchard et al., 2003). The items target TPB constructs including attitude, subjective norm, perceived behavioral control and intention. The items for attitude, subjective norm and intention were the same for both the 2003 and 2008 studies. Perceived behavioral control items varied slightly between the two study years. In 2003, two questions targeted ease of engaging in exercise activities and one targeted control over performing exercise activities. In 2008, the three questions for perceived behavioral control were related to control, confidence and ease of participating in physical activity.

Attitude

A six-item scale developed by Blanchard et al. (2003) will be used to assess attitude. Based on Blanchard et al.'s approach a list of adjectives will be preceded with the following statement, "For me to accumulate 30 minutes of leisure time physical activity within campus recreation programs and facilities on 5 or more days during the next week will be..." Participants are then asked to rate six items related to attitude on a 7-point semantic differential adjective scale. Largely because of its ease of construction, semantic differential (Osgood, Suci, & Tannenbaum, 1957) is often the preferred method to assess attitude (Ajzen and Fishbein, 2008). This scale taps both the instrumental (harmful-beneficial, bad-good, useless-useful) and affective (unpleasant-pleasant, boring-fun, unenjoyable-enjoyable) aspects of attitude. The verbal descriptors are "extremely" (points 1 and 7), "quite" (points 2 and 6), "slightly" (points 3 and 5) and "neutral" (point 4). For example, point 1 = extremely harmful, 2 = quite harmful, 3 = slightly harmful, 4 = neutral, 5 = slightly beneficial, 6 = quite beneficial and 7 = extremely beneficial. Scale scores will be formed by averaging the responses to the affective and instrumental norm questions (higher scores indicate a more favorable attitude). The 2008 study reported the affective attitude scale to have an internal consistency (Cronbach alpha) of $\alpha = 0.74$ for the sample of African American students and $\alpha = 0.79$ for the Caucasian students. The instrumental attitude scale had an internal consistency (Cronbach alpha) of $\alpha = 0.70$ for the African American students and $\alpha = 0.81$ for the Caucasian students.

Subjective Norm

Subjective norm is the perceived social pressure to perform or not to perform a particular behavior (Ajzen, 1991) and will be measured using a three-item Likert scale rated from 1 (strongly disagree) to 7 (strongly agree). Subjective norm items include; "Most people important to me (1) think I should, (2) approve of me and (3) support me in accumulating 30 minutes of leisure time physical activity within campus recreation programs and facilities on 5 or more days during the next week". Scale scores will be calculated by averaging the responses to the three questions (higher scores indicate stronger subjective norm for leisure time physical activity). Internal consistency (Cronbach alpha) for the 3-item scale has been previously reported ($\alpha = 0.81$; (Blanchard et al., 2003).

Perceived behavioral control

Perceived behavioral control is defined as the perceived ease or difficulty of performing the behavior and it reflects past experience as well as anticipated impediments and obstacles (Ajzen, 1991) and will be measured using a three-item scale from the 2008 study. These items include the following: (1) “During the next week, how confident are you that you can accumulate 30 minutes of leisure time physical activity within campus recreation programs and facilities on 5 or more days?” rated on a scale of 1 (not at all confident) to 7 (extremely confident); (2) “During the next week, for me to accumulate 30 minutes of leisure time physical activity within campus recreation programs and facilities on 5 or more days will be...” rated on a scale of 1 (extremely difficult) to 7 (extremely easy) and (3) “During the next week, how much control do you believe you have to accumulate 30 minutes of leisure time physical activity within campus recreation programs and facilities on 5 or more days?” rated on a scale of 1 (extreme lack of control) to 7 (extreme control). Scale scores will be calculated by averaging the responses to the three questions (higher scores indicate greater perceived control for leisure time physical activity). Internal consistency was not reported for this scale (Blanchard et al., 2008); however, it will be examined in the present study.

Intention

Intention to perform a given behavior indicates how hard people are willing to try and how much effort they plan to exert in order to perform a behavior that is under volitional control (Ajzen, 1991). Intention toward the behavior will be measured using a 3-item scale. The first two items, (1) “During the next week, I intend to accumulate 30 minutes of leisure time physical activity within campus recreation programs and facilities on 5 or more days” and (2) “During the next week, I will try to accumulate 30 minutes of leisure time physical activity within campus recreation programs and facilities on 5 or more days”, will be measured on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). The third item states, “During the next week, my goal is to accumulate 30 minutes of leisure time physical activity within campus recreation programs and facilities on at least ___ days”. Scale scores will be formed by averaging the responses to the three items (higher scores indicate a greater intention to participate in leisure time physical activity). For the purposes of this research, intention will be a continuous variable. Good internal consistency ($\alpha = 0.87$) for this scale has been previously reported (Blanchard et al., 2003).

Self-Efficacy

Self-efficacy is one’s degree of confidence in the ability to perform the behavior in the face of various obstacles or challenges (Montano & Kasprzyk, 2008). Self-efficacy for leisure time physical activity will be measured using the five-item scale developed by Marcus and colleagues (Marcus, Selby, Niaura, & Rossi, 1992). This scale measures how confident participants are that they can participate in leisure time physical activity when faced with common barriers, negative affect, resisting relapse and making time for exercise. Participants will rate their confidence on a Likert scale from 1 (not at all confident) to 7 (very confident). Self-efficacy scores will be calculated by summing the scores on the individual items (higher

scores indicate greater self-efficacy). This scale has high previously reported two-week test-retest reliability ($r = .90$) and internal consistency ($\alpha = 0.82$; (Marcus, Selby, Niaura, & Rossi, 1992).

Descriptive Norm

The IBM identifies injunctive and descriptive norm within the TPB construct of subjective norm (Montano & Kasprzyk, 2008). Injunctive norm is defined as normative beliefs about what others think one should do and motivation to comply and descriptive norm is defined as perceptions about what others in one's social or personal networks are doing (Montano & Kasprzyk, 2008). Injunctive and descriptive norm will be measured using a three-item scale. The three-item subjective norm scale from Blanchard, et al., 2008, addresses only injunctive norm and does not include items to capture descriptive norm. Therefore, a two-item scale will be used from Okun, et al., 2002 to gather this information. The authors developed these items specifically for their study with college students to determine if descriptive norm was a significant and positive predictor of intention to participate in leisure time physical activity and leisure time physical activity behavior (Okun, Karoly, & Lutz, 2002). However, internal consistency for this scale was not reported. The first item asks whether most of the subjects' friends engage in leisure time physical activity at least 5 days a week. The second asks whether or not the subjects' family members engage in leisure time physical activity at least 5 days a week (Okun, Karoly, & Lutz, 2002). Okun, et al., measured these items on a Likert scale from 0 (strongly disagree) to 6 (strongly agree). However, for consistency of this research project with the other scales, the ability to compare means and improving understandability for the students', both questions will be measured on a scale from 1 (strongly disagree) to 7 (strongly agree). Scale scores will be formed by averaging the responses to the two questions (higher scores indicate stronger descriptive norm for leisure time physical activity). Internal consistency will be examined in the present study.

Leisure Time Physical Activity

Leisure time physical activity behavior will be measured using the Godin Leisure Time Exercise Questionnaire, which was developed by Godin and Shepard (Godin, 1985). The questionnaire was designed to be reliable, valid and easy to complete quickly without a need for detailed review (Godin, 1985). The questionnaire is relatively short and asks the participant to recall their participation in leisure time physical activity for the past seven days. The instrument contains three open ended questions covering the frequency of mild (e.g. easy walking), moderate (e.g. fast walking) and strenuous (e.g. jogging) exercises completed during free time. As was done by Rhodes and colleagues (2006), the phrase "leisure time physical activity" will be substituted for "exercise" on the instrument (Rhodes, Blanchard, Matheson, & Coble, 2006). This survey instrument has been consistently used to identify engagement in leisure time physical activity and is commonly used with the college student population (Blanchard et al., 2008; Gyurcsik, Bray, & Brittain, 2004; Okun, Karoly, & Lutz, 2002; Rhodes, Blanchard, Matheson, & Coble, 2006; Rhodes & Courneya, 2003b; Rhodes, Jones, & Courneya, 2002; Winters, Petosa, & Charlton, 2003). An independent evaluation of this measure found it to be easily administered, brief, reliable and to possess concurrent validity based on various criteria including objective activity monitors and fitness indexes (Jacobs, Ainsworth, Hartman, & Leon, 1993). This questionnaire has demonstrated a one-month test-retest reliability of 0.63 and concurrent validity coefficients of 0.32 with an objective activity indicator (CALTRAC

accelerometer), 0.56 with VO_{2max} (as measured by expired gases) and -0.43 with percent body fat (as measured by hydrostatic weighing; (Jacobs, Ainsworth, Hartman, & Leon, 1993). The Godin Leisure Time Exercise Questionnaire is a public domain scale. For the purposes of this research, this variable will be measured as a continuous variable.

Participation in Campus Recreation

In addition, items will be included regarding students' participation in campus recreation programs and services. Select items from the Campus Recreation Student Outcomes Benchmarking Project (Moore & colleagues., 2005) will be included in the assessment battery. Items target frequency and duration of participation in specific campus recreation facilities and programs, factors that may impede participation in campus recreation programs and outcome beliefs associated with participation in campus recreation programs and services. In addition, students will rate the importance of leisure time physical activity prior to entering college and the importance leisure time physical activity will likely have after graduation. To date, approximately 70 institutions of higher education have utilized the Campus Recreation Student Outcomes Benchmarking Project, including The University of Alabama; however, reliability and validity have not reported for this instrument. *Internal consistency will be examined in the present study.*

Site of Data Collection:

The University of Alabama, Tuscaloosa, AL

Dr. M. Renée Umstatted will serve as the faculty Principle Investigator with research interests focusing on the promotion of health and quality of life across the lifespan through physical activity. Specific research interests include examining the relationships among theoretical determinants of physical activity from a social cognitive and ecological perspective; implementation and evaluation of theoretically based physical activity interventions and the translation and dissemination of efficacious physical activity interventions into community settings.

Jill Marie Beville will serve as the Doctoral student Principle Investigator with specific research interests and expertise in the areas of physical activity, theory and campus recreation.

Informed Consent:

Nine Basic Elements of Informed Consent (*Quotes taken directly from informed consent forms)

1. A statement that the study involves research

“You are being asked to participate in a research study using an in-class survey assessment designed to examine leisure time physical activity behaviors among college students.”

2. An explanation of the purposes of the research

“The purpose of this study is to better understand leisure time physical activity behaviors of college students.”

3. The expected duration of the subject's participation

“If you choose to take part in this study, you will be asked to complete survey that will take about 15 minutes.”

4. A description of the procedures to be followed

“For this study, participants will be asked to complete an in-class leisure time physical activity behavior survey.”

5. A description of any reasonably foreseeable risks or discomforts to the subject

“One risk may be that you might not like to answer questions about what your leisure time physical activity behaviors.”

6. A description of any benefits to the subject or to others that may reasonably be expected from the research

“As a participant, you will benefit by learning more about your leisure time physical activity behaviors. Society will benefit by having a better understanding of college students leisure time physical activity behaviors that can lead to innovative education, promotion and interventions”

7. A statement describing the extent, if any, to which confidentiality of records identifying the subject will be maintained

“The information you provide will remain secret and private. Information obtained through this study will only be used by the research staff. All data will be stored in using locked computers with a password and/or locked filing cabinets.

The University of Alabama Institutional Review Board (a group that looks out for the fair and just treatment of people in research studies) will review study records from time to time. This is to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.”

8. An explanation of whom to contact for answers to pertinent questions about the research and research subjects' rights, and whom to contact in the event of a research-related injury to the subject

“For more information concerning this research, you should contact Dr. M. Renée Umstatted at (205) 348-4751. If you have any questions about your rights as a research participant, you may contact The University of Alabama Research Compliance Officer at (205) 348-5152.”

9. A statement that participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which the subject is otherwise entitled and the subject may discontinue participation at any time without penalty or loss of benefits to which the subject is otherwise entitled

“Please know that your **participation is voluntary**, if you choose not to take part in the survey, there will not be a penalty. You may quit the study at any time. If you choose not to participate, the information that has been told to us will be kept secret and private. Your choice to take part in this study (or to not help) will not reflect on you as a student of the University of Alabama.”

Risks and Benefits:

Potential Risks:

Risks for participation in this study are minimal. Participants could potentially feel uncomfortable answering questions regarding their leisure time physical activity behavior, especially if they are not comfortable with their current activity levels.

Risk Minimization:

Each participant will be given the opportunity to withdraw from the study at any time and participation in the study is entirely voluntary.

Benefits:

Participant: Participants will benefit from this study by having a better understanding of their leisure time physical activity behavior. Participants could also benefit by simply knowing that their participation in this study contributes to the enhancement of scientific understanding and knowledge

Researchers, Health Professionals, Community Planners: Findings from this research have several implications for researchers, campus recreation professionals and other health educators. First, this research will provide a better understanding of current university student leisure time physical activity behaviors. Second, the information gleaned from this study will provide valuable information that will help with the design of a future intervention to increase physical activity among students. Third, the information obtained from this study could also be used by other universities interested in increasing the participation in leisure time physical activity among students.

Risk/Benefit Ratio:

Though there are some mild psychological risks to participants (annoyance, reflection on current leisure time physical activity levels); however, the benefits of this proposed research to the participants and society at-large outweigh the risks.

Participants Confidentiality:

The information that is being collected with this research will be basic demographic information and the completion of a knowledge based questionnaire. Only the principle investigator and research staff will have access to the data. There will be no identifying information collected. We are requesting a waiver of informed consent since this research could not be carried out without the waiver of consent. Each participant will receive an information sheet when the

assessment is distributed. The information sheet will explain that their information is **anonymous** and will be used solely for research purposes.

At the end of the participant information sheet we have included the following statement indicating that completing this survey is of a voluntary nature:

Thank you very much for participating in this questionnaire today.

By completing this questionnaire you are agreeing to participate in this research study.

Please know that your participation is entirely voluntary and in no way will impact your standing as a student at The University of Alabama.

Incentives to Participate:

There will not be any direct incentives for participation in this study. We will explain to participants that their contribution will provide researchers with valuable information on leisure time physical activity behaviors and related factors.

Participant Information Sheet Leisure Time Physical Activity Survey

Title of Research: Theory-based Investigation of Leisure Time Physical Activity among College Students
Principal Investigators: M. Renee Umstatted, Ph.D. and Jill Marie Beville, M.A.

Explanation of Procedures

You are being asked to complete this questionnaire voluntarily as part of a research study to gain a better understanding of leisure time physical activity behaviors of students at the University of Alabama. This questionnaire will contain questions about your leisure time physical activity behaviors as well as your perceptions of leisure time physical activity. This questionnaire will take approximately 15 minutes to complete. Findings from this questionnaire will be used to assist with the development of health promotion messages which will attempt to increase the proportion of students engaging in leisure time physical activity.

Risks and Discomforts

There are no physical risks or discomforts in this study. Mild psychological discomfort might be involved in answering questions about your leisure time physical activity behaviors, but this should be minimal.

Benefits

There are no direct benefits to you for your participation in this study.

Confidentiality

Your information gathered during this study will be anonymous, so the information you provide cannot be linked to you. Your information will be entered into a database whose files will be indexed with a unique identification number for this study. Data will be stored in secure computers with password protection accessible only to the principal investigators. The results of the study may be published for scientific purposes; however, there will be no way to identify you in the results.

Withdrawal Without Prejudice

You are free to withdraw your consent and to discontinue participation in this project at any time without prejudice **or any negative consequences.**

Costs to Subject from Participation in the Research

There will be no cost to you from participation in this research.

Questions

For more information concerning this research you should contact Dr. M. Renee Umstattd at (205) 348-4751. If you have any questions about your rights as a research participant you may contact Ms. Tanta Myles, the University of Alabama Research Compliance Officer, at 205-348-5152.

Legal Rights

You are not waiving any of your legal rights by reading this information sheet and participating in this research study.

Thank you very much for participating in this questionnaire today. **By completing this questionnaire you are agreeing to participate in this research study.** Please know that your participation is entirely voluntary and in no way will impact your standing as a student at The University of Alabama.

Office for Research
Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
RESEARCH

November 9, 2009

M. Renée Umstatt, Ph.D.
Department of Health Sciences
College of Human Environmental Sciences
The University of Alabama

Re: IRB # 09-OR-308 "A Theory-based Investigation of Leisure Time
Physical Activity among College Students"

Dear Dr. Umstatt:

The University of Alabama Institutional Review Board has reviewed the
revision to your previously approved expedited protocol. The board has
approved the change in your protocol.

Please remember that your approval period expires one year from the date
of your original approval, October 30, 2009, not the date of this revision
approval.

Should you need to submit any further correspondence regarding this
proposal, please include the assigned IRB application number.

Good luck with your research.

Sincerely,

Carpano T. Myles, MSM/CIIM
Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama



152 Rose Administration Building
Box 870117
Tuscaloosa, Alabama 35487-0117
(205) 348-5152
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APPENDIX C
WAIVERS OF INFORMED CONSENT

THE UNIVERSITY OF ALABAMA
HUMAN RESEARCH PROTECTIONS PROGRAM

FORM: Request for Waiver/Alteration of Informed Consent

Title of Research: Theory-based Investigation of Leisure Time Physical Activity
among College Students
Principal Investigators: M. Renee Umstattd, Ph.D. and Jill Marie Beville, M.A.

Directions: Complete this form and attach it to your application if you desire a waiver or alteration of informed consent (includes studies seeking no consent, studies involving deception/concealment, and studies using a short form informed consent document.) ALL conditions must be met for a waiver/alteration to be granted. Also state in your application that you are requesting a waiver of informed consent and describe what you will do in the procedure section of your application. The IRB often requires investigators to provide participants with a written information statement about the research when informed consent is waived; you may wish to include one in your initial application.

NOTE that the IRB does not allow passive consent and that waivers may not be granted for FDA-regulated research. You are welcome to call Research Compliance staff at 205-348-5152 to discuss your need for a waiver in advance of application submission.

This request is made to waive consent from students 19 years of age or older. We will recruit students from a variety of academic classes at the University of Alabama. This research presents minimal risk and the justification for this request is as follows.

1. Describe exactly what you wish to waive: For this study we wish to waive informed consent from UA students who are at least 19 years of age. Since we are also requesting a waiver of parental consent for students under the age of 19 it would not be realistic to have only those students 19 and older sign the informed consent document.

2. Describe why the research involves no more than minimal risk to the subjects: There are no foreseen risks to participating in this study. There may be mild psychological risks which could occur as a result of revealing their leisure time physical activity behaviors. Participants will not be placed in any situation that may be physically or psychologically stressful. This survey is completely voluntary **and anonymous** and their participation will in no way will impact their standing as a student at the University of Alabama.

3. Describe why the waiver or alteration will not adversely affect the rights and welfare of the subjects: **Participants will take full responsibility in deciding whether or not to participate in this study. A paragraph explaining the study will be included on the information sheet so that the participants may make a fully informed decision to participate. Participants' willingness to participate is therefore the participants' consent. The waiver of consent will not produce any danger to the participants' welfare or rights.**

4. Describe why the research could not practicably be carried out without the waiver or alteration of informed consent. The ultimate purpose of this research study is to gain information regarding the leisure time physical activity behaviors of college students. Targeting academic classes to distribute surveys will result in having students under the age of 19 and it is not realistic to obtain parental consent from the parents of those UA students. Thus, it would not be practical or necessary to only request signed informed consent from students who are 19 years of age or older.

5. Will subjects will be provided with additional pertinent information after or during the research? If yes, describe how information will be provided to participants: No, this survey is voluntary and anonymous and there is no follow-up with the students.

THE UNIVERSITY OF ALABAMA
HUMAN RESEARCH PROTECTIONS PROGRAM
FORM: Request for Waiver/Alteration of Informed Consent

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Directions: Complete this form and attach it to your application if you desire a waiver or alteration of informed consent (includes studies seeking no consent, studies involving deception/concealment, and studies using a short form informed consent document.) ALL conditions must be met for a waiver/alteration to be granted. Also state in your application that you are requesting a waiver of informed consent and describe what you will do in the procedure section of your application. The IRB often requires investigators to provide participants with a written information statement about the research when informed consent is waived; you may wish to include one in your initial application.

NOTE that the IRB does not allow passive consent and that waivers may not be granted for FDA-regulated research. You are welcome to call Research Compliance staff at 205-348-5152 to discuss your need for a waiver in advance of application submission.

This request is made to waive consent from parents of students less than 19 years of age. We will recruit students from a variety of academic classes at the University of Alabama. This research presents minimal risk and the justification for this request is as follows.

1. Describe exactly what you wish to waive: For this study we wish to waive parental consent from UA students less than 19 years of age. Since some of the participants will be under 19 we also wish to waive consent from those participants aged 19 and older.

2. Describe why the research involves no more than minimal risk to the subjects: There are no foreseen risks to participating in this study. There may be mild psychological risks which could occur as a result of revealing their leisure time physical activity behaviors. Participants will not be placed in any situation that may be physically or psychologically stressful. This survey is completely voluntary **and anonymous** and their participation will in no way will impact their standing as a student at the University of Alabama.

3. Describe why the waiver or alteration will not adversely affect the rights and welfare of the subjects: **Participants will take full responsibility in deciding whether or not to participate in this study. A paragraph explaining the study will be included on the information sheet so that the participants may make a fully informed decision to participate. Participants' willingness to participate is therefore the participants' consent. The waiver of consent will not produce any danger to the participants' welfare or rights.**

4. Describe why the research could not practicably be carried out without the waiver or alteration of informed consent. The ultimate purpose of this research study is to gain information regarding the leisure time physical activity behaviors of college students. Targeting academic classes to distribute surveys will result in having students under the age of 19 and it is not realistic to obtain parental consent from the parents of those UA students. Furthermore, many students are from out of town which would make it impossible for a parent to be present to give permission in a timely manner.

5. Will subjects be provided with additional pertinent information after or during the research? If yes, describe how information will be provided to participants: No, this survey is voluntary and anonymous and there is no follow-up with the students.