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Miami, Florida

EXTENDING THE THEORY OF PLANNED BEHAVIOR IN THE EXERCISE  
DOMAIN: A STUDY OF COMMUNITY COLLEGE STUDENTS IN AN URBAN  
MULTICULTURAL SETTING

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by

Marilyn Smith Gordon

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To: Interim Dean Kingsley Banya  
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This dissertation, written by Marilyn Smith Gordon, and entitled Extending the Theory of Planned Behavior in the Exercise Domain: A Study of Community College Students in an Urban Multicultural Setting, having been approved in respect to style and intellectual content, is referred to you for judgment.

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## DEDICATION

I dedicate this dissertation to my family; my loving husband and two beautiful, intelligent daughters who have been more than patient and supportive while I completed this project. To my parents, I thank them for instilling the idea in me at an early age that I would be attending college, and finally, my grandmother, Nanny, who nurtured my love of reading and books, always emphasizing the importance of an education.

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ABSTRACT OF THE DISSERTATION

EXTENDING THE THEORY OF PLANNED BEHAVIOR IN THE EXERCISE  
DOMAIN: A STUDY OF COMMUNITY COLLEGE STUDENTS IN AN URBAN  
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by

Marilyn Smith Gordon

Florida International University, 2008

Miami, Florida

Professor Ann Nevin, Major Professor

The purpose of this study was to assess the intention to exercise among ethnically and racially diverse community college students using the Theory of Planned Behavior (TPB). In addition to identifying the variables associated with motivation or intention of college students to engage in physical activity, this study tested the model of the Theory of Planned Behavior, asking: Does the TPB model explain intention to exercise among a racially/ethnically diverse group of college students?

The relevant variables were the TPB constructs (behavioral beliefs, normative beliefs, and control beliefs), which combined to form a measure of intention to exercise. Structural Equation Modeling was used to test the predictive power of the TPB constructs for predicting intention to exercise. Following procedures described by Ajzen (2002), the researcher developed a questionnaire encompassing the external variables of student demographics (age, gender, work status, student status, socio-economic status, access to exercise facilities, and past behavior), major constructs of the TPB, and two questions from the Godin Leisure Time Questionnaire (GLTQ; Godin & Shephard, 1985).

Participants were students ( $N = 255$ ) who enrolled in an on-campus wellness course at an urban community college.

The demographic profile of the sample revealed a racially/ethnically diverse study population. The original model that was used to reflect the TPB as developed by Ajzen was not supported by the data analyzed using SEM; however, a revised model that the researcher thought was theoretically a more accurate reflection of the causal relations between the TPB constructs was supported. The GLTQ questions were problematic for some students; those data could not be used in the modeling efforts. The GLTQ measure, however, revealed a significant correlation with intention to exercise ( $r = .27, p = .001$ ). Post-hoc comparisons revealed significant differences in normative beliefs and attitude toward exercising behavior between Black students and Hispanic students. Compared to Black students, Hispanic students were more likely to (a) perceive “friends” as approving of them being physically active and (b) rate being physically active for 30 minutes per day as “beneficial”. No statistically significant difference was found among groups on overall intention to exercise.

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## LIST OF ACRONYMS

ACRONYM	MEANING
ACSM	American College of Sports Medicine
ACHA	American College Health Association
ANOVA	Analysis of Variance
BB	Behavioral Belief
BDA	Behavioral Direct Attitude
BMI	Body Mass Index
BQHPA	Baecke Questionnaire of Habitual Physical Activity
CB	Control Belief
CBT	Cognitive Behavioral Therapy
CDC	Centers for Disease Control
CFI	Comparative Fit Index
GLTQ	Godin Leisure Time Questionnaire
GRAD	Get Ready for Activity Daily
HRA	Hierarchical Regression Analysis
MANCOVA	Multiple Analysis of Covariance
MANOVA	Multiple Analysis of Variance
NB	Normative Belief
NCHRBS	National College Health Risk Behavior Survey
NHANES	National Health and Nutrition Examination Survey
PAR	Physical Activity Readiness

## LIST OF ACRONYMS (Continued)

PBC	Perceived Behavioral Control
RMSEA	Root Mean Square Error of Approximation
SCT	Social Cognitive Theory
SEM	Structural Equation Modeling
SN	Subjective Norm
TPB	Theory of Planned Behavior
TPBQ	Theory of Planned Behavior Questionnaire
TRA	Theory of Reasoned Action
USDHHS	U.S. Department of Health and Human Services

# CHAPTER I

## INTRODUCTION

There is a nationwide obesity epidemic in America, according to the National Health and Nutrition Examination Survey (NHANES) conducted in 1999-2002, which reported approximately 65% of the adult population were either overweight or obese and 16% of children and adolescents aged 12-19 were overweight. Concurrent with the increase in the obese and overweight populations, an increasing number of Americans fail to participate in physical activity. Data obtained from the 2005 National Health Interview Survey showed that 62% of U.S. adults aged 18 years and older were not engaging in the recommended amount of leisure time physical activity as reported by the Centers for Disease Control (CDC, 2007a). The effects of physical activity on health and disease have been documented by the CDC (1995, 1999, 2006a, 2006b, 2008). At least eight health conditions are preventable or their severity lessened with regular physical activity: overall mortality, cardiovascular disease, cancer, non-insulin dependent diabetes mellitus, osteoarthritis, osteoporosis, obesity, and mental health. In addition, regular physical activity has been linked to an enhanced quality of life.

Overweight and obesity are considered risk factors for many chronic conditions. As cited by CDC (2006b), the National Health and Nutrition Examination Survey (1999-2002) reported the prevalence of obesity was highest for non-Hispanic Black women (49%) and lowest for Mexican American men (27.7 %). In the United States (U.S.), as reported by CDC (2005b), the highest prevalence of diabetes could be found in non-Hispanic Blacks (13.3%), followed by American Indians/Alaskan Natives (12.8%),

Hispanic/Latino Americans (9.5%), and non-Hispanic Whites (8.7%). The less affluent were more inactive than the affluent and people with a high school education or less were not as active as the college educated (Pearce, 1999). In a systematic review of prevalence of college students' physical activity, women, especially African-American women were among the least active students (Irwin, 2004). In addition to obesity and overweight, other negative effects of lack of exercise or fitness have been documented for college students (e.g., high cholesterol, a major determinant for future cardiovascular disease). For example, Spencer (2002) found that 29% had undesirably high total cholesterol levels, 10% had unfavorably low high-density lipoprotein (HDL) cholesterol, 10% had high systolic blood pressure, and 11% had high diastolic blood pressure.

Several researchers have studied coursework and activities designed to address the health challenges of college students. Improvement in knowledge and attitude were found among low-fitness level college students who completed a general physical education class in Brazil (Nahas, 1992), and higher awareness of the health benefits of exercise in reducing coronary heart disease for students who exercised on a regular basis (Green, Grant, Hill, Brizzolara, & Belmont, 2003). Mack and Shaddox (2004) found that undergraduate students who enrolled in a personal wellness course consisting of 2 lecture days and 2 days of aerobic activity changed their attitudes in a positive manner toward physical activity. DeVahl, King, and Williamson (2005) were successful in using academic incentives to increase physical activity with a goal of lowering body fat. Proximity to exercise facilities and home exercise equipment comprised another factor that was found to influence exercise patterns (Reed & Phillips, 2005). Other instructional interventions have also been found to be effective, such as web-assisted instruction to

change the social cognitive variables related to physical activity (Suminski & Petosa, 2006).

Many researchers have studied the factors that motivated college students to participate in physical activities (e.g., Calfas, Sallis, Lovato, & Campbell, 1994; Keating, Guan, Pinero, & Bridges, 2005; Kilpatrick, Hebert, & Bartholomew, 2005; Sparling & Snow, 2002). One study showed that 84.7% of those who exercised on a regular basis as college seniors were still physically active 5-10 years later (Calfas et al., 1994). Another study found that 81.3% of those persons who were physically inactive as college seniors later reported they had maintained a sedentary lifestyle (Sparling & Snow, 2002). In a meta-analysis of physical activity of college students, Keating et al. (2005) reported those motivational factors for college students to exercise included looking good, gaining muscle, losing weight, and having fun. In general, college students tended to get involved in activities that they already felt competent performing with weight training and aerobics being most popular. Weight gain and behavioral patterns established during college may contribute to overweight and obesity in adulthood.

To summarize, some college students are at increased risk of morbidity and mortality due to the detrimental effects of a sedentary lifestyle. Researchers have shown that the majority of college students were inactive and that lifetime habits were established in the college years. Wellness courses could be designed to address identified attitudes, motivations, and actions toward a physically active lifestyle among a culturally diverse student population, which would lead to a higher quality of life for the individual.

## Statement of the Problem

As described above, many researchers have studied factors that motivate college students to participate in physical activities. However, there has been limited research related to the possible influence of racial and ethnic diversity of college students and their motivation to engage in fitness activities. The two-fold purpose of the study was to identify factors that contribute to and promote physical activity for college students, such as how race, culture, and ethnicity affect attitude towards physical activity participation, and to reveal more about the motivations of college students to engage in physical activity on a regular basis. Towards that end, the secondary purpose of the study was to determine if intention to exercise varies among different groups of college students.

## Significance

The study may be significant for three reasons. First, there is increased racial and ethnic diversity of the student population on college campuses and much of the prior research has been conducted on samples dominated by White students. Second, there is a need for increased exercise among college students due to the health benefits of a physically active lifestyle in decreasing future risk of obesity, diabetes, hypertension, and stroke. The present study will provide insights into ways that this might be accomplished. Third, the Theory of Planned Behavior could help detect differences in attitudes (behavioral beliefs), subjective norms (normative beliefs), and perceived control (control beliefs) about exercise among the different groups and thus assist wellness educators with the vital information needed to design appropriate coursework, discussions, and physical activity experiences.

The theoretical framework that was used to investigate these factors was the Theory of Planned Behavior (TPB) developed by Ajzen (1991). Ajzen's theory suggests that explanatory constructs within the TPB could predict intention to exercise. The TPB also can be used to identify differences in behavioral, normative, and control beliefs among various ethnic groups that could be useful to educators when designing successful wellness programs and exercise interventions. In addition to identifying the motivation or intention of college students to engage in fitness activity, this study tested the model of the TPB using structural equation modeling to determine if the TPB constructs and the external variables (age, gender, race/ethnicity, work status, student status, access to fitness equipment, past behavior) predicted the intention of college students to engage in fitness activity.

#### Research Questions

Do the TPB constructs explain intention to exercise among a multi-culturally diverse group of college students?

Specific research questions included:

1. Were the identified racial or ethnic groups different in age, gender, SES, work status, school status, access to exercise equipment, and past exercise behavior?
2. What was the relationship between behavioral beliefs and the intention to exercise among various groups of college students?
3. What was the relationship between normative beliefs and the intention to exercise among college students of various groups?

4. What was the relationship between perceived behavioral control beliefs and the intention to exercise among college students of various groups?
5. To what extent did the Theory of Planned Behavior constructs predict the intention to exercise among college students of various groups?
6. Did the intention to exercise correlate with college students' report of their physical activity in the past seven days?

#### Theoretical Framework

The theoretical framework for understanding college students' motivation and intention to perform physical activity or exercise comes from Icek Ajzen's (1991) Theory of Planned Behavior (TPB). According to the theory, an individual's intention to perform a particular behavior is the major determinant of actual behavior (Ajzen, 1998).

Intentions are an indicator of an individual's effort to try to accomplish a goal. As individuals form their intentions, three factors are considered. The first is how favorable or unfavorable they feel about performing the behavior (also called the attitude towards performing the behavior), the second, the perceived social pressure to perform the behavior, and lastly the individuals' perception of control over the behavior. In general, a more favorable attitude, higher social pressure, and higher perception of control would result in a greater intention to perform the identified behavior (Ajzen, 1998). As early as 1985, Ajzen posed the notion that intention can only be expected to predict an individual's "attempt" to perform a specific behavior, but not necessarily predict his or her actual performance because intentions could change after they had been assessed. For example, an individual might intend to exercise after work or school and plan ahead by bringing the appropriate attire with them. At the last minute, he or she might be required

to work late to finish an important project or term paper and decide to forgo the exercise session. In this scenario, the planned intentions do not lead to the desired behavior. This may explain why the theory has not been consistent in predicting actual behavior.

Following a thorough analysis of the research, the results of two meta-analyses which reviewed 102 studies concluded that the TPB performed well when analyzing the relationship between intention and exercise behavior in studies of physical activity (Hagger, Chatzisarantis, & Biddle, 2002; Hausenblas, Carron, & Mack, 1997). The Hausenblas et al. (1997) study included studies published from 1975-1996. Two criteria had to be met, the studies had to focus on exercise and incorporate at least two of the TPB constructs. Thirty-one quantitative studies were reviewed in the analysis. In the Hagger et al. (2002) study, 72 quantitative studies were reviewed. Of the 72 studies, 16 studies focused on college or university students, both men and women.

A chronological overview of the most recent and pertinent studies helped lay the groundwork toward understanding how the TPB could be a useful tool to assist in the understanding of attitudes, motivations, perceived barriers, and social support of a group of racially and ethnically diverse college students. These five studies are summarized in detail (chapter 2) to illustrate how the TPB constructs have been defined and examined (i.e., Blanchard et. al., 2003; Chatzisarantis & Hagger, 2005; Courneya, Plotnikoff, Hotz, & Birkett, 2000; Norman & Conner, 2005; Rhodes, Jones, & Courneya, 2002).

Collectively, both male and female college students formed the populations for three of the five studies while in the Courneya et al. (2000) study, the population consisted of a sample of adults from the community and Chatzisarantis and Hagger's (2005) population consisted of younger students, mean age 14.6 years. All five studies

used quantitative designs and focused on the TPB and exercise or physical activity. Data were collected via a questionnaire except for Courneya et al. (2000) who utilized telephone interviews. In that study, intention to exercise was measured using two to five items on the questionnaires and assessed by a single item during the telephone interview (Courneya et al., 2000).

Many researchers, such as Rhodes et al. (2002) have argued that Ajzen's TPB has emerged as one of the foremost social cognitive frameworks for understanding exercise motivation and behavior. Moreover, Fishbein and Ajzen (2005) remarked that the primary goal of interventions framed within a TPB was to change intentions whereas the primary goal of Cognitive Behavior Therapy (CBT) was to help people carry out their intentions. Interventions based on the TPB were usually directed at individuals who did not currently intend to perform the desired behavior. The TPB could be used to identify behavioral, normative, and/or control beliefs and that information used to target interventions to increase the target behavior, whereas CBT usually assists people in attaining existing goals or intentions. Fishbein and Ajzen (2005) commented that just producing favorable intentions may not be enough to produce a change in the target behavior but that intentions are an indicator of how hard the individual is willing to work towards the goal behavior. Ogden (2003) challenged the TPB and other cognitive models. She claimed that certain social cognition models cannot be truly tested; that there is not an adequate criterion for the rejection of the model or theory so therefore it cannot meet the criteria set for a good theory. The criticism was that most such models are never rejected; instead, the researchers offer numerous explanations for why the anticipated outcome did not occur.

Within the spirit of adding to the literature, the researcher has assessed the suitability of TPB for explaining college students' intention or motivation to engage in fitness activities. The methodology for this study included the development and distribution of a TPB questionnaire to determine how the intention to exercise and the components of the TPB might vary amongst a culturally diverse college student population.

## Definitions

### *Acculturation*

Acculturation was defined for this study as the cultural modification of an individual, group, or people by adapting to or borrowing traits from another culture; also, a merging of cultures because of prolonged contact (Merriam-Webster's Collegiate Dictionary, 1998). Acculturation could also be defined as cultural change; a change in the cultural behavior and thinking of a person or groups of people through contact with another culture, or absorption of culture; the process by which somebody absorbs the culture of a society from birth onward (Encarta, 2003).

### *Behavioral Beliefs or Attitude (BB)*

Behavioral beliefs were defined by Ajzen as the perception that performing the behavior in question leads to one or more consequences (i.e., perceived advantages and disadvantages of performing the behavior) and an attitude as "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188).

*Colloquial definition.* College students who participated in fitness and exercise classes during the fall 2006 semester at the author's college (Gordon, 2006) wrote the

following descriptors when asked about the benefits of fitness and exercise: “increased cardiovascular health and endurance”, “fitness”, “weight control”, and “well-being”.

Thus, in the present study, a colloquial definition of this construct is as follows: people’s perceptions that fitness and exercise lead to favorable outcomes such as cardiovascular health and endurance, weight control, fitness, and an overall sense of well-being.

*Operational definition.* Participants rated statements on the Fitness TPB Questionnaire related to their behavioral beliefs (see Appendix A, part 2), specifically items related to participants’ beliefs about exercising leading to cardiovascular health, fitness level, healthy weight levels, and emotional well-being.

*Control Beliefs or Perceived Behavioral Control (CB)*

Control beliefs were defined by Ajzen as perceptions of specific factors that make it easy or difficult to perform the behavior and the more general perceived behavioral control as “the perceived ease or difficulty of performing the behavior.” The latter is assumed to reflect past experience as well as anticipated impediments and obstacles. (Ajzen, 1991, p. 188).

*Colloquial definition.* College students who participated in fitness and exercise classes during the fall 2006 semester at the author’s college (Gordon, 2006) described barriers to their exercise, which included “work”, “school”, and “time.” In the present study, a colloquial definition of the construct is as follows: people’s beliefs about how work, school, and time influence their perceived control to engage in physical activity on a regular basis.

*Operational definition.* Participants rated statements on the TPB Questionnaire related to control beliefs (see Appendix A, part 2), specifically items assessing

participants' perceptions about the ease or difficulty of exercising, particularly their beliefs about the influence of work and school responsibilities, fatigue, or lack of time.

#### *Culture/Ethnicity*

Culture is defined as customary beliefs, social forms, and material traits of a racial, religious or social group, the set of shared attitudes, values, and goals (Merriam-Webster's Collegiate Dictionary, 1998). Culture could also be defined in part as shared attitudes; a particular set of attitudes that characterized a group of people (Encarta, 2003).

*Operational definition.* The racial or ethnic group that was self-selected on the demographic portion of the questionnaire (see Appendix A, part 1) identified the individual's perceived culture as reflected in the selected category.

#### *Intention/Motivation to Exercise Regularly*

Intention is defined as an aim or objective: the quality of purposefulness (Encarta, 2003). Ajzen (1991) defines intention as a decision to perform a behavior that varies in decision strength or in underlying motivation. "Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior" (Ajzen, 1991, p. 181).

*Operational definition.* Intention is measured on the basis of responses to the TPB questionnaire that reflect intent to exercise regularly (see Appendix A, part 2).

#### *Normative Beliefs or Subjective Norm (NB)*

One of the constructs of the TPB, normative beliefs (subjective norms) is defined by Ajzen as "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, p. 188).

*Colloquial definition.* College students who participated in fitness and exercise classes during the fall 2006 semester at the author's college (Gordon, 2006) wrote the following descriptors as those who may approve or disapprove of physical activity participation: "friends", "mother or other stated specific family member" or "friends and family grouped together". In the present study, a colloquial definition of the construct is as follows: people's perceptions that both family and friends influence their decisions to be physically active on a regular basis.

*Operational definition.* Participants rated statements on the TPB Questionnaire related to normative beliefs (see Appendix A, part 2), specifically items assessing participants' perceptions about the approval or disapproval from mother, other family members, friends, and other people about exercising regularly.

#### *Physical Activity and Exercise*

"Physical activity" and "exercise" are frequently used interchangeably even though they have slightly different meanings. Physical activity could be defined as any bodily movement carried out by the skeletal muscles requiring energy. Examples of moderate physical activity included brisk walking, cycling, swimming, dancing, and yard work. At least 30 minutes of moderate-intensity physical activity per day have been recommended (Dietary Guidelines for Americans, USDHHS, USDA, 2005). This recommendation is consistent with other authoritative expert recommendations from the Surgeon General (1996), the American College of Sports Medicine (2006), and the CDC (2007b).

*Operational definition.* Physical activity is measured via a self-report questionnaire about leisure time physical activity using the Godin Leisure-Time

Questionnaire (Godin & Shepard, 1985). This research tool measured physical activity during a typical 7-day period based on responses to four questions.

Exercise is described as a subset of physical activity that is structured, repetitive, planned, and specifically designed to improve or maintain fitness (ACSM, 2006). The term “exercise” has been defined as “strenuous activities which usually make you sweat, breathe harder, and feel your heart beat” (Courneya et al., 2000, p. 303). In order for fitness levels to improve, people must perform enough physical activity with adequate intensity to place a demand or stress on the body. In response, the body adapts over time resulting in improved fitness and decreased risk of disease.

*Operational definition.* In the present study, exercise is measured by a self-report questionnaire about leisure time physical activity using the Godin Leisure-Time Questionnaire (Godin & Shepard, 1985).

#### *Theory of Planned Behavior (TPB)*

Proposed by Icek Ajzen (1985), the TPB is a theory about the association between attitudes, norms, perceived control and behavior. It is an extension of the Theory of Reasoned Action (TRA) which was proposed by Ajzen and Martin Fishbein in 1975. The TPB was based upon the premise that human beings usually behave in a way that they take into consideration what they perceive as the available information and consider the implications of their actions (Ajzen, 1985). The TRA focused on volitional behaviors and incorporated two factors, the attitude toward the behavior and subjective norms. In general, people intend to perform a behavior when they feel positively about performing it and believe that important people in their life think that they should execute it. TRA does not take into account perceived control with respect to performing the behavior.

According to Ajzen (1991), such beliefs can influence a person's decision to perform a behavior in that if they do not think they can perform a behavior, then they may decide not to even try to perform it. Thus, the TPB added the construct of perceived behavioral control (Ajzen, 1991). Perceived behavioral control refers to people's perception of the ease or difficulty of performing the behavior. The three constructs determine an individual's intention in terms of trying to perform a behavior rather than the actual performance of that behavior.

### Delimitations

Delimitations to this study included that it was composed of student volunteers enrolled in wellness courses at one campus of a multi-campus, multi-ethnic community college in the southeastern United States and may not be generalizable to 4-year institutions or colleges with a different student population. The categories chosen to represent race or ethnicity in the questionnaire reflect the categories used by the educational institution where the research was conducted

### Overview of Chapters

In chapter 2, the researcher reviews and critiques studies on physical activity among college students, ethnicity and exercise, and the Theory of Planned Behavior. In chapter 3, the researcher provides a description of the research site, participants, questionnaires, and procedures for conducting the study and analyzing the data. In chapter 4, the researcher describes the results of the data analyses. In chapter 5, the researcher further summarizes the findings and also interprets the findings in relation to the research questions and prior research. The researcher concludes with

recommendations for follow up investigations and implications for health educators, administrators, and higher education personnel.

## CHAPTER II

### LITERATURE REVIEW

This literature review focuses on the areas of physical activity and exercise among college students, the differences that had been identified among ethnic groups, and the Theory of Planned Behavior. The researcher conducted a search for articles published in the years 2000-2007 in peer-reviewed journals and indexed in the following databases: Omni file Full Text Mega-Wilson Web, Pro Quest, Cambridge Scientific Abstracts, Educational Resources Information Clearinghouse, Psych Info, Physical Education Index, Medline, and Journal Storage. Keywords included Theory of Planned Behavior, exercise, physical activity, ethnicity, culture, and college student. Overall, 19 empirical studies emerged, including 17 studies that used survey, questionnaires, correlational, quasi-experimental, and descriptive designs, and two studies that used an interview design and reflective reporting. The studies were critiqued according to the researchers' adherence to accepted criteria for quantitative and qualitative research designs. The results of this critique are organized into the following sections: (a) the prevalence of physical activity among college students, (b) college courses and physical activity research, (c) race/ethnicity or culture and physical activity, and (d) the Theory of Planned Behavior.

#### Physical Activity and the College Student

Physical education and activity provided opportunities to establish habits for life-long physical activity (Corbin, 2002; Floyd, 2003). College students tend to engage in sedentary activities such as attending lectures, conducting library research, using educational technology (e.g., computer research, online courses, and email) and studying

(Buckworth & Nigg, 2004). Many community college students also work full time or part time and had little spare time for campus recreation and intramural sports. Moreover, many programs of study prepare students to become part of a workforce in which sedentary activities are prevalent. Sedentary behaviors increase the risk of heart disease, obesity, and diabetes (Sparling, 2007). Students of all ages who have been educated about the health benefits that accrue from frequent physical activity often become sufficiently motivated to engage in regular physical activity (Irwin, 2004; Keating, Guan, Pinero, & Bridges, 2005).

The Healthy People 2010 report published by the United States Department of Health and Human Services and Office of Disease Prevention and Health Promotion (2000) emphasized the importance of involvement in physical activity as one of the primary factors toward maintaining good health. The U. S. Surgeon General's Report (1996) cited the most frequently performed activities among adults were walking, gardening, stretching, resistance training, jogging, aerobic dance, cycling, stair climbing, swimming, and tennis. However, the prevailing data at the time indicated that the American public was not physically active. The American College Health Association (ACHA) conducted a national survey, the National College Health Assessment. Developed by an interdisciplinary team of health education researchers, the 30-minute survey covered a wide array of health issues pertaining to college students including weight, nutrition, and exercise. ACHA (2006) reported that only 43.6% of college students ( $N = 23,143$ ) reported vigorous exercise for at least 20 minutes or moderate exercise for 30 minutes on at least 3 of the previous 7 days. In other words, the majority of students (56.4%) exercised less than three times per week.

Four studies related to physical activity and the college student emerged from the literature search (i.e., Buckworth & Nigg, 2004; Butler, Black, Blue, & Gretebeck, 2004; Huang et al., 2003; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Each will be discussed and critiqued below in chronological order. This technique helps to show how the research has evolved over the past several years.

In a cross-sectional survey of 738 college students (382 men or 52.1% and 354 women or 47.9%) who attended a Midwest university, researchers assessed weight status, diet, and physical activity (Huang et al., 2003). Demographic data of the participants indicated 90% were White, 2.8% Hispanic, 2.7% Asian/Pacific islander, 1.8% “other”, 1.6% African American, and .4% Native American. Self-reported height and weight were used to calculate BMI. For students'  $\leq 19$  years of age, BMI percentiles were used as well as the standard BMI charts and categories for adults. If students were  $\geq 20$  years old, only the standards applied to adults were used. Dietary habits were assessed using the Berkeley fruit, vegetable, and fiber screener (Block, 2000), an instrument that had been previously validated by the researchers.

Physical activity was assessed using three questions from the Youth Risk Behavior Survey (CDC, 1995). The questions were related to physical activity in the past seven days and participation in a physical education class. The researchers did not stratify by ethnicity as the majority of the students were White and no statistically significant differences were observed among the groups. The results revealed that BMI varied depending on the method of evaluation chosen. If BMI percentile was used for students  $\leq 19$  years of age, a lower overall prevalence of overweight and obesity (16.2% overweight, 4.2% obese) were found compared to utilizing BMI adults charts directly where 21.6%

were categorized as overweight and 4.9% obese. Average fruit and vegetable consumption was  $4.2 \pm 2.0$  servings per day and fiber intake was  $18.0 \pm 5.6$  g per day. Two thirds of this convenience sample of students consumed less than the 5 recommended servings of fruits and vegetables per day and 67.1% consumed less than 20 g of fiber.

The average aerobic physical activity reported was  $2.8 \pm 2.1$  days in the past seven days. Male students reported more physical activity days than female students, which is consistent with the literature. Students engaged in strength training activities on an average of 2.2 days (with a range of 2.1 days) in the past 7 days and participated in a physical education class on an average of .9 days (with a range of 1.8 days) in the past seven days. Neither result was significant for comparisons as a function of gender or age.

Buckworth and Nigg (2004) examined physical activity, exercise, and sedentary behavior in college students enrolled in activity classes at a university in the Midwest USA. The classes were part of another study (Buckworth, 2001) to test curriculum modifications and exercise adherence among college students. Questionnaires were distributed during the fall (six classes,  $n = 215$ ) and the spring (four classes,  $n = 278$ ) among college students during the beginning of the course. Ethnic breakdown was 73.8% White, 16.2% African American, 3.8% Asian, 2.2% Hispanic, and 4% other. Average age was  $21 \pm 4.0$  years and 58.3% were women.

Researchers asked three questions pertaining to duration (minutes), frequency (days per week), and length of time (months) spent exercising at a particular level. Test-retest reliabilities were assessed at three one-week intervals (.93, .90, and .97, respectively). Physical activity habits were assessed using the CARDIA Physical Activity

History Questionnaire (Jacobs et al., 1989), a measure of moderate and vigorous activities during the previous 12 months. Sedentary behaviors were assessed with three questions regarding time spent watching television and videos, using a computer, and study time. One-week reliabilities were  $r = .62$  for studying,  $r = .72$  for watching television/videos, and  $r = .87$  for computer use in college students.

Analysis of Variance (ANOVA) and multiple regressions with Tukey's Honestly Significant Difference (HSD) post hoc comparisons analyzed for differences in sedentary behaviors by sex, age, and differences in physical activity indicators. Pearson correlation coefficients determined the relationships among the study variables. Students reported that they spent nearly 30 hours per week involved in sedentary activity ( $M = 29.72$ ,  $SD = 15.19$ ,  $n = 474$ ). The majority of the time (13.25 hours) was spent studying. However, more students engaged in moderate activity (30.6% in  $\geq 5$  of the previous 7 days) and vigorous activity (53.2%  $\geq 3$  of the previous 7 days) compared to students sampled in the 1995 NCHRBS. In addition, 73.1% of the study participants exercised at least three times in the past 7 days compared to the NCHRBS where only 40.5% exercised. Statistically significant differences were found between men and women.

Men reported watching more television, videos, and time on the computer but also more time spent in higher levels of exercise. For women only, television watching was negatively correlated with frequency of exercise and history of vigorous physical activity. Television appeared to compete for college women's leisure time. The researchers commented that television was assessable and required less effort than the computer. Men were more physically active than women were but also reported more time in

sedentary activities such as television viewing and computer time (Buckworth & Nigg, 2004).

At approximately the same time, Butler et al. (2004) and Racette et al. (2005) reported changes in diet, physical activity and body weight among college freshman. Butler, et al. (2004) used a quasi-experimental research design, which focused on one group's changes in diet, physical activity, and body weight for women as they moved from a home setting to a university setting. Students were recruited from five different residence halls at a midwestern university.

Of the 82 students who volunteered to participate, 54 completed both the pretest (home setting) and posttest (university setting). Their mean age at the beginning of the study was 17.79 years and the ethnic background was White (92.6%), African American (3.66%), and 3.66% Asian, Pacific Islander, or Native American. Their mean BMI ( $\text{kg}/\text{m}^2$ ) was calculated by the researchers to be 23.64 (normal,  $SD = 3.86$ ). Incoming female freshman were recruited at orientation via flyers and letters and by verbal persuasion. The investigators collected the data at the residence halls. Students were informed that a posttest meeting would be required approximately 20 weeks later and that they would be contacted by phone and email to remind them of their follow up appointments. The variables related to fitness and physical activity included self-reports of leisure, total physical activity, and occupational sports; a measured estimated  $\text{VO}_2$  max (an indicator of cardiovascular fitness), and recovery heart rate.

Instrumentation included the Baecke Questionnaire of Habitual Physical Activity (BQHPA, 1982), in which students reported their participation in physical activity in the previous 4 months. Prior research with the BQHPA yielded satisfactory test-retest

reliability and positive correlations with activity diaries, oxygen consumption measures, and accelerometer readings. During the test, students completed a 3-minute step test to estimate VO<sub>2</sub> max. Other data obtained by an exercise physiologist included measures of a 15-second recovery heart rate, participants' height, weight, and three distinct skin fold measurements.

The data were utilized to calculate Body Mass Index (BMI) and estimate body fat percentages. Dietary intake was assessed using the Block Food Frequency Questionnaire (Block et al., 1986), an instrument used in the National Health and Nutrition Examination Survey. Statistical analyses included independent/dependent Student's *t*-test, a Mann-Whitney U nonparametric test when the data were decidedly ordinal and independent groups tests were appropriate, and a Wilcoxin paired sign test when the data were ordinal and the focus was on dependent groups.

There was no statistically significant difference in the pretest data between the respondents and nonrespondents at the posttest; thus, a self-selection bias due to attrition was not evident. Of the 54 female participants, 19.51% were either overweight or obese compared to the national average of 20.5% of college students reported in the National College Health Risk Behavior Survey (1995). In this study sample, 14.63% were overweight compared to women's averages for ages 18-24 at 13.9% ± 1.8 and women's age ≥ 25 at 29 ± 3.1 (CDC, 1995) and 4.88% were obese. Statistically significant differences over time were found for variables related to diet with a decline in meat and vegetable intake, total calories, and milk intake. There were also significant differences for variables related to diet and body weight and total physical activity. In relation to diet, caloric intake decreased by 348.78 calories per day, however, there was an increase in

percent of fat and alcohol consumed. There were significant increases in body weight, BMI, fat mass (increase), and fat free mass (decrease). Decreases were also observed in total physical, work, and sport activities, but also an increase in leisure activities. Both measures of fitness (VO<sub>2</sub> max and recovery heart rate) worsened but did not reach levels of significance.

This study showed that freshmen women tend to gain body fat weight the first year of college away from home similar to outcomes from other recent studies (i. e., Hoffman, Policastro, Quick & Lee, 2006; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Even though caloric intake decreased, the students gained body mass.

Racette et al. (2005) examined weight changes, exercise, and dietary patterns during the freshman and sophomore years of college at a mid-size university. In the beginning of the first year, participants were recruited via flyers, email, and campus mail. They received financial incentives to participate. Students completed demographic, health history, self-report exercise, and dietary questionnaires. Students' height and weight were measured by the researchers and used to determine BMI (kg/m<sup>2</sup>). The participants ( $n = 764$ ) included 274 freshmen in 1999 and 490 freshmen in 2000. The mean age was 18.1 years ( $\pm 0.3$  years). The ethnic distribution was White (74%), Asian (10%), African American (5%), Hispanic (3%), and unknown background (8%). Fifty-three percent were female and 47% were male.

The researchers reported similarities in ethnic and gender distributions between the two classes. Chi-square tests for the categorical measures and two-sample *t*-tests for continuous outcome measures were computed. Changes in time from the beginning of the student's freshman year to the end of the sophomore year were compared using paired-

samples *t*- tests. For changes in status for categorical outcomes, the McNemar change test was employed. The .05 significance level was used for all tests.

Results showed that the overall exercise participation did not change significantly over time but that aerobic exercise activity declined, with more students reporting that they increased their participation in stretching exercises. Overall body weight had increased in 70% of the students, decreased in 26%, and only 3% stayed the same. Reports of consumption of fruit, vegetable, and high fat fast foods did not show statistically significant change. No correlations between changes in body weight and changes in exercise and diet were statistically significant.

In a meta-analysis, Irwin (2004) reviewed 19 studies from 27 countries, which revealed there was a lack of a standardized instrument to measure physical activity, and most studies relied on self-report measures. In another meta-analysis of college students' physical activity behaviors, Keating et al. (2005) evaluated 16 descriptive studies and three intervention studies, none of which employed a true experimental design. Every study used a quasi-experimental design relying on intact groups. They also found most studies relied on self-reported physical activity data so the accuracy of the measures was in question. In Table 1, on the following page, the four research articles which revealed that college students were sufficiently active to maintain good health are briefly noted by author, focus, and method.

#### *Interventions Designed to Increase the Physical Activity Levels of College Students*

Many interventions have been designed to influence student health and physical activity patterns. Researchers have developed special health courses (Clemmens, Engler, & Chin, 2004), assessed how health-related fitness and wellness courses influenced

attitudes toward physical activity (Mack & Shaddox, 2004), and experimented with web-assisted instruction in the design of health and wellness courses (Suminski & Petosa, 2006). Educators have used academic incentives to increase physical activity among college students (DeVahl, King, & Williamson, 2005) and have examined whether the proximity of exercise facilities or exercise home equipment are factors to be considered when assessing students physical activity participation (Reed & Phillips, 2005).

Table 1

*Physical Activity and the College Student*

Authors (Date)	Focus	Methods
Huang, Harris, Lee, Nazir, Born, and Kaur (2003)	Assessment of weight status, diet, and physical activity in college students	Cross-sectional survey $\chi^2$ test <i>t</i> -test
Buckworth and Nigg (2004)	Relationship between physical activity, exercise, and sedentary behaviors in college students	Survey Questionnaires Descriptive statistics
Butler, Black, Blue, and Gretebeck (2004)	Changes in diet, physical activity, and body weight in female college freshman	ANOVA Multiple Regression Pre-test/Post-test Repeated Measures Descriptive Statistics
Racette, Deusinger, Strube, Highstein, and Deusinger (2005)	Weight changes, exercise, and dietary patterns during freshman and sophomore	Questionnaires Longitudinal design Paired samples <i>t</i> -test $\chi^2$ test

Few randomized controlled physical activity interventions were found in the literature; Calfas et al. (2000) was one example that was located. Six studies published within the past 7 years are listed in Table 2 and will be critiqued in chronological order.

Table 2

*Interventions Designed to Increase College Students' Physical Activity Levels*

Authors (Date)	Focus	Methods
Calfas, Sallis, Nichols, Sarkin, Johnson, Caparosa, Thompson, Gehrman, and Alcaraz (2000)	Physical activity intervention among young adults	Randomized controlled intervention Interviews, Questionnaires ANCOVA
Clemmens, Engler, and Chinn (2004)	College students' experience with an introductory health course	Reflective summaries Qualitative analysis
Mack and Shaddox (2004)	Attitude changes toward physical activity of wellness university students	Attitude inventory MANOVA
DeVahl, King, and Williamson (2005)	Comparison of academic reward structures on students' physical activity	Descriptive statistics Stepwise regression
Reed and Phillips (2005)	Relationships between physical activity and the proximity of exercise facilities	Random sampling Questionnaire Descriptive statistics Correlation
Suminski and Petosa (2006)	Web-assisted instruction for changing social cognitive variables related to physical activity	Questionnaire ANOVA $\chi^2$ test Paired <i>t</i> test ANCOVA

One intervention study that involved physical activity was conducted by Calfas et al. (2000). The purpose of Project Graduate Ready for Activity Daily (GRAD) was to evaluate an intervention designed to promote the initiation and maintenance of physical activity among 338 university seniors in transition from university to post-university life. Students who were unable to perform moderate-intensity exercise were excluded. After baseline assessments and screenings, students were randomly assigned to a control course that covered general health topics or the intervention, a course designed to promote the implementation and maintenance of physical activity. Students received course credit for both options. Students were assessed at baseline, following course completion, at 1-year and 2-year anniversaries of the baseline assessments. The GRAD intervention was based upon exercise and behavioral science research that targeted self-efficacy, social support, perceived benefits, barriers, enjoyment, and the process of change. Students in the intervention group attended 15 weeks of lectures and weekly lab experiences, which included supervised physical activity. The interventions were designed to change physical activity outcomes and psychosocial mediators such as social support.

An 18-month post graduation follow up consisted of phone and mail methods conducted by peer health facilitators known to the students. Each call followed a semi-structured script and had a set topic. After the first 6 months of follow up, the participants received very brief reminder phone calls to be physically active and to contact their counselor for assistance were left as phone messages. The participants also received newsletters through the mail, which focused on exercise topics, behavior modification, nutrition, equipment, and other pertinent topics. In contrast, the GRAD control students attended 2 hours of lecture weekly for 15 weeks. The course covered general health

topics. The course focused on knowledge acquisition. Participants received the *Berkeley Wellness Newsletter* bimonthly for their 18-month follow up contact.

The measures for the baseline and follow up assessments included a 7-day Physical Activity Readiness (PAR) questionnaire (Blair, 1984), which is a self-report measure of physical activity, administered by trained personnel over the phone. The second was a “stage of change” for exercise assessment used to classify participants into “active” or “less active” lab sessions. The third measure used five mediating variables from the Transtheoretical Model (Prochaska & DiClemente, 1983) or Social Cognitive Theory (Bandura, 1986), assessing social support, benefits, barriers, enjoyment, and process of change. This was assessed as part of a 20-page questionnaire. Statistical analysis included a series of repeated measures ANCOVA which analyzed the effects of the intervention on physical activity outcomes and scores on nine mediator variables. Regression analyses were performed to determine which mediators were significantly associated with change in physical activity.

The researchers concluded based on their analyses that the intervention was not effective in promoting long-term physical activity. Two years after the baseline assessment, there were no statistically significant differences in means on any of the physical activity outcomes between students in the intervention and control groups. The second study concerning interventions to increase activity was conducted by Clemmens et al. (2004) who studied the impact of an introductory health course. The course was designed by a nursing school to address the health challenges on college campuses. The objectives of the study for the nursing students included increasing awareness of risk factors, personal resources, barriers, personal health needs and strategies, that could be

employed in their professional practice to improve their health. During a 15-week semester, students completed individual and group projects. The course was web-enhanced with an electronic text and internet links. After course completion, students authored reflective summaries of their wellness journey. With student consent, this information became the data that were used in the research portion of the study. Out of 200 potential subjects, 115 agreed to share their reflective summaries. The verbatim text of their summaries was entered into a database and subsequently coded by two of the course instructors into patterns and themes. Twelve categories emerged from the data. A secondary analysis led to the development of a dominant construct of the wellness journey with two main categories: Living Health and Learning Health.

Under the category of Living Health, students reported positive changes in diet, exercise habits, and decreased negative behaviors such as smoking and alcohol use. Under the category of Learning Health, students responded about their increased awareness of the benefits of being healthy, the environment, diet, exercise, and decisions about alcohol and tobacco products. Students also commented on discovering how much control they have over their state of wellness and risk of future disease. The research findings were discussed with campus officials and this resulted in administrative approval for future health prevention and health promotion programs on campus. In its second year of being offered, the introductory health course was in high demand throughout the university. This study showed that coursework could develop meaningful knowledge about factors associated with health and fitness. It is one example of qualitative research design because it elicited thoughts and opinions from the students, which may have otherwise been unknown or not considered.

In the third intervention study, published the same year, health-related fitness and wellness courses were found to influence attitudes toward physical activity in a study conducted by Mack and Shaddox (2004), who surveyed a voluntary sample of 1,625 undergraduate students including 63.3% women ( $n = 1,028$ ) and 36.7% men ( $n = 597$ ). Of the participants, 16.7% were first year, 37.3% second year, 28.3% third year, 17.0% fourth year, and 0.6% were in their fifth year of college. They completed a 50-statement inventory assessing their attitudes toward exercise and physical activity the first and last day of a wellness course. The personal wellness course consisted of 2 days of lecture and 2 days of aerobic activity. Students chose from a wide variety of activity options such as water aerobics, circuit aerobics/weights, biking, aerobic cross training, power walking, and cardio-kick boxing. Paired samples  $t$ -tests revealed a significant improvement, ( $t(1624) = 2.91, p < .01$ ) in attitude toward physical activity scores. Repeated measures, MANOVA also revealed significant differences for gender  $F(1, 1579) = 30.23, p < .01$  with women having higher pre and post test attitude scores and during the semester on exercise history  $F(2, 1579) = 35.16, p < 0 .01$ ).

The following year, in the fourth intervention study, DeVahl et al. (2005) arranged academic incentives with 210 physical therapy students to increase their physical activity. The students enrolled in a cardiopulmonary patient management course were invited to participate in the study and subsequently were divided into two groups by random assignment, the exam bonus (EB) group and the grade bonus (GB) group. The EB group consisted of 92 participants (64 women and 28 men with an average age  $26.8 \pm 5.6$  years) and 17 nonparticipants. The GB group consisted of 89 participants (60 women and 29 men with an average age  $23.8 \pm 5.2$  years) and 12 nonparticipants. Descriptive

statistics showed that the groups were not significantly different in age, gender, body fat percentage, or prior exercise program. Both groups of students participated in a 12-week exercise program designed to lower body fat. Students in the EB group were informed that those who lost the greatest percentage of body fat (%BF) would be awarded 1 bonus point on an exam. The GB group was given the same offer except their incentive was that they would receive the bonus point to their overall grade, not just a single exam.

Four factors were found to be significant predictors to %BF loss: (a) the initial % BF ( $r^2 = 0.09, p < .0009$ ); (b) history of exercise ( $r^2 = 0.19, p < .0004$ ); (c) group assignment ( $r^2 = 0.28, p < .0004$ ); and (d) current exercise habits ( $r^2 = 0.31, p < .01$ ). The group with the lowest reward structure (EB) had the most dropouts ( $n = 51$  completers,  $n = 41$  non-completers). The group with the greatest reward structure (GB) had higher exercise adherence ( $n = 65$  completers,  $n = 24$  non-completers) and a greater body fat loss ( $-3.3 \pm 1.7\%$ ,  $p < .005$ ). The researchers found that modifying health behaviors in students involved the factors outlined in the Transtheoretical Model or Stages of Change Model developed by Prochaska and DiClemente (1983). These factors included goal setting, written contract, continual feedback, rewards, social support, and prompts to exercise. This study primarily examined the reward aspect.

In the fifth intervention study, Reed and Phillips (2005) considered the relationships between physical activity and the proximity of exercise facilities and home exercise equipment. The researchers used stratified random sampling and identified 411 undergraduate university students who completed questionnaires about the proximity of an exercise facility and the quantity of home exercise equipment. Results revealed that close physical proximity to an exercise facility and the quantity of home exercise

equipment were associated with increased participation. There was a statistically significant relationship between intensity of exercise and proximity from home to exercise location ( $r = .106, p < .05$ ). There was also a correlation between duration of exercise and the proximity ( $r = .119, p < .05$ ). As the distance between the exercise location and the place of residence increased, so did the intensity and duration of the physical activity. Exercise intensity and duration were significantly related to proximity among freshmen students ( $r = .208, r = .204, p < .05$ ). Home exercise equipment was also found to be significantly correlated ( $p < .05$ ) to total physical activity, frequency, intensity, and duration for freshman students.

In the sixth intervention study, web-assisted instruction was used successfully to change variables identified through Social Cognitive Theory (SCT) related to physical activity (Suminski & Petosa, 2006). Male and female students from a large Midwestern university enrolled in a health and wellness course voluntarily participated in the study. Students were excluded if they reported having a medical condition that limited their ability to be physically active (14.4%). There were three groups, the control ( $n = 178$ ), the comparison group ( $n = 118$ ), and the treatment group ( $n = 127$ ). There were no significant initial differences between the groups when considering age, gender, ethnicity, or BMI.

The control group covered health topics but was void of exercise and fitness information. The comparison group was enrolled in a course titled “Fitness and Exercise” and was required to attend a 1-hour lecture session and three lab sessions where students performed supervised exercise on the university property. The treatment group was enrolled in the same “Fitness and Exercise” course as the comparison group but was also

required to complete a web-based program targeting Social Cognitive Theory (SCT) variables designed to facilitate changes in behavior. Each week, students also received a reminder email related to previous course content and assignments. The key SCT variables related to physical activity were self-regulation, self-efficacy, and social support.

The results revealed that more than half (68%) of the students found the web assignments useful for understanding physical activity. Knowledge and skills conveyed through the web assignments were found to be higher for the treatment group than the comparison group. The total knowledge score was significantly correlated with the use of self-regulation skills ( $r = .54$ ), but not with the other SCT variables. When pre and post treatment SCT mean scores for the three groups were compared, in the treatment group, the use of self-regulation strategies increased ( $p < .001$ ) and social support from friends decreased ( $p < .005$ ). There were decreases for self-regulation, social support from family, and social support from friends in the control group ( $p < .05$ ). There were no significant changes in the SCT variable in the comparison group. Comparisons of variables related to the SCT revealed that the use of self-regulation skills at pretest was higher in the treatment group than it was in the comparison and control groups ( $p < .001$ ), and it was higher in the comparison group than it was in the control group ( $p < .001$ ). At posttest, self-regulation scores were higher in the treatment groups than they were for the comparison ( $p < .005$ ) and control groups ( $p < .001$ ), and they were higher for the comparison group than they were for the control group ( $p < .001$ ). Suminski and Petosa (2006) concluded that the web-based program did not adequately address self-efficacy,

barriers to exercise or social support for exercise, and thus may have contributed to social isolation due to time spent on the computer.

To summarize, there is a body of literature that indicates interventions designed to increase the physical activity levels of college students can be effective. Although there were limitations associated with each study, overall, the evidence indicates that college students could be influenced by the programs described.

### *Racial and Ethnic Groups and Physical Activity*

In this section, studies of college students from various ethnic groups and their intention to exercise or current activity levels are summarized and critiqued. However, only one study focused on ethnicity and physical activity that pertained to college students. Thus, studies on high school female students and older female adults were found and included in this section because 17-19 year old females and older adult females also attend college and their exercise habits and beliefs could be valuable. No studies focused solely on ethnic differences and physical activity for male college students or male adults.

In Table 3 on the following page, the studies related to ethnicity and race and physical activity are briefly summarized with respect to authors, focus, and methods. Each will be discussed in chronological order. These studies laid the foundation for the present research. Two studies investigated ethnicity, exercise, and older women. Heesch et al. (2000) determined whether barriers to exercise differed among the racial/ethnic groups at the same stage of exercise adoption and adjacent stages within racial/ethnic groups. The purpose was to identify the barriers that interfered with exercise participation

Table 3

*Race/Ethnicity and Physical Activity*

Authors (Date)	Focus	Methods
Heesch, Brown, and Blanton (2000)	Perceived barriers to exercise and stage of exercise adoption in older women of different racial/ethnic groups	Descriptive statistics Logistic regression analysis
Henderson and Ainsworth (2000)	Sociocultural perspectives on physical activity of older women	Qualitative interviews
Suminski and Petosa (2002)	Stages of change among ethnically diverse college students and physical activity	Chi-square analysis Logistic regression analysis
Fahlman, Hall, and Lock (2006)	Ethnic and socioeconomic comparisons of activity and barriers to exercise in high school females	MANOVA
Despues and Friedman (2007)	Ethnic differences in health behaviors	MANCOVA Correlation analyses

and to determine whether barriers differed according to racial/ethnic groups. The population included African American, Hispanic, Native American/Native Alaskan, and White women at the same exercise stage and across the stages of exercise adoption within each racial/ethnic group. In July 1996 through June 1997, a cross-sectional survey of 2,912 U.S. women aged 40-93 years (769 Whites, 745 African Americans, 660 Hispanics, and 738 Native Americans/Native Alaskans) was administered. Efforts were made to sample equal numbers of women in each group. Using random-digit-dialing,

potential participants were chosen. The overall response rate was 87%. A five-item instrument assessed stage of exercise adoption. The stages were defined based upon “yes” or “no” responses to the following statements: “I currently exercise” (actives), “I intend to exercise in the next 6 months” (contemplators), “I currently exercise regularly (actives), “I have exercised regularly for the past 6 months” (maintainers). Those that did not exercise or intend to exercise in the next 6 months were classified as “precontemplators” while those who exercised but not on a regular basis were classified as “preparers”. This instrument had demonstrated concurrent validity by its significant association with the 7-day Physical Activity Recall questionnaire (PAR; Marcus & Simkin, 1993). The PAR, a self-report measure of physical activity, is administered in an interview format. According to Marcus and Simkin (1993), test-retest reliability data has been stable for light ( $r = .65$ ), hard ( $r = .31$ ), and very hard activity ( $r = .61$ ).

To determine barriers to exercise and physical activity, participants rated how often each of 10 items interfered with or prevented them from being physically active or exercising. The scale used was adapted from the San Diego Health and Exercise Survey (Sallis, 1989) that had been found to be significantly and inversely correlated with exercise participation. The ten barriers were lack of time, lack of energy, being too tired, lack of a safe exercise environment, poor health, fear of injury, self-conscious about one’s looks, lack of social support, perception of bad weather, and having care giving duties.

For the statistical analysis, the researchers excluded the “maintainers” as the percentage of women (49% of their sample) was much higher than percentages reported in national surveys (9%-23%) so they concluded that the instrument had misclassified

many women. Their analysis focused on comparing precontemplators, contemplators, preparers, and actives since the main interest was to understand the barriers women who are not yet regularly active might experience. In addition, the researchers combined the preparation and action stages into one stage; the preparation/action stage, due to the small number of participants in each of those stages. Data were collapsed to examine only the barriers rated as “often” and “very often”. Test-retest reliability was evaluated in a subsample of women. Reliabilities were calculated using McNemar’s test for significant changes. Spearman correlation coefficients were calculated to determine the extent to which each racial/ethnic group in the same stage ranked the barriers. Next, the differences in barriers between those classified in bordering stages were examined through backward elimination logistic regression analyses. The final regression model included only those variables, which added significantly different results to the model. Along with the 10 barriers rated by the participants, status variables were included (i.e., age, highest educational level, and smoker/nonsmoker).

The average age of participants was 54 years for the Hispanic and Native American/Native Alaskans and 57 years for African Americans and Whites. Significantly, more White women (32%) reported college degrees compared to Hispanic women (19%), Native American/Native Alaskans (18%), or African American women (15%) ( $p < .0001$ ). The breakdown of exercise stage included 49% of participants in the maintenance stage of whom 43% were Native Americans/Native Alaskans and 54% Whites; 6% in the action stage of whom 6% were Whites and 8% Hispanics; 5% in the preparations stage of whom 4% were White and 6% Hispanic; 16% in the contemplation stage of whom 14% were White and 19% of Native American/Alaskan Native; and 24%

in the precontemplation stage of whom 19% were Hispanic, 23% White, 24% African American, and 28% of Native American/Alaskan Natives. The reader is then referred to another research article (Bull, Eyster, King, & Brownson, 2001) for further reporting of the participants characteristics by stage. Bull et al. (2001) reported that Black women (OR 0.53, 95% 0.31-0.91) were less likely to be in the active stages compared to the other three ethnic groups even when controlling for covariates such as age, education, smoking, and BMI.

The instrument used to determine barriers was reasonably reliable in a test-retest assessment using a random sub sample of 197 women. The ranking of barriers reported by each stage for race/ethnicity as often or very often were significantly different for those participants in the precontemplation stage ( $r = .76$  to  $.89, p < .05$ ) and contemplation stage ( $r = .68$  to  $.84, p < .05$ ). In the preparation/action stage, few of the correlations met significance. The correlation between White and Native American/Native Alaskan women ( $r = .66, p < .05$ ) and between White and Hispanic women ( $r = .75, p < .05$ ) were significant. Across most racial/ethnic groups, the most frequently reported barriers among precontemplators were a lack of energy and being afraid of injury. Being too tired and being in bad health were mentioned more frequently among precontemplators in all groups. Among contemplators, lacking time and a safe place to exercise was reported most frequently compared to women in other stages. Across all racial/ethnic groups, contemplators mentioned that care-giving duties were a barrier. The preparers or actives made mention of being self-conscious about their looks. The weather and being discouraged was ranked as the lowest barrier among all racial/ethnic groups in all stages.

The logistic regression analysis examined the differences between adjacent stages and the percentages of participants in each racial/ethnic group. The barriers varied across the groups. Within the preparers/actives, Whites identified the significant barriers as being too tired and self-conscious about appearance, among African Americans; it was lack of time and fear of injury. Hispanics reported being discouraged by others, and Native Americans and Alaskan Natives reported lack of energy and being too tired. Among the contemplators, significant barriers were lack of time and a fear of injury for the Whites, lack of a safe place to exercise for African Americans, and lack of time and or energy (“being too tired”) for Hispanics. Among those in the precontemplation stage, Whites and Native American/Native Alaskans reported being too tired and being in bad health. African Americans reported being too tired and Hispanics reported being in bad health and afraid of injury. Results suggest that within each exercise adoption stage, there are some differences among the different racial/ethnic groups. There also appear to be similarities.

Henderson and Ainsworth (2000) conducted interviews of 30 African American women from South Carolina and 26 American Indians from New Mexico and the Pueblo and Navajo Nation. The purpose of their study was to discover the sociocultural meanings of physical activity for older African American and American Indian women (> 40 years). Participation in this qualitative study was voluntary and a part of a larger study, the Cross Cultural Activity Participation Study (CAPS) where involvement in physical activity was assessed quantitatively through surveys, physical activity records, and mechanical devices such as pedometers. Participants were recruited through health providers, churches, newspaper ads, and senior centers. Participants received a small

monetary incentive and informed consent was obtained. Paid indigenous interviewers conducted the interview sessions and were taught how to ask probing questions. The length of the interviews ranged from 45 to 75 minutes. The interviews were taped, translated into English and transcribed. The questions were designed to encourage the women to talk about their lives, their perception of physical activity, and its relative importance. Individuals of color who had similar backgrounds as the study participants from South Carolina and New Mexico were recruited to serve as an advisory panel since neither researcher was a woman of color. These individuals helped to develop the interview questions and identify the most appropriate way to recruit the participants. Data analyses were conducted in three stages using the constant comparison technique. This type of analysis brings order to the qualitative data and organizes the words into descriptive units, patterns, and categories. The data were entered into a computer-assisted program to organize, identify, code, and reduce the data. Second, the researchers manually analyzed the categories by comparing them to the interview transcriptions. In the final stage, categories were refined and delimited.

Overall, the women agreed that being female resulted in social expectations that competed with time available for physical activity. The average age of the participants was 56 years for the American Indian women ( $n = 26$ ) and 57 years for the African American women ( $n = 30$ ). Half of the American Indian women and one-third of the African American women reported they played a major role in taking care of their grandchildren. One African American woman perceived that 75% of the responsibility of the family is on the woman. Individuals from both groups stated that if they had been White, they would have had more help around the house. However, when asked how race

or ethnicity affects what they did for physical activity, most women responded that it did not matter, that, in their opinion, race or ethnicity was not a significant factor. They felt that they could do whatever they had wanted and that their involvement in physical activity was up to them. The researchers remarked that maybe they wanted to believe this but one African American woman had previously stated that race had no influence on her physical activity but then also remarked that, as a child she had to walk all the time, as she was not allowed to ride a bus to school. Subsequently as an adult, she avoided walking and drove as close to her destination as possible.

Four themes emerged from the perspectives voiced by the participants: history, marginality, cultural pride, and daily living. Among the African American participants, discrimination and oppression surfaced: Many African American women reported that they had not learned to swim because the only place available for them to swim was a river or creek. Another African American reported that even though she was active as a child, she never had observed adults engaged in physical activity because they were always working. Marginality for American Indian women meant lack of recreation facilities and the amount of work that had to be completed every day. There were few paved roads and cars so walking was a built in necessity.

The American Indian women remarked how important physical activity was to them culturally as part of ceremonies and dances. One woman remarked that anyone overweight or out of shape would not be able to participate. Walking and running was a part of ethnic pride for the American Indian women. It was part of a morning routine, rising early in the morning, saying prayers, having water, stretching and walking or running. As one participant said, "There was never a time to be lazy" (Henderson &

Ainsworth, 2000, p.15). The issue of physical activity during free time was both cultural and personal among African American women. Several African American women suggested that they did not enjoy physical activity because it ruined their hair style. One woman remarked that even though exercise should be a priority, she tended to put others ahead of herself. The American Indian women held different perspectives about daily living. Wearing a wristwatch was not customary among these American Indians which meant that concept of 30 minutes of physical activity per day may have been extraneous. Having social support was important. For example, one American Indian woman reported her active involvement in community group activities and family-related activities. "It's a problem when someone gets sick or we have someone be too lazy" (Henderson & Ainsworth, 2000, p. 16). The researchers summarized how this information may provide a reference for developing culturally sensitive questions for future studies. Similar to this study, the focus group interview and subsequent research study helped identify similarities and differences among and within ethnic groups pertaining to beliefs about exercise.

Another study evaluated the exercise stages among ethnically diverse college students. Suminski and Petosa (2002) used the Stages of Change behavior model developed by Prochaska and DiClemente (1983) which suggested that individuals move through stages when trying to acquire or change a health behavior. As previously described, the five stages include precontemplation (not thinking about change), contemplation (considering change but not yet taking action), preparation (preparing for change), action (evident behavior change; considered the first 6 months of the new behavior), and maintenance (regular practice of the new behavior for 6 months or longer).

Four racial/ethnic groups were represented in their study of undergraduate college students Asian ( $n = 869$ ), African American ( $n = 373$ ), White ( $n = 1322$ ), and Hispanic ( $n = 535$ ). Questionnaires, completed during class time during the second week of the term, were collected over a 1-year period at the beginning of each semester. Exercise was self-reported and a single question was posed to assess current stage of change for exercise behavior.

Results revealed that 47% of the sample did not engage in vigorous physical activity during the month prior to the study. Only 25% of men and 16% of women reported levels of activity at the maintenance stage. Asian women, Asian men, and Hispanic women were found to be at the greatest risk of being in the nonexercise stages. African American men and White men and women were more likely to be in the exercise stages.

Fahlman et al. (2006) studied female high school students to determine racial/ethnic and socioeconomic comparisons of fitness, activity, and barriers to exercise. A cross sectional sample of female students with a mean age of age  $16.2 \pm 0.9$  years were included: White (49%,  $n = 641$ ), African American (28%,  $n = 367$ ), and Hispanic (23%,  $n = 306$ ) high school students where 46% of all the students were from low socioeconomic groups and 54% from moderate or high socioeconomic groups ( $n = 1314$ ). Survey instruments and fitness tests were completed during regular physical fitness classes. Data analysis included a study of the main effects of socioeconomic status (SES), race/ethnicity and the possible interaction between them. A MANOVA was conducted on the dependent variables, activity level, barriers, BMI, mile run, and percent fat. Separate logistic regression analysis was carried out on each of the dependent variables with

race/ethnicity and SES entered as covariates due to the interaction between race/ethnicity and SES.

Race/ethnicity proved to be an independent predictor in all but one instance, separate univariate analysis of variances were conducted on the dependent variable by race/ethnicity. When significance was found based on race/ethnicity, a Tukey post hoc and independent samples *t*-test was conducted. These researchers found that fitness levels differed among African American, Hispanic, and White high school female students and between the different socioeconomic groups. Fifty-seven percent of African American female students ( $n = 209$ ), 72% of Hispanic female students ( $n = 220$ ), and 29% of White female students ( $n = 186$ ) had aerobic fitness levels that put them into a “poor” fitness classification. Statistically significant main effects were found for race/ethnicity,  $F(10, 2610) = 4.5, p < .001$ ; SES,  $F(5, 1304) = 3.3, p < .001$ ; and the race/ethnicity X SES interaction,  $F(10, 2610) = 2.9, p < .001$ .

Perceived barriers also differed among the race/ethnic and socioeconomic groups. White students ( $n = 641$ ) perceived very few barriers to exercise ( $M = 1.4 \pm 0.5$ ) compared to African Americans ( $M = 3.1 \pm 0.6; n = 367$ ) and Hispanics ( $M = 3.5 \pm 0.5; n = 306$ ) on a 1 to 5 rating scale (1 = strongly agree, 5 = strongly disagree). Sixty five percent of African Americans ( $n = 239$ ), 68% of Hispanics ( $n = 208$ ), but only 31% of Whites ( $n = 198$ ) responded positively to the statement; “I do not exercise because it makes me tired”. In response to the statement “I am not physically active because it makes me sweat too much,” 71% of African Americans ( $n = 261$ ), 52% of Hispanics ( $n = 159$ ), and 31% of Whites ( $n = 199$ ) responded positively. In response to the statement “I do not exercise because I do not feel safe in my neighborhood,” 71% of African

Americans ( $n = 261$ ), 62% of Hispanics ( $n = 190$ ), and 9% of Whites ( $n = 58$ ) responded positively. Whites were more likely to believe that exercise helps to sustain an attractive appearance.

Despues and Friedman (2007) investigated ethnic differences in health behaviors among college students. Participants were 521 college students (354 female, 167 male). Mean age was 19.27 years. The majority was comprised of first-generation college students who had achieved similar educational levels and student ranking. The participants identified themselves as European American (21%), Asian American (29.4%), Hispanic American (26.5%), African American (13.2%), multi-ethnic (6.5%), and belonging to an ethnic group not listed (3.3%).

The participants completed questionnaires pertaining to healthy eating habits, healthy behaviors such as exercise, and health harming habits such as alcohol and tobacco use. Statistical tests included a series of multiple analyses of covariances (MANCOVAs) to determine the relationship between ethnicity and preventive health behaviors, one of which was exercise, controlling for parental income. The overall model was significant  $F(9, 1100) = 7.56, p < .001$ . The MANCOVA to determine the relationship between ethnicity and health harming behaviors was significant,  $F(12, 1196) = 4.96, p < .001$ . Parental income served as a covariate.

Concerning exercise, participants used a scale ranging from zero (none) to five (everyday) to rate their exercise. The results showed that European Americans were more likely to report higher frequency of exercise ( $M = 2.83, SE = .15, n = 108$ ) followed by Hispanic Americans ( $M = 2.12, SE = .13, n = 134$ ), African Americans ( $M = 2.05, SE = .18, n = 66$ ), and then Asian Americans ( $M = 1.56, SE = .19, n = 151$ ). Correlation

analyses were conducted to determine the relationship between mainstream acculturation and health behaviors. Degree of acculturation was determined using a modified version of an acculturation scale developed by Marin, Sabogal, Marin, Otero-Sabogal, and Perez-Stabel (1987). The Asian Americans and Hispanic American college student varied substantially in degree of acculturation. Acculturated Asian American students were more likely to report exercising ( $r = .17, p < .04$ ), drinking alcohol ( $r = .17, p < .03$ ), and obtaining physical exams ( $r = .17, p < .04$ ) compared to the less acculturated Asian students. The highly acculturated Hispanic Americans also reported increased likelihood of obtaining physical exams ( $r = .21, p < .02$ ) and drinking alcohol ( $r = .18, p < .04$ ) compared to the less acculturated Hispanics. Compared to the European American students, African American students were less likely to eat fruit ( $M = 1.36$  vs.  $1.10$ , respectively) and exercise ( $M = 2.83$  vs.  $2.05$ , respectively) but also less likely to drink excess alcohol ( $M = 0.50$  vs.  $0.12$ , respectively).

#### Theory of Planned Behavior and Exercise Activity

Icek Ajzen (1991), a Professor of Psychology at the University of Massachusetts, developed the Theory of Planned Behavior (TPB). The theory proposes that intention (the immediate antecedent of behavior) is a function of three variables; attitudes (positive or negative), subjective norms (perceived influences of significant others), and perceived behavioral control (the extent to which individuals believed they have control of the situation). Motivating individuals to engage consistently in physical activity and exercise is an ongoing challenge for health educators. Five studies of physical activity and exercise and the TPB were found and are described in chronological order followed by a

summary of the studies. The earliest study was based upon the findings of a review of 18 studies testing the TPB and exercise reported by Godin and Kok (1996).

Courneya, Plotnikoff, Hotz, and Birkett (2000) set out to test the usefulness of social support and subjective norm for predicting intention to exercise and stage of exercise. Subjective norm had been shown to be a significant determinant of intention in approximately one-third of the prior studies. Courneya et al. (2000) studied Canadian adults (ages 18-65 years,  $n = 1557$ ) whose phone numbers were randomly selected from the regional telephone exchange using a computer-assisted telephone interviewer system. Trained interviewers conducted the telephone survey.

The term “exercise” was defined as “strenuous activities which usually make you sweat, breathe harder, and feel your heart beat” (Courneya et al., 2000, p. 303). Social support was assessed by a single question which respondents rated on a 5-point rating scale ranging from 1 (none at all) to 5 (very much).

Subjective norms were measured by two items which respondents rated on a 5-point scale that ranged from 1 (strongly disagree) to 5 (strongly agree). The items were:

My family thinks that I should participate in physical activity.

My doctor or health care provider thinks that I should participate in physical activity. (p. 303)

The internal consistency for this measure assessed via Cronbach alpha was  $\alpha = .61$ .

Attitude was measured by three items, which respondents rated on 5-point scales ranging from 1 (not at all) to 5 (very much). The three items were “It would be (gratifying, boring, or fun) for me to do physical activity over the next 6 months.” Internal consistency for this measure was assessed via Cronbach alpha,  $\alpha = .64$ . Perceived

behavioral control was measured by two items and rated on a 5-point scale ranging from 1 (absolutely no control) to 5 (complete control). The two items were:

How much control do you have over whether or not you engage in regular physical activity?

How much control do you have over the amount of time you have for physical activity? (p. 303)

Internal consistency (Cronbach alpha) for this item was  $\alpha = .65$ . Intention was assessed by one question “On a scale from 0% to 100%, how likely is it that you will get regular vigorous physical activity within the next 6 months?” (p. 304) Stage of change items were rated in a yes/no format. Based upon questions about past and current exercise patterns, subjects were categorized in the precontemplation, contemplation, preparation, action, or maintenance stages. The stages were coded from 1 (precontemplation) to 5 (maintenance). Descriptive statistics and zero-order correlation analyses among each of the main constructs were calculated. The exercise stage of the subjects were distributed as 11.0% ( $n = 172$ ) precontemplation, 32.6% ( $n = 508$ ) contemplation, 14.1% ( $n = 220$ ) preparation, 8.1% ( $n = 126$ ) action, and 34.1% ( $n = 531$ ) maintenance.

The main hypotheses were tested using hierarchical regression analyses (HRA). In the first HRA, stage of change was regressed on four blocks of variables; intention, PBC, attitude and subjective norm, and social support. Results of this first HRA indicated that intention explained 29% of the variance in exercise stage of change [ $F(1, 1555) = 633.96, p < .001$ ]. The PBC explained an additional 1% of the variance [ $F_{\text{change}}(1, 1554) = 19.24, p < .001$ ] with intention ( $\beta = .52, p < .001$ ) maintaining its contribution and PBC ( $\beta = .10, p < .001$ ) providing additional contribution. The third block, attitude and subjective norm, also explained an additional 1% of the variance [ $F_{\text{change}}(2, 1552) =$

7.81,  $p < .001$ ] with intention ( $\beta = .48, p < .001$ ) and PBC ( $\beta = .09, p < .001$ ) maintaining their contribution and attitude ( $\beta = .08, p < .001$ ) providing additional contribution. The last block, social support explained an additional 1% of the variance [ $F_{\text{change}}(1, 1551) = 16.63, p < .001$ ] with intention ( $\beta = .09, p < .001$ ) providing additional contribution. The results remained unchanged even after controlling for variables such as age, sex, education, BMI, health behaviors, marital status, and child care responsibilities.

A second HRA was completed with intention to exercise regressed on three blocks of variables that consisted of attitude and subjective norm (block #1), PBC (block #2), and social support (block #3). The results revealed that block #1 explained 17% of the variance in intention to exercise [ $F(2, 1554) = 162.20, p < .001$ ] with attitude ( $\beta = .41, p < .001$ ) making a distinctive contribution. Block #2 explained an additional 4% of the variance [ $F_{\text{change}}(1, 1553) = 67.78, p < .001$ ] with attitude ( $\beta = .38, p < .001$ ) maintaining its distinctive contribution and PBC ( $\beta = .19, p < .001$ ) providing an additional contribution. Finally block #3 explained an additional 1% of the variance [ $F_{\text{change}}(1, 1552) = 20.81, p < .001$ ] with attitude ( $\beta = .36, p < .001$ ) and PBC ( $\beta = .17, p < .001$ ) maintaining their distinctive contributions, and social support ( $\beta = .11, p < .001$ ) providing an additional contribution. These relationships were unchanged even after controlling for age, sex, education, BMI, health behaviors, marital status and child care responsibilities. The variance explained by the TPB constructs with respect to exercise intention was 22%. The major result of this research study was that social support was found to be superior to subjective norm in predicting both exercise intention and stage.

Rhodes et al. (2002) posited that the subjective norm construct has not performed well in explaining intention to exercise when controlling for attitude and PBC, even

though quantitative reviews have consistently supported the usefulness of the TPB in the exercise domain. These researchers investigated whether social support (assistance from others) would be more useful than just knowing that others approve of the behavior (subjective norm). The researchers used a prospective design, validated measures of social support and subjective norm, and structural equation modeling. The participants were 192 undergraduate students enrolled in a psychology course. The mean age was 19.81 years ( $SD = 4.05$ ) and 72.4% were female. The participants completed self-report measures of social support and the TPB and a 2-week follow up measure of exercise behavior. Regular exercise was defined as activities performed at a vigorous intensity three or more times per week for at least 30 minutes each time. The Godin Leisure Time Exercise Questionnaire (GLTQ) measured exercise behavior. The statistical analysis included 173 participants.

A model was estimated, and the standardized significant structural effects were reported for attitude, PBC, and social support (.10, .50, and .23, respectively ( $p < .05$ , one-tailed), while subjective norm was not significant ( $p > .10$ , one-tailed). The total explained variance of these concepts on exercise intention was 32%. In addition, intention had the strongest effect on strenuous exercise behavior (.62), followed by PBC (.41), and social support (.12), resulting in a total explained variance of 56% (all effects, one-tailed). The researchers suggest that individuals are influenced by perceived social support for exercise when forming their exercise intention. The social support concept in the model found that perceiving a reliable alliance (someone to depend upon if needed) was a significant contributor to intention (.23,  $p < .05$ , one-tailed) with the total explained

variance of attitude, perceived behavioral control, and social support on exercise intention of 32%.

Blanchard et al. (2003) examined the moderating influence of race/ethnicity on the TPB in the area of exercise and set out to produce common and racial/ethnic-specific fundamental understandable beliefs. One hundred eighty four students were recruited from undergraduate psychology, fitness, or health education classes. Ninety students were White and 94 were African American. Students volunteered to complete a questionnaire, which included demographic questions, TPB questions, and nine open-ended questions to determine beliefs. The analysis showed that instrumental ( $\gamma_{10} = 0.10$ ) and affective ( $\gamma_{20} = 0.15$ ) attitudes and PBC ( $\gamma_{40} = 0.13$ ) had significant and unique associations within exercise intention, whereas subjective norm ( $\gamma_{30} = 0.05$ ) did not. In step three, analyses of the race/ethnicity and gender moderator variables showed that race/ethnicity was significantly associated with affective attitudes ( $\gamma_{11} = 0.34$ ) whereas gender was significantly associated with affective ( $\gamma_{12} = 0.26$ ) and instrumental ( $\gamma_{22} = -0.32$ ) attitudes. Race/ethnicity by gender interactions emerged for affective ( $\gamma_{13} = -0.44$ ) and instrumental ( $\gamma_{23} = 0.39$ ) attitudes.

For Whites, the association of affective attitudes with exercise intention was stronger for females [ $0.26 + 0(0.44) = 0.26$ ] whereas for African Americans, the association was stronger for males [ $0.26 + 1(-0.44) = -0.18$ ]. The association of instrumental attitudes with exercise intention was stronger for men [ $-0.32 + 0(0.39) = -0.32$ ] than women for Whites but for African Americans, the association was stronger for women [ $-0.32 + 1(0.39) = 0.07$ ] than men. No significant effects were found for

race/ethnicity, gender, or a race/ethnicity by gender interaction for subjective norm or perceived behavioral control.

Further breakdown of beliefs by gender showed that African American females viewed school as more of a barrier to exercise compared to African American males. There were no statistically significant differences for gender in Whites. For African Americans, more females believed exercise would improve fitness and reduce weight compared to males. In contrast, more African American males believed that exercise would improve heart health, sleep, and would be difficult if sick, injured, or due to lack of time. For Whites, significantly more men believed that their friends would approve of their engagement in exercise, whereas significantly more women believed access to facilities would be a barrier. Researchers were surprised by the interactions of race/ethnicity and gender for the attitudinal variables. Three main race/ethnicity-specific beliefs emerged. For African Americans, a behavioral belief, “good for the soul”, and a control belief, “no one to exercise with” were identified. Whites identified the importance of a “health educator” (normative belief).

Chatzisarantis and Hagger (2005) studied the influence of persuasive communication targeting behavioral beliefs on attitudes towards exercise and intentions. Beliefs were divided into two types; salient (to “have fun,” “stay fit,” “improve skills,” “getting an injury,” and “feeling hot and sweaty”) or nonsalient (“feeling better mentally,” “relaxing and forgetting about cares,” “looking better,” “interference with daily routine,” and “having a health condition aggravated”). The researchers studied 83 teenagers (41 male students, 42 female students, mean age 14.6 years,  $SD = .47$ ), recruited from two schools from an unspecified location. Students studied one of two

targeted messages and were asked to participate in exercise during the following 5 weeks. Analysis of variance and pair wise comparison as well as a path analysis were conducted to examine the usefulness of attitudes in mediating effects of the persuasive communication targeting behavioral beliefs concerning intentions to exercise.

A multivariate ANOVA revealed a significant multivariate effect of persuasive communication on attitudes, and a marginally significant effect on intentions. The effect of persuasive communication on physical activity was not statistically significant. The model revealed that intentions predicted physical activity behavior while attitudes and perceived behavioral control predicted intentions. Compared to control students, the students who received the persuasive communication targeting salient beliefs reported more positive attitudes and stronger intentions. The multivariate ANOVA did not reveal any statistically significant effects of persuasive communication on subjective norms or perceived behavioral control. Subsequently, when physical activity was measured using the Godin and Shephard (1985) Leisure Time Questionnaire, the intervention did not result in changes in physical activity participation. The researchers commented that this result is in accordance with the purpose of the TPB, which is to facilitate intentions but not necessarily behaviors.

Norman and Conner (2005) studied the physical activity of undergraduate university students. Study 1 focused on a convenience sample of students aged 18-39 ( $M = 21.38$ ,  $SD = 3.39$ ); a total of 126 students (61 male students, 65 female students) completed a TPB questionnaire twice, separated by 2 weeks. The Time 1 questionnaire assessed intention, attitude, subjective norm, and perceived behavior control, planning, and past exercise behavior. Future exercise behavior was assessed at the 2-week follow

up with one question that asked the participants to state the number of times they had exercised in the last 2 weeks. One hundred twenty five students completed the first questionnaire, and 58 students completed the second.

Regular physical activity was defined as “physical activity that you purposely engage in for whatever reason at least 2 or 3 times a week for about 20 to 30 minutes at a time” (p. 492). Multi-item scales were used to rate questionnaire items related to intention, attitude, subjective norm, and perceived behavior control as well as planning, past exercise behavior, and future exercise behavior. Exercise intention was not measured; however, attitude, subjective norm, and perceived behavioral control were. The researchers found that the constructs of attitude, subjective norm, and perceived behavioral control were significant predictors along with past behavior. The TPB variables explained 37% of the variance in exercise intentions, with attitude and perceived behavioral control emerging as significant independent predictors. In the final regression equation, the four variables explained 55% of the variance in exercise intentions.

The prediction of exercise behavior was determined using hierarchical regression analysis. Here, intention and perceived behavioral control explained 43% of the variance in exercise behavior at Time 2, with both variables contributing to the equation at a statistically significant level (intention,  $\beta = .43$ ,  $p < .01$ ; perceived behavioral control,  $\beta = .32$ ,  $p < .05$ ). The measure of planning was not found to statistically significantly increase the amount of variance explained in exercise behavior,  $\Delta R^2 = .02$ ,  $\Delta F = 2.08$ , over and above the TPB. One major limitation was the low response rate to the Time 2 questionnaire, which may have reduced the statistical power of the regression analysis to

predict Time 2 behavior. The addition of the interaction term between intention and planning produced a significant increment for variance explained; indicating that planning moderated the intention-behavior relationship. Then using simple slopes analysis, the strength of intention-behavior relationship was found to increase along with levels of planning. Under low levels of planning, intention was a modest predictor of behavior,  $\beta = .52, p < .05$ , whereas under moderate,  $\beta = .84, p < .001$ , and high,  $\beta = 1.16, p < .001$ , levels of planning, intention was a stronger predictor of behavior. Adding a measure of past behavior produced a further increment for variance explained,  $\Delta R^2 = .21, \Delta F = 37.77, p < .001$ . In the final regression equation, 71% of the variance was explained in Time 2 exercise behavior. In addition, past behavior and the intention by planning interaction emerged as significant independent predictors.

In Study 2, the researchers replicated of the procedures of Study 1 but with improved assessment of specific plans for exercise as to when, where, how, and how often exercise would occur over the next week (Norman & Conner, 2005). The respondents included a convenience sample of undergraduate students in a psychology class who completed the same TPB questionnaire during a regularly scheduled class period at two time points separated by one week. One hundred two respondents completed the Time 1 questionnaire 20 male students and 82 female students aged 19-51 ( $M = 20.8, SD = 3.85$ ). Time 2 questionnaires were completed and obtained from 76 of the Time 1 sample who rated survey items related to intention, attitude, subjective norms, perceived behavioral control, planning, and past exercise behavior. Study 2 was improved by focusing on exercise behavior over the next week rather than an unspecified period as in Study 1. Descriptive statistics and intercorrelational analyses between variables were

conducted. All three TPB constructs were found to have significant positive correlations with exercise intentions (attitude,  $r = .70, p < .001$ ; social norms,  $r = .34, p < .01$ ; perceived behavioral control,  $r = .77, p < .001$ ). The TPB constructs explained 62% of the variance in exercise intentions,  $F(3, 98) = 53.43, p < .001$  with attitude and perceived behavioral control emerging as significant independent predictors. The addition of past behavior led to an increase in the percent of the variance explained,  $\Delta R^2 = .05, \Delta F = 15.23, p < .001$ . In the final regression equation, the four variables explained 67% of the variance in exercise intentions,  $F(4, 97) = 56.33, p < .001$ .

A hierarchical regression analysis was used to predict exercise behavior. Intention and perceived behavior control explained 49% of the variance in exercise behavior at Time 2,  $F(2, 73) = 34.71, p < .001$ , even though intention was the only significant predictor variable. The addition of planning led to a significant increment for variance explained in exercise behavior,  $\Delta R^2 = .06, \Delta F = 10.91, p < .001$  and reduced the beta weight for intention, from .70 to .43, although it remained significant. The addition of interaction between intention and planning produced a further addition for variance explained,  $\Delta R^2 = .05, \Delta F = 8.52, p < .01$ , indicating that planning moderated the intention-behavior relationship. Simple sloped analyses was used to discover that under low levels of planning, intention showed a non-significant relationship with behavior,  $\beta = .22, ns$ , however, the strength of the intention-behavior relationship increased along with the levels of planning. Intention was a significant predictor of behavior under moderate,  $\beta = .49, p < .001$ , and high,  $\beta = .75, p < .001$ , levels of planning. The further addition of past behavior produced a further addition for variance explained,  $\Delta R^2 = .14, \Delta F = 35.38, p < .001$ . In the final regression analysis, the variables under scrutiny were able to explain

74% of the variance in exercise behavior at Time 2,  $F(5, 70) = 35.33, p < .001$ , with planning, past behavior, and the intention x planning interaction rising as significant independent predictors. In summary, both studies found strong support for the TPB and its ability to predict exercise intentions and behavior. The TPB constructs explained 37% (Study 1) and 62% (Study 2) of the variance in exercise intentions, with perceived behavioral control and attitude emerging as significant independent predictors. Intention was the strongest predictor of exercise behavior.

Hausenblas, Carron, and Mack (1997) conducted a meta-analysis of the Theory of Reasoned Action (TRA) and the TPB as theories that can explain and predict exercise behavior. Thirty-one studies published between 1975 and 1997 were reviewed which yielded 162 effect sizes (*ES*), based upon  $n = 10,621$ . Results concluded that the TPB is superior to TRA when accounting for exercise behavior. Large effect sizes were found for the relationships between intention and exercise behavior ( $ES = 1.09$ ), attitude and intention ( $ES = 1.22$ ), attitude and exercise behavior ( $ES = .84$ ), perceived behavioral control and exercise ( $ES = 1.01$ ), and perceived behavioral control and intention ( $ES = .97$ ). The *ES* for relationships between subjective norm and intention was moderate ( $ES = .56$ ), and between subjective norm and exercise behavior was small ( $ES = .18$ ).

Hagger et al. (2002) conducted a meta-analysis of 72 studies of the TRA and TPB in physical activity, published between 1975 and 2001. They concluded that the major relationships of the TRA/TPB were supported in the physical activity literature. Of the theoretically resultant relationships, the strongest association was between attitude and intention ( $\beta = .56$ ), followed by the intention-behavior ( $\beta = .51$ ), perceived behavioral control-intention, and the subjective norm-intention ( $\beta = .12$ ) relationships. The inclusion

of past behavior resulted in a weakening of the intention-behavior, attitude-intention, self-efficacy-intention, and self-efficacy relationships but added to the knowledge base about the effect of planning to moderate intention to exercise.

As summarized in Table 4, studies related to TPB and exercise varied with respect to focus and methods. The TPB had been utilized in numerous physical activity studies and took into account the many beliefs that individuals hold that influence the strength of their intention to exercise.

Table 4

*The Theory of Planned Behavior and Exercise*

Authors (Date)	Focus	Methods
Courneya, Plotnikoff, Hotz, and Birkitt (2000)	Social support and the TPB in the exercise domain	Computer-assisted telephone interviewer system Descriptive statistics Zero order correlation Hierarchical regression analyses
Rhodes, Jones, and Courneya (2002)	TPB, exercise and the comparison of social support and subjective norm	Structural equation modeling Chi-square
Blanchard, Rhodes, Nehl, Fisher, Sparling, and Courneya (2003)	Ethnicity, TPB in the exercise domain	Multilevel modeling analysis ANOVA
Chatzisarantis and Hagger (2005)	Participation in leisure-time physical activity	Path analysis
Norman and Conner (2005)	TPB, exercise and the mediating and moderating roles of planning	Hierarchical regression analysis

## Critique of Relevant Studies

The 19 studies summarized in this review included two studies where qualitative designs were used (Clemmens et al., 2004; Henderson & Ainsworth, 2000) and 17 where quantitative research designs were used. Concerning the former, Clemmens et al. (2004) used reflective essay summaries to obtain data designed to determine students' experiences with a health course. Text files were coded and themed by the instructors and it is not made clear whether the instructors were also the researchers. Thorough reporting of the students reflections were provided but no triangulation was made to confirm or corroborate the written information. The essays did appear to reflect what the students were expected to have learned in the course and the researchers connected the reflective summaries to the course objectives. It would have been valuable if the researchers had included descriptive data on the students to compare with their respective essays and grades. Henderson and Ainsworth (2000) used an interview design and followed a good qualitative research design by collecting data through in-depth interviewing and by using trained indigenous interviewers where appropriate. The researchers (a) compared audiotapes to the manually recorded information and (b) reported their results using rich descriptive text based on the participants' responses. This technique allowed the participants' voices to reveal that differences do exist among individuals from different racial and ethnic groups with respect to their decisions to be physically active.

Overall, the quantitative studies used adequate sample sizes and statistical applications. In the four studies that focused on increasing physical activity (Buckworth & Nigg, 2004; Butler et al., 2004; Huang et al., 2003; & Racette et al., 2005), a frequent limitation was the use of self report data of height, weight, diet, or physical activity. Self

reported data is subject to error and bias. Even in light of those limitations, self-report is frequently used in physical activity studies due to difficulty verifying physical activity. Despite self-reported data, the Buckworth and Nigg (2004) study revealed different sedentary behaviors that compete for students' discretionary time that could be targeted towards physical activity. Butler et al. (2004) surmised that weight gain experienced by female college students was due to a decrease in physical activity caloric expenditure.

However, although these results emerged from a convincing design, a limitation of the study was that it was unclear if the study sample was representative of the population since a description of the total population that resided in the residence hall was not provided. The study only included women, so it may not be generalizable to males. Huang et al. (2003) used an appropriate cross sectional design and obtained data that can inform the field with respect to the importance of providing systematic health and fitness education opportunities for college students. Racette et al. (2005) used BMI, which cannot differentiate between fat mass and fat-free mass. This is important because some individuals can be classified as overweight even when the excess weight or mass is from healthy muscle or denser bones. In addition, an individual may be classified in the normal range and have a high percentage of body fat and low percentage of muscle mass due to chronic inactivity. Another drawback is that the diet questionnaires may have not been sensitive enough to detect small changes and participants were only asked about the dietary intake of the previous week. Further, the exercise questionnaire was self-report which is subject to bias without verification of the reported behavior. The researchers summarized that the weight gain, lack of exercise and unhealthy eating patterns are typical in their study population of female college freshman students but they failed to

consider the role of alcohol intake, which can contribute substantial calories to the diet and promote weight gain.

Studies that assessed interventions to increase physical activity in college students included one randomized controlled trial (Calfas et al., 2000). Other studies to increase physical activity among college students assessed the influence of incentives (DeVahl et al., 2005), computer technology (Suminski & Petosa, 2006), and the environment (Reed & Phillips, 2005).

One of the few studies related to increasing physical activity and the influence of various racial/ethnic groups of college students was conducted by Suminski and Petosa (2002). The researchers noted that the instruments that they used were not sensitive to racial or ethnic differences, which may have explained the conflicting results. However, they verified that differences in physical activity patterns do exist among the various racial/ethnic groups; moreover, almost half of the students in their study did not exercise on a regular basis. Heesch et al. (2000) conducted a study that included older women while Fahlman et al. (2006) studied younger women. In the Heesch et al. (2000) study, limitations include the fact that the stage of exercise adoption instrument might lack cultural sensitivity, which may have resulted in misclassification of the participants into a particular stage. Some physical activities that are popular among non-Whites may have not been included in the instrument since the exercise adoption instrument specifically asked only about aerobic dance, jogging, and power walking. The compiled data from this study indicated that 45% of the sampled women were not exercising regularly, a statistic that is much lower than that reported in a national sample, which reported 77%-88% of women in this age group as being physically inactive (USDHHS, 1996, p. 183).

A fourth limitation to that study is that the telephone random sampling technique may have not accurately produced a random sampling of women. However, in spite of these limitations, the study has value because it suggested that differences do exist among different ethnic groups.

Limitations of the Fahlman et al. (2006) study included that the average age in the study was 16; however, information from these young students would possibly relate to some of the younger students who attend college. However, because this was a select population of female adolescents, their experiences may not represent the larger population of adolescent female students. The survey data were self reported and could be subject to bias. In spite of these limitations, the results pointed out several differences between the various racial/ethnic groups with respect to perceptions that exercise made people “tired” or made people “sweat too much”. In addition, individuals in racial/ethnic groups did not agree that physical activity contributes to an attractive appearance. The researchers concluded that ethnic differences in the barriers to exercise could be due to cultural differences, beliefs, or biases that require further investigation.

Five studies utilized the TPB in relationship to exercise and physical activity (Blanchard et al., 2003; Chatzisarantis & Hagger, 2005; Courneya et al., 2000; Norman & Conner, 2005; and Rhodes et al., 2002). Two of the studies did not adhere to the appropriate design of a TPB questionnaire (Courneya et al., 2000; Rhodes et al., 2002). Courneya et al. (2000) measured the social cognitive constructs with only one or two survey items, which may not provide an adequate assessment, thus reducing the validity and reliability of the results. Limitations in the Rhodes et al. (2002) study included the self-reported measure of exercise behavior, the convenience sample of university

undergraduate students, and the fact that the social support construct lacked measurement characteristics suggested by Ajzen (2002) such as target, action, context, and time (TACT). For example, using the following statement “considering walking on a treadmill at home for at least 30 minutes per day in the upcoming month”, the treadmill would be considered the target, the action is walking, the context is at home, and time is 30 minutes per day in the upcoming month. However, in spite of the limitations, this study was an important indicator of the robustness of the TPB in explaining motivation or intention to exercise and it also analyzed the data using structural equation modeling (SEM). SEM can be used to test theories of causal relationships between variables (Gall et al., 2007. p. 371).

The Blanchard et al. (2003) study is similar to this research study. A limitation was the use of only two racial/ethnic groups and small sample sizes of each group by gender but this study also provides useful insight into beliefs and barriers held by the different genders and racial/ethnic groups. This information could be helpful when designing a TPB questionnaire that is sensitive to wording. The Chatzisarantis and Hagger (2005) study used path analysis as a methodology which is considered more powerful than multiple regressions and could be used to test theories about hypothesized causal links between variables (Gall et al., 2007, p. 363). Limitations of the study included the fact that the researcher was present and there was no control for experimenter bias. In addition, a more detailed description of the school type and location and descriptive statistics about the participants would have made the findings more generalizable.

However, in spite of the limitations and the age difference of these students compared to college age students, Chatzisarantis and Hagger's study showed that identifying and subsequently targeting salient beliefs could be useful to increase the intention to exercise. TPB research has revealed that attitude and intention are statistically significant contributors to exercise behavior. Differences such as the benefits and the barriers to physical activity do exist among the various racial/ethnic groups. The TPB theoretical framework not only encompasses pieces from other psychosocial theories such as SCT (self-efficacy), but also goes into more depth by assessing beliefs, barriers, and support systems. The Transtheoretical Model ("stages of change") is frequently used in exercise studies but it has limitations in that it only places people in a stage of exercise readiness but does not help to identify why they are in that stage. The Health Belief Model has been used in exercise studies but relies on the individuals' perception of being susceptible to a health condition which would result in serious consequences (Strecher & Rosenstock, 1997; Weinberg & Gould, 1999). The TPB is a more comprehensive model, which can be useful to assess how each individual construct can contribute to overall intention to exercise and subsequent behavior. The procedure used to develop the TPBQ required obtaining specific beliefs held by individuals similar to the potential participants, thus allowing for cultural appropriate wording that reflects the usage and perceptions of the population to be assessed.

### Summary

In chapter 2, the empirical research related to motivation of college students to engage in fitness activities was reviewed. Studies revealed the negative health implications for failure to engage in regular physical activity and multiple benefits in

overall health and quality of life for engaging in regular physical activity. The studies showed that the majority of college students do not engage in regular physical activity.

College student enrollment data reflect an increasing number of racially, ethnically, and culturally diverse individuals; however there is limited research available about the effects of race/ethnicity on intention to engage in physical activity and exercise. Researchers have documented some ethnic and cultural differences in perception about and involvement in physical activity among individuals of all ages. The available research showed that differences in perceptions about physical activity and barriers do exist among the various racial/ethnic groups. First, there are differences among racial and ethnic groups about perceived benefits from a physically active lifestyle. Second, groups differ with respect to type of support systems. Third, groups differ about perceived enhancement of physical appearance through exercise. Fourth, groups differ in the perception that participation is equal among ethnic/racial groups.

In spite of several initiatives from community college educators to promote physical activity in college students, there appear to be external variables that influence the college student's behavioral, normative and control beliefs, which further influenced the strength of the intention to exercise construct. The TPB provides a viable framework to determine intention to exercise by examining salient beliefs, attitudes, social norms and perceived behavioral control over the action. The Theory of Planned Behavior questionnaire is a reliable tool to uncover intentions to participate in physical activity among groups of individuals.

Overall, the research review revealed that participation in physical activity and perceptions about physical activity vary among racial/ethnic groups. In an effort to

mobilize all racial/ethnic groups to be physically active on a regular basis so that they enjoy health improvements and optimal quality of life, these differences need to be identified and addressed by wellness educators and college programs. The Theory of Planned Behavior has been used to study this process. TPB research has revealed that attitude and intention are statistically significant contributors to exercise behavior. The research also showed that differences do exist among the various racial/ethnic groups, specifically the perceived benefits and barriers. The TPB theoretical framework not only encompasses pieces from other psychosocial theories such as SCT (self-efficacy), but also goes into more depth by assessing beliefs, barriers, and support systems. The Transtheoretical Model which incorporates “stages of change” is frequently used in exercise studies but it has limitations in that it only places people in a stage of exercise readiness but does not help to identify why they are in that stage. The TPB is a more comprehensive model, which can be useful to assess how each individual construct can contribute to overall intention to exercise and subsequent behavior. The present study is needed because of its focus on racially/ethnically diverse college students, the wide age range of the college population, and the important role of racial/ethnic diversity and how that might influence the perceived social support and barriers to maintain a physically active lifestyle.

In chapter 3, the researcher describes the research methods, research setting and participants. The instrument development processes are thoroughly explained. The procedures used for conducting the study, the data collection and analysis are detailed.

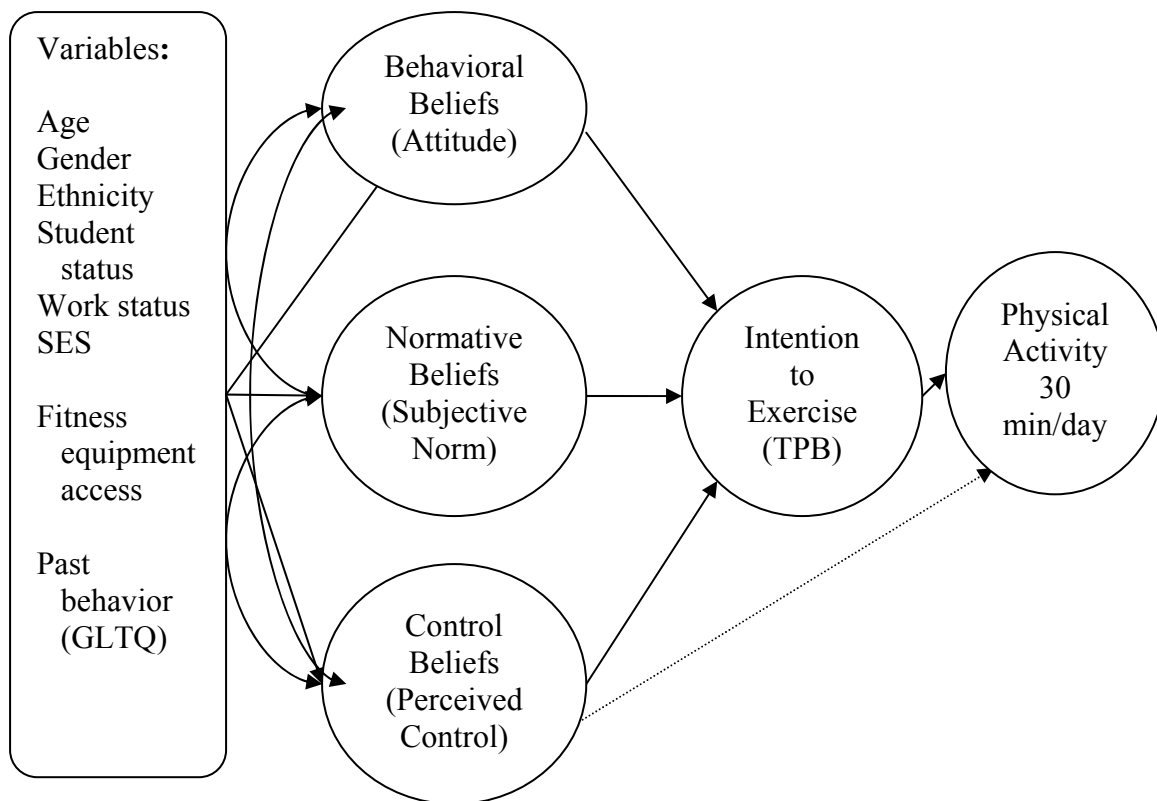
## CHAPTER III

### METHODS

A correlational design was used in this study. The major variables were the constructs of the Theory of Planned Behavior (TPB), which were used to predict a measure of the intention to exercise. TPB constructs include behavioral beliefs, normative beliefs, and cognitive beliefs. Structural Equation Modeling (SEM) was used to test the TPB constructs as predictors of intention to exercise. Figure 1 shows the logical relationship of the measures of dependent, independent, and external variables derived from the literature review and the TPB constructs.

The model was derived from the review of the literature on motivation to engage in fitness activities and the conceptual model of the Theory of Planned Behavior. Numerous variations of the TPB model can be found in the literature (Chatzisarantis & Hagger, 2005; Rhodes et al., 2002; Van Ryn, Lytle, & Kirscht, 1996). The schematic representation of Ajzen's model as presented can be found on Ajzen's (2004) website and in health and exercise studies (Godin & Kok, 1996; Hausenblas et al., 1997).

SEM procedures were used to characterize the results of the TPB statistical analysis. SEM can determine if the TPB constructs and the external variables (age, gender, race/ethnicity, work status, student status, SES, access to fitness equipment, and past behavior) predict the intention of college students to engage in physical activity in accord with the causal structure implied by Figure 1.



*Figure 1.* Logical relationship of measures of external, dependent, and independent variables and TPB constructs.

### Setting and Participants

The research setting was a community college in a large metropolitan area of the southeastern United States that had approximately 30,000 students. The student body was culturally diverse and the college offered a variety of instructional modes and delivery systems to enable students of all ages and ethnic backgrounds to prepare for the future. At the time of the study, the general education program stressed communication and computational skills; historical, social, ethical, and global perspectives; the sciences, humanities, and physical fitness. All students who enrolled in the college for the first time in the fall semester, 2007 or after were required to complete a 2.0 credit wellness course

to graduate and obtain the Associate of Arts or Associate of Science degree. Prior to 2007, only one 1.0 credit wellness course was required. This was one indicator of institutional interest and commitment to promoting the health and wellness of the student body.

College-wide fall enrollment for the 2006-2007 academic year revealed a total *N* of 30,600 (with 61% women, 39% men) The distribution by ethnicity was 31% non-Hispanic Whites, 27% Black non-Hispanic, <1% American Indian/Alaskan Native, 4% Asian Pacific Islander, 26% Hispanic, and 5% unknown. There were 8% who were categorized as non-resident aliens. The average age of the college student in this academic year was 25 years (Department of Education, 2007).

Participants included all students who enrolled into one of the on- campus wellness courses scheduled in a winter semester. It was assumed that the student population obtained for the study was a reasonably representative sample of the entire campus population. It was also assumed that the pilot study group is representative of the actual study group one semester later.

Prior to initiating the study, the Institutional Review Boards at the participating community college and Florida International University (Appendix B) reviewed the proposal and provided consent for the project to proceed. Written consent was obtained from all participating students in the group interview. All data were reported in aggregate form to protect anonymity. Transcriptions of the audiotapes were kept in a secure locked file in the researcher's office on campus. Only the researcher and members of her Committee had access to the data. Appendix C includes the letter of informed consent

from the discussion groups. Appendix D includes participant cover letters for the pilot study and full study.

### Instrument Development

Two instruments (the Theory of Planned Behavior questionnaire and the Godin Leisure Time Questionnaire) were combined into one and used in this study. The Theory of Planned Behavior questionnaire and the Godin Leisure Time Questionnaire are described below.

#### *The Theory of Planned Behavior (TPB) Questionnaire*

The TPB questionnaire was developed according to the process described by Ajzen and Fishbein (1980) and Ajzen (2004) as well as the procedures in the document titled *Constructing Questionnaires based on the Theory of Planned Behavior: A Manual for Health Services Researchers* (Francis et al., 2004). The development of a TPB questionnaire requires both quantitative and qualitative research methods.

#### *Survey Group*

The draft questionnaire was developed in the fall of 2006 when 38 students who were enrolled in three separate wellness courses were asked to complete a beliefs elicitation survey; a nine item open-ended questionnaire (see Appendix E) to determine their beliefs about intention to be physically active for at least 30 minutes per day in the coming month. The questionnaire was modeled after a similar one given as an example by Ajzen (2002). Completion of the draft questionnaire was voluntary. The response rate was 100%. From the questionnaire, common beliefs were categorized and counted for frequency by the researcher. From this frequency analysis, salient beliefs concerning intention, social norms, perceived behavioral control, and attitudes about exercise were

identified and a rough draft of the Theory of Planned Behavior Questionnaire was developed (Appendix A, part 2).

### *Validity*

To establish content validity, Ajzen (2004) recommends an interview process (see Appendix F) to further uncover beliefs, attitudes, social norms, and perceived behavioral control towards physical activity and cultural expectations or differences that may not have surfaced with the earlier elicitation of beliefs or from the review of the literature. The interview process served as a cognitive response analysis. Students who completed wellness courses within the previous two semesters were recruited via their college email address and interviewed in a group (audio taped for later verbatim transcription). The pilot group included 5 students who identified themselves from various races and cultures.

### *Pilot Group*

The group interview began with the researcher facilitating the introductions and stating the purpose of the meeting. The future use and benefits of their responses were explained thoroughly and openly discussed. They were allowed to stop participating at any time. The participants' questions were answered before formally beginning. Each individual in the group signed a written consent and gave verbal consent that was audio-recorded.

To develop the TPB questionnaire items related to behavioral beliefs, the researcher selected the most frequently named advantages and disadvantages of being physically active for at least 30 minutes each day in the coming month from the pilot surveys and group interview. Thirty minutes of physical activity or exercise per day was

chosen due to its simplicity, data from prior studies, the 2005 U.S. Dietary Guidelines for Americans, and the American College of Sports Medicine and American Heart Association's guidelines (Haskell et al., 2007). To develop the questionnaire items related to normative beliefs, the researcher selected the most frequently named people or groups of people who would approve or disapprove of the students being physically active at least 30 minutes each day in the coming month. To develop the questionnaire items related to control beliefs, the researcher selected the most frequently named barriers to or facilitating factors that make it easier or more difficult to be physically active for at least 30 minutes each day in the coming month. Finally, the researcher solicited pilot study participants' opinions of the influence of their race, culture, or ethnicity on their attitude, social support, and perceived control over whether they were physically active for at least 30 minutes each day.

#### *The Godin Leisure-Time Exercise Questionnaire (GLTQ)*

The Godin Leisure-Time Exercise Questionnaire (GLTQ) was originally developed to assess leisure time physical activity. In contrast to other questionnaires, which were lengthy and difficult for the subject to complete accurately, the GLTQ has good estimates of validity and reliability using community research populations (Godin & Shephard, 1985). In the GLTQ, the respondents considered the frequency of physical activity in which they have engaged during the previous week. In response to three statements about physical activity intensity, students wrote the number of times per week they exercised at that level for more than 15 minutes. The fourth and final question asked how often the individual had engaged in regular activity long enough to work up a sweat. The individual then checked one of three responses: often, sometimes, or never/rarely.

The researcher later completed simple calculations to achieve a total leisure activity score. An example would be if weekly frequencies of strenuous, moderate, and light activities reported were 3, 6, and 14, these numbers were multiplied by 9, 5, and 3, respectively. Then a total leisure activity was calculated in arbitrary units by summing the products of the three intensities  $(9 \times 3) + (5 \times 6) + (3 \times 14) = 99$ . The final question pertaining to “exercising hard enough to work up a sweat” required students to check-off the relevant box labeled 1-often, 2-sometimes, or 3-seldom/rarely. The total leisure scoring process was found valid and reliable (Godin & Shephard, 1985)

### *Pilot Study*

A pilot study of the TPB questionnaire and GLTQ was conducted among the community college students that agreed to participate in the focus group interview. It was assumed that the focus group students and the study participants were similar to each other. From the pilot questionnaire, the final instrument was distributed to all students enrolled in wellness courses by their respective instructors. All student participation was voluntary.

Wellness courses encompass four courses titled Total Wellness, Weight Training, Aerobics, and Introduction to Healthy Living. Each class consisted of 25 students. The instructor for each class distributed the questionnaire during a portion of the scheduled class period. Students were informed that their participation was both voluntary and anonymous and the information obtained would be used to learn more about individuals and their intention to be physically active (see cover letter, Appendix D). The questionnaire was distributed during the first 2 weeks of classes. The response rate was high since the questionnaire was completed during regularly scheduled class sessions.

The questionnaire was comprised of three sections. Section 1 included the demographic questions such as age, gender, race/ethnicity, student status, work status, socioeconomic status, access to fitness equipment, and past behavior. Section 2 contained the questions derived from the Theory of Planned Behavior, and Section 3 included two questions from the Godin Leisure Time Questionnaire to determine physical activity participation in the past 7 days.

### *Reliability*

The TPB instrument was developed according to theoretical guidelines outlined by Ajzen (2004) and was modified based upon the salient beliefs and referents derived from the student focus group. A Cronbach's alpha coefficient ( $\alpha$ ) and inter-item reliability correlations were calculated to measure the internal consistency of the appropriately grouped questionnaire items. The researcher wanted to be sure that the questionnaire items as written and interpreted by the participant consistently measured the same construct. As indicated in the review of the TPB research, alpha coefficients ranged from a low of .544 for subjective norms (Chatzisarantis & Hagger, 2005) to a high of .95 for intention to engage in regular physical activity (Norman & Conner, 2005). The GLTQ was administered concurrently with the TPBQ and collected at the same time to ensure that the total time for the two instruments fit within a regularly scheduled class period. Godin and Shephard (1985) reported two independent criteria of concurrent validity for the GLTQ. The two week test-retest reliability coefficients were .94, .46, .48 and .80 for self reports of intensity of exercise.

## Data Collection

During the first few weeks of classes in the semester of the full study, the instrument was distributed to students enrolled in all wellness courses offered in the daytime and evening hours. The anticipated number was 250-300 students. Data collection took place during the 2-week period to obtain a representative sample of the population and to maximize sample size and power.

An early distribution of the TPB at the beginning of the course by their respective instructors ensured that students would not yet be influenced by the course content. Once completed, the questionnaires were collected by the instructor, placed in an envelope, and sealed. The researcher retrieved the envelopes from the various instructors within the 2-week time frame.

## Data Analysis

Basic descriptive statistics were used to analyze RQ 1 --Are the identified racial/ethnic groups different in age, gender, SES, work status, school status, access to exercise equipment, and past exercise behavior? Correlational analyses were conducted for: RQ's 2-4 --What was the relationship between the three beliefs (behavioral, normative, and control) and the intention to exercise among various racial/ethnic groups of college students? Correlational analyses were conducted for RQ 6 --Does the intention to exercise correlate with college students' report of their physical activity in the past 7 days? Structural Equation Modeling was conducted for RQ 5 --To what extent does the Theory of Planned Behavior and external variables (age, gender, race/ethnicity, student status, work status, access to fitness equipment, and past behavior) predict the intention to exercise among college students of various ethnic groups?

The descriptive data were organized into seven demographic categories (see Appendix A, part 1): (a) age, (b) gender, (c) race/ethnicity, (d) socioeconomic status, (e) student status (full or part time), (f) employment status, and (g) access to fitness equipment and their past behavior. Descriptive statistics included frequencies, percentages, and means which were calculated through a computer assisted statistical analysis program (SPSS 16.0, SPSS Inc., 2007).

Correlation analyses permitted the researcher to determine patterns of relationships among variables and to observe how, alone or in combination; they affected the pattern of behavior (Gall et al., 2007, p. 137). Pearson-product moment correlation was utilized to determine the correlation between the TPB constructs (see Appendix A, part 2) and the GLTQ (see Appendix A, part 3): Do students with high intentions to exercise report regular physical activity? Do relationships exist between the constructs of attitude, social norms, or perceived behavioral control and students' intention to exercise? Does the impact of the three constructs towards intention to exercise vary based upon race/ethnicity or any of the other external factors?

A structural equation modeling analysis (SEM) was conducted to test the larger TPB model as per Figure 1. Path analyses and SEM have been applied to other studies that used the Theory of Planned Behavior as indicated in the review of the literature (Chatzisarantis & Hagger, 2005; Hagger et al., 2002). SEM permits an overall test of model fit. SEM is a method for testing the support of a theory about causal relationships between variables (Gall et al., 2007). Prior to conducting the full study, the researcher believed that the three basic conditions for path analysis to provide meaningful results were met: (a) the variables must be well measured, (b) important causal variables cannot

be left out of the model, and (c) the sample size must be adequate (Gall et al., 2007). Prior to the SEM analysis, the researcher attempted to closely adhere to these conditions in this study by (a) conducting a beliefs elicitation survey, (b) performing group interviews of individuals from the target population for construct development and conducting a pilot study on the instrument prior to its distribution to the study participants, (c) conducting a thorough literature review to identify external variables (age, gender, race/ethnicity, student status, work status, SES, access to fitness facilities, and past behavior), and (d) ensuring an appropriate sample size (a power analysis) and enhancing the probability of an adequate response rate by utilizing regularly scheduled class times to invite participants to complete the instrument.

SEM is a sophisticated method for multivariate correlational analysis. It tests theories about hypothesized causal links between variables. Parameter estimates are valid as long as the model is not mis-specified and the underlying statistical assumptions are met. Researchers have raised the issue that the regression structures of SEM often assume a lack of interaction among predictors (Newman & Marth, 1995). If there is an interaction between two variables in predicting the third variable, then fitting a model that ignores that interaction and assumes only main effects represents a mis-specified model and the researcher can be misled. However, the TPB is a strong theory that does not posit interactions and there is no reason to expect an interaction (J. Jaccard, personal communication, December 7, 2007).

The AMOS 16.0 statistical analysis program (Arbuckle, 2007) was used to analyze the path diagram using full information estimation. SEM computer programs use full information estimation approaches where all of the path coefficients (and their

standard errors) are estimated simultaneously in the context of the full system of linear equations implied by the model. This approach can yield more efficient estimates and increased statistics about goodness of model fit (Jaccard, 2007b).

Five global fit indices were used to evaluate overall model fit. These included: (a) the overall chi-square test of model fit, which should be statistically non-significant, (b) the Root Mean Square Error of Approximation (RMSEA) which should be less than 0.08 to declare satisfactory fit, (c) the  $p$  value for the test of close fit, which should be statistically non-significant, (d) the Comparative Fit Index (CFI), which should be greater than 0.95; and (e) the standardized root mean square residual, which should be less than 0.05. In addition, focused fit tests included examination of the standardized residual covariance, which should be between -2.00 and 2.00, and the modification indices, which should be less than 4.00 (Bollen & Long, 1993).

### Summary

In chapter 3, the researcher included a description of the research setting, participants, procedures used to protect human subjects, and the procedures used to conduct the research study. Statistical methods to evaluate the data were delineated with respect to the research questions.

Chapter 4 describes the results of both the pilot study and the full study. Characteristics of the study participants are detailed. An analysis of the TPB model is explained thoroughly. The findings related to each of the six research questions are presented.

## CHAPTER IV

### RESULTS

The two-fold purpose of the study was (a) to identify factors that contribute to and promote physical activity for college students, such as how race, culture, and ethnicity affect attitude towards physical activity participation, and (b) to reveal the motivations of college students to engage in physical activity on a regular basis. Towards that end, the secondary purpose of the study was to determine if intention to exercise varied among college students for different racial/ethnic groups.

#### Pilot Study

Thirty-eight former wellness students comprised the survey group which provided the list of salient beliefs concerning intention, social norms, perceived behavioral control, and attitudes about exercise which were used to develop the draft Theory of Planned Behavior Questionnaire (Appendix A, part 2). The results from the earlier beliefs elicitation survey (Gordon, 2006;  $N = 38$ ) revealed that cardiovascular health, fitness level, a healthy weight, and emotional well-being were cited most frequently as advantages to physical activity. The respondents also revealed that friends, family members, and mothers are influential in the decision to be physically active. Work, school responsibilities, and lack of time were perceived as effecting control over whether they would be physically active.

After receiving approval from the Office of Graduate Studies to conduct the research study, the researcher contacted former students from eight wellness sections via e-mail ( $N = 200$ ). They were invited to participate in a group interview. The purpose of

the meeting was (a) to elicit behavioral, normative, and control beliefs and (b) confirm that the definitions and questionnaire items were understood by the participants. The researcher received eight replies from former students who expressed an interest in participating. A mutually acceptable meeting date and time was able to be arranged with six of the eight students.

The researcher convened the pilot study group on the campus of the college in a private room where there would be no interruptions. Five students came to the focus group interview. The session began with the students signing consents to participate in the group interview. The tape recorder was turned on and the researcher prepared to write notes during the interview. Since the researcher knew the students, voice recognition was easily determined for purposes of transcribing the audio tape.

The researcher explained the purpose of the meeting as well as the potential benefits of their responses. The group interview ( $N = 5$ ) served as a method to conduct a cognitive response analysis. Students reviewed the written definitions of exercise and physical activity as worded on the draft questionnaire. The researcher asked the students (a) to add anything to the definitions and (b) to comment on the language and phraseology of the definitions. The researcher then posed a series of open ended interview questions (Appendix F) so as to elicit behavioral, normative, and control beliefs. The researcher asked students to complete the draft questionnaire which took approximately five minutes. The researcher asked students if they detected any ambiguous or confusing terms. Finally, the researcher asked students how their race or culture viewed or influenced their physical activity habits. Prior to completing the interview, the researcher asked students if it would be acceptable for the researcher to

contact them via email if any further questions arose and if they would complete a revised version of the questionnaire. All participants agreed that this was acceptable. The focus group interview was terminated and then the researcher gave each student a \$10.00 gift card to Barnes and Noble Bookstore as a token of appreciation.

The researcher reviewed the five completed questionnaires and handwritten notes and listened to the audio taped record. In the meantime, the researcher initiated an attempt to convene a second group interview with the students that expressed interest but could not be available for the first interview. Only one responded and a date and time was set, but the student did not come to the session.

The demographic profile of the pilot study participants included three males and two females. One participant was between 18-20 years of age and four were over 30 years of age. Two students were in their second year of college, and three reported they had more than 2 years of college. Student status included three part time students and two full time students. Three students reported being unemployed, one was employed 30-40 hours per week, and one was employed more than 40 hours per week. Race or ethnicity and gender was reported as two White females, one White male, one Black (non-Hispanic) male, and one Hispanic male. Socio-economic status included one participant who earned less than \$19,000 per year, three earned \$20-39,000 per year, and one earned more than \$60,000 per year as spousal income since that person was personally unemployed. All participants reported that they had access to exercise equipment.

In response to the question, "How does race or culture influence your physical activity habits?" their responses varied. For example, the Black (non-Hispanic) male student noted, "Exercise is not promoted in my country but soccer is played." He

remarked that schools he had attended focus on “mental fitness.” He remembered a professor who would sweep the roofs on break to relieve mental exhaustion. The professor called it “vascular,” referring to cardiovascular. Comments from the Hispanic male student focused on how he grew up in a “basketball family” and was pushed to exercise. He stated that, as a young adult, he later rebelled, stopped all physical activity, and gained 50 pounds. He is now exercising and worries if he will ever return to his original shape. The White male student commented that, in his culture, there existed the extreme opposites of those who were very fit and those who were unfit. He proudly reported how he got his father to begin exercising and how it has reduced his father’s stress level. He also reported that his mother thought sweating undesirable, but he personally thought it was appealing. The White females commented on the inactivity of children, suggesting that schools should take a more active role in promoting physical activity. They also mentioned that efforts to promote physical activity should target couples.

The researcher sent the revised instrument as an attachment to the participants approximately 2 weeks after the first interview, and requested that the students complete it for the second time. Four of the five returned the revised questionnaire. The revised questionnaire can be found in Appendix G.

### Full Study

The final version of the survey instrument was distributed to students enrolled in wellness courses during the first two weeks of classes in January, 2008. In this section, the response rate, participants, and item reliability are described.

### *Response Rate*

Two hundred and fifty five students were present on the day of questionnaire distribution. All students present agreed to complete the survey resulting in a 100% response rate and an  $N = 255$ .

### *Participants*

Table 5 shows the frequencies and percentages of participants according to various demographics. Of the 255 respondents, 54.5% were women ( $N = 139$ ) and 45.4% were men ( $N = 116$ ). The majority (59.6%,  $N = 152$ ) were between 18-20 years of age and the minority were >30 years of age (8.2%,  $N = 21$ ) or between 21-29 years of age (32%,  $N = 82$ ).

For year in college, 38.7% ( $N = 98$ ) of the students reported they were in their first year while 39.1% ( $N = 99$ ) were in their second year, and 22.1% ( $N = 56$ ) had been in college 2 years or more. Of the 255 respondents, 74.4% ( $N = 189$ ) reported full time status, 25.1% ( $N = 64$ ) reported part time status, and .4% ( $N = 1$ ) were not enrolled as official students.

Regarding work status, 23.5% ( $N = 60$ ) reported not being employed. Nine students (3.5%) worked <10 hours per week, 41 students (16.1%) worked 10-20 hours per week, 23.5% ( $N = 60$ ) reported they worked 20-30 hours per week, 43 students (16.9%) worked 30-40 hours per week. Finally, 42 (16.5%) worked > 40 hours per week.

For groups of students, 42.9% of the participants reported they were Black ( $N = 109$ ), 33.9% were Hispanic ( $N = 86$ ). Another 13.4% were White ( $N = 34$ ) and 5.9% were Asian/Pacific Islander ( $N = 15$ ).

Table 5

*Frequencies and Percentages of Participant's Demographics*

Characteristic	<i>N</i>	Missing	Percent
Gender	255	0	100.0
Male	116		45.5
Female	139		54.5
Age		0	
18-20 years	152		59.6
21-29 years	82		32.2
>30 years	21		8.2
Year in college		2	
1 <sup>st</sup> year	98		38.7
2 <sup>nd</sup> year	99		39.1
>2 years	56		22.1
Student Status		1	
Unofficial	1		.4
Full time	189		74.4
Part time	64		25.2
Work status		0	
Not employed	60		23.5
<10 hrs/wk	9		3.5
10-20 hrs/wk	41		16.1
20-30 hrs/wk	60		23.5
30-40 hrs/wk	43		16.9
>40 hrs/wk	42		16.5
Group		1	
White	34		13.4
Black	109		42.9
Hispanic	86		33.9
Asian/Pacific Islander	15		5.9
Other	10		3.9
SES by Income		10	
<\$19,000	112		45.7
20-39,000	82		33.5
40-59,000	26		10.6
>60,000	25		10.2
Access to Equipment		3	
Yes	193		76.6
No	59		23.4

In addition, 3.9% ( $N = 10$ ) categorized themselves as “Other.” In this survey item, participants could write the words that best described their culture or ethnicity. They included the following: Indian/Alaskan Native, Black Hispanic, Haitian, West Indian, Jamaican Indian, Jamaican-Puerto Rican, Indo-Guyanese, Indian, and Caribbean. One did not specify.

For income, there were 10 items of missing data. The income reported included personal income per year if working or parental (significant other) income if not working. Of the  $N = 245$ , 45.7% ( $N = 112$ ) reportedly earned less than \$19,000 per year; Eighty-two 32.2% ( $N = 82$ ) earned between \$20-39,000 per year; 10.6% ( $N = 26$ ) earned between \$40-59,000 per year; 9.8% ( $N = 25$ ) earned more than \$60,000 per year.

With regards to access to exercise equipment, of the 252 participants who completed this item, 75.7% ( $N = 193$ ) answered “yes” that they had access to exercise equipment. This means that 23.4% reported that they did not.

#### *Item Reliability*

Based on  $N = 255$ , Cronbach alpha coefficients were calculated for each of the constructs. Attitude, based on five items, yielded a Chronbach’s alpha of .78. There were originally four items to measure subjective norms; however, only two of the four were reasonably correlated so only those two items were used, yielding an inter-item correlation of .45(Cronbach’s alpha of .62). Perceived behavioral control was originally measured using four items. However, two of the four were reasonably correlated so only those two items were used, yielding an inter-item correlation of .44 (Cronbach’s alpha of .61). Intention was measured using 3 items and yielded a Cronbach’s alpha of .77.

## Preliminary Analysis of the TPB Model

### *Missing Data*

Upon review of the TPBQ data, it was noted that data were either missing or unable to be interpreted in the Godin Leisure Time Questionnaire (GLTQ) portion. Out of 255 questionnaires, 36 (14%) were answered incorrectly. Some examples are: (a) the student wrote in a word such as “cycling” instead of a number, (b) the student wrote in a word “sometimes” instead of a number, and (c) the student wrote in “90” which might be interpreted as they perform the stated activity 90 times per week which is illogical if not impossible. Given 1020 entries ( $N = 255 \times 4$  GLTQ questions), a total of 103 (10%) were either answered incorrectly, missing, or the response was illogical and unable to be interpreted with confidence. The GLTQ data were omitted in the model thus deleting the measure of self-reported physical activity behavior.

Traditional maximum likelihood methods of SEM assume that the continuous variables in the model are multivariate normally distributed. Skewness and kurtosis indices for each variable showed no values outside  $\pm 2$ . The data were effectively normally distributed at the univariate level and were within the bounds of skewness and kurtosis that typically permit the application of traditional maximum likelihood algorithms.

### *Main Analysis*

The fit of the model shown in Figure 1 was evaluated with AMOS 16.0 using a maximum likelihood algorithm. The global fit indices showed  $\chi^2 = 151.038$ ,  $df = 12$ ,  $p = .000$ , Root Mean Square Error of Approximation (RMSEA) = .214 ( $< .08$  is consistent with a good model fit), the  $p$  value for close fit = .000 ( $> .05$  is consistent with a good

model fit), and the Comparative Fit Index (CFI) = .683 (> .95 is consistent with good model fit). Based upon this information, it was concluded that the data did not support the original model. The original model did not fit the data whether including or excluding the GLTQ available data.

Based upon model diagnostics and the examination of modification indices and theoretical coherence, four additional paths were added to the model so as to improve model fit: (a) behavioral beliefs → intention; (b) behavioral beliefs → subjective norm; (c) behavioral beliefs → perceived behavioral control; and (d) control beliefs → subjective norm. The error terms between attitude toward behavior and perceived behavioral control and between subjective norm and perceived behavioral control were allowed to be correlated. The substantive justification for the additional path coefficients is as follows. For the direct effect of behavioral beliefs on intentions, there are previous studies in the social psychological and marketing literature that suggest that attitudes may not completely mediate the effect of behavioral beliefs on intentions. Beliefs may reflect certain aspects of the cognitive system that impact decisions and that are not well captured by a general feeling of favorableness or unfavorableness, as reflected in the global attitude. For the remaining paths that focused on the endogenous variable of subjective norms, the logic is that one's behavioral beliefs and control beliefs may bias one's overall assessment of referent approval/disapproval independent of specific normative beliefs by means of rationalization and justification processes. For example, if a person sees a behavior as leading to negative outcomes, then this may bias the individual to also see relevant others, as a group, as disapproving of behavioral performance. This logic would also apply to the added path for the endogenous variable

of perceived behavioral control. In terms of correlated error, the suggestion is that an unanticipated explanatory variable that influences both attitude and subjective norm was left out of the model. The researcher can only speculate what such other variables might be, but perhaps it is some additional form of rationalization tendency. The revised TPB model, shown in Figure 2<sup>1</sup>, includes four additional paths and correlated error terms but omits the GLTQ (self-reported measure of physical activity).

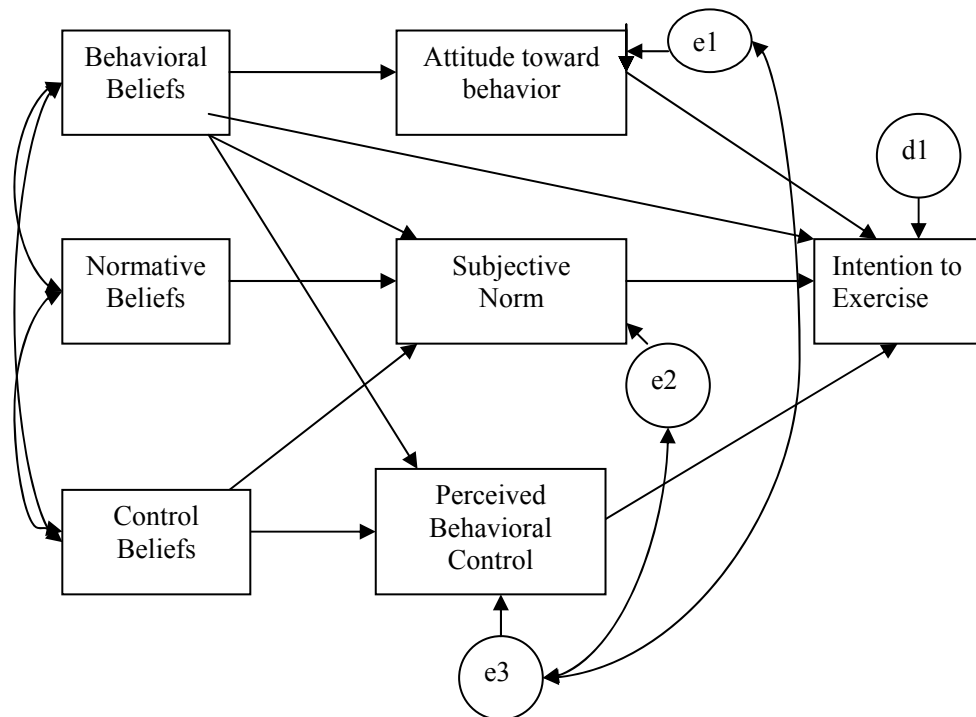


Figure 2. Revised TPB model and intention to exercise.

Figure 3 presents the parameter estimates for the structural coefficients from the SEM. Standardized coefficients appear on each path, with unstandardized coefficients in parentheses. The residuals estimate the proportion of unexplained variance in the endogenous variables (i.e., they are error variances in standardized form). Using the

<sup>1</sup> Note: AMOS symbols are used in Figures 2 and 3.

unstandardized regression weights, for every one unit increase in behavioral beliefs (BB), intention is predicted to increase by .01 units, holding relevant other variables constant. For every one unit increase in perceived behavioral control (PBC), intention is predicted to increase by .27 units, holding relevant other variables constant.

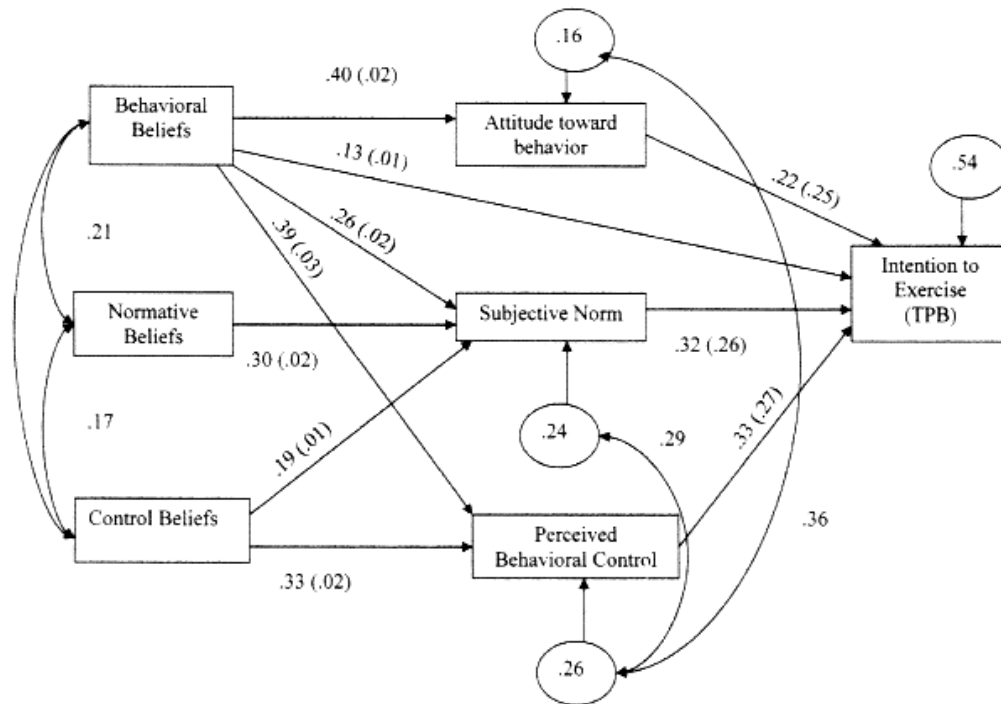


Figure 3. Revised TPB model with significant standardized coefficients shown on the path with unstandardized coefficients in parentheses.

For every one unit increase in subjective norm (SN), intention is predicted to increase by .26 units, holding other relevant variables constant. For every one unit increase in behavioral belief (attitude) (BBA), intention is predicted to increase by .25 units, holding other relevant variables constant.

For every one unit increase in BB, SN is predicted to increase by .02 units, holding other relevant variables constant. For every one unit increase in CB, SN is predicted to increase by .01 units, holding other relevant variables constant. For every

one unit increase in BB, PBC is predicted to increase by .03 units, holding other relevant variables constant. For every one unit increase in normative beliefs (NB), SN is predicted to increase by .02 units, holding other relevant variables constant. For every one unit increase in BB, PBC is predicted to increase by .03 units, holding other relevant variables constant. For every one unit increase in normative beliefs (NB), SN is predicted to increase by .02 units, holding other relevant variables constant. For every one unit increase in BB, BBA is predicted to increase by .02 units, holding other relevant variables constant. For every one unit increase in CB, PBC is predicted to increase by .02 units, holding other relevant variables constant.

Using the standardized regression weights, when BB increases by one standard deviation (SD), intention is predicted to increase by .13 standard deviations (SDs), holding other relevant variables constant. When BBA increases by one SD, intention is predicted to increase by .22 SDs, holding other relevant variables constant. When PBC increases by one SD, intention is predicted to increase by .33 SDs, holding other relevant variables constant. When SN increases by one SD, intention is predicted to increase by .32 SDs, holding other relevant variables constant. When BB increases by one SD, BBA is predicted to increase by .40 SDs, holding other relevant variables constant. When NB increases by one SD, SN is predicted to increase by .30 SDs, holding other relevant variables constant. When CB increases by one SD, SN is predicted to increase by .19 SDs, holding other relevant variables constant. When CB increases by one SD, PBC is predicted to increase by .33 SDs, holding other relevant variables constant. When BB increases by one, PBC is predicted to increase by .39 SDs, holding other relevant

variables constant. Overall, an increase in beliefs results in a predicted increase in intention to exercise.

Table 6 presents the 95% confidence intervals for each of the unstandardized path coefficients. All path coefficients were statistically significant at the .05 level in the predicted direction. An effects analysis revealed the following total effects for the three exogenous variables (Normative Beliefs, Control Beliefs, and Behavioral Beliefs) on intention. A one unit increase in NB was associated with a .01 predicted increase in intention; a 1 unit increase in CB was associated with a .01 predicted increase in intention; and a 1 unit increase in BB was associated with a .03 predicted increase in intention. As the NB, CB, or BB increased, so did intention.

Table 6

*95% Confidence Intervals for Unstandardized Path Coefficients*

Path	Point Estimate	95% Confidence Interval
PBC ← CB	.202**	.196 to .208
BBA ← BB	.022**	.016 to .028
SN ← NB	.019**	.013 to .025
PBC ← BB	.029**	.021 to .037
SN ← CB	.012**	.006 to .018
SN ← BB	.019**	.011 to .027
Intention ← BBA	.247**	.141 to .353
Intention ← SN	.263**	.187 to .339
Intention ← PBC	.274**	.190 to .358
Intention ← BB	.008*	.002 to .014

Note: \*\* $p < .001$ , \* $p < .01$

### Addressing the Research Questions

In this section, each research question is addressed in reference to the revised TPB Model shown in Figure 2. For each item, the research question is restated. Then the

researcher describes the evidence for how the question was addressed.

### *Research Question 1*

Were the identified racial/ethnic groups different in age, gender, SES, work status, school status, and access to exercise equipment?

Due to the  $N = 1$  (.4% of the population) in the American Indian/Alaskan Native group and the  $N = 9$  (3.5% of the population) in the Other group, they were omitted from the statistical analyses. As shown in Table 7, one-way ANOVAs on quantitative outcomes and chi square tests of independence on qualitative outcomes revealed that there were no significant differences between the remaining four racial/ethnic groups (Black, Hispanic, White, and Asian/Pacific Islander) in terms of gender, years in college, student status, work status, SES as indicated by income, or access to exercise equipment.

Table 7

### *Analysis of Variance for Demographics by Groups*

Variable	<i>p</i>
Age	.230
Gender	.278
Year in college	.979
Student Status	.128
Work Status	.522
SES by Income	.311
Equipment Access	.208

Note: \* $p < .05$ .

### *Research Question 2*

What was the relationship between behavioral beliefs and the intention to exercise among various groups of college students? Table 8 shows the rankings of the correlations

of the eight items assessing behavioral beliefs and intention to exercise. Improvement in emotional well-being and emotional well-being were the most highly correlated with intentions ( $r = .336, p = .000$ ;  $r = .334, p = .000$ ). The lowest ranking beliefs were the items related to obtaining or maintaining a healthy weight ( $r = .175, p = .006$ ;  $r = .260, p = .000$ ). Improving cardiovascular health was also highly correlated with intentions ( $r = .331, p = .000$ ). Emotional well-being and cardiovascular health appear to be important behavioral beliefs among this group of college students with less importance being given to the ability of 30 minutes of physical activity per day being able to influence obtaining or maintaining a healthy weight.

Table 8

*Correlation of Behavioral Beliefs with Intention to Exercise (Ranked Highest to Lowest)*

Item	Question	<i>r</i>	<i>p</i>
4.	Improvement in emotional well-being (unlikely/likely)	.336**	.000
12.	My emotional well-being is (unimportant/important)	.334**	.000
9.	Improving my cardiovascular health (undesirable/desirable)	.331**	.000
10.	Improving my fitness level (undesirable/desirable)	.320**	.000
2.	My fitness level will improve (unlikely/likely)	.282**	.000
1.	My cardiovascular health will improve (unlikely/likely)	.260**	.000
11.	Obtaining/maintaining a healthy weight (undesirable/desirable)	.260**	.000
3.	Obtain/maintain a healthy weight (unlikely/likely)	.175**	.006

Note: \*\* $p < .001$ .

### *Research Question 3*

What was the relationship between normative beliefs and the intention to exercise among college students of various groups? Table 9 ranks the correlations of the eight

items assessing normative beliefs and intention to exercise. The highest ranking was given to the item; “My family members think that I should not/should be physically active for at least 30 minutes each day in the coming month” ( $r = .257, p = .000$ ); followed by “Mother’s approval” ( $r = .187, p = .004$ ). The lowest rankings and correlations were related to “What my friends think I should do” ( $r = .022, p = .738, ns$ ) and “Other people whose opinion I value do not/do participate in physical activity themselves” ( $r = .077, p = .230, ns$ ). The most important influences of normative beliefs in this group of college students appeared to be “family members” and “mother”.

Table 9

*Correlation of Normative Beliefs with Intention to Exercise (Ranked Highest to Lowest)*

Item	Question	$r$	$p$
13.	Family members think I (should not/should)	.257**	.000
27.	Mother’s approval is important (disagree/agree)	.187**	.004
24.	Family’s approval is important (disagree/agree)	.185**	.004
14.	My friends would (disapprove/approve)	.145*	.024
16.	My Mother would (disapprove/approve)	.136*	.034
26.	Doing what other people ... (disagree/agree)	.119	.064
15.	Other people... (do not/do)	.077	.230
25.	What my friends think... (disagree/agree)	.022	.738

Note: \*\* $p < .01$ , \* $p < .05$

*Research Question 4*

What was the relationship between perceived behavioral control beliefs and the intention to exercise among college students of various groups?

Table 10 shows the rankings of the correlations of the eight items assessing control beliefs and the intention to exercise. Work responsibilities were correlated most highly ( $r = .314, p = .000$ ), followed by school responsibilities ( $r = .262, p = .000$ ). The lowest correlations were on the items “Work responsibilities can prevent me from being physically active for at least 30 minutes per day in the coming month” ( $r = -.054, p = .403, ns$ ) and “Lack of time availability makes it less likely/more likely for me to be physically active for at least 30 minutes each day in the coming month” ( $r = .083, p = .200, ns$ ). Beliefs about both work and school appear to be important control beliefs.

Table 10

*Correlation of Control Beliefs with Intention to Exercise (Ranked Highest to Lowest)*

Item	Question	<i>r</i>	<i>p</i>
28.	Work responsibilities make it (less likely/more likely)	.314**	.000
29.	School responsibilities make it (less likely/more likely)	.262**	.000
6.	School may prevent...(unlikely/likely)	-.212**	.001
7.	Lack of time may prevent...(unlikely/likely)	-.185**	.004
8.	Feeling too tired may prevent...(unlikely/likely)	-.127*	.049
31.	Feeling too tired will make it...(less likely/more likely)	.108	.094
30.	Lack of time availability makes it...(less likely/more likely)	.083	.200
5.	Work responsibilities can prevent...(unlikely/likely)	-.054	.403

Note: \*\* $p < .01$ , \* $p < .05$ .

### *Research Question 5*

To what extent did the Theory of Planned Behavior predict the intention to exercise among college students of various groups?

The variables in the revised model accounted for approximately 54% of the variance in intention to exercise. The predictors of subjective norm explained 24% of the variance in intention to exercise; the predictors of behavioral beliefs (attitude) explained 16% of the variance in intention to exercise, and the predictors of perceived behavioral control explained 26% of the variance in intention to exercise, when considered bivariate. The percentages of explained variances for the individual predictors do not take into account redundant explained variance (i.e., the fact that the predictors are somewhat correlated). However, the standardized residuals in the overall analysis do. All of the path coefficients shown in the model were statistically significant ( $p < .001$ , two-tailed). The conclusion is that the TPB constructs can predict intention to exercise among a group of multi-culturally diverse college students.

### *Research Question 6*

Did the intention to exercise correlate with college students' report of their physical activity in the 7 days prior to the survey?

Utilizing the questionnaires with complete data ( $N = 224$ ), which included accurate data for both Generalized Intention and the GLTQ; a bivariate correlation was performed between intention and the self-reported physical activity measure. In the TPB, intention is an indication of a person's readiness to perform a given behavior. In the current study, intention was not significantly correlated with the GLTQ data ( $r = .13$ ,  $p = .052$ ), but it was in the hypothesized direction, almost achieving significance. However,

the GLTQ measure correlated significantly ( $r = .27, p = .001$ ) with the intention statement: “This month, how many days do you expect to be physically active for at least 30 minutes per day?”

*Exploratory Analysis*

ANOVAs were conducted to compare the TPB constructs (control beliefs, normative beliefs, and attitude) as a function of ethnic/racial groups. The results are shown in Table 11.

Table 11

*Analysis of Variance among Constructs and Ethnic/Racial Groups*

Construct	<i>df</i>	<i>F</i>	<i>p</i>
Control Beliefs	3	.904	.440
Normative Beliefs	3	2.703	.046*
Attitudes Toward			
Behavior	3	3.266	.022*
Subjective Norm	3	1.543	.204
Perceived Behavioral			
Control	3	.908	.438
Generalized Intention	3	2.454	.064

Note: \* $p < .05$ .

Statistically significant differences were found for normative beliefs and attitudes toward behaviors among ethnic/racial groups. To discern the direction of those differences, post hoc comparisons were conducted.

Post hoc comparisons shown in Table 12 revealed that there were significant differences between Blacks and Hispanics on (a) Normative Beliefs ( $p = .006$ ) and (b) Attitude toward the behavior ( $p = .007$ ) with Blacks rating both normative beliefs and attitudes lower than Hispanics. The Asian/Pacific Islander students also rated attitude toward the behavior lower than the Hispanic students ( $p = .036$ ). When comparing single items on the TPBQ, ANOVAs revealed significant differences between groups ( $p = .007$ ) on the item: “My friends would (disapprove, approve) of me being physically active for at least 30 minutes each day in the coming month.”

Table 12

*Post Hoc Multiple Comparisons of Beliefs and Attitudes: Least Significant Differences*

Dependent Variable	(I) Group (Mean)	(J) Group (Mean)	Mean Difference (I-J)	$p$
Normative Beliefs	Hispanic (41.9)	Black (32.4)	9.4919	.006*
Attitudes Toward Behavior	Hispanic (6.27)	Black (5.85)	.4174	.007*
	Hispanic (6.27)	Asian/PI (5.64)	.6274	.036*

Note: \* $p < .05$ .

As shown in Table 13, multiple comparisons revealed statistically significant different responses for Black and Hispanic students ( $p = .007$ ). Hispanic students rated their friends’ approval at higher levels. Statistically significant differences in responses

were apparent for the Hispanic and Asian/Pacific Islander students ( $p = .007$ ). Here, Hispanic students rated their friends' approval higher than Asian/Pacific Islander students. Statistically significant differences between White and Hispanic students were noted. Hispanic students rated friends' approval higher ( $p = .034$ ). However, an ANOVA revealed no significant differences between groups on the three general intention items.

Table 13

*Post Hoc Multiple Comparisons of Items: Least Significant Differences*

Dependent Variable	(I) Group (Mean)	(J) Group (Mean)	Mean	$p$
			Difference (I-J)	
My friends would (disapprove, approve) of me being physically active for at least 30 minutes each day in the coming month.	Hispanic (2.42)	White (1.76)	.65	.034*
	Hispanic (2.42)	Black (1.83)	.59	.007*
	Hispanic (2.42)	Asian/PI (1.27)	1.15	.007*

Note: \* $p < .05$ .

The ANOVA of behavioral beliefs revealed significant differences between groups ( $F = 3.706, p < .012$ ) on the item: “Being physically active for at least 30 minutes per day in the coming month is (harmful/beneficial)” and also on the item rating the statement (bad/good) ( $F = 2.832, p < .039$ ). As shown in Table 14, the post hoc analysis of multiple comparisons on items assessing direct attitude towards the behavior revealed significant differences ( $p = .001$ ) between Blacks and Hispanics with Hispanics rating physical activity as more beneficial. The rating of the item: “being physically active for at

least 30 minutes per day in the coming month” as being good or bad revealed significant differences when comparing Whites and Blacks ( $p = .014$ ) and Hispanics and Blacks ( $p = .024$ ) with the Whites and Hispanics giving a higher rating.

Table 14

*Post Hoc Multiple Comparisons of Direct Attitude Items*

Dependent Variable	(I) Group (Mean)	(J) Group (Mean)	(I-J) Mean Difference	<i>p</i>
Being physically active for at least 30 minutes per day in the coming month is:				
Harmful/beneficial	Hispanic (6.62)	Black (5.92)	.70	.001*
Bad/good	White (6.74)	Black (6.08)	.65	.014*
	Hispanic (6.52)	Black (6.08)	.44	.024*

Note: \* $p < .05$ .

Summary

The findings related to each of the research questions were presented in chapter 4, in addition to the demographic data, ANOVA findings, and post hoc analyses. The revised TPB model with corresponding standardized and unstandardized path coefficients was described. Through the use of SEM procedures, the data obtained did not fit the original Ajzen TPB Model. However, a modified TPB model was found to fit the data by

adding four additional paths (BB→ Intention, BB→ SN, BB→ PBC, and CB→ SN) and correlating error terms. ANOVA and post hoc analysis revealed interesting statistically significant differences among student groups.

Specifically, there were statistically significant differences between Black students and Hispanic students in the areas of normative beliefs and attitude toward physical activity, with the Hispanic students rating normative beliefs and attitude toward physical activity more positively. Hispanic students also rated attitude more positively than Asian/ Pacific Islander students. On the item regarding “friends’ approval,” Hispanic students rated this more positively than all other groups.

There was, however, no statistically significant difference among student groups and their overall intention to exercise. In this study, utilizing a revised TPB model, the TPB constructs accounted for 54% of the variance in intention to exercise. This appears to be able to provide a good prediction of intention to exercise among this group of college students.

In chapter 5, the research findings are summarized and interpreted in relation to prior research and the research questions. Implications for health educators, administrators, and higher education personnel are discussed. The chapter concludes with recommendations for follow up investigations.

## CHAPTER V

### DISCUSSION

In chapter 5, the researcher summarizes the findings and then discusses how the findings relate to prior research on physical activity, TPB, the college student, and race/ethnicity. Limitations of the study are noted. The researcher offers recommendations for health educators, higher education administrators, higher education personnel preparation programs, and researchers.

#### Summary of the Findings

This study drew upon prior research on physical activity, college students, race/ethnicity, and the Theory of Planned Behavior (TPB). The TPB was applied to study the intention to exercise of a group of racially and ethnically diverse community college students during the first week of classes in the winter semester, 2008. Using structural equation modeling (SEM), it was revealed that the obtained data did not fit the original model. A revised model with additional paths and correlated error terms did fit the data. However, this model was derived post hoc and must be treated with interpretational caution until it is replicated in future research. The revised model can be theoretically justified based on rationalization and justification processes, but this is speculative at this point.

The data for this study were based on multiple sources: (a) a beliefs elicitation survey, (b) a pilot study, and (c) a questionnaire completed by 255 participants. The survey response rate was 100%. All students who attended class on the day that the instructors distributed the survey agreed to complete the survey.

Data were analyzed through SEM techniques as well as frequencies and percentages, ANOVA comparisons, and bivariate correlations. The majority of the participants were women (54.5%), 18-20 years old (59.6%), reporting either their first year (38.7%), or second year (39.1%) in college, and attended school full time (74.4%). Most students (73%) worked between 10-40 hours per week; however 23.5% were not employed. This population was typical for young adults attending college for the first time. Participants represented racial and ethnic diversity, reporting that they were Black (42.9%), Hispanic (33.9%), White (13.4%), Asian/Pacific Islander (5.9%), and 3.9% "Other." The majority (45.7%) reported a yearly income of <\$19, 000 per year.

Six research questions were addressed. First, no statistically significant differences were found among the identified groups in the external variables of age, gender, SES by income, year in college, work status, student status, or access to exercise equipment. Second, in reference to research question 2, there was a statistically significant relationship between behavioral beliefs and the intention to exercise among these various groups of college students. The specific survey items that were most predictive included: (a) "Improving cardiovascular health" and "emotional well-being" ( $r = .338, p = .000$ ); (b) "Improvement in emotional well-being" ( $r = .334, p = .000$ ); (c) "Improving my fitness level" ( $r = .324, p = .000$ ); (d) "My fitness level will improve" ( $r = .285, p = .000$ ); (e) "My cardiovascular health will improve" ( $r = .274, p = .000$ ); (f) "Desirability to obtain/maintain a healthy weight" ( $r = .257, p = .000$ ); and (g) "Likelihood of obtaining/maintaining a healthy weight" ( $r = .188, p = .003$ )

Third, in reference to research question 3, there was a statistically significant relationship between normative beliefs and the intention to exercise among these various

groups of college students ( $r = .26, p = .001$ ). The specific survey items that were most predictive included: (a) “Family members think I...” ( $r = .277, p = .000$ ); (b) “Mother’s approval is important” ( $r = .189, p = .003$ ); (c) “Family’s approval is important” ( $r = .181, p = .004$ ); (d) “My Mother would...” ( $r = .162, p = .010$ ); and (e) “My friends would...” ( $r = .151, p = .016$ ).

Fourth, in reference to research question 4, there was a statistically significant relationship between control beliefs and the intention to exercise among various groups of college students of various groups ( $r = .27, p = .001$ ). The specific perceived behavioral control items that were most predictive included: (a) “work responsibilities” ( $r = .314, p = .000$ ), (b) “school responsibilities” ( $r = .266, p = .000$ ); (c) “School may prevent” ( $r = -.194, p = .002$ ); (d) “Lack of time may prevent” ( $r = -.189, p = .003$ ); and (e) “Feeling too tired” ( $r = -.129, p = .040$ ).

Fifth, the (revised) theory of planned behavior predicted the intention to exercise among various groups of college students, accounting for approximately 54% of the variance in intention to exercise. All of the paths were statistically significant, but four additional paths were necessary to achieve adequate model fit (BB→ Intention, BB→ SN, BB→ PBC, and CB→ SN).

Sixth, a measure of intention to exercise yielded a statistically significant correlation with college students’ reports of their intended physical activity. Specifically, an  $r = .27, p = .001$  was obtained for the question; “This month, how many days do you expect to be physically active for at least 30 minutes per day?” However, other indicators of intention failed to show a statistically significant relationship.

## Evaluation of Findings

This study was designed (a) to identify behavioral, normative, and control beliefs of college students about physical activity that contribute to the intention to be physically active and (b) to examine any differences between groups if they were found to exist. The survey instrument was created following strict adherence to Ajzen's guidelines including a referent group beliefs' elicitation survey and a pilot group with open discussions. The instrument was modeled after examples provided by Ajzen (2002) and also used in prior research applying the TPB. Some items on the questionnaire did not perform well (low alpha level) even though they were commonly used in Ajzen's examples and other studies (e.g., Blanchard et al., 2003; Norman & Conner, 2005).

SEM was used for statistical analysis. SEM provides global fit indices of the fit between a covariance structure as hypothesized by a model and the covariance structure observed in the data (Chi-square, Comparative Fit Index, Root Mean Square Error of Approximation, P-close, and Standardized Root Mean Residual) and focused fit indices (Modification Indices, Standardized Residuals). SEM has been utilized in other studies testing the TPB (e.g., Chatzisarantis & Hagger, 2005; Rhodes et al., 2002; Van Ryn, Lytle, & Kirscht, 1996).

### *Relationship to Prior Research*

In this study, the revised TPB model accounted for 54% of the variance when four additional paths were added ( $BB \rightarrow$  Intention,  $BB \rightarrow$  SN,  $BB \rightarrow$  PBC, and  $CB \rightarrow$  SN) in contrast to studies by Chatzisarantis and Hagger (2005) and Rhodes et al. (2002) whose models explained 32% of the variance in physical activity intentions and Courneya et al. (2000) whose model explained 22% of the variance in exercise intention. Because other

researchers (Chatzisarantis & Hagger, 2005, and Rhodes et al., 2002) had used the GLTQ to study young people and undergraduates, there was no reason to expect difficulty in comprehension by the participants in the present study. However, in the current study, the model fit improved when the GLTQ measure was removed. Moreover, in the current study, all three constructs were statistically significant and predicted intentions (PBC,  $r^2 = .26$ ; SN,  $r^2 = .24$ ; and Attitude,  $r^2 = .16$ ), in contrast to findings from Chatzisarantis and Hagger (2005) where only Attitude ( $r^2 = .54$ ) and PBC ( $r^2 = .22$ ) were statistically significant in predicting intentions.

Unlike the current study which found no statistically significant differences between male and female students, the Blanchard et al. (2003) study which examined only African American and Caucasian students revealed statistically significant differences between male and female students. In that study, Chi-square analyses within racial/ethnic groups showed that African American females viewed school-work as a barrier to exercise compared to African American males. There were no statistically significant differences among Caucasians. Compared to African American males, more female African Americans believed that exercise would improve their fitness and help reduce their weight. More African American males believed that exercise would improve heart health and would be difficult to do as a result of lack of time. The Caucasian males believed that their friends would approve of them exercising whereas significantly more Caucasian females thought that access to facilities would be a barrier. The Blanchard et al. (2003) study found that subjective norm was not a significant predictor of exercise intention ( $\chi^2_{30} = 0.05, p = 0.21$ ).

In a two-part study, Norman and Conner (2005) found that the TPB explained 37% (part 1) and 62% (part 2) of the variance in exercise intentions but that the subjective norm-intention relationship was weak and nonsignificant in the first part. The current study found that the revised TPB model explained 54% of the variance in exercise intentions and that the predictors of subjective norm explained 24% of its variance which was statistically significant.

In addition, Hausenblas et al. (1997) meta-analysis found correlations between all three constructs (Attitude,  $r = .52$ ; SN,  $r = .27$ ; and PBC,  $r = .43$ ) and intention. A later meta-analysis of 72 studies (Hagger et al. 2002) found that Ajzen's 1985 model was improved by adding a free path between PBC and intention. The Hagger et al. (2002) model confirmed that Attitude ( $\beta = .40$ ) and PBC ( $\beta = .33$ ) were the best predictors of intentions. The correlation between SN and intention was small but statistically significant ( $\beta = .054$ ,  $p < .01$ ). The current study found a lower correlation for Attitude ( $r^2 = .16$ ) and PBC ( $r^2 = .26$ ) but a similar correlation for SN ( $r^2 = .24$ ) and the intention to exercise.

Most of the TPB studies show that the most significant predictor of intention is attitude. In the present study, attitude yielded the lowest correlation of the three predictors. This might be because the behavioral beliefs obtained by referents in the beliefs elicitation survey and pilot group may have not been consistent with those of the main study group. Moreover, historically, SN has not performed well in TPB analyses; however, in the current study, it did.

In a post hoc analysis, the current study found statistically significant differences, primarily between Blacks and Hispanics in the areas of Normative Beliefs and Attitude

toward behavior. Similarly, Despues and Friedman (2007) reported that African Americans were less likely than European Americans to report exercise and that Hispanic Americans were less likely to report exercise than European Americans. In the current study, Hispanic students indicated that “Being physically active for 30 minutes per day in the coming month” was more “beneficial” and “good” compared to Black students. The other statistically significant difference was “friends’ approval” of physical activity where Hispanic students rated “friends’ approval” higher than all other groups. The differences in normative beliefs need to be explored further.

When educating students, it would be wise to emphasize how a “workout buddy” or friend can be instrumental in maintaining an exercise program. It would be important to help students identify, “who is that person who they believe would approve of them being physically active?” Surrounding oneself with social support will increase the likelihood of maintaining an exercise program. Wellness educators who understand that all students do not agree that physical activity is beneficial or good may realize that the pedagogy in the classroom and fitness center must be changed. In the past, physical fitness was emphasized and glorified primarily for the athlete, someone who was already active. Those without a gift of athleticism may have been left to sit on the bench which can create a bad taste or opinion of physical activity. Students need to be educated on the numerous benefits of physical activity which will change their attitude towards physical activity. Daily physical activity is one behavior that is within one’s control and is one of the best ways to prevent disease in the U.S.

The current study yielded no significant difference between groups in response to the statement, “Feeling too tired may prevent me from being physically active for at least

30 minutes each day in the coming month.” In contrast, differences between groups were found by Fahlman et al. (2006) who posed a similar but not identical statement. In their study, 65% of African American female students and 68% Hispanic female students compared to 31% of White female students responded more positively to the statement, “I do not exercise because it makes me tired.”

The current study found that one of the strongest correlates of intention to exercise was the behavioral belief “improvement in emotional well-being”. The best normative predictor was “family members think I (should not/should) be physically active for 30 minutes per day”; and the best control belief predictor was “work responsibilities make it (less likely/more likely)”for me to be physically active for 30 minutes per day. Having access to this information encourages the wellness educator to reinforce and highlight all of the improvements in emotional well-being and stress reduction through physical activity. A high correlation of what family members think emphasizes the importance of approval of the exercise behavior. In this group of students, it was important that they perceive the family members’ approval of physical activity for 30 minutes per day. The positive correlation of the control belief related to work responsibilities making it more likely that the individual will be physically active could be because, in this group of students, 23.5% were unemployed, 19.6% worked 20 hours or less, 40.4% worked 30-40 hours per week, and 16.5% reported that they worked more than 40 hours per week.

#### *Inferences from Revised Model*

In this section, the researcher considers the rationale for the paths that were added to the revised TPB model, namely Path 1 (BB → intention), i.e., intention was

influenced by behavioral beliefs (cardiovascular health, emotional well-being, fitness level, healthy weight) independent of the attitude measures (harmful/beneficial, pleasant/unpleasant, bad/good, etc.); Path 2 (BB → SN), i.e., behavioral belief influenced perceived social pressure to engage in physical activity; Path 3 (BB → PBC), behavioral beliefs influenced the students' perception of their ability to be physically active; and Path 4: CB → SN control beliefs (such as work, school, time, being too tired), influenced the students' perceived social pressure to engage or not engage in physical activity.

The need to add these paths question the viability of the TPB in its current form. However, the addition of the paths was post hoc and one should not give them strong credence until they are replicated in future research. The fact that they have not been observed in other work on exercise with TPB also suggests caution. However, no other study has focused on the study population of multi-culturally diverse college students used in the present research, so perhaps the effects are meaningful for this group.

The primary theoretical justification for the additional paths is that people like to be consistent in their beliefs and attitudes. According to Dissonance Theory (Festinger, 1962), individuals strive toward consistency within themselves with respect to opinions and attitudes. There is this same type of consistency between what a person knows or believes and what they do. The person involved may not psychologically accept these inconsistencies and may choose rationalization and justification. Festinger labels this inconsistency as "dissonance". When inconsistencies are pointed out, people will realign their beliefs. It would be inconsistent to say that exercising for 30 minutes each day leads

to positive things such as a sense of well being and improved cardiovascular health and people think that I should not do it.

In the present study, there is a bias to align subjective norms with control beliefs and behavioral beliefs ( $BB \rightarrow SN$ ,  $CB \rightarrow SN$ ), and perceived behavioral control with behavioral beliefs ( $BB \rightarrow PBC$ ). For Path 2 ( $BB \rightarrow SN$ ), the students are justifying their beliefs about the favorableness or unfavorableness of physical activity for 30 minutes per day specifically related to cardiovascular health, fitness, healthy weight and emotional well-being with those of their normative group of family, mother, or friends. They are biasing their beliefs about what the normative group believes based upon their beliefs.

For Path 3 ( $BB \rightarrow PBC$ ), the students are rationalizing their beliefs about the favorableness or unfavorableness of physical activity for 30 minutes per day specifically related to cardiovascular health, fitness, healthy weight and emotional well-being with their perceived influence of work, school, and time on perceived control to be physically active for 30 minutes per day. If behavioral beliefs are favorable, then the perceived influence of work, school, or time is also favorable and would be less likely to be a hindrance to physical activity. For Path 4 ( $CB \rightarrow SN$ ), students are biasing their beliefs about what their normative group members believe (either approval or disapproval) in regard to the ease or difficulty of control over exercise. If students believe that it is difficult to have a full time job, go to school full time, and find time to exercise; they would rationalize that their perceived social pressure to perform the activity was also low.

#### Study Limitations

In pilot testing the instrument, the pilot group was small ( $N = 5$ ) and older ( $> 30$  years of age) than 91.8% of the current study sample. The limitations brought about the

size and demographics of the pilot interview group may have affected the accuracy estimate of the control beliefs, normative beliefs, and attitudes. Even though every effort was made to have a larger and more diverse group representing the larger student population, the pilot group was missing an African American female who would have been an important individual for this study since many research studies suggest that African American women are the most inactive group and have health problems associated with the inactivity. The beliefs elicitation survey group and the pilot group were both comprised of former wellness students who had been educated on the benefits of physical activity, which possibly influenced their responses on “Behavioral Belief” items compared to the study population which had not yet been educated. Thus their “Behavioral Beliefs” could be totally different, thus explaining the low correlation for Attitude ( $r^2 = .22$ ) for the full study of 255 participants who had not yet completed these wellness courses.

Ideally there would be multiple items (4 or 5) to measure each construct. In the current study, only two or three items could be used in some cases due to poor item reliability. However, the present study compares favorably to other TPB studies (Chatzisarantis & Hagger, 2005; Courneya et al., 2000; and Norman & Conner, 2005) where only two to three items were used to measure each construct.

The present study lacked a measure of physical activity behavior in the TPB model since the GLTQ items had to be removed from the SEM analysis. Although the GLTQ measure had been used successfully in other studies, the students in the current study found it confusing, possibly due to (a) the change in response format compared to the rest of the survey or (b) questionnaire fatigue. The GLTQ may have required a verbal

explanation from the instructor or clearer written instructions. Perhaps responses to the GLTQ could have been more accurate if it had appeared at the beginning of the TPB items on the survey instead of at the end. However, the data for the accurately completed GLTQ items were utilized in a bi-variate correlation yielding a statistically significant correlation with the survey's one item exercise intention statement ( $r = .27, p = .001$ ).

As with any survey, there is the social desirability factor. Students may have answered in ways that they thought were correct so as to make a good impression just in case the surveys were not anonymous and their instructors would view them. It is also possible that some students could want to appear undesirable and deliberately answered the questionnaire items in what they thought would be negative ways. The beginning of the wellness course combined with the survey could have made them think more about their recent inactivity. The timing of the future survey could be changed to the third week of the semester when students have settled into their routine and adjusted to college life.

An important limitation of this study was that the original TPB model was not supported by the obtained research data. The researcher created a revised TPB model that was not originally hypothesized prior to the SEM analysis. Post SEM analysis, it was found that the data obtained from the research supported a revised TPB model. Any model derived post hoc must be subjected to rigorous replication and interpretations are limited accordingly.

### Recommendations

In this section, the researcher offers recommendations for health educators, administrators, and higher education personnel. In addition, the researcher describes

recommendations for future studies. The researcher ends with conclusions related to implications for the Theory of Planned Behavior.

### *Health Educators and Administrators*

The Theory of Planned Behavior can help health educators to better understand the factors that motivate college students to engage in their fitness plans. Health educators already know that it is important to educate students on the benefits of regular exercise and physical activity to transform their beliefs about the favorable health benefits. Some of those benefits are: (a) improved cardiovascular health, (b) improved fitness level, (c) improved sense of well-being, and (d) healthy weight management. It has been documented that weight gain is common in the college years. Given the prevalence of adults who are overweight or obese and the associated health problems that affect 65% of the U.S. population, health educators can perhaps increase their impact with an increased understanding of factors that motivate college students from different groups. Individuals have the greatest commitment to exercise when they hold a favorable attitude about exercise and believe that they can successfully perform the behavior (Hausenblas et al., 1997).

In the current study, as many as 23.4% of the college students reported that they did not have access to exercise equipment in spite of the fact that state-of-the-art facilities existed on the campus. This may indicate that college administrators need to publicize in student orientation that their wellness/exercise facilities exist. The marketing of any service is a key factor to its success. The fitness center needs to be (a) located in a safe, convenient area, (b) operated by knowledgeable personnel who can provide instruction and supervision, (c) kept clean and visually appealing, and (d) the hours of operation

need to be convenient to the working student's schedule. Students should be surveyed periodically to determine what type of group exercise classes would appeal to them and what type of equipment or programs would increase their participation. This particular TPBQ did not identify specific preferences for physical activity classes or experiences that could be addressed in a future qualitative study. Course instructors could offer extra credit to those students who identified an "exercise buddy" and brought them to the fitness center or group exercise class. As a way to maintain the motivation and accountability for exercise and fitness, colleges could consider offering a one credit wellness workout course for those who have completed the required wellness course. If the student enrolls with a "buddy", they each receive a workout shirt with the college logo.

The U.S. Department of Health and Human Services (USDHHS) released its "Physical Activity Guidelines Advisory Committee Report" in which the benefits of physical activity for all ages and groups of individuals are described. The report emphasizes the importance of 30 to 60 minutes per day of moderate to vigorous intensity physical activity on 5 or more days per week (USDHHS, 2008). The report coincides with the TPBQ in the current study which asked participants to express their feelings (ratings) regarding statements about physical activity for at least 30 minutes per day in the coming month. As wellness educators, we need to spread this simple message to our students and co-workers.

In the current study, the survey and pilot groups identified four beliefs about physical activity that were important to them after they had been wellness educated. The courses seemed to be important turning points in many students' lives. Students' fitness

patterns may change when, as a result of the wellness courses, they learn the health benefits of physical activity and experience that they can be successful at physical movement even if they are not an athlete or even if physical activity was not promoted in the family unit. The courses teach students how to prioritize their schedules, making time for exercise rather than finding excuses as to why they have no time. Most instructors structure wellness courses so as to increase friendships (e.g., a workout “buddy”). Such friendships may increase the likelihood that they will continue to exercise, especially given the current study results which showed that college students’ motivation to engage in fitness activities are influenced by what their friends think, especially for Hispanic students. Ultimately, a wellness course increases students’ “intention” to be physically active which is the greatest determinate of the desired behavior (Mack & Shaddox, 2004). In this study, the intention statement was significantly correlated with the measure of intended physical activity (i.e., the GLTQ responses).

#### *Preparation of Higher Education Personnel*

All of the higher education faculty should be educated on the benefits of physical activity and incorporate some aspect of it into their course curriculum. Those who are preparing to become college administrators, student affairs personnel, and faculty could then provide their students with a “wellness” culture as the students proceed through the college experience. Students who are physically active in college are more likely to become physically active adults. These adults will become part of a healthier community population and enjoy an enhanced quality of life. Keeping a community physically active is a cost saving measure to the individual as well as the healthcare system.

All individuals are motivated by things that they find important to them. As wellness faculty, it is our role to: (a) find out what motivates our students to be physically active, (b) to find out who are the important people in their lives who would support a physically active lifestyle; and (c) to uncover their perceived barriers which prevent them from taking 30 minutes out of a typical day to improve their health. This can be done easily through carefully designed course curriculum, group physical activities, and health/family survey projects. By increasing the perceived health benefits of exercise, decreasing the barriers and identifying social support, students would be more likely to increase their physical activity.

In this study, both the survey and pilot groups identified motivating factors such as cardiovascular health, fitness, and emotional well-being. Persons important to their decision to be physically active included friends, family members, and mothers. The perceived barriers to physical activity for them included work, school, and time. Moreover, these factors varied as the groups of students surveyed varied. Wellness educators cannot assume that all class groups are the same, or that all members of ethnic groups have the same beliefs. Many wellness educators may not be aware that differences in motivation or intention to exercise exist among racial and ethnic groups and members of those groups. Such awareness can assist wellness educators in designing the appropriate wellness experience for all students. An open discussion among the students themselves can illuminate the similarities and differences and lead to a greater understanding about why some individuals find it so difficult to engage in a physically active lifestyle.

The current study identified differences between groups with Hispanics rating friends' approval higher than all other groups. It was also revealed that Hispanic students' attitude toward physical activity as "beneficial" and "good" was significantly more positive than Black and Asian/Pacific Islander students. As the student population becomes increasingly diverse, wellness educators and researchers should identify these differences and address them so that all individuals can benefit from a healthy lifestyle.

#### *Future Research*

The current study indicated that cultural factors may be influencing racially and ethnically diverse college students' intentions to be physically active. A future study could investigate the beliefs (attitude, perceived control, and social norms) about physical activity among students from various racial and ethnic groups. Including a larger focus group comprised of students from multiple races/ethnicities and generations could reveal how culture influences daily physical activity habits. Based upon this information, a specific plan to target identified beliefs within various ethnically diverse groups could be designed and included in the wellness curriculum. Future research could also include the translation of the TPBQ into the languages of the culturally diverse student body and also test the validity and reliability of the GLTQ among students of multiple ethnicities.

Another question to be answered is: Do health behaviors and disease risk factors become more favorable or unfavorable with greater acculturation? For example, among Latinos, acculturation has been positively associated with increased likelihood of physical activity and a lower likelihood of type 2 diabetes (Pérez-Escamilla & Putnik, 2007). Acculturation seemed to be positively associated with participation in leisure-time physical activity among Mexican American adults, and Spanish speaking Mexican

Americans had a higher prevalence of physical inactivity during leisure time compared to those who spoke English (Crespo, Smit, Carter-Pokras, & Anderson, 2001). Similar studies could be designed to discover differences about members of other racial and ethnic groups.

Although differences in intention to exercise were not statistically significant among the present study's groups of college students, there were statistically significant differences in normative beliefs and attitudes between the groups. Why is the approval of friends rated significantly higher by Hispanic students compared to all other groups? What motivates the Hispanic student to perceive physical activity in such a positive light? These differences in attitude and important referents could be due to cultural norms, family lifestyle, that are currently unidentified but could be explored through qualitative research utilizing focus groups and interviews.

In addition, an intervention study could be conducted where the TPBQ and GLTQ are distributed at the beginning of a semester and again at the end to see whether beliefs had changed and subsequent intention to exercise due to the wellness course curriculum. Perhaps the opportunities to make friends in the wellness classes could influence the SN-Intention correlation. Perhaps, after participating in class activities which increase self efficacy for exercise, the PBC-Intention correlation might increase. Perhaps, after being educated on the numerous health benefits to be gained by regular physical activity, the "Attitude"-Intention correlation might increase. Ultimately the future study could assess the benefits of requiring students to successfully complete a wellness course that includes weekly labs of physical activity experiences. Perhaps, as indicated in the Theory of Planned Behavior, "Intention" would be shown to lead directly to the desired behavior.

Finally, the revised TPB model that emerged from this study needs to be replicated with another multi-culturally diverse group of college students.

### Conclusions

The researcher intended to (a) identify factors that contributed and promoted physical activity among college students, (b) to reveal motivations of college students to engage in physical activity, and (c) to determine if intention to exercise varied among different groups of college students. It was found that (a) friends approval is important in the decision to be active among Hispanic students, (b) students are motivated to engage in physical activity by health, fitness, and a sense of well-being, and (c) among this group of college students, intention to exercise did not vary according to race/ethnicity.

Responses from participants in the pilot study indicated that college students care about what others think about them with respect to their intention to exercise: individuals such as family, mother, and friends. Hispanic participants in the current study group rated “friends” approval higher than all other groups. Beliefs such as improved cardiovascular health, emotional well-being, and an improved fitness level were also identified by the pilot group students as factors contributing to the intention to be physically active. These beliefs may or may not be the ones that would have been identified by the main study group thus affecting the data used in the present study to test the original TPB model developed by Ajzen. In addition, the survey group and pilot group participants identified possible control beliefs such as work, school, lack of time and feeling too tired as affecting their intention to be physically active. However, these control beliefs were not significantly different between groups in the main study. Possibly there are other control

beliefs that were not identified. A study using case study methods and in-depth interviews might reveal some of those other beliefs.

Participants in the full study indicated that there are possibly salient belief differences among groups of students who have been wellness educated and students who have not yet completed the wellness course. In the current study, based upon SEM analysis of the revised TPB model, it appears that in this group of students ( $N = 255$ ), there are other factors besides those identified by the survey and pilot groups that are influencing their intention to be physically active. These factors need future study. In the full study, the need to add the additional paths to the model suggests that intention, subjective norms, and perceived behavioral controls are being influenced by behavioral beliefs which are unique to this group. The students' perceptions or global judgments are related to their beliefs that, if they perceive the outcome to be good, they perceive that others also think in a similar way. If they perceive the action as uncontrollable, they tend to perceive that others also see it as uncontrollable.

Through the development of a TPB questionnaire, TPB constructs are anchored in the specific beliefs of the population being studied. Thus, there is room for cultural or racial and ethnic norms or local norms to be represented in the way that the constructs are operationally defined. Moreover, as revealed in the review of the literature, some researchers have already identified differences in exercise behaviors of people from different racial or ethnic groups (specifically Heesch et al., 2000; Henderson & Ainsworth, 2000; Suminski & Petosa, 2002; Fahlman et al., 2006; Despues & Friedman, 2007). The ethnically/racially diverse college students who participated in this study showed that they do indeed have different behavioral beliefs, control beliefs, and attitudes

when it comes to their intentions to exercise. The connection between exercise habits and race, ethnicity, and culture needs to be fully explored in future research.

The revised model tells us that an explanatory variable that influences the endogenous variables (attitude toward behavior, subjective norm, perceived behavioral control) is in the error term of two sets of endogenous variables, causing the error terms to be correlated. The error terms of subjective norm and perceived behavioral control were correlated, thus an unidentified explanatory variable that influences both could be an important referent that was not identified by the pilot group that influences their control over exercise, possibly a girlfriend or boyfriend. The error terms of attitude toward behavior and perceived behavioral control were also correlated, thus a left our explanatory variable that influences both could be a recent exercise experience that positively or negatively effected attitude and perceived control factors. The statistically significant direct paths from behavioral beliefs to intention, subjective norm, and perceived behavioral control confirm the importance of obtaining accurate and representative behavioral outcomes from participants in the pilot study. These beliefs guide an individuals' decision to engage in the exercise behavior described. Wellness educators can apply the results of this study with confidence that their racially and ethnically diverse college students can be influenced to increase their intentions to engage in fitness activities.

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## APPENDICES

## Appendix A



## DRAFT of the Questionnaire for the Theory of Planned Behavior

### Part 1: Demographic Questions

Thank you for taking the time to respond to this questionnaire. Your answers are anonymous and confidential. Your responses are valuable to educators dedicated to improving your health, wellness, and college experience.

#### Gender

- Male
- Female

#### Age

- 18-20 years
- 21-29 years
- $\geq 30$  years

#### Year in college

- 1<sup>st</sup> year
- 2<sup>nd</sup> year
- >2 years

#### Student status

- Not enrolled as an official student (taking courses)
- Full time
- Part time

#### Work status

- Not Employed
- Employed  $\leq 10$  hrs per week
- Employed 10-20 hours per week
- Employed 20-30 hours per week
- Employed 30-40 hours per week
- Employed >40 hours per week

#### Race or Ethnicity

How do you identify your Race or Ethnicity? \_\_\_\_\_

From the following list of descriptors, which one best describes you?

- White (non-Hispanic)
- Black (non-Hispanic)
- Hispanic
- Asian/Pacific Islander
- American Indian/Alaskan Native
- Other (please specify) \_\_\_\_\_

Socio-Economic Status [Personal income/yr (if working) or parental income (if not working)]

- < \$19,000
- 20-39,000
- 40-59,000
- > \$60,000

Do you have access to exercise equipment? \_\_\_\_\_ Yes \_\_\_\_\_ No

Part 2: The following questions ask your opinion about being physically active for at least 30 minutes per day in the coming month. Carefully study the words at each end of the scale and circle the number that best represents how you feel.

Some definitions of physical activity from the reviewed literature include: easy walking, fast walking, jogging, exercise completed during free time for at least 30 minutes (Rhodes et al. 2002), vigorous sports, vigorous physical activities (Chatzisarantis & Hagger, 2005), and brisk walking (Blanchard, et al., 2003).

1. For me to be physically active for at least 30 minutes per day in the coming month would be

Bad: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Good

2. The people in my life whose opinions I value would

Disapprove: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Approve of me being physically active for at least 30 minutes per day.

3. If I wanted to, I could be physically active for 30 minutes each day in the coming month.

Definitely false: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Definitely True

4. Being physically active for 30 minutes per day in the coming month would improve my cardiovascular health.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

5. My Mother thinks that

I should not: 1 : 2 : 3 : 4 : 5 : 6 : 7 : I should be physically active for 30 minutes per day in the coming month.

6. How much control do you believe you have over being able to be physically active for 30 minutes per day in the coming month?

No Control: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Complete Control

7. To me, my emotional well-being is

Unimportant: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Important

8. Work and school cannot prevent me from being physically active for at least 30 minutes per day in the coming month.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

9. My family thinks that to be physically active for 30 minutes per day is

Harmful: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Beneficial

10. I will make the time to be physically active for at least 30 minutes per day in the coming month.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

11. Most of my friends would find 30 minutes of physical activity per day

Unenjoyable: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Enjoyable

12. To me, managing a healthy weight and being fit is

Worthless: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Valuable

Part 3: Godin Leisure-Time Exercise Questionnaire

Godin, G., & Shephard, R.J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences*, 10, 141-146.

Directions: During a typical 7-Day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write on each line the appropriate number).

Times Per Week:

a) STRENUOUS EXERCISE (HEART BEATS RAPIDLY) \_\_\_\_\_

(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

b) MODERATE EXERCISE (NOT EXHAUSTING) \_\_\_\_\_

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

c) MILD EXERCISE (MINIMAL EFFORT) \_\_\_\_\_

(e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)

2. 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)? Check one of the following options:

OFTEN      SOMETIMES      NEVER/RARELY

1.

2.

3.


## Appendix B

FIU IRB  
APPROVAL



Office of Research Integrity  
Research Compliance, MARC 430

**MEMORANDUM**

**To:** Marilyn Gordon  
**CC:** Dr. Ann Nevin  
File  
**From:** Chris Grayson, CIM, Asst. Director of Research Compliance   
**Date:** September 21, 2007  
**Proposal Title:** A Study of Ethnically Diverse Community College Students and their Intentions to Exercise.  
**Approval #** 092007-00

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Your study was deemed Exempt by the Institutional Review Board at Florida International University on **September 20, 2007**.

As a requirement of IRB approval you are required to:

- 1) **Submit a completion report** (Form B-2) upon completion of your project in order for the file to be closed.
- 2) Submit a proposal and receive approval for any additions or changes in the procedures involving human subjects.
- 3) Provide immediate written notification to the IRB of every serious or unusual or unanticipated adverse event as well as problems with the rights or welfare of the human subjects. You must confirm the receipt of serious AE reports with the IRB office.

**Special Conditions:** N/A

Please note your approval number is indicated above. For further information, you may contact the IRB Coordinator by email at [irbiacuc@fiu.edu](mailto:irbiacuc@fiu.edu) or visit the OSRA – Human Subjects website at [www.osra.fiu.edu](http://www.osra.fiu.edu).

## Appendix C



IRB Approval #092007-00

### Informed Consent for Discussion Group Participation

Dear College Student,

My name is Marilyn Gordon and I am a candidate for the Ed.D. from Florida International University, College of Education. My dissertation is researching a group of diverse college students and their intention to be physically active or exercise. I am conducting these group interviews to expand my understanding of the various factors that motivate or deter students from regular physical activity. The information that I receive from the group will assist me in the development of a research questionnaire. Your input is valuable and appreciated. Our discussion will take approximately 1 hour of your time and will be audio recorded so that I can later transcribe the information and confirm its accuracy. After the audio tapes have been transcribed, they will be destroyed.

Your consent is required for further participation and you may decline participation at any time. All information concerning participation will be held in complete confidence. If you have any comments or questions, please feel free to contact me ([mgord004@fiu.edu](mailto:mgord004@fiu.edu) or by phone, 954-201-8972), or my chair ([DrAnnNevin@bellsouth.net](mailto:DrAnnNevin@bellsouth.net), or by phone, 954-885-7662) or Dr. Patricia Price, the Chairperson of the FIU Institutional Review Board (305-348-2618 or 305-348-2494) with any questions or comments concerning this study.

Thank you, Marilyn Gordon

## Appendix D



IRB Approval #092007-00

Cover Letter

“A Study of Community College Students in an Urban Multicultural Setting”

Dear college student,

Hello, my name is Marilyn Gordon and I am a candidate for the Ed. D. from Florida International University College of Education under the supervision of Dr. Ann Nevin, chair of my dissertation committee. This is a study of college students and their intention to be physically active. Your participation would require approximately 30 minutes of your time to complete a questionnaire regarding some baseline demographic data and beliefs about physical activity and exercise. All data and information obtained is confidential because your identities are not collected with the survey and responses will be analyzed in a way that will protect your anonymity. Your participation in this study is voluntary, and you may decline at any time. Your participation in this study is valuable, as it will assist in future course development to create an optimal learning experience for students that enroll in any of the wellness course offerings.

Feel free to contact me ([mgord004@fiu.edu](mailto:mgord004@fiu.edu), 954-201-8972) or my chair ([DrAnnNevin@bellsouth.net](mailto:DrAnnNevin@bellsouth.net), 954-885-7662) with any questions or comments concerning this study. If you would like to talk with someone else about your rights of being a subject in this study, you may contact Dr. Patricia Price, the Chairperson of the FIU Institutional Review Board at 305-348-2618 or 305-348-2494.

Thank you, Marilyn Gordon

## Appendix E



IRB Approval #092007-00

Nine item open-ended questions used to draft TPBQ

1. What do you believe are the advantages of being physically active for at least 30 minutes each day in the coming month?
2. Are there any individuals or groups who would approve of you being physically active at least 30 minutes each day in the coming month?
3. What factors or circumstances would enable you to be physically active for at least 30 minutes each day in the coming month?
4. What do you believe are the disadvantages of being physically active for at least 30 minutes each day in the coming month?
5. Are there any individuals or groups who would disapprove of you being physically active at least 30 minutes each day in the coming month?
6. What factors or circumstances would make it difficult or impossible for you to be physically active for at least 30 minutes each day in the coming month?
7. Is there anything else you associate with your being physically active for at least 30 minutes each day in the coming month?
8. Are there any other individuals or groups who come to mind when you think about walking on a treadmill for at least 30 minutes each day in the coming month?
9. Are there any other issues that come to mind when you think about the difficulty of being physically active for at least 30 minutes each day in the coming month?

## Appendix F



IRB Approval #092007-00

## Focus Group Interview Protocol

### *Logistics*

1. Solicit former wellness students via college email system.
2. Coordinate convenient date, time, and location to meet.
3. Obtain signed consents to participate in group interview.
4. Begin audio-taping.
5. Assure participants of confidentiality prior to beginning interview and explain that they may decline participation at any time.
6. Introduce participants to each other (*to obtain a voice recognition check for the transcriber*) and explain the purpose of the meeting.
7. Explain potential benefits of their responses.
8. Distribute written definitions of exercise and physical activity as they will be used interchangeably in the discussion.

### *Interview Questions*

1. Questions to determine behavioral beliefs:
  - a) What do you believe are the advantages of being physically active for at least 30 minutes each day in the coming month?
  - b) What do you believe are the disadvantages of being physically active for at least 30 minutes each day in the coming month?

- c) Is there anything else you associate with your being physically active for at least 30 minutes each day in the coming month?
2. Questions to determine normative beliefs:
- a) Are there any individuals or groups who would approve of you being physically active at least 30 minutes each day in the coming month?
  - b) Are there any individuals or groups who would disapprove of you being physically active at least 30 minutes each day in the coming month?
  - c) Are there any other individuals or groups who come to mind when you think about being physically active for at least 30 minutes each day in the coming month?
3. Questions to generate a list of control beliefs:
- a) What factors or circumstances would enable you to be physically active for at least 30 minutes each day in the coming month?
  - b) What factors or circumstances would make it difficult or impossible for you to be physically active for at least 30 minutes each day in the coming month?
  - c) Are there any other issues that come to mind when you think about the difficulty of being physically active for at least 30 minutes each day in the coming month?
4. After a thorough discussion of the proposed open-ended questions, participants will be asked if they have any further questions, comments, or suggestions for the questionnaire.

*Follow Up Pilot Test of Questionnaire Instrument*

1. Participants will be told that a study instrument will be developed based upon their responses and they will be asked to later complete the questionnaire and return it. The purpose of the pilot study is to confirm clarity and accuracy of the questionnaire.
2. Participants will be reminded of the researcher's contact information.
3. Thank the participants for their assistance.
4. Stop audio-taping.
5. Say goodbye!

## Appendix G



IRB Approval #092007-00

### Part 1: Demographic Questions

Thank you for taking the time to respond to this survey, IRB approval # 092007-00. Your answers are anonymous and confidential. Your responses are valuable to educators dedicated to improving your health, wellness, and college experience.

#### Gender

- Male
- Female

#### Age

- 18-20 years
- 21-29 years
- $\geq 30$  years

#### Year in college

- 1<sup>st</sup> year
- 2<sup>nd</sup> year
- >2 years

#### Student status

- Not enrolled as an official student (taking courses)
- Full time
- Part time

#### Work status

- Not Employed
- Employed  $\leq 10$  hrs per week
- Employed 10-20 hours per week
- Employed 20-30 hours per week
- Employed 30-40 hours per week
- Employed >40 hours per week

#### Race or Ethnicity- How do you identify your Race or Ethnicity?

From the following list of descriptors, which one best describes you?

- White (non-Hispanic)
- Black (non-Hispanic)
- Hispanic
- Asian/Pacific Islander
- American Indian/Alaskan Native
- Other (please specify) \_\_\_\_\_

Socio-Economic Status [Personal income/yr (if working) or parental (significant other) income (if not working)]

- < \$19,000
- 20-39,000
- 40-59,000
- > \$60,000

Do you have access to exercise equipment? \_\_\_\_\_ Yes \_\_\_\_\_ No

Part 2: The following questions ask your opinion about **being physically active for at least 30 minutes per day in the coming month**. *Carefully study the words at each end of the scale and circle the number that best represents how you feel.*

Some definitions of physical activity from the reviewed literature include: easy walking, fast walking, jogging, exercise completed during free time for at least 30 minutes (Rhodes et al. 2002), vigorous sports, vigorous physical activities (Chatzisarantis & Hagger, 2005), and brisk walking (Blanchard, et al., 2003). Additional descriptors include: cycling, dancing, swimming, gardening, weight training, structured exercise classes, walking the dog, and mowing the lawn.

1. If I am physically active for at least 30 minutes per day in the coming month, my cardiovascular health will improve.

Unlikely:   1   :   2   :   3   :   4   :   5   :   6   :   7   : Likely

2. If I am physically active for at least 30 minutes per day in the coming month, my fitness level will improve.

Unlikely:   1   :   2   :   3   :   4   :   5   :   6   :   7   : Likely

3. If I am physically active for at least 30 minutes per day in the coming month, I will be able to obtain and maintain a healthy weight.

Unlikely:   1   :   2   :   3   :   4   :   5   :   6   :   7   : Likely

4. If I am physically active for at least 30 minutes per day in the coming month, it will improve my emotional well-being'

Unlikely:   1   :   2   :   3   :   4   :   5   :   6   :   7   : Likely

5. Work responsibilities can prevent me from being physically active for at least 30 minutes per day in the coming month.

Unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Likely

6. School may prevent me from being physically active for at least 30 minutes per day in the coming month.

Unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Likely

7. Lack of time may prevent me from being physically active for at least 30 minutes each day in the coming month.

Unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Likely

8. Feeling too tired may prevent me from being physically active for at least 30 minutes each day in the coming month.

Unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Likely

9. To me, improving my cardiovascular health is:

Extremely Undesirable: -3 : -2 : -1 : 0 : +1 : +2 : +3 : Extremely Desirable

10. To me, improving my fitness level is:

Extremely Undesirable: -3 : -2 : -1 : 0 : +1 : +2 : +3 : Extremely Desirable

11. To me, obtaining and maintaining a healthy weight is:

Extremely Undesirable: -3 : -2 : -1 : 0 : +1 : +2 : +3 : Extremely Desirable

12. To me, my emotional well-being is:

Extremely Unimportant: -3 : -2 : -1 : 0 : +1 : +2 : +3 : Extremely Important

13. My family members think that I should not: -3 : -2 : -1 : 0 : +1 : +2 : +3 : should be physically active for at least 30 minutes each day in the coming month.

14. My friends would disapprove: -3 : -2 : -1 : 0 : +1 : +2 : +3 : approve of me being physically active for at least 30 minutes each day in the coming month.

15. Other people whose opinion I value do not: -3 : -2 : -1 : 0 : +1 : +2 : +3 : do

participate in physical activity for at least 30 minutes each day in the coming month.

16. My Mother would

disapprove: -3 : -2 : -1 : 0 : +1 : +2 : +3 : approve  
of me being physically active for at least 30 minutes each day in the coming month.

17. Most of the people who are important to me think that

I should: 1 : 2 : 3 : 4 : 5 : 6 : 7 : I should not  
be physically active for at least 30 minutes per day in the coming month.

18. Whether I am physically active for at least 30 minutes per day in the coming month is entirely up to me.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

Q19-23: *Being physically active for at least 30 minutes per day in the coming month is:*

19. Enjoyable: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Unenjoyable

20. Harmful: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Beneficial

21. Good: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Bad

22. Pleasant: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Unpleasant

23. Worthless: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Useful

24. My family's approval of me being physically active for at least 30 minutes per day in the coming month is important to me.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

25. What my friends think I should do matters to me.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

26. Doing what other people whose opinion I value do is important to me.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

27. My Mother's approval of me being physically active for at least 30 minutes per day in the coming month is important to me.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

28. My work responsibilities make it  
less likely: -3 : -2 : -1 : 0 : +1 : +2 : +3 : more likely  
for me be physically active for at least 30 minutes each day in the coming month.

29. My school responsibilities make it  
less likely: -3 : -2 : -1 : 0 : +1 : +2 : +3 : more likely  
for me be physically active for at least 30 minutes each day in the coming month.

30. Lack of time availability makes it  
less likely: -3 : -2 : -1 : 0 : +1 : +2 : +3 : more likely  
for me be physically active for at least 30 minutes each day in the coming month.

31. Feeling too tired will make it  
less likely: -3 : -2 : -1 : 0 : +1 : +2 : +3 : more likely  
for me be physically active for at least 30 minutes each day in the coming month.

32. People who are important to me want me to be physically active for at least 30  
minutes each day in the coming month.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

33. I expect to be physically active for at least 30 minutes per day in the coming month.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

34. I feel under social pressure to be physically active for at least 30 minutes each day in  
the coming month.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

35. I am confident that I can be physically active for 30 minutes each day in the coming  
month.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

36. The decision to be physically active for at least 30 minutes each day in the coming  
month is beyond my control.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

37. For me to be physically active for at least 30 minutes each day in the coming month is

Easy: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Difficult

38. I want to be physically active for at least 30 minutes per day in the coming month.

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree

39. It is expected of me to be physically active for at least 30 minutes per day in the coming month.

Strongly Disagree:   1   :   2   :   3   :   4   :   5   :   6   :   7   : Strongly Agree

40. I intend to be physically active for at least 30 minutes per day in the coming month.

Strongly Disagree:   1   :   2   :   3   :   4   :   5   :   6   :   7   : Strongly Agree

41. Considering this current month, out of the 31 days, how many days do you expect to be physically active for at least 30 minutes per day? Please circle one number.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Part 3: During a typical 7-Day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write on each line the appropriate number).

Times per Week:

a) STRENUOUS EXERCISE (HEART BEATS RAPIDLY) \_\_\_\_\_

(e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

b) MODERATE EXERCISE (NOT EXHAUSTING) \_\_\_\_\_

(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

c) MILD EXERCISE (MINIMAL EFFORT) \_\_\_\_\_

(e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)

2. 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)? Check one of the following options:

OFTEN      SOMETIMES      NEVER/RARELY

1.

2.

3.

*Please now take a moment to review each page to ensure that each item has been answered. ☺*

*Thank you for taking the time to share your feelings and opinions.*

VITA

MARILYN SMITH GORDON

EDUCATIONAL HISTORY

- 1984                      A.A., Liberal Arts  
Miami-Dade Community College  
Miami, Florida
- 1987                      B.S., Nutrition and Dietetics  
Florida International University  
Miami, Florida
- 1998                      M.S., Exercise Science/Wellness  
Florida Atlantic University  
Boca Raton, Florida

EMPLOYMENT HISTORY

- 1987-1999                Registered Dietitian/Licensed Nutritionist  
Memorial Regional Hospital  
Hollywood, Florida
- 1999-2008                Registered Dietitian/Licensed Nutritionist  
Memorial Fitness and Rehabilitation Center  
Hollywood, Florida
- 2001-present             Adjunct Faculty, Wellness  
Broward College  
Pembroke Pines, Florida
- 2007-present             Registered Dietitian/Licensed Nutritionist  
Nova Southeastern University  
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