I, Lisa English, hereby submit this original work as part of the requirements for the degree of:

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It is entitled:

College Students' Perceived Benefits, Barriers, and Cues to Vigorous Physical Activity

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Abstract

AN ABSTRACT OF THE THESIS FOR THE MASTERS OF SCIENCE DEGREE IN
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TITLE: College Students’ Perceived Benefits, Barriers, and Cues to Vigorous Physical Activity

MASTERS COMMITTEE MEMBERS: Dr. Keith King, Chair
Dr. Amy Bernard

The purpose of this study was to examine college students’ perceived benefits, barriers, cues to action, and extent of involvement in vigorous physical activity. Analyses were also conducted to examine whether benefits, barriers, cues, and vigorous physical activity involvement differed significantly based on: sex, grade level, parental exercise patterns, parental encouragement, peer exercise patterns, and peer encouragement.

A convenience sample of 480 participants were surveyed during the 2009 spring and fall quarters. The sample included students from a variety of general education courses. Valid and reliable subscales were developed for the 21 item questionnaire. Descriptive statistics, one-way analyses of variance, and Pearson correlations were used to analyze the data. Results indicated that overall, participants’ involvement in vigorous physical activity was low. It was found that parent and peer engagement in and encouragement of vigorous physical activity significantly affected the number of perceived benefits, barriers, cues and involvement in vigorous physical activity. Results also showed significant correlations between the number of perceived benefits, barriers, and cues to vigorous physical activity and the extent of involvement in vigorous physical activity. Recommendations have been included for future studies.
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Chapter 1

The Problem

In the last 20 years there has been a dramatic increase in obesity around the world and in the United States (Center for Disease Control and Prevention [CDC], 2006; U.S. Office of Disease Prevention and Health Promotion [USODPHP], 2005; World Health Organization [WHO], 2006). This rising epidemic is a huge cost burden to the U.S. healthcare system, American employers and individual Americans (Goetzel et al., 2003; U.S. Department of Health and Human Services [USDHHS], 2007; USDHHS, 2006; WHO, 2006). In 2007 the prevalence of obesity was equal to or greater than 25% in 30 states and greater than 30% in three states. These numbers indicate a drastic increase since 1980, with adult obesity rates doubling and childhood obesity rates tripling, resulting in one third of adults, or 72 million people, and 16% of children falling into the obese category (USDHHS, 2006, 2007).

While the obesity epidemic is national in its scope, the problem is especially noted among college students. Bowman et al. (1999) reports that between 1991 and 1999 the greatest rise in obesity occurred in the college population. On average, weight gain among college students was greater than that of the general population over the same time frame (Halbmaier, Levitsky, & Mrdjenovic, 2004). The 2007 American College Health Association-National College Health Assessment (ACHA-NCHA) results indicated that of the students surveyed, 23% were overweight and 13.7% were obese (American College Health Association [ACHA], 2007). Regarding sex differences, research has found that males are significantly more likely to be obese than females (Cheung et al., 2007). This trend continues beyond college as those students who are obese or develop obesity during the college years are at increased risk for obesity.
throughout adulthood (Adair, Gorden-Larson, Nelson, & Popkin, 2004; Bravender, DeSai, Miller, & Staples, 2008). This is a significant problem since obese individuals are also at increased risk for the many health problems related to obesity, such as heart disease, diabetes, and some cancers (CDC, 2006; Torgan, 2002).

Obesity has physical, psychological, and social consequences (CDC, 2009). Regarding physical consequences, major health organizations agree that obesity is linked to serious medical conditions including: high blood pressure, high cholesterol, type 2 diabetes, heart disease, stroke, gallbladder disease, arthritis, sleep disturbances, problems breathing, and certain types of cancer (CDC, 2008c; USODPHP, 2005; and WHO, 2003). Although obesity has serious physical consequences, the psychological effects are equally problematic. The USDHHS (2006) asserted that American society’s emphasis on physical appearance and the perception that slimness equals attractiveness sends negative messages to overweight people, resulting in emotional suffering. Aside from the physical and psychological consequences, obesity presents significant social consequences as well. Obese individuals are oftentimes labeled as “gluttonous, lazy, and/or both” (USDHHS, 2006, n.p.). Furthermore, these misperceptions often result in obese individuals experiencing discrimination, prejudice and emotional hardship at school, work, and in social situations. Due to the stigma associated with obesity, obese individuals frequently deal with depression, shame, and feelings of rejection.

As government agencies recognize the health risks and potential physical, psychological, and social consequences, attempts are being made to address the problem through prevention strategies (USDHHS, 2000). Research has found several strategies to effectively reduce and prevent obesity. One behavioral strategy consistently mentioned in the literature is engaging in regular physical activity (USDHHS, 2009; WHO, 2009). Numerous physical and mental
benefits are linked to physical activity (CDC, 2008a; WHO, 2008). Physical benefits include: weight control; reduced risk of heart disease, type 2 diabetes, and some cancers; improved bone health; stronger muscles; improved ability to perform daily activities, and increased life span. The AHA (2009) cites additional physical health benefits such as: improved blood cholesterol levels; reduced blood pressure; increased energy levels; and improved sleep patterns. Along with the physical benefits associated with regular physical activity, there are also several mental health benefits. Such mental health benefits include: decreased tension and stress; improved body image; improved mood; reduced anxiety and depression; and increased enthusiasm and optimism (AHA, 2009; CDC, 2008a; WHO, 2008).

Despite the known benefits of physical activity, the USDHHS (2008b) reports that the number of physically inactive adults and children is still high, and little progress has been made in increasing the amount of physical activity throughout the nation. It is estimated that only 25% of Americans get enough regular exercise. Fifty percent do not get enough activity to provide health benefits, and 25% of Americans participate in no physical leisure time activity at all (CDC, 2008a). In 2007, the American College Health Association-National College Health Assessment (ACHA-NCHA, 2007) reported that there has also been little progress made in increasing physical activity among college students. Over half of college students do not meet the recommended guidelines for physical activity. Consequently, those individuals who are inactive in college and continue to lead sedentary lifestyles are significantly more likely to gain weight after graduation than those who are active (Snow & Sparling, 2002).

Studies on effective physical activity interventions for college students are limited. Few experimental studies on increasing physical activity in college students have been conducted (Booth, McKenzie, Stone, & Welk, 1998; Bridges et al., 2005). Since research has shown that
exercise behaviors adopted in college are likely to carry over into adulthood, it is important that more research be conducted in order to determine how to increase the physical activity levels of college students (Snow & Sparling, 2002). One model used to identify factors associated with health behaviors is the Health Belief Model.

The Health Belief Model (HBM) was conceived in the 1950’s by a group of social psychologists in an effort to explain individuals’ participation, or lack of participation, in health services or programs designed to prevent or detect disease. The five basic components of the HBM are: 1) perceived susceptibility, 2) perceived severity, 3) perceived benefits, 4) perceived barriers, and 5) perceived cues to action (Rosenstock, 1974, Stretcher & Rosenstock, 1997). These components can be used to determine college students’ perceptions of physical activity.

Previous research has shown that both male and female college students tend to indicate that a main reason for exercising is to improve physical appearance (Bridges et al., 2005). Institutional, intrapersonal, and interpersonal factors are associated with a variety of barriers to physical activity among college students. Some of the main barriers are: school workload, lack of sleep and motivation, social invitations during workout times, and unfamiliarity with the physical activity environment (Bray, Brittain, & Gyurcsik, 2004). Few cues to action for physical activity among college students have been identified; however, social support and organized intramural sports are thought to be two possible reasons students might choose to become active (Bridges et al., 2005). Nevertheless, sizeable gaps exist in the research. Additional research is clearly needed to more thoroughly understand the issue of physical activity and college students. Not enough attention has been focused on physical activity patterns among college students, which limits the knowledge about their perceived benefits, barriers, and cues to action. More specifically, research is needed to determine the current
benefits, barriers and perceived cues to students’ involvement in vigorous physical activity (Bray et al., 2004; Bridges et al., 2005; & Brown, 2005). Therefore, the present study examined these three components of the HBM as they pertained to physical activity behaviors of college students. The HBM suggests that the number of perceived benefits, barriers, and cues help to predict specific behaviors. Thus, this study examined the relationship between the number of perceived benefits, barriers, and cues to action and involvement in vigorous physical activity. The findings of this study contribute to the literature by providing information on college students’ perceptions regarding physical activity. Such findings can in turn be used to help health educators and program planners develop and implement effective efforts and intervention strategies to increase physical activity among this population.

Statement of the Problem

The purpose of this study was to examine college students’ perceived benefits, barriers, cues to action, and extent of involvement in vigorous physical activity. Analyses were also conducted to examine whether benefits, barriers, cues, and vigorous physical activity involvement differed significantly based on: sex, grade level, parental exercise patterns, parental encouragement, peer exercise patterns, and peer encouragement.

Research Questions

This study examines the following research questions:

1. To what extent are college students involved in vigorous physical activity?

2. What are the most commonly perceived benefits for vigorous physical activity among college students?
3. What are the most commonly perceived barriers to vigorous physical activity among college students?

4. What are the most commonly perceived cues to vigorous physical activity among college students?

5. Does the number of perceived benefits, barriers, and cues to action for vigorous physical activity among college students differ based on: sex, grade level, parental involvement in vigorous physical activity, parental encouragement of vigorous physical activity, peer involvement in vigorous physical activity, and peer encouragement of vigorous physical activity?

6. Does the extent of involvement in vigorous physical activity among college students differ based on: sex, grade level, parental involvement in vigorous physical activity, parental encouragement of vigorous physical activity, peer involvement in vigorous physical activity, and peer encouragement of vigorous physical activity?

7. Does the extent of involvement in vigorous physical activity differ based on the number of perceived benefits, barriers, and cues to engaging in vigorous physical activity?

**Hypotheses**

*Null hypothesis 1.* There will be no significant difference in the number of perceived benefits for vigorous physical activity based on grade level.

*Null hypothesis 2.* There will be no significant difference in the number of perceived benefits for vigorous physical activity based on sex.

*Null hypothesis 3.* There will be no significant difference in the number of perceived benefits for vigorous physical activity based on whether students have at least one parent that engages in vigorous physical activity and the number of perceived benefits for vigorous physical...
activity reported by students who do not have at least one parent that engages in vigorous physical activity.

Null hypothesis 4. There will be no significant difference in the number of perceived benefits for vigorous physical activity based on whether students have at least one parent that encourages vigorous physical activity and the number of perceived benefits for vigorous physical activity reported by students who do not have at least one parent that encourages vigorous physical activity.

Null Hypothesis 5. There will be no significant difference in the number of perceived benefits for vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the number of perceived benefits for vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

Null Hypothesis 6. There will be no significant difference in the number of perceived benefits for vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the number of perceived benefits for vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

Null hypothesis 7. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on grade level.

Null hypothesis 8. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on sex.

Null hypothesis 9. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on whether students have at least one parent that
engages in vigorous physical activity and the number of perceived barriers for vigorous physical activity reported by students who do not have at least one parent that engages in vigorous physical activity.

Null hypothesis 10. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on whether students have at least one parent that encourages vigorous physical activity and the number of perceived barriers for vigorous physical activity reported by students who do not have at least one parent that encourages vigorous physical activity.

Null hypothesis 11. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on whether students have at least one peer that engages in vigorous physical activity and the number of perceived barriers for vigorous physical activity reported by students who do not have at least one peer that engages in vigorous physical activity.

Null hypothesis 12. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the number of perceived barriers for vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

Null Hypothesis 13. There will be no significant difference in the number of perceived cues to action for vigorous physical activity based on grade level.

Null hypothesis 14. There will be no difference in the number of perceived cues for vigorous physical activity based on sex.
Null hypothesis 15. There will be no significant difference in the number of cues for vigorous physical activity based on whether students have at least one parent that engages in vigorous physical activity and the number of cues for vigorous physical activity reported by students who do not have at least one parent that engages in vigorous physical activity.

Null hypothesis 16. There will be no significant difference in the number of cues for vigorous physical activity based on whether students have at least one parent that encourages vigorous physical activity and the number of cues for vigorous physical activity reported by students who do not have at least one parent that encourages vigorous physical activity.

Null hypothesis 17. There will be no significant difference in the number of cues for vigorous physical activity based on whether students have at least one peer that engages in vigorous physical activity and the number of cues for vigorous physical activity reported by students who do not have at least one peer that engages in vigorous physical activity.

Null hypothesis 18. There will be no significant difference in the number of cues for vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the number of cues for vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

Null Hypothesis 19. There will be no significant difference in the extent of involvement in vigorous physical activity based on grade level.

Null hypothesis 20. There will be no significant difference in the extent of involvement in vigorous physical activity based on sex.

Null hypothesis 21. There will be no significant difference in the extent of involvement in vigorous physical activity based on whether students have at least one parent that engages in
vigorous physical activity and the extent of involvement in vigorous physical activity reported by students who do not have at least one parent that engages in vigorous physical activity.

*Null hypothesis 22.* There will be no significant difference in the extent of involvement in vigorous physical activity based on whether students have at least one parent that encourages vigorous physical activity and the extent of involvement in vigorous physical activity reported by students who do not have at least one parent that encourages vigorous physical activity.

*Null hypothesis 23.* There will be no significant difference in the extent of involvement in vigorous physical activity based on whether students have at least one peer that engages in vigorous physical activity and the extent of involvement in vigorous physical activity reported by students who do not have at least one peer that engages in vigorous physical activity.

*Null hypothesis 24.* There will be no significant difference in the extent of involvement in vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the extent of involvement in vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

*Null hypothesis 25.* There will be no difference in the extent of involvement in vigorous physical activity based on the number of perceived benefits to engaging in vigorous physical activity.

*Null hypothesis 26.* There will be no difference in the extent of involvement in vigorous physical activity based on the number of perceived barriers to engaging in vigorous physical activity.

*Null hypothesis 27.* There will be no difference in the extent of involvement in vigorous physical activity based on the number of perceived cues for engaging in vigorous physical activity.
**Operational Definitions**

1. Perceived benefits - Factors that one perceives as advantages for engaging in vigorous physical activity.

2. Perceived barriers - Any psychological, physical, or social factors in one’s life that one perceives as being an obstacle to involvement in vigorous physical activity.

3. Perceived cues - Any indicator or reminder that one perceives would increase his/her likelihood for engaging in vigorous physical activity.

4. Vigorous physical activity – Any physical activity that is performed for at least 20 minutes that causes one to breathe hard and sweat. Jogging or running, riding a bike uphill and playing a high speed game of basketball are examples of vigorous exercise.

5. Extent of physical activity involvement – Number of days in an average week one engages in vigorous physical activity. (Three or more days = high involvement; Two or fewer days = low involvement )

**Delimitations**

1. This study was delimited to students attending the University of Cincinnati during the 2009 spring and fall quarters and currently enrolled in general education classes.

2. This study sampled students in selected general education courses and therefore may not be representative of all University of Cincinnati students or college students in general.
Limitations

This study was limited by: the self-reporting accuracy of the participants, the participants’ ability to read and understand the questionnaire, and the honesty of individuals’ responses.

Assumptions

For the purpose of this study it was assumed that all students understood the survey and answered all questions as accurately and honestly as possible.
Chapter Two

Review of Literature

The purpose of this study was to examine college students’ perceived benefits, barriers, cues to action, and extent of involvement in vigorous physical activity. Analyses were also conducted to examine whether benefits, barriers, cues, and vigorous physical activity involvement differed significantly based on: sex, grade level, parental exercise patterns, parental encouragement, peer exercise patterns, and peer encouragement. Chapter one introduced the problem, the research questions and hypotheses, and provided operational definitions, delimitations, limitations, and assumptions for this study. This chapter will present a review of the literature.

Extent of Obesity in the United States

In the last twenty years there has been a dramatic increase in obesity around the world and in the United States (Center for Disease Control and Prevention [CDC], 2006; U.S. Office of Disease Prevention and Health Promotion [USODPHP], 2005; World Health Organization [WHO], 2006). The rising epidemic is a huge cost burden to the U.S. healthcare system, American employers, and individual Americans (Goetzel, Hawkins Ozminkowski, & Wang, 2003; U.S. Department of Health and Human Services [USDHHS], 2007; USDHHS, 2006; WHO, 2006).

The prevalence of obesity is equal to or greater than 25% in 30 states and greater than 30% in three states. These numbers are a drastic increase since 1980, with adult obesity rates
doubling and childhood obesity rates tripling. As a result, one third of adults, or 72 million people, and 16% of children fall into the obese category (USDHHS, 2006, 2007).

As the number of obese individuals has continued to rise, the national costs associated with obesity and overweight have also risen, accounting for 27% of the increases in medical costs since 1987. By 2000, medical costs related to obesity totaled an estimated $117 billion. A significant portion of those costs are attributed to an increase in annual hospital costs for obese children and adolescents (WHO, 2006). The economic repercussions of obesity do not just have an impact on government costs; the problem also affects American employers’ health care expenditures.

In 2008 it was estimated that companies’ annual healthcare costs would average about $9,312 per employee. Employee out of pocket costs increased by 59% in only five years, going from $1,284 in 2003 to $2,040 in 2008. In 2006 healthcare costs accounted for 44% of total benefit costs (American Institute for Preventive Medicine, 2008). Companies face direct and indirect costs related to healthcare. Direct medical care expenses account for less than half the total healthcare costs for companies; while indirect costs, such as absenteeism, worker’s compensation, turnover, disability utilization, family medical leave, and lost productivity make up the rest of the costs. When factoring in direct and indirect costs, employers can pay as much as $18,618 per full-time employee (Goetzel et al., 2003). Although government and work institutions incur great financial costs related to obesity, individual Americans who are overweight or obese pay the ultimate price of poor health (USDHHS, 2007; USDHHS, n.d.; WHO, 2003).

A number of factors contribute to obesity among Americans including genetic, environmental, and social factors. Obesity tends to run in families; however families often share
the same lifestyles. These lifestyle choices are greatly influenced by environmental factors such as longer commutes and less walking; living in communities without sidewalks; eating out more often; having vending machines with high-fat, high-calorie foods in workplaces; and lack of physical activity. Although the environment often does not support healthy behaviors, social factors are also found to have a negative impact on the health of Americans. Circumstances such as poverty and lower levels of education are linked to obesity. It is often more expensive to eat healthier foods like fresh fruits and vegetables, while more processed, high-calorie foods are easier to find and more affordable. Other potential barriers for low-income individuals include the lack of safe recreational facilities and the inability to afford gym memberships, resulting in a lack of physical activity (USDHHS, 2006). While the obesity epidemic is national in its scope, the problem can be broken down by examining different sub-groups of the population including, but not limited to: seniors, minorities, women, children, adolescents, and young adults (college students).

**Extent of Obesity among College students**

Starting college has been identified as a major life transition accompanied by a variety of changes. Many factors contribute to this adjustment period: a new living environment; more freedom; new social influences; personal, academic, and financial stressors; work load; demanding course work; and the transition from adolescence to adulthood (Fisch & Nies, 1996; Lawrence & Schank, 1995; Pender, Walker, Sechrist, & Stromborg, 1988; Kantanis, 2000). Grace (1997) claimed that college students have increased rates of morbidity, mortality, and disability due to developmental, environmental, and behavioral risk factors, thus resulting in increased years of life lost from preventable illnesses and injuries. More specifically, young
people transitioning from adolescence to adulthood are at increased risk for overweight or obesity, which has lead to obesity being a growing problem on university campuses (Cheung, Gortmaker, Nelson, Subramanian, & Wechsler, 2007).

Bowman et al. (1999) reported that between 1991 and 1999 the greatest rise in obesity occurred in the college population. On average, weight gain among college students has been found to be greater than that of the general population over the same time frame (Halbmaier, Levitsky, & Mrdjenovic, 2004). The 2007 American College Health Association-National College Health Assessment (ACHA-NCHA) results indicated that of the students surveyed, 23% were overweight and 13.7% were obese (American College Health Association [ACHA], 2007). Research also shows that males are more likely to be obese than females. In addition, overweight in males is more prevalent among African Americans and Hispanics, while overweight in females is more prevalent just among African Americans. Furthermore, prevalence of overweight in general increases as students move from freshmen to seniors (Cheung et al., 2007). Regarding sex differences, research has found that males are significantly more likely to be obese than females (Cheung et al., 2007). This trend continues beyond college as those students who are obese or develop obesity during the college years are at increased risk for obesity throughout adulthood (Adair, Gorden-Larson, Nelson, & Popkin, 2004; Bravender, DeSai, Miller, & Staples, 2008). This is a significant problem since obese individuals are also at increased risk for the many health problems related to obesity, such as heart disease, diabetes, and some cancers (CDC, 2006; Torgan, 2002).
Health Consequences of Obesity

Obesity has physical, psychological and social consequences (CDC, 2009). Major health organizations all agree that obesity is linked to serious medical conditions including: high blood pressure, high cholesterol, type 2 diabetes, heart disease, stroke, gallbladder disease, arthritis, sleep disturbances, problems breathing, and certain types of cancer (CDC, 2008c; USODPHP, 2005; and WHO, 2003).

Although obesity has serious physical consequences, the psychological effects are equally problematic. The National Institute of Diabetes and Digestive and Kidney Diseases and the National Institutes of Health (USDHHS, 2006) assert that American society’s emphasis on physical appearance and the perception that slimness equals attractiveness sends negative messages to overweight people, resulting in emotional suffering. The USDHHS contends that the emotional effects of being overweight, particularly for women, may be one of the most painful effects of obesity.

Aside from the physical and psychological consequences, obesity presents significant social consequences as well. According to the USDHHS (Understanding Adult Obesity, 2006, n.p.), obese individuals are many times inaccurately labeled as being “gluttonous, lazy, or both.” These misperceptions often result in obese people facing discrimination or prejudice at school, work, and in social situations. Due to the lack of social acceptance of obesity, obese individuals potentially have to deal with depression, shame, or feelings of rejection (USDHHS, 2006). Given that government agencies recognize the health risks and potential physical, psychological, and social consequences, attempts have been made to address the problem through prevention strategies (USDHHS, 2000).
**Strategies to Prevent Obesity-Related Health Problems**

Research has found several strategies to effectively reduce or prevent obesity. Strategies vary in scope and include policy, environmental, and behavioral strategies. *Healthy People 2010* is a national health promotion and disease prevention agenda with the purpose of providing a framework for improving the health of all Americans. The top two leading health indicators for *Healthy People 2010* are physical activity and overweight and obesity. *Healthy People 2010* includes specific objectives related to increasing physical activity levels and reducing overweight and obesity among Americans (USDHHS, 2000). In addition to it being a national priority area, physical activity is one behavioral strategy consistently mentioned in the literature as a way to improve health and reduce obesity (ACSM, 2007; CDC, 2008a; CDC, 2008b; USDHHS, 2008a; USDHHS, 2008b; WHO, 2009). Furthermore, in *Physical activity guidelines for Americans: 2008 Physical activity guidelines for Americans* summary, the USDHHS (2008c) asserted that physical activity is “one of the most important steps that Americans of all ages can take to improve their health.” Although there are other obesity prevention strategies mentioned in the literature, they are beyond the scope of the present study; therefore this paper focuses specifically on physical activity as a strategy for preventing or reducing obesity and improving health.

According to the CDC (2009), physical activity involves working hard enough to raise the heart rate and break a sweat. The American College of Sports Medicine (ACSM) and the American Heart Association (AHA) recommend that for health benefits individuals should regularly engage in both aerobic and strength training exercises (ACSM, 2007). According to national guidelines, adults have a variety of options for meeting the recommended amounts of physical activity. Individuals can perform either moderate-intensity aerobic activity for 150
minutes per week or vigorous-intensity aerobic activity for 75 minutes a week. For health benefits, aerobic activities need to be a minimum duration of 10 minutes per session. Several 10 minute sessions can be performed throughout the day (ACSM, 2007). In addition, it is recommended that 8 to 10 strength training exercises that work all the major muscle groups be performed twice a week (CDC, 2008b).

Examples of moderate-intensity aerobic exercises include: walking fast, water aerobics, bike riding, and playing tennis. Vigorous exercise includes activities such as jogging, running, swimming laps, and playing basketball. Lifting weights, using resistance bands, doing yoga, and performing resistance exercises using body-weight, such as push-ups or sit-ups, are all ways to incorporate the strength training recommendations (CDC, 2008b). Finally, it has been noted that simply adding more movement to one’s daily routine is beneficial to health. Behaviors including taking the stairs instead of the elevator, raking leaves, washing the car, and taking a walk instead of watching T.V. are all encouraged as ways to have a more active lifestyle (USDHHS, 2006).

Benefits of Physical Activity

Numerous physical and mental benefits are linked to physical activity (CDC, 2008a; WHO, 2008). Physical benefits include: weight control; reduced risk of heart disease, type 2 diabetes, and some cancers; improved bone health; stronger muscles; improved ability to perform daily activities, and increased life span. The AHA (2009) cites additional physical health benefits such as: improved blood cholesterol levels; reduced blood pressure; increased energy levels; and improved sleep patterns. Along with the physical benefits, there are several mental health benefits associated with regular physical activity. These include: decreased tension and stress; improved body image; improved mood; reduced anxiety and depression; and increased
enthusiasm and optimism (AHA, 2009; CDC, 2008a; WHO, 2008). Furthermore, the AHA purports that there are few other lifestyle choices that can have such a positive impact on an individual’s health. The impact on health is significant considering that in comparison with individuals who are physically active for less than 30 minutes a week; those individuals who are active for 7 hours a week decrease their risk of premature death by 40%.

Physical Activity Behaviors of Americans

Despite the known benefits of physical activity, the USDHHS (2008b) reports that the number of physically inactive adults and children is still high, and little progress has been made in increasing the amount of physical activity throughout the nation. It is estimated that only 25% of Americans get enough regular exercise. Fifty percent do not get enough activity to provide health benefits, and 25% of Americans participate in no physical leisure time activity at all (CDC, 2008a).

The CDC does report one positive trend: the prevalence of physical activity increased overall between 2001 and 2005. However, disparities are present in the levels of increase in physical activity among various groups. Gender differences are evidenced by an 8.6% increase in physical activity among women, while only a 3.5% increase occurred among men. Racial/ethnic disparities are similar in both genders; non-Hispanic whites had the largest increases in physical activity, and non-Hispanic blacks and Hispanics had the lowest increases in activity levels (CDC, 2007).

The CDC reports disparities not only in the levels of increase in physical activity among groups, but also in the amount of physical activity reported for each group. Only 46.7% of women are physically active compared to 49.7% of men. Among women, 49.6% of non-
Hispanic whites are physically active, followed by women classified as other race (46.6%), Hispanics (40.5%), and non-Hispanic blacks (36.1%). There are also disparities in amount of physical activity among men. Non-Hispanic whites have the highest prevalence of activity (52.3%), followed by men classified as other race (45.7%), non-Hispanic blacks (45.3%), and Hispanics (41.9%).

Finally, physical activity levels, as well as increases in those levels, differ among age groups. Significant increases in physical activity levels among men are only reported among those between 45 and 64 years of age. Among women, all age groups report increases in physical activity levels except for one. Young adult women ages 18 to 24 do not report significant increases in the participation of regular physical activity (CDC, 2007). This fact is worth noting because while research has shown a continual decline in physical activity with age, the most dramatic decline occurs between adolescence and young adulthood (Bray, 2007).

Physical Activity Behaviors of College students

Starting college is acknowledged as a major life transition for young adults and one that is accompanied by a variety of changes. Many factors are shown to contribute to this adjustment period: a new living environment; more freedom; new social, academic, personal, and financial stresses; greater expectations from academia; and the transition from adolescence to adulthood (Fisch & Nies, 1996; Lawrence & Schank, 1995; Pender et al., 1988; Kantanis, 2000). Grace (1997) claimed that college students have increased rates of morbidity, mortality, and disability due to developmental, environmental, and behavioral risk factors, thus resulting in increased years of life lost from preventable illnesses and injuries.
One of the behavioral risk factors for college students noted in the literature is a decline in physical activity (Bray, 2007; Born & Bray, 2004; Clayton et al., 1997). One study examined the decline in student physical activity from the last 2 months of high school to the first 2 months of college, and the research cites significant declines in frequency and duration. Furthermore, the study indicates that 56% of the college freshmen students who had been vigorously active during their senior year of high school are no longer engaging in vigorous amounts of physical activity; and over 30% of previously active students become inactive during their first year in college (Born & Bray, 2004). These results supported earlier findings (Clayton, et al., 1997) from the U.S 1995 Youth Risk Behavior and 1995 National College Risk Behavior Surveys. The survey’s results indicated that 54.9% of high school seniors participated in sufficient amounts of physical activity, while only 39.6% of students at four year universities engaged in adequate amounts of physical activity.

The 2007 American College Health Association-National College Health Assessment (NCHA-NCHA) reported that little progress had been made in increasing physical activity among college students. The results indicated that over half of college students did not meet the recommended guidelines for physical activity. Of those surveyed, only 42.8% reported 20 minutes of vigorous or 30 minutes of moderate activity at least 3 days a week, and 48.2% reported engaging in resistance training 2 days a week. Incidentally, only 37.5% reported that they received information on physical activity from their university (ACHA, 2008).

Bridges, Guan, Keating, and Pinero (2005) further confirmed that 50% of college students do not meet the recommended physical activity guidelines, and they also noted that college students’ physical activity levels are not any higher than those seen in the general adult population. One difference that was noted is that adults in other populations are more active on
the week-ends, but college students are more active during the week. Bridges et al. also reported that both the overall physical activity patterns of college students and the decline in those patterns over the four years at school are of concern.

According to a study on recent college alumni, those concerns are warranted. Evidence indicates that exercise behaviors in college are strong predictors of exercise behaviors post-college. This carry-over effect is supported by the fact that 84.7% of college students who are regular exercisers report that they are as active or even more active six years after graduation. Similarly, 81.3% of those students who are inactive in college report being the same or less active six years after graduation. Consequently, those individuals who are inactive in college and continue to lead sedentary lifestyles are significantly more likely to gain weight after graduation than those who are active (Snow & Sparling, 2002).

Perceived Benefits, Barriers, and Cues to Physical Activity among College students

Although the health benefits of physical activity are widely noted (AHA, 2009; CDC, 2009; WHO, 2003), college students do not identify that as a primary reason for engaging in physical activity. Both males and females indicate that their main reason for exercising is to improve physical appearance, although each sex looks for different results. For males the primary goal is to gain muscle, whereas females focus on weight loss or weight control (Bridges et al., 2005). Perhaps the reason behind this is related to societal pressure and the emphasis on physical appearance in American culture (USDHHS, 2006).

Besides looking good, college students identify other reasons for engaging in physical activity including: enjoyment/fun, to learn a new activity, to improve skills, and to improve fitness. More specifically, women identify learning a new activity, improving fitness, and
reducing stress as reasons they engage in physical activity. Men are physically active to have fun, learn a new activity, improve skills, improve fitness, and earn a class credit (Leenders, Sherman, & Ward, 2003). Although college students clearly identify positive benefits associated with physical activity, a large number of them are not physically active (ACHA, 2008; Bray, 2007; Born & Bray, 2004).

Bray, Brittain, & Gyurcsik (2004) used an ecological model to study university student’s barriers to engaging in physical activity. The study focused on those students transitioning into their first year of college. Three main types of barriers to physical activity were identified: institutional, intrapersonal, and interpersonal. Institutional barriers include factors such as school workload, jobs, and stress related to exams. Intrapersonal barriers that were identified include: lack of motivation, injury, illness, lack of sleep, and wanting to relax. Social invitations during workout times, lack of training partners, inactive friends, and intimidation due to being unfamiliar with the social physical activity environment are all identified as being significant interpersonal barriers to engaging in physical activity.

The literature did not reveal many cues to action for college students to be physically active. Social support and organized intramural sports, specifically those organized through fraternities and sororities, are identified as two possible reasons students might choose to become active (Bridges et al., 2005). Furthermore, the assertion is made that not enough attention has been focused on physical activity patterns among college students, and therefore not enough information is known about their perceived benefits, barriers, and cues to action. Due to this gap in the literature the assertion has been made that more research is needed to determine the perceived barriers and cues to physical activity in the university setting (Bray et al., 2004; Bridges et al., 2005; & Brown, 2005).
Strategies Used to Overcome Barriers and Increase Physical Activity among College students

According to the literature, studies on physical activity interventions for college students are limited (Booth, McKenzie, Stone, & Welk, 1998; Bridges et al., 2005; & Eber et al., 2003). Several databases including: Academic Research Complete, CINAHL, ERIC, MEDLINE, and SocINDEX were utilized. A variety of combinations for the following search terms were used: college students, university, obesity, physical activity, physical fitness, exercise, overweight, barriers, benefits, Health Belief Model, interventions, weight gain, and freshman 15. The search indicated that most studies are school-based and related to children and adolescents. Those samples do not include college students. Ebert et al. (2003) confirmed this finding and asserted that studies of college students’ health behaviors are lacking. According to one meta-analysis, only three experimental studies on increasing physical activity in college students were noted after an extensive and comprehensive review of the literature. These studies include: Project GRAD, Project TEAM, and Project Active Recreation on Tertiary Education Campuses (ARTEC) (Booth, McKenzie, Stone, & Welk, 1998; Bridges et al., 2005). No additional studies for the university population were found during the search that was conducted by the authors of this paper.

Project GRAD was implemented in a semester class that was designed to include a lecture and lab component. The lectures focused on fitness and health knowledge, and the labs focused on adopting and maintaining physical activity patterns. Students were responsible for their own activity behaviors. The project includes follow-up strategies of emails and phone calls for 18 months. The intervention does not address student barriers to physical activity and the program does not have any significant long-term effects on students’ physical activity behaviors (Alcaraz, Calfas, Gehrman, Johnson, & Sallis, 1999).
Project TEAM (Teaching Exercise/Activity Maintenance) was implemented in aerobic dance, jogging, and weight training physical activity classes and consists of one 50 minute lecture a week and three 45 minute physical activity labs each week. The primary objective is to increase the proportion of students who continue to engage in regular physical activity after the course; however, the research does not indicate any specific intervention strategies that will target barriers to physical activity. The study is not yet complete and results were unavailable at the time of publication (Buckworth, 2001).

ARTEC was implemented on four Australian campuses. Free fitness testing, demonstrations, and a media campaign aim at increasing college students’ leisure time activity. Although several approaches are used to encourage students to become more active, no strategies specifically target students’ perceived barriers to engaging in physical activity. Research shows moderate levels of increase in activity levels; however, long-term effects are unknown (Leslie, Owen, & Sparling, 2001).

Bridges et al. (2005) identified several weaknesses of the existing interventions. One weakness they mentioned was the use of weak intervention designs. The only theoretical foundations mentioned in the studies are the Social Cognitive Theory (SCT) and the Transtheoretical Model (TTM). A second weakness is that inconsistent and subjective measures of physical activity have been used. This inconsistency does not allow for comparisons between studies. One final weakness was that no data has been able to show that participants adopt long-term physical activity habits. This weakness is particularly important because research shows that 50% of individuals who adopt an exercise program drop out within the first six months (Dishman, 1988).
Since research has shown that exercise behaviors adopted in college are likely to carry over into adulthood (Snow & Sparling, 2002) it is important that more research be conducted in order to determine how to increase the physical activity levels of college students (Bridges et al., 2005). In addition, research has also shown that perceived barriers have a significant and negative impact on college students’ health behaviors such as physical activity (Ebert, Kang, Ngamvitroj, Park, & Von Ah, 2004). Despite the knowledge that college students’ physical activity levels are largely linked to their perceived barriers and that the behaviors they adopt will likely continue on into adulthood, there was a gap in the literature regarding the number of studies that actually focus on college students’ activity levels. The literature also indicated that not enough is known about how to help students overcome their perceived barriers to being physically active (Bridges et al., 2005; Buckworth, 2001; Petosa & Suminski, 2006).

Health Belief Model

The Health Belief Model (HBM) was conceived in the 1950’s by a group of social psychologists in an effort to explain individuals’ participation, or lack of participation, in health services or programs designed to prevent or detect disease (Rosenstock, 1974). Two main factors of HBM are values and expectancies. In health behaviors the value is the desire to prevent illness or to get well, and the expectancy is the belief that specific health behaviors will prevent illness (Rosenstock & Stretcher, 1997).

The five basic components of the HBM are: 1) perceived susceptibility, 2) perceived severity, 3) perceived benefits, 4) perceived barriers, and 5) perceived cues to action. In order for individuals to engage in health behaviors or behavior change, they need to believe that they are susceptible to a disease or condition and that the presence of the disease poses a threat to
them and their health. They also need to believe that taking a particular action will reduce their susceptibility to disease and that the benefits will outweigh the barriers for taking such action (Rosenstock, 1974; Rosenstock & Stretcher, 1997). Furthermore, self-efficacy (confidence in one’s ability to perform a specific task or behavior) was not originally a part of the HBM; however, in recent years research has shown its relevance in the perceived barriers construct of the model (Cottrell, Girvan, & McKenzie, 2009, p. 124, & Ebert et al., 2004).

The HBM has been used to predict health behaviors in various populations. The literature includes several examples of the HBM as it relates to exercise behaviors (Aiken, Gerend, Sander, & Schmiege, 2007; Al-Ali & Haddad, 2004; Armstrong, Beerman, Campbell, Pond-Smith, & Swift, 1995; Godin & Shepard, 1990). Ebert et al. (2003) reported that perceived barriers have the most significant negative impact on college students’ health behaviors; and that self-efficacy and perceived barriers are the two most significant factors that predict health behaviors. The authors concluded that health behaviors adopted in adolescence and young adulthood can have a strong impact on future health and risk of disease, which supports their findings on the importance of perceived barriers and self-efficacy in predicting health behaviors among college students.

There are three components of the HBM that are applicable to the present study: perceived barriers, perceived benefits, and cues to action. College students’ physical activity behaviors appear to be influenced the most by those factors (Bray et al., 2004; Bridges et al., 2005; Ebert et al., 2003, & Leenders et al., 2003). Perceived susceptibility and perceived severity do not appear to have a significant impact on college students’ health-related behaviors (Bridges et al., 2005). Furthermore, the research indicates a strong need for more information not only on the determinants of college students’ physical activity behaviors, but also for the
identification of appropriate strategies for helping students to overcome perceived barriers to physical activity (Bridges et al., 2005; Buckworth, 2001; Ebert et al., 2004; Petosa & Suminski, 2006).

Summary

In this chapter, the literature related to the problem of obesity among Americans and the consequences associated with it was reviewed. The extent of the problem is evidenced by the increased numbers of overweight and obese individuals in the population as well as by the strong economic impact of obesity-related illnesses. National healthcare expenditures, employer health care costs, and the overall poor health of Americans are a growing national concern. Furthermore, obesity and overweight are largely preventable and physical activity is one of the main strategies for combating the condition. Most Americans are not engaging in adequate amounts of physical activity for health benefits and the college population is believed to be especially at risk.

One of the most dramatic declines in physical activity occurs among individuals 18 to 24 years old. College students’ physical activity patterns mimic those of the general adult population in that a large portion of students are not sufficiently active. Furthermore, the physical activity behaviors among college students are likely to continue after graduation, setting them up for poor health as adults. This finding provides rationale for placing priority on increasing physical activity among college students. Although it is clear that great opportunities for interventions exist within the university setting, a lack of research has been done that specifically focuses on the unique needs of this target population.
The transition from high school to college is associated with a variety of lifestyle changes and new stressors. These changes are often accompanied by increased health-risk behaviors, including a decrease in physical activity. It is important to recognize that although college students identify benefits to physical activity, health benefits have not been shown to be a motivating factor in their behavioral choices. Additionally, students are faced with a variety of daily hassles, which present significant barriers to their participation in physical activity, thus providing an opportunity for intervention.

Limited research has been done on how to increase physical activity in college students. Of the three experimental studies mentioned in the literature, none of them have shown significant long-term impact on physical activity levels; and the short term positive effects that were found are moderate at best. There is also a significant gap in the research regarding how to overcome college students’ perceived barriers to physical activity. None of the interventions mentioned in this review addressed this factor and most studies indicated a need for further research.

The Health Belief Model proposes perceived benefits, perceived barriers, and cues to action as important factors that influenced the adoption of healthy behaviors. These constructs are discussed in relation to college students and how their perceptions affect the adoption and maintenance of physical activity. Research suggests that the identification of college students’ perceptions of physical activity and what they need to overcome perceived barriers will assist in developing more effective strategies for increasing physical activity.
Chapter Three

Methods

In the last 20 years there has been a large increase in obesity in the United States, resulting in one third of adults, or 72 million people, and 16% of children are classified as obese. The college population is among one of the groups most affected by the problem of obesity. When compared over the same amount of time, weight gain among college students has been found to be greater than that of the general population. Physical activity is one strategy that has been shown to prevent obesity, however over half of college students do not meet the recommended guidelines for physical activity. Consequently, those individuals who are inactive in college tend to lead sedentary lives after graduation; and therefore they are more likely than those who are active in college to gain weight after graduation (Snow & Sparling, 2002).

The purpose of this study was to examine college students’ perceived benefits, barriers, cues to action, and extent of involvement in vigorous physical activity. Analyses were also conducted to examine whether benefits, barriers, cues and vigorous physical activity involvement differed significantly based on sex, grade level, parental exercise patterns, parental encouragement, peer exercise patterns, and peer encouragement.

Chapter one discussed the research questions, hypotheses, delimitations, limitations, assumptions, and operational definitions. Chapter two provided a comprehensive review of the literature. This chapter describes the methods used in this study.

Participants

A convenience sample of students from the University of Cincinnati served as the participants of this study. Based on a total population of 28,369 undergraduate students, a
sample of 379 was needed to have a confidence level of 95% with a confidence interval of 5%. Participants were students currently enrolled in a sample of seven general education courses at the University of Cincinnati main campus during the 2009 spring and fall quarters. All students were between 18 and 25 years of age. Participation was voluntary and no incentives were offered.

Instrumentation

A two-page, 21-item survey was developed to determine participants’ involvement in vigorous physical activity and their perceived benefits, barriers, and cues to vigorous physical activity. The survey was divided into four sections. Definitions for vigorous physical activity, moderate physical activity, and strength training activity were listed at the top of the first page of the survey instrument (Appendix A). The first section of the survey addressed involvement in physical activity. The first three questions asked participants to list the number of days during an average week that they participate in vigorous physical activity, moderate physical activity, and strength training. The fourth question provided a list of 14 activities and asked participants to check all of the activities they performed in the last 30 days.

Section two of the survey addressed perceived benefits, barriers and cues for vigorous physical activity. Question five provided a list of 14 benefits for engaging in vigorous physical activity and asks participants to check all that apply. An “other” category was also included. Each checked benefit received a score of 1, while each unchecked benefit received a score of 0, resulting in an overall potential range of 0 to 15. Question six provided a list of 15 barriers to engaging in vigorous physical activity and asked participants to check all that apply. An “other” category was also included. Each checked barrier received a score of 1, while each unchecked
barrier received a score of 0, resulting in an overall potential range of 0 to 16. Question seven provided a list of 15 cues to engaging in vigorous physical activity, as well as an “other” category. Participants were asked to check all that apply. Each checked cue received a score of 1, while each unchecked cue received a score of 0, resulting in an overall potential range of 0 to 16. Section three of the survey measured motivational factors to physical activity. Students were asked, “Which of the following do you feel would help motivate you to engage in vigorous physical activity?” Participants were requested to check all that apply among 23 motivational factors and an “other” category was included. Each checked factor received a score of 1, while each unchecked factor received a score of 0, resulting in an overall potential range of 0 to 24.

The fourth section of the survey requested students to provide demographic and background information. This section consisted of 13 items: sex, race/ethnicity, age, height, weight, grade level, athletic team involvement, university team involvement, parental/peer involvement in vigorous physical activity, and parental/peer encouragement of vigorous physical activity. Students responded to these items by filling in the appropriate blanks or checking the appropriate response options (i.e., Yes/No; Male/Female, etc.).

Instrument Testing

Validity and reliability of the survey were established using a variety of tests. A panel of experts was used to establish face and content validity. The panel consisted of an expert in survey design and research from the University of Cincinnati, an expert in exercise science, and two health education professors from the University of Cincinnati.

The researcher sent each expert a cover letter attached to the survey explaining the purpose of the study and why the expert had been selected to participate in the review of the
instrument. This information was sent via email and hard copies were sent in the mail. The experts were asked to critique the survey to determine if the questions were clear, understandable and whether items tended to measure what they were intended to measure. Experts were asked to provide any questions, corrections, or other feedback as to how the instrument should be revised. The researcher requested that the suggestions be returned within two weeks via email or hard copies could be sent in the mail. This panel confirmed that the instrument measured what it was supposed to measure and only suggested minor revisions. The authors of this study incorporated the experts’ comments and suggestions into the final instrument.

Test-retest was used to ensure stability reliability. This test assessed the degree of association between survey items at two different points in time. A convenience sample of 27 students was used for the test-retest sample. The students were male and female members of a health education class and represented various grade levels, majors, and race/ethnicities. The survey was first administered to the participants at the beginning of class on a Thursday. The same test was administered to the same group of students one week later. Kendall’s tau-b correlation coefficients were calculated to determine test-retest reliability for nonparametric sections of the survey and yielded the following: .861 (Perceived Benefits), .884 (Perceived Barriers), .792 (Perceived Cues).

Procedures

The study proposal, survey instrument, cover letters, and informal and formal consent forms were approved by the researcher’s thesis committee and submitted to the University of Cincinnati Institutional Review Board (IRB). The IRB approved the study.
The primary researcher selected instructors of general education courses from the University’s list of course offerings. These courses consisted of a variety of general education courses including: Accounting, Marketing, Business, Biology, Ecology, Sociology, History, Communication, Education, Criminal Justice, Psychology, English, Economics, and Social Work. The researcher emailed the instructors requesting permission for the survey to be distributed in their courses during the 2009 spring and fall quarters. The researcher sent instructors the survey with an attached cover letter explaining the purpose of the study. Those who agreed were asked to email the researcher days and times of classes, the number of sections, and students in each section. A total of thirty instructors were asked to participate, thirteen of them responded, and of those thirteen seven agreed to participate. Once permission was obtained from instructors, surveys were distributed during class time in May 2009; in October 2009 one section of Psychology was also surveyed.

A total of nine classes were surveyed, which included one section of Biology, two sections of Social Work, two sections of Criminal Justice, two sections of Psychology, and one section of Sociology. A combined total of 596 students were present in the classes and of the 596 present 521 completed the survey. The survey instrument was introduced to the classes. The researcher explained the purpose of the study to students and informed them that their responses would be kept anonymous. Students were also informed that their participation was completely voluntary, and that by completing the survey they were granting their permission for their responses to be used in the study. All students received a survey with a cover letter reiterating the purpose of the study, that the study was voluntary and that by completing the survey they were granting their permission for their responses to be used in the study. The time required to complete the survey was approximately five to ten minutes.
The researcher preserved anonymity of the surveys by instructing participants to refrain from putting their name, social security number or student identification number on the survey. This ensured that surveys could not be matched to individual participants. The researcher then asked students to place their surveys face down in an envelope that was placed on the desk at the front center of the room. The desk was empty except for the computer equipment used for instruction. The researcher sealed the envelopes after all surveys were collected. The researcher counted each batch of surveys after they were collected to keep an accurate count of completed surveys and to discard any that could not be used. A total of 521 surveys were collected. Forty-one surveys were eliminated because they were incomplete; therefore a sample of 480 surveys was used for this study. Surveys were stored in a locked personal file cabinet at the researcher’s home until data entry was conducted. All surveys were shredded following the data analysis.

**Data Analysis**

All data was analyzed using the Statistical Package for the Social Sciences (SPSS Version 16). Descriptive statistics (frequencies, means, standard deviations, ranges) were used to describe the demographic and background information. A series of one-way analyses of variance (ANOVAs) were computed to determine whether involvement in vigorous physical activity differed based on the number of perceived benefits, barriers and cues to vigorous physical activity. Similarly ANOVAs were computed to examine whether involvement in vigorous physical activity differed based on: sex, grade level, parental/peer vigorous physical activity involvement, and parental/peer encouragement for vigorous physical activity. An alpha level of .05 was established for determining significance.
Chapter Four

Results and Discussion

The purpose of this study was to examine college students’ perceived benefits, barriers, cues to action, and extent of involvement in vigorous physical activity. Analyses were also conducted to examine whether benefits, barriers, cues, and vigorous physical activity involvement differed significantly based on: sex, grade level, parental exercise patterns, parental encouragement, peer exercise patterns, and peer encouragement. The HBM suggests that the number of perceived benefits, barriers, and cues help to predict specific behaviors. Thus, this study examined the relationship between the number of perceived benefits, barriers, and cues to action and involvement in vigorous physical activity. Chapter one discussed the research questions, hypotheses, delimitations, limitations, assumptions, and operational definitions. Chapter two provided a comprehensive review of the literature, and Chapter three discussed the methods used in this study. This chapter discusses the results of the research.

Participation

Students \((n = 480)\) enrolled in nine sections of general education courses: Biology, Social Work, Criminal Justice, Psychology, and Sociology during the 2009 spring and fall quarters at a Midwestern University served as the participants of this study. Initially, a total of 596 surveys were distributed and 521 were returned, resulting in a response rate of 87.4%. Forty-one surveys were incomplete and therefore eliminated, resulting in a total sample size of 480 and a total participation rate of 80.5%. A power analysis was conducted a priori based on a total population
of 28,369 undergraduate students with a confidence level of 95% and a confidence interval of 5% and indicated that a sample of 379 students was needed to achieve a representative sample.

**Demographic and Background Characteristics**

Most participants were female (66.2%) and white (82.2%) (Table 4.1). Grade levels included freshmen (51.4%), sophomores (22.8%), juniors (13.4%), seniors (9.4%), and graduate students (3.1%). Ages ranged from 17 to 29 ($M = 19.68, SD = 1.756$). Seventy-one percent of participants reported that they were members of an athletic team in high school. Only 6.7% reported that they were members of a university team during the 2008-2009 school year. Most of the respondents (91.0%) reported that they were not members of a fraternity/sorority.

Participants were also asked about parent and friend involvement in and encouragement of vigorous physical activity. Forty-six percent of participants reported having at least one parent/guardian who engaged in vigorous physical activity for at least 20 minutes three times a week (Table 4.2). The majority of participants (86.2%) reported having at least one friend who engaged in vigorous physical activity for at least 20 minutes three times a week. Approximately 60% of participants reported having at least one parent/guardian who encouraged them to engage in vigorous physical activity, and 62.5% reported having at least one friend who encouraged them to engage in vigorous physical activity.

**Involvement in Physical Activity**

Students were asked to report the number of days during an average week that they participated in the following: vigorous physical activity, moderate physical activity, and strength training. Number of days for each activity ranged from 0-7 (Table 4.3). Students reported a
Table 4.1  Demographic and Background Characteristics of Participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>%</th>
</tr>
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<tbody>
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<td><strong>Member of an athletic team in high school</strong></td>
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<td></td>
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<tr>
<td>No</td>
<td>137</td>
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<td><strong>Member of a university team during 2008-2009 school year</strong></td>
<td></td>
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<td>Yes</td>
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<td><strong>Currently a member of a campus fraternity/sorority</strong></td>
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</tr>
<tr>
<td>No</td>
<td>433</td>
<td>91.0</td>
</tr>
</tbody>
</table>

N = 480; Percents refer to valid percents; Missing values excluded
Table 4.2  Parent/Friend Engagement in and Encouragement of Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Do you….?</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have at least one parent/guardian who engages in vigorous physical activity for at least 20 minutes 3 or more times a week?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>222</td>
<td>46.2</td>
</tr>
<tr>
<td>No</td>
<td>258</td>
<td>53.8</td>
</tr>
<tr>
<td>Have at least one friend who engages in vigorous physical activity for at least 20 minutes 3 or more times a week?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>416</td>
<td>86.8</td>
</tr>
<tr>
<td>No</td>
<td>63</td>
<td>13.2</td>
</tr>
<tr>
<td>Have at least one parent/guardian who encourages you to engage in vigorous physical activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>286</td>
<td>59.6</td>
</tr>
<tr>
<td>No</td>
<td>194</td>
<td>40.4</td>
</tr>
<tr>
<td>Have at least one friend who encourages you to engage in vigorous physical activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>300</td>
<td>62.5</td>
</tr>
<tr>
<td>No</td>
<td>180</td>
<td>37.5</td>
</tr>
</tbody>
</table>

N = 480; Percents refer to valid percents; Missing values excluded
Table 4.3 Involvement in Physical Activity

<table>
<thead>
<tr>
<th>Item</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>During an average week, on how many days do you participate in vigorous physical activity?</td>
<td>2.34</td>
<td>1.883</td>
</tr>
<tr>
<td>During an average week, on how many days do you participate in moderate physical activity?</td>
<td>4.15</td>
<td>2.306</td>
</tr>
<tr>
<td>During an average week, on how many days do you participate in strength training?</td>
<td>1.46</td>
<td>1.724</td>
</tr>
</tbody>
</table>

Notes: Range = 0-7 days; N = 480; Missing values excluded
mean of 2.34 days \((SD = 1.883)\) for vigorous physical activity, a mean of 4.15 days \((SD = 2.306)\) for moderate physical activity, and a mean of 1.46 days \((SD = 1.724)\) for strength training.

**Type of Physical Activity Performed**

Participants were asked to report which types of physical activity they had performed in the last thirty days. Students were provided a list of 13 activities as well as an “Other” option and could check all that applied. The top three activities that were reported were jogging/running \((67.9\%)\), brisk walking \((66.9\%)\), and free weights \((41.7\%)\) (Table 4.4). The lowest ranking activities included jumping rope \((7.3\%)\), kickboxing \((4.2\%)\), and spinning class \((4.0\%)\).

**Perceived Benefits of Engaging in Vigorous Physical Activity**

Question five on the survey asked participants, “Which of the following do you feel are benefits to you in engaging in vigorous physical activity?” Students were instructed to check all that apply from a list of 14 potential benefits plus an option for “Other.” The top five benefits that students reported included: improving health \((85.0\%)\), improving appearance \((81.7\%)\), maintaining a healthy weight \((78.3\%)\), losing weight \((70.8\%)\), and improving fitness \((69.2\%)\) (Table 4.5). The least reported perceived benefits included: meeting new people/socializing \((27.1\%)\), learning a new activity/sport \((24.6\%)\), increasing dating opportunities \((14.6\%)\), and other \((2.5\%)\).
Table 4.4 Type of Physical Activity Performed in Last 30 Days

<table>
<thead>
<tr>
<th>Activity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jogging/running</td>
<td>326</td>
<td>67.9</td>
</tr>
<tr>
<td>Brisk walking</td>
<td>321</td>
<td>66.9</td>
</tr>
<tr>
<td>Free weights</td>
<td>200</td>
<td>41.7</td>
</tr>
<tr>
<td>Weight machines</td>
<td>187</td>
<td>39.0</td>
</tr>
<tr>
<td>Elliptical machine</td>
<td>167</td>
<td>34.8</td>
</tr>
<tr>
<td>Exercise bike</td>
<td>140</td>
<td>29.2</td>
</tr>
<tr>
<td>Other</td>
<td>129</td>
<td>26.9</td>
</tr>
<tr>
<td>Yoga</td>
<td>49</td>
<td>10.2</td>
</tr>
<tr>
<td>Pilates</td>
<td>45</td>
<td>9.4</td>
</tr>
<tr>
<td>Row machine</td>
<td>41</td>
<td>8.5</td>
</tr>
<tr>
<td>Step aerobics</td>
<td>37</td>
<td>7.7</td>
</tr>
<tr>
<td>Jumping rope</td>
<td>35</td>
<td>7.3</td>
</tr>
<tr>
<td>Kickboxing</td>
<td>20</td>
<td>4.2</td>
</tr>
<tr>
<td>Spinning class</td>
<td>19</td>
<td>4.0</td>
</tr>
</tbody>
</table>

N = 480; Percents refer to valid percents; Missing values excluded
Table 4.5  Perceived Benefits of Engaging in Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving health</td>
<td>408</td>
<td>85.0</td>
</tr>
<tr>
<td>Improving appearance</td>
<td>392</td>
<td>81.7</td>
</tr>
<tr>
<td>Maintaining a healthy weight</td>
<td>376</td>
<td>78.3</td>
</tr>
<tr>
<td>Losing weight</td>
<td>340</td>
<td>70.8</td>
</tr>
<tr>
<td>Improving fitness</td>
<td>332</td>
<td>69.2</td>
</tr>
<tr>
<td>Increasing strength</td>
<td>323</td>
<td>67.3</td>
</tr>
<tr>
<td>Reducing stress</td>
<td>322</td>
<td>67.1</td>
</tr>
<tr>
<td>Increasing energy</td>
<td>322</td>
<td>67.1</td>
</tr>
<tr>
<td>Improving self-esteem</td>
<td>289</td>
<td>60.2</td>
</tr>
<tr>
<td>Enjoyment/fun</td>
<td>255</td>
<td>53.1</td>
</tr>
<tr>
<td>Doing something active with others</td>
<td>198</td>
<td>41.2</td>
</tr>
<tr>
<td>Meeting new people (socializing)</td>
<td>130</td>
<td>27.1</td>
</tr>
<tr>
<td>Learning a new activity/sport</td>
<td>118</td>
<td>24.6</td>
</tr>
<tr>
<td>Increasing dating opportunities</td>
<td>70</td>
<td>14.6</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>2.5</td>
</tr>
</tbody>
</table>

N = 480; Percents refer to valid percents; Missing values excluded
*Perceived Barriers to Engaging in Vigorous Physical Activity*

Question six on the survey asked participants, “Which of the following do you feel are barriers to you engaging in vigorous physical activity?” Students were instructed to check all that apply from a list of 15 potential barriers plus an option for “Other.” The top reported perceived barriers included: school workload (84.8%), lack of motivation (59.0%), job (55.0%), and lack of sleep (44.8%) (Table 4.6). The least reported barriers were: lack of a place to exercise (7.5%), current health problems (6.9%), other (1.9%), and do not think exercising is important (1.0%).

*Perceived Cues to Engaging in Vigorous Physical Activity*

Question seven on the survey asked participants, “Which of the following do you feel currently motivates you to engage in vigorous physical activity?” Students could select all that applied from a list of 15 potential cues plus an option for “Other.” The top reported cues were: wanting to look physically fit (82.7%), looking at myself in the mirror (56.9%), having an exercise partner (54.6%), and having a friend who exercises (52.1%) (Table 4.7). The least frequently reported cues included: learning how to set up an exercise program (9.0%), other (4.2%), and receiving motivational email reminders to exercise (3.3%).

*Motivational Factors for Engaging in Vigorous Physical Activity*

Question eight of the survey asked participants to check all that applied to, “Which of the following do you feel would help to motivate you to engage in vigorous physical activity?” A list of 24 items, including an option for “Other,” was included. Wanting to look physically fit (68.8%) was the top response, followed by having an exercise partner (68.5%), wanting to
Table 4.6 Perceived Barriers to Engaging in Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>School workload</td>
<td>407</td>
<td>84.8</td>
</tr>
<tr>
<td>Lack of motivation</td>
<td>283</td>
<td>59.0</td>
</tr>
<tr>
<td>Job</td>
<td>264</td>
<td>55.0</td>
</tr>
<tr>
<td>Lack of sleep</td>
<td>215</td>
<td>44.8</td>
</tr>
<tr>
<td>Want to do other things with my time</td>
<td>137</td>
<td>28.5</td>
</tr>
<tr>
<td>No exercise partner</td>
<td>123</td>
<td>25.6</td>
</tr>
<tr>
<td>Inactive friends</td>
<td>86</td>
<td>17.9</td>
</tr>
<tr>
<td>Do not enjoy exercising</td>
<td>84</td>
<td>17.5</td>
</tr>
<tr>
<td>Social invitations/parties</td>
<td>61</td>
<td>12.7</td>
</tr>
<tr>
<td>Too hung over to exercise</td>
<td>58</td>
<td>12.1</td>
</tr>
<tr>
<td>Lack of knowledge about how to exercise/workout</td>
<td>54</td>
<td>11.2</td>
</tr>
<tr>
<td>Embarrassed to exercise with others</td>
<td>40</td>
<td>8.3</td>
</tr>
<tr>
<td>Lack of a place to exercise</td>
<td>36</td>
<td>7.5</td>
</tr>
<tr>
<td>Current health problems</td>
<td>33</td>
<td>6.9</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>1.9</td>
</tr>
<tr>
<td>Do not think exercising is important</td>
<td>5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

N = 480; Percents refer to valid percents; Missing values excluded
increase personal appearance (62.7%), having a friend who exercises (60.6%), and having better
time management skills (50.0%) (Table 4.8). Watching people exercise on television
(10.6%), watching exercise on television (10.2%), receiving motivational email reminders to
exercise (7.3%), and other (2.1%) received the lowest response.

**Hypotheses Testing**

**Null hypothesis 1.** There will be no significant difference in the number of perceived
benefits for vigorous physical activity based on grade level.

Grade levels were collapsed and re-coded into two levels: freshman/sophomore and
junior/senior/graduate student. This was done in order to divide students into lower and
upperclassmen. An analysis of variance (ANOVA) was conducted to determine whether the
number of perceived benefits for engaging in vigorous physical activity differed based on grade
level. Results showed that there was no significant difference in the number of perceived
benefits reported by freshman/sophomore students (\(M = 8.05, SD = 3.101\)) and the number of
perceived benefits reported by junior/senior/graduate students (\(M = 8.22,\)
\(SD = 3.038\)), \(F(1,477) = .260, p = .610\). Therefore, the null hypothesis was not rejected.

**Null hypothesis 2.** There will be no significant difference in the number of perceived
benefits for vigorous physical activity based on sex.

An ANOVA was conducted to determine if the number of perceived benefits for vigorous
physical activity differed based on sex. Results showed that males (\(M = 8.65, SD = 3.187\))
perceived there to be significantly more benefits to engaging in vigorous physical activity than
did females (\(M = 7.82, SD = 2.990\)), \(F(1,478) = 7.920, p = .005\). Therefore, the null hypothesis
was rejected.
### Table 4.7 Perceived Cues to Engaging in Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wanting to look physically fit</td>
</tr>
<tr>
<td>Looking at myself in the mirror</td>
</tr>
<tr>
<td>Having an exercise partner</td>
</tr>
<tr>
<td>Having a friend who exercises</td>
</tr>
<tr>
<td>Seeing spring/summer clothes you would like to buy (i.e., shorts, tank tops, bathing suits)</td>
</tr>
<tr>
<td>Being reminded of the health benefits of physical activity</td>
</tr>
<tr>
<td>Participating in competitive activities or fitness challenges</td>
</tr>
<tr>
<td>Seeing pictures of physically fit people in magazines, TV or Internet</td>
</tr>
<tr>
<td>Reading about exercise in magazines</td>
</tr>
<tr>
<td>Meeting people at recreation/fitness centers</td>
</tr>
<tr>
<td>Having a parent who exercises</td>
</tr>
<tr>
<td>Watching people exercise on television</td>
</tr>
<tr>
<td>Watching exercise on television</td>
</tr>
<tr>
<td>Learning how to set up an exercise program</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Receiving motivational email reminders to exercise</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>397</td>
<td>82.7</td>
</tr>
<tr>
<td>273</td>
<td>56.9</td>
</tr>
<tr>
<td>262</td>
<td>54.6</td>
</tr>
<tr>
<td>250</td>
<td>52.1</td>
</tr>
<tr>
<td>242</td>
<td>50.4</td>
</tr>
<tr>
<td>201</td>
<td>41.9</td>
</tr>
<tr>
<td>138</td>
<td>28.8</td>
</tr>
<tr>
<td>132</td>
<td>27.5</td>
</tr>
<tr>
<td>81</td>
<td>16.9</td>
</tr>
<tr>
<td>71</td>
<td>14.8</td>
</tr>
<tr>
<td>55</td>
<td>11.5</td>
</tr>
<tr>
<td>55</td>
<td>11.5</td>
</tr>
<tr>
<td>43</td>
<td>9.0</td>
</tr>
<tr>
<td>43</td>
<td>9.0</td>
</tr>
<tr>
<td>20</td>
<td>4.2</td>
</tr>
<tr>
<td>16</td>
<td>3.3</td>
</tr>
</tbody>
</table>

N = 480; Percents refer to valid percents; Missing values excluded
### Table 4.8 Motivational Factors for Engaging In Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wanting to look physically fit</td>
<td>330</td>
<td>68.8</td>
</tr>
<tr>
<td>Having an exercise partner</td>
<td>329</td>
<td>68.5</td>
</tr>
<tr>
<td>Wanting to increase personal appearance</td>
<td>301</td>
<td>62.7</td>
</tr>
<tr>
<td>Having a friend who exercises</td>
<td>291</td>
<td>60.6</td>
</tr>
<tr>
<td>Having better time management skills</td>
<td>240</td>
<td>50.0</td>
</tr>
<tr>
<td>Having a personal trainer</td>
<td>231</td>
<td>48.1</td>
</tr>
<tr>
<td>Looking at myself in the mirror</td>
<td>197</td>
<td>41.0</td>
</tr>
<tr>
<td>Having access to a gym/recreation center</td>
<td>186</td>
<td>38.8</td>
</tr>
<tr>
<td>Seeing spring/summer clothes you would like to buy (i.e., shorts, tank tops, bathing suits)</td>
<td>186</td>
<td>38.8</td>
</tr>
<tr>
<td>Being encouraged to exercise by a friend/family member</td>
<td>175</td>
<td>36.5</td>
</tr>
<tr>
<td>Being reminded of the health benefits of physical activity</td>
<td>166</td>
<td>34.6</td>
</tr>
<tr>
<td>Knowing more about how to exercise</td>
<td>131</td>
<td>27.3</td>
</tr>
<tr>
<td>Wanting/planning to participate in competitive/fitness activities</td>
<td>115</td>
<td>24.0</td>
</tr>
<tr>
<td>Being encouraged to exercise by a physician</td>
<td>110</td>
<td>22.9</td>
</tr>
<tr>
<td>Seeing pictures of physically fit people in magazines, TV, or Internet</td>
<td>96</td>
<td>20.0</td>
</tr>
<tr>
<td>Learning how to set up an exercise program</td>
<td>93</td>
<td>19.4</td>
</tr>
<tr>
<td>Having a parent who exercises</td>
<td>89</td>
<td>18.5</td>
</tr>
<tr>
<td>Wanting to increase dating opportunities</td>
<td>75</td>
<td>15.6</td>
</tr>
<tr>
<td>Reading about exercise in magazines</td>
<td>72</td>
<td>15.0</td>
</tr>
<tr>
<td>Wanting to meet people at recreation/fitness centers</td>
<td>63</td>
<td>13.1</td>
</tr>
<tr>
<td>Watching people exercise on television</td>
<td>51</td>
<td>10.6</td>
</tr>
<tr>
<td>Watching exercise on television</td>
<td>49</td>
<td>10.2</td>
</tr>
<tr>
<td>Receiving motivational email reminders to exercise</td>
<td>35</td>
<td>7.3</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>2.1</td>
</tr>
</tbody>
</table>

N = 480; Percents refer to valid percents; Missing values excluded
**Null hypothesis 3.** There will be no significant difference in the number of perceived benefits for vigorous physical activity based on whether students have at least one parent that engages in vigorous physical activity and the number of perceived benefits for vigorous physical activity reported by students who do not have at least one parent that engages in vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived benefits for vigorous physical activity differed based on whether students had at least one parent who engaged in vigorous physical activity. Results showed there to be no significant difference in the number of perceived benefits between those who had at least one parent/guardian who engaged in vigorous physical activity ($M = 8.20, SD = 3.053$) and those who did not have at least one parent/guardian who engaged in vigorous physical activity ($M = 8.01, SD = 3.106$), $F(1,478) = .437, \ p = .509$. Thus, the null hypothesis was not rejected.

**Null hypothesis 4.** There will be no significant difference in the number of perceived benefits for vigorous physical activity based on whether students have at least one parent that encourages vigorous physical activity and the number of perceived benefits for vigorous physical activity reported by students who do not have at least one parent that encourages vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived benefits for vigorous physical activity differed based on whether students had at least one parent that encouraged vigorous physical activity. Results showed that those who had at least one parent who encouraged vigorous physical activity ($M = 8.44, SD = 3.065$) perceived there to be significantly more benefits than those who did not have at least one parent who encouraged vigorous physical activity.
activity ($M = 7.59, SD = 3.039$), $F(1,478) = 8.905$, $p = .003$. Therefore, the null hypothesis was rejected.

**Null Hypothesis 5.** There will be no significant difference in the number of perceived benefits for vigorous physical activity based on whether students have at least one peer that engages in vigorous physical activity and the number of perceived benefits for vigorous physical activity reported by students who do not have at least one peer that engages in vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived benefits for engaging in vigorous physical activity differed based on whether students had at least one peer that encouraged vigorous physical activity. Results indicated that there was no significant difference in the number of perceived benefits between those who had at least one friend who engaged in vigorous physical activity ($M = 8.14, SD = 3.063$) and those who did not have at least one friend who engaged in vigorous physical activity ($M = 7.78, SD = 3.180$), $F(1,477) = .745$, $p = .388$. Thus, the null hypothesis was not rejected.

**Null Hypothesis 6.** There will be no significant difference in the number of perceived benefits for vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the number of perceived benefits for vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

An ANOVA was conducted to determine if number of perceived benefits for engaging in vigorous physical activity differed based on whether students had at least one peer that encouraged vigorous physical activity. The results showed that those who had at least one friend who encouraged vigorous physical activity ($M = 8.45, SD = 3.169$) perceived there to be
significantly more benefits than those who did not have at least one friend who encouraged
vigorous physical activity ($M = 7.51, SD = 2.835$), $F(1,478) = 10.876$, $p = .001$. Thus, the null
hypothesis was rejected.

Null hypothesis 7. There will be no significant difference in the number of perceived
barriers for vigorous physical activity based on grade level.

An ANOVA was conducted to determine if the number of perceived barriers to engaging
in vigorous physical activity differed based on grade level. The results showed that there was no
significant difference in the number of perceived barriers between freshman/sophomore ($M = $
$3.96, SD = 2.084$) and junior/senior/graduate students ($M = 3.92,$
$SD = 1.902$), $F(1,477) = .038$, $p = .846$. Therefore, the null hypothesis was not rejected.

Null hypothesis 8. There will be no significant difference in the number of perceived
barriers for vigorous physical activity based on sex.

An ANOVA was conducted to determine if the number of perceived barriers to engaging
in vigorous physical activity differed based on sex. The results showed that there was no
significant difference in the number of perceived barriers between males ($M = 3.75, SD = 2.094$)
and females ($M = 4.05, SD = 2.000$), $F(1,478) = 2.247$, $p = .135$. Therefore, the null hypothesis
was not rejected.

Null hypothesis 9. There will be no significant difference in the number of perceived
barriers for vigorous physical activity based on whether students have at least one parent that
engages in vigorous physical activity and the number of perceived barriers for vigorous physical
activity reported by students who do not have at least one parent that engages in vigorous
physical activity.
An ANOVA was conducted to determine if the number of perceived barriers to engaging in vigorous physical activity differed based on whether students had at least one parent that engaged in vigorous physical activity. The results showed that there was no significant difference in the number of perceived barriers between those who had at least one parent who engaged in vigorous physical activity ($M = 3.94, SD = 1.971$) and those who did not have at least one parent who engaged in vigorous physical activity ($M = 3.95, SD = 2.093$), $F(1,478) = .004$, $p = .949$. Thus, the null hypothesis was not rejected.

Null hypothesis 10. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on whether students have at least one parent who encourages vigorous physical activity and the number of perceived barriers for vigorous physical activity reported by students who do not have at least one parent who encourages vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived barriers to engaging in vigorous physical activity differed based on whether students had at least one parent who encouraged vigorous physical activity. The results showed that there was no significant difference in the number of perceived barriers between those who had at least one parent who encouraged vigorous physical activity ($M = 3.87, SD = 2.066$) and those who did not have at least one parent who encouraged vigorous physical activity ($M = 4.06, SD = 1.989$), $F(1,478) = 1.021$, $p = .313$. Therefore, the null hypothesis was not rejected.

Null hypothesis 11. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on whether students have at least one peer who engages in vigorous physical activity and the number of perceived barriers for vigorous physical activity reported by students who do not have at least one peer who engages in vigorous physical activity.
activity reported by students who do not have at least one peer that engages in vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived barriers to engagement in vigorous physical activity differed based on whether students had at least one peer who engaged in vigorous physical activity. The results showed that those who had at least one friend who engaged in vigorous physical activity ($M = 3.84, SD = 2.020$) perceived there to be significantly fewer barriers than those who did not have at least one friend who engaged in vigorous physical activity ($M = 4.62, SD = 2.019$), $F(1,477) = 8.110, p = .005$. Thus, the null hypothesis was rejected.

Null hypothesis 12. There will be no significant difference in the number of perceived barriers for vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the number of perceived barriers for vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived barriers to engaging in vigorous physical activity differed based on whether students had at least one peer that encouraged vigorous physical activity. The results showed that there was no significant difference in the number of barriers between those who had at least one friend who encouraged vigorous physical activity ($M = 3.84, SD = 2.081$) and those who did not have at least one friend who encouraged vigorous physical activity ($M = 4.13, SD = 1.949$), $F(1,478) = 2.256, p = .134$. Therefore, the null hypothesis was not rejected.

Null Hypothesis 13. There will be no significant difference in the number of perceived cues to action for vigorous physical activity based on grade level.
An ANOVA was conducted to determine if the number of perceived cues to action for engaging in vigorous physical activity differed based on grade level. The results showed that there was no significant difference in the number of perceived cues to action between freshman/sophomore ($M = 4.84, SD = 2.780$) and junior/senior/graduate students ($M = 4.54, SD = 2.503$), $F(1,477) = 1.140, p = .286$. Therefore, the null hypothesis was not rejected.

*Null hypothesis 14.* There will be no difference in the number of perceived cues for vigorous physical activity based on sex.

An ANOVA was conducted to determine if the number of perceived cues to action for engaging in vigorous physical activity differed based on sex. The results showed that there was no significant difference in the number of perceived cues to action between males ($M = 4.51, SD = 2.769$) and females ($M = 4.89, SD = 2.673$), $F(1,478) = 2.090, p = .149$. Therefore, the null hypothesis was not rejected.

*Null hypothesis 15.* There will be no significant difference in the number of cues for vigorous physical activity based on whether students have at least one parent that engages in vigorous physical activity and the number of cues for vigorous physical activity reported by students who do not have at least one parent that engages in vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived cues to action for engaging in vigorous physical activity differed based on whether students had at least one parent that engaged in vigorous physical activity. The results showed that those who had at least one parent who engaged in vigorous physical activity ($M = 5.13, SD = 2.881$) perceived there to be significantly more cues to action for engaging in vigorous physical activity than those who did not have at least one parent who engaged in vigorous physical activity ($M = 4.45, SD = 2.515$), $F(1,478) = 7.544, p = .006$. Therefore, the null hypothesis was rejected.
Null hypothesis 16. There will be no significant difference in the number of cues for vigorous physical activity based on whether students have at least one parent that encourages vigorous physical activity and the number of cues for vigorous physical activity reported by students who do not have at least one parent that encourages vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived cues for engaging in vigorous physical activity differed based on whether students have at least one parent that encourages vigorous physical activity. The results showed that those who had at least one parent who encouraged vigorous physical activity ($M = 5.11, SD = 2.920$) perceived there to be significantly more cues than those who did not have at least one parent who encouraged vigorous physical activity ($M = 4.25, SD = 2.277$), $F(1,478) = 11.797, p = .001$. Therefore, the null hypothesis was rejected.

Null hypothesis 17. There will be no significant difference in the number of cues for vigorous physical activity based on whether students have at least one peer that engages in vigorous physical activity and the number of cues for vigorous physical activity reported by students who do not have at least one peer that engages in vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived cues for engaging in vigorous physical activity differed based on whether students have at least one peer that engages in vigorous physical activity. The results showed that those who had at least one friend who engaged in vigorous physical activity ($M = 4.88, SD = 2.728$) perceived there to be significantly more cues than those who did not have at least one friend who engaged in vigorous physical activity ($M = 3.86, SD = 2.306$), $F(1,477) = 8.061, p = .005$. Thus, the null hypothesis was rejected.
Null hypothesis 18. There will be no significant difference in the number of cues for vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the number of cues for vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

An ANOVA was conducted to determine if the number of perceived cues for engaging in vigorous physical activity differed based on whether students have at least one peer that encourages vigorous physical activity. The results showed that those who had at least one friend who encouraged vigorous physical activity (\(M = 5.21, SD = 2.950\)) perceived there to be significantly more cues than those who did not have at least one friend who encouraged vigorous physical activity (\(M = 4.02, SD = 2.055\), \(F(1,478) = 22.472, p = <.001\). Therefore, the null hypothesis was rejected.

Null Hypothesis 19. There will be no significant difference in the extent of involvement in vigorous physical activity based on grade level.

An ANOVA was conducted to determine if the extent of involvement in vigorous physical activity differed based on grade level. The results showed that there was no significant difference in the extent of involvement in vigorous physical activity between freshman/sophomore (\(M = 2.34, SD = 1.878\)) and junior/senior/graduate students (\(M = 2.35, SD = 1.912\), \(F(1,474) = .001, p = .972\). Therefore, the null hypothesis was not rejected.

Null hypothesis 20. There will be no significant difference in the extent of involvement in vigorous physical activity based on sex.

An ANOVA was conducted to determine if the extent of involvement in vigorous physical activity differed based on sex. Results showed males reported a significantly higher level of involvement in vigorous physical activity (\(M = 2.93, SD = 1.922\)) than did females.
Results and Discussion

(M = 2.05, SD = 1.794), F(1,475) = 24.327, p = <.001  Thus, the null hypothesis was rejected.

**Null hypothesis 21.** There will be no significant difference in the extent of involvement in vigorous physical activity based on whether students have at least one parent that engages in vigorous physical activity and the extent of involvement in vigorous physical activity reported by students who do not have at least one parent that engages in vigorous physical activity.

An ANOVA was conducted to determine if the extent of involvement in vigorous physical activity differed based on whether students had at least one parent that engaged in vigorous physical activity. The results showed that those who had at least one parent who engaged in vigorous physical activity (M = 2.56, SD = 1.867) reported a significantly higher extent of involvement than those who did not have at least one parent who engaged in vigorous physical activity (M = 2.16, SD = 1.881), F(1,475) = 5.240, p = .023. Therefore, the null hypothesis was rejected.

**Null hypothesis 22.** There will be no significant difference in the extent of involvement in vigorous physical activity based on whether students have at least one parent that encourages vigorous physical activity and the extent of involvement in vigorous physical activity reported by students who do not have at least one parent that encourages vigorous physical activity.

An ANOVA was conducted to determine if the extent of involvement in vigorous physical activity differed based on whether students had at least one parent that encouraged vigorous physical activity. The results showed that those who had at least one parent who encouraged vigorous physical activity (M = 2.69, SD = 1.907) reported a significantly higher extent of involvement than those who did not have at least one parent who encouraged vigorous physical activity (M = 1.83, SD = 1.730) F(1,475)= 29.940, p = <.001. Thus, the null hypothesis was rejected.
Null hypothesis 23. There will be no significant difference in the extent of involvement in vigorous physical activity based on whether students have at least one peer that engages in vigorous physical activity and the extent of involvement in vigorous physical activity reported by students who do not have at least one peer that engages in vigorous physical activity.

An ANOVA was conducted to determine if the extent of involvement in vigorous physical activity differed based on whether students had at least one peer that engaged in vigorous physical activity. The results showed that those who had at least one friend who engaged in vigorous physical activity ($M = 2.52, SD = 1.862$) reported a significantly higher extent of involvement than those who did not have at least one friend who engaged in vigorous physical activity ($M = 1.11, SD = 1.527$), $F(1,474) = 32.241, p = <.001$. Therefore, the null hypothesis was rejected.

Null hypothesis 24. There will be no significant difference in the extent of involvement in vigorous physical activity based on whether students have at least one peer that encourages vigorous physical activity and the extent of involvement in vigorous physical activity reported by students who do not have at least one peer that encourages vigorous physical activity.

An ANOVA was conducted to determine if the extent of involvement in vigorous physical activity differed based on whether students had at least one peer that encouraged vigorous physical activity. The results showed that those who had at least one friend who encouraged vigorous physical activity ($M = 2.62, SD = 1.905$) reported a significantly higher extent of involvement than those who did not have at least one friend who encouraged vigorous physical activity ($M = 1.88, SD = 1.756$), $F(1,475) = 17.468, p = <.001$. Therefore, the null hypothesis was rejected.
Null hypothesis 25. There will be no difference in the extent of involvement in vigorous physical activity based on the number of perceived benefits to engaging in vigorous physical activity.

A Pearson correlation was conducted to determine whether involvement in vigorous physical activity differed based on the number of perceived benefits to engaging in vigorous physical activity. Results indicated a significant positive correlation between involvement in vigorous physical activity and number of perceived benefits to engaging in vigorous physical activity, \( r = .305, p < .001 \). Therefore, the null hypothesis was rejected.

Null hypothesis 26. There will be no difference in the extent of involvement in vigorous physical activity based on the number of perceived barriers to engaging in vigorous physical activity.

A Pearson correlation was conducted to determine whether involvement in vigorous physical activity differed based on the number of perceived barriers to engaging in vigorous physical activity. Results indicated a significant negative correlation between involvement in vigorous physical activity and the number of perceived barriers to engaging in vigorous physical activity, \( r = .097, p = .033 \). Therefore, the null hypothesis was rejected.

Null hypothesis 27. There will be no difference in the extent of involvement in vigorous physical activity based on the number of perceived cues for engaging in vigorous physical activity.

A Pearson correlation was conducted to determine whether involvement in vigorous physical activity differed based on the number of perceived cues to engaging in vigorous physical activity. Results indicated a significant positive correlation between involvement in
Results and Discussion

vigorous physical activity and number of perceived cues to engaging in vigorous physical activity, \( r = .094, p = .039 \). Therefore, the null hypothesis was rejected.

Discussion

A total of 480 students completed a survey regarding their perceived benefits, barriers, cues to action, and involvement in physical activity. Participants of this study were enrolled in a variety of general education courses at a Midwestern university. The majority of participants were white (82.2%), over half were female (66.0%), and about half were freshmen (51.4%). Nearly three-fourths of participants were on athletic teams in high school, however most were not members of a university athletic team. The majority of participants also reported that they were not members of a fraternity/sorority.

Nearly half (46%) of participants reported having at least one parent who engaged in vigorous physical activity, and the majority (86%) reported having at least one friend who engaged in vigorous physical activity. The majority of students reported having at least one parent (60.0%) and at least one friend (62.5%) who encouraged vigorous physical activity.

Of the physical activities assessed on the survey, students reported the highest level of involvement in moderate physical activity, averaging about 4 days a week. They reported an average of about 2 days a week of vigorous physical activity and nearly 1.5 days of strength training per week. The top three activities in which students participated were: jogging/running, brisk walking, and free weights. The bottom three activities in which students participated included: jumping rope, kickboxing, and spinning class.

Improving health, improving appearance, and maintaining a healthy weight were reported as the top three perceived benefits to engaging in vigorous physical activity. The least reported
benefits included: meeting new people/socializing, learning a new activity/sport, increasing
dating opportunities, and other. The most commonly perceived barriers to engaging in vigorous
physical activity were: school workload, lack of motivation, jobs, and lack of sleep. The most
commonly perceived cues to engaging in vigorous physical activity included: wanting to look
physically fit, looking in the mirror, having an exercise partner, and having a friend who
exercises. Similarly, the top motivational factors for engaging in vigorous exercise included:
wanting to look physically fit, having an exercise partner, wanting to increase personal
appearance, having a friend who exercises, and having better time management skills.

This study included 27 hypotheses which examined four dependent variables: number of
perceived benefits, barriers, and cues to and extent of involvement in vigorous physical activity.
There were six independent variables that were considered: grade level, sex, parent engagement
in and encouragement of vigorous physical activity, and peer engagement in and encouragement
of vigorous physical activity.

Results showed that the number of perceived benefits did not differ based on grade level,
parental engagement in vigorous physical activity or peer engagement in vigorous physical
activity. The results did show significant differences in the number of perceived benefits for
engaging in vigorous physical activity based on sex, with males perceiving there to be more
benefits than females (Table 4.9). In addition, those who had at least one parent and those who
had at least one friend who encouraged vigorous physical activity perceived there to be
significantly more benefits to engaging in vigorous physical activity.

Peer engagement in vigorous physical activity had the only significant effect on the
number of perceived barriers to engaging in vigorous physical activity (Table 4.10). Results
showed that those who had at least one friend who engaged in vigorous physical activity
Table 4.9 Number of Perceived Benefits to Engaging in Vigorous Physical Activity Based on Sex, Grade, and Parent/Peer Involvement in and Encouragement of Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>n</th>
<th>Number of Perceived Benefits</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td></td>
<td>$M (SD)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>162</td>
<td>8.65 (3.187)</td>
<td>7.920</td>
<td>.005</td>
</tr>
<tr>
<td>Female</td>
<td>318</td>
<td>7.82 (2.990)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman/Sophomore</td>
<td>355</td>
<td>8.05 (3.101)</td>
<td>.260</td>
<td>.610</td>
</tr>
<tr>
<td>Junior/Senior/Grad</td>
<td>124</td>
<td>8.22 (3.038)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent Involvement in VPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>222</td>
<td>8.20 (3.053)</td>
<td>.437</td>
<td>.509</td>
</tr>
<tr>
<td>No</td>
<td>258</td>
<td>8.01 (3.106)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent Encouragement of VPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>286</td>
<td>8.44 (3.065)</td>
<td>8.905</td>
<td>.003</td>
</tr>
<tr>
<td>No</td>
<td>194</td>
<td>7.59 (3.039)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Involvement in VPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>416</td>
<td>8.14 (3.063)</td>
<td>.745</td>
<td>.388</td>
</tr>
<tr>
<td>No</td>
<td>63</td>
<td>7.78 (3.180)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer Encouragement of VPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>300</td>
<td>8.45 (3.169)</td>
<td>10.876</td>
<td>.001</td>
</tr>
<tr>
<td>No</td>
<td>180</td>
<td>7.51 (2.835)</td>
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</tr>
</tbody>
</table>

Note: Number of perceived benefits ranged from 0-15, $M = 8.10$, $SD = 3.079$
Table 4.10  Number of Perceived Barriers to Engaging in Vigorous Physical Activity Based on Sex, Grade, and Parent/Peer Involvement in and Encouragement of Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>n</th>
<th>Number of Perceived Barriers</th>
<th>F</th>
<th>p</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>M (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>162</td>
<td>3.75 (2.094)</td>
<td>2.247</td>
<td>.135</td>
</tr>
<tr>
<td>Female</td>
<td>318</td>
<td>4.05 (2.000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman/Sophomore</td>
<td>355</td>
<td>3.96 (2.084)</td>
<td>.038</td>
<td>.846</td>
</tr>
<tr>
<td>Junior/Senior/Grad</td>
<td>124</td>
<td>3.92 (1.902)</td>
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<td></td>
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<tr>
<td>Parent Involvement in VPA</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>222</td>
<td>3.94 (1.971)</td>
<td>.004</td>
<td>.949</td>
</tr>
<tr>
<td>No</td>
<td>258</td>
<td>3.95 (2.093)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent Encouragement of VPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>286</td>
<td>3.87 (2.066)</td>
<td>1.021</td>
<td>.313</td>
</tr>
<tr>
<td>No</td>
<td>194</td>
<td>4.06 (1.989)</td>
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<tr>
<td>Peer Involvement in VPA</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>416</td>
<td>3.84 (2.020)</td>
<td>8.110</td>
<td>.005</td>
</tr>
<tr>
<td>No</td>
<td>63</td>
<td>4.62 (2.019)</td>
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<td>Peer Encouragement of VPA</td>
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<td>300</td>
<td>3.84 (2.081)</td>
<td>2.256</td>
<td>.134</td>
</tr>
<tr>
<td>No</td>
<td>180</td>
<td>4.13 (1.949)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:  Number of perceived barriers ranged from 0-16, $M = 3.95$, $SD = 2.035$
Results and Discussion

perceived there to be significantly fewer barriers to engaging in vigorous physical activity. Results showed that the number of perceived barriers did not differ based on: grade level, sex, parent engagement in vigorous physical activity, parent encouragement of vigorous physical activity, or peer encouragement of vigorous physical activity.

Parent engagement in and encouragement of vigorous physical activity and peer engagement in and encouragement of vigorous physical activity all had significant positive effects on the number of perceived cues to engaging in vigorous physical activity (Table 4.11). The number of perceived cues did not differ based on grade level or sex. Results showed that sex, parent engagement in and encouragement of, and peer engagement in and encouragement of vigorous physical activity all had a significant effect on the extent of involvement in vigorous physical activity (Table 4.12). Males had a higher extent of involvement than did females. Having parent engagement in and encouragement of and peer engagement in and encouragement of vigorous physical activity all resulted in a significantly higher extent of involvement in vigorous physical activity.

Finally, results showed significant correlations between the number of benefits, barriers, and cues to vigorous physical activity and the extent of involvement in vigorous physical activity. The more perceived benefits and cues there were to engaging in vigorous physical activity, the higher the extent of involvement there was in vigorous physical activity. Likewise, the more perceived barriers there were to engaging in vigorous physical activity, the lower the extent of involvement there was in vigorous physical activity.
Table 4.11  Number of Perceived Cues to Engaging in Vigorous Physical Activity Based on Sex, Grade, and Parent/Peer Involvement in and Encouragement of Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>n</th>
<th>Number of Perceived Cues $M (SD)$</th>
<th>$F$</th>
<th>$p$</th>
</tr>
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<td>Sex</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Male</td>
<td>162</td>
<td>4.51 (2.769)</td>
<td>2.090</td>
<td>.149</td>
</tr>
<tr>
<td>Female</td>
<td>318</td>
<td>4.89 (2.673)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman/Sophomore</td>
<td>355</td>
<td>4.84 (2.780)</td>
<td>1.140</td>
<td>.286</td>
</tr>
<tr>
<td>Junior/Senior/Grad</td>
<td>124</td>
<td>4.54 (2.503)</td>
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<tr>
<td>Parent Involvement in VPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>222</td>
<td>5.13 (2.881)</td>
<td>7.544</td>
<td>.006</td>
</tr>
<tr>
<td>No</td>
<td>258</td>
<td>4.45 (2.515)</td>
<td></td>
<td></td>
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<tr>
<td>Parent Encouragement of VPA</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>286</td>
<td>5.11 (2.920)</td>
<td>11.797</td>
<td>.001</td>
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<td>No</td>
<td>194</td>
<td>4.25 (2.277)</td>
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<td>Peer Involvement in VPA</td>
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<tr>
<td>Yes</td>
<td>416</td>
<td>4.88 (2.728)</td>
<td>8.061</td>
<td>.005</td>
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<tr>
<td>No</td>
<td>63</td>
<td>3.86 (2.306)</td>
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<td>Peer Encouragement of VPA</td>
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</tr>
<tr>
<td>Yes</td>
<td>300</td>
<td>5.21 (2.950)</td>
<td>22.472</td>
<td>&lt;.001</td>
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</table>
Table 4.12  Extent of Involvement in Vigorous Physical Activity Based on Sex, Grade, and Parent/Peer Involvement in and Encouragement of Vigorous Physical Activity

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>n</th>
<th>Number of Perceived Cues $M (SD)$</th>
<th>$F$</th>
<th>$p$</th>
</tr>
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<tr>
<td><strong>Sex</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>161</td>
<td>2.93 (1.922)</td>
<td>24.327</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Female</td>
<td>316</td>
<td>4.89 (2.673)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman/Sophomore</td>
<td>353</td>
<td>2.34 (1.878)</td>
<td>.001</td>
<td>.972</td>
</tr>
<tr>
<td>Junior/Senior/Grad</td>
<td>123</td>
<td>2.35 (1.912)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parent Involvement in VPA</strong></td>
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<tr>
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<td>219</td>
<td>2.56 (1.867)</td>
<td>5.240</td>
<td>.006</td>
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<tr>
<td>No</td>
<td>258</td>
<td>2.16 (1.881)</td>
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<tr>
<td><strong>Parent Encouragement of VPA</strong></td>
<td></td>
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<tr>
<td>Yes</td>
<td>284</td>
<td>2.69 (1.907)</td>
<td>24.940</td>
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<tr>
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<td>193</td>
<td>1.83 (1.730)</td>
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<td><strong>Peer Involvement in VPA</strong></td>
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<td>414</td>
<td>2.52 (1.862)</td>
<td>32.241</td>
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<td>62</td>
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<td>300</td>
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<td>17.568</td>
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<tr>
<td>No</td>
<td>177</td>
<td>1.88 (1.756)</td>
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Note: Number of perceived cues ranged from 0-16, $M = 4.76$, $SD = 2.709$
Chapter Five

Conclusions and Recommendations

Obesity has reached epidemic proportions in the United States over the last twenty years. The growing number of individuals who are overweight and obese is of major concern due to the associated health risks. Obesity is associated with increased risk for Type II diabetes, heart disease, stroke, and some cancers. Individuals who are obese often face mental, emotional, and social challenges such as: depression, anxiety, low self-esteem, and lack of acceptance. In addition to the health consequences, there are also economic repercussions. Rising health care costs have put a major strain on employers, employees and tax payers alike.

In an effort to improve health and decrease costs, a wide array of obesity prevention efforts have been undertaken. Several strategies have been identified as being effective in combating obesity. One main strategy is regular involvement in physical activity. Despite the known and widespread health benefits of physical activity, most Americans do not engage in an adequate amount of physical activity. In addition, US college students have shown low levels of regular physical activity.

Following a comprehensive review of the literature, no published study was found that examined college students’ perceptions of and involvement in vigorous physical activity based on the Health Belief Model’s (HBM) constructs of perceived benefits, barriers, and cues to action. Therefore, the purpose of this study was to examine college students’ perceived benefits, barriers, cues to action, and extent of involvement in vigorous physical activity. Analyses were also conducted to examine whether benefits, barriers, cues, and vigorous physical activity involvement differed significantly based on: sex, grade level, parental exercise patterns, parental encouragement, peer exercise patterns, and peer encouragement. The HBM suggests that
perceived benefits, barriers, and cues help to predict specific behaviors. Thus, this study examined the relationship between the number of perceived benefits, barriers, and cues to action and involvement in vigorous physical activity. Chapter one discussed the research questions, hypotheses, delimitations, limitations, assumptions, and operational definitions. Chapter two provided a comprehensive review of the literature; and Chapter three discussed the participants, instrumentation, procedures, and data analysis. Chapter four provided the results of this study. This chapter presents the conclusions, discusses the findings, and provides recommendations for the field and for future research.

Conclusions

A total of 480 college students were surveyed regarding their perceptions of and involvement in vigorous physical activity. Students were enrolled in general education classes during the 2009 fall and spring quarters at a Midwestern university. The majority of participants were white (82.2%), over half were female (66.0%), and about half were freshmen (51.4%). Nearly three-fourths of participants were on athletic teams in high school, however most were not members of a university athletic team. The majority of participants also reported that they were not members of a fraternity/sorority.

When examining the extent of involvement in vigorous physical activity, the participants in this study reported an overall low level of involvement. The present study found that the majority of the college students surveyed (56%) engaged in two or fewer days of vigorous physical activity during an average week, with males reporting higher involvement than females. Additionally, results of this study indicated that parent engagement in and encouragement of
vigorous physical activity and peer engagement in and encouragement of vigorous physical activity was associated with increased student involvement in vigorous physical activity.

The present study also found that males perceived there to be more benefits to engaging in vigorous physical activity than did females, thus showing that sex was significantly associated with the number of perceived benefits. Results also showed that those who had at least one parent and those who had at least one friend who encouraged vigorous physical activity perceived there to be significantly more benefits to engaging in vigorous physical activity.

Upon examining perceived barriers to engaging in vigorous physical activity, the present study found that peer engagement in vigorous physical activity was the only variable assessed that was significantly associated with the number of perceived barriers. Results showed that those who had at least one friend who engaged in vigorous physical activity perceived there to be significantly fewer barriers to engaging in vigorous physical activity.

The present study also examined perceived cues to engaging in vigorous physical activity and found that the number of perceived cues significantly differed based on four of the six independent variables. The number of perceived cues was greater for students who reported having: parental engagement, parental encouragement, peer engagement, and peer encouragement in regards to vigorous physical activity involvement.

Finally, results showed significant correlations between the number of perceived benefits, barriers, and cues to vigorous physical activity and the extent of involvement in vigorous physical activity. The more perceived benefits and cues there were to engaging in vigorous physical activity, the higher the extent of involvement; likewise, the more perceived barriers there were to engaging in vigorous physical activity, the lower the extent of involvement there
was in vigorous physical activity. These findings support the HBM, which suggests that perceived benefits, barriers, and cues help to predict specific behaviors.

**Discussion**

Physical inactivity is a significant problem in the United States. The present study found that of the college students surveyed, 56% engaged in two or fewer days of vigorous physical activity a week. Results also indicated that 70% engaged in three or more days of moderate physical activity, and 60% of the participants engaged in strength training fewer than two days a week. These findings concur with those of other studies in showing that college students tend to be insufficiently active (ACHA, 2008; Bridges, Guan, Keating, and Pinero, 2005). Such findings are particularly important because exercise behaviors during college are strong predictors of exercise behaviors post-college (Snow & Sparling, 2002). If students are inactive in college it is likely that they will be just as (if not more) inactive post-college, placing them at increased risk for obesity and related health problems.

Although the present study’s hypotheses strictly examined vigorous physical activity involvement, it is worth noting that the majority of participants did report moderate activity involvement. On average, participants reported engaging in moderate physical activity four days in a typical week. These results could be related to how participants interpreted the definition for moderate physical activity. It is suspected that many students likely counted walking across campus to and from classes as part of their moderate activity involvement, thus suggesting that it might be beneficial to further examine the criteria by which students are determining their involvement in moderate physical activity. Furthermore, if the results regarding moderate
activity involvement are accurate, then it suggests that opportunities are needed to move students from moderate activity to vigorous activity involvement.

Results showed that involvement in vigorous physical activity differed significantly based on sex, parent engagement in and encouragement of vigorous physical activity, and peer engagement in and encouragement of vigorous physical activity. The present study did not find a significant difference in vigorous physical activity involvement based on grade level. These findings differ from Bridges et al (2005) study which found that physical activity patterns of college students declined during their four years at school. One possible explanation for this difference is that the sample of the present study was largely comprised of underclassmen with 51% of participants self-reporting as freshmen. Thus, additional research in this area is warranted.

In examining perceived benefits to engaging in vigorous physical activity, the present study found that males perceived there to be significantly more benefits than did females. Other studies did not report a difference in the number of perceived benefits between males and females; however, it has been suggested that the types of benefits differed between the sexes (Leenders, Sherman, & Ward, 2003). The present study found that the participants’ top three perceived benefits to engaging in vigorous physical activity were: improving health (85%), improving appearance (81.7%) and maintaining a healthy weight (78.3%). The bottom three perceived benefits were: learning a new activity/sport (24.6%), increasing dating opportunities (14.6%), and other (2.5%). These differ slightly from previous findings which showed that improving appearance was the main benefit associated with exercising (Bridges, et al., 2005).

Another study reported that college students perceived learning a new activity, enjoyment/fun, and reducing stress as other benefits to exercising (Leenders, Sherman, & Ward,
While the present study found that reducing stress was a perceived benefit for 67% of participants, only 53% reported enjoyment/fun as a perceived benefit. In addition, learning a new activity/sport was in the bottom three, with only 24.6% perceiving that to be a benefit to engaging in vigorous physical activity. One possible reason for these differences could be that the present study specifically examined vigorous activity, whereas previous studies just examined exercising in general. It could be that vigorous activity is perceived to be less enjoyable/recreational than moderate activity.

The present study also examined perceived barriers to engaging in vigorous physical activity and found the top three barriers to be: school workload (84.8%), job (65.0%) and lack of motivation (59.0%). Bray, Brittain, & Gyurscik (2004) found similar results and cited lack of sleep, wanting to relax, lack of training partners, inactive friends, and social invitations as barriers to exercise. These issues were all identified as perceived barriers in the present study as well. Interestingly, of all the variables assessed, the present study found that the number of perceived barriers to engaging in vigorous physical activity differed only by peer engagement in vigorous physical activity. This result is worth noting since the HBM suggests that perceived benefits, barriers, and cues are important factors in predicting specific behaviors. Ebert et al. (2003) reported that perceived barriers have the most significant negative impact on college students’ health behaviors. The existence of such barriers lends itself to critical implications for future intervention strategies, especially since three previous programs did not implement strategies to specifically target barriers, and two of them yielded insignificant results regarding increasing college students’ physical activity (Alcaraz, et al., 1999, Buckworth, 2001, & Leslie, et al., 2001). Future programs should consider how to effectively overcome such barriers as a means to increase physical activity involvement.
While the professional literature is somewhat lacking in information regarding perceived cues to engaging in physical activity, the present study found four variables that were significantly associated with the number of perceived cues to engaging in vigorous physical activity. The number of perceived cues was significantly higher for those who had: parental and peer engagement in and encouragement of vigorous physical activity. The top perceived cues were: wanting to look physically fit, looking at myself in the mirror, having an exercise partner, and having a friend who exercises. The lowest perceived cues were: watching exercise on television, learning how to set up an exercise program, and other. Receiving motivational email reminders to exercise was the lowest ranked perceived cue. Not surprisingly, in one previous study that utilized emails and phone calls as follow-up strategies for 18 months, study results indicated that the program did not have significant long-term effects on physical activity behaviors (Alcaraz, et al., 1999).

In addition to examining college students’ perceived benefits, barriers, and cues to engaging in vigorous physical activity, the present study also examined the relationship between the number of perceived benefits, barriers, and cues to action and involvement in vigorous physical activity. The results indicated that a higher number of perceived benefits and cues was associated with higher vigorous physical activity involvement; whereas a higher number of perceived barriers was associated with lower vigorous physical activity involvement. One of the main critiques of previous studies regarding physical activity among college students has involved the use of weak intervention designs (Bridges et al., 2005). Bridges and colleagues (2005) stated that the primary theoretical frameworks mentioned in previous studies are the Social cognitive theory and the Transtheoretical model. Based on such critiques and the present study’s findings, it may be beneficial to use the HBM to help design future interventions.
Recommendations

Recommendations for practice. When considering strategies to increase vigorous physical activity involvement, individuals should consider the findings of the present study. This study indicated that the number of perceived benefits, barriers, and cues help predict the extent of involvement in vigorous physical activity. Furthermore, participants of this study reported that parent and peer encouragement of and engagement in vigorous physical activity were significantly associated with the number of perceived cues to vigorous physical and frequency of involvement vigorous physical activity. Additionally, parent and peer encouragement of vigorous physical activity were significantly associated with the number of perceived benefits to vigorous physical activity. In addition, the number of perceived barriers differed significantly based on peer engagement in vigorous physical activity.

These results indicate that parent/peer involvement and social support are important factors to consider when designing intervention strategies for increasing college students’ involvement in vigorous physical activity. Since college students likely spend more time among their peers due to living away from home and attending classes on campus, it may be more feasible to initially focus on this factor when designing programs. Furthermore, the present study and previous studies alike found that involvement in vigorous physical activity was inversely related to the number of perceived barriers. However, this study indicated that students who had peers who engaged in vigorous physical activity had significantly fewer barriers to vigorous physical activity than their counterparts. Thus, including peer support in future programs and interventions is recommended.

Recommendations for improving this research. One recommendation for improving this research study would be to obtain a sample that contained equal numbers of students in each
grade level. Such a stratified sampling procedure could allow for a more diverse and representative sample of the college population at large.

It also may be helpful to modify the benefits, barriers and cues sections of the survey, by providing scaled response options as opposed to the check all that apply format that was used. Future studies may seek to use such a scaled response option as a means to obtain parametric data with means and standard deviations that could be used to compare perceived strength and importance of each of the individual items. This may provide more insight as to whether it is the number of benefits and barriers that is important in predicting behavior or if the strength or importance of individual benefits and barriers has more effect on physical activity behaviors. It is possible that one or two really important benefits could move students to engage in vigorous physical activity. It is also possible that one extremely strong barrier could be enough to deter students from engaging in vigorous physical activity, regardless of the number of benefits.

**Recommendations for future research.** More studies clearly need to be conducted on vigorous physical activity among college students. This study obtained data from a sample of college students at a Midwestern university, which thus may limit the ability to generalize the results to students at other universities. Replication studies should be conducted in universities in different geographical areas to determine whether similar results are found.

The present study found the HBM to be beneficial in exploring student perceptions of and involvement in vigorous physical activity. Future studies should consider employing this model in evaluating the effectiveness of physical activity promotion programs and interventions. Evaluations are needed to identify strategies that assist in increasing the number of benefits and cues to activity while decreasing the number barriers.
In addition, future research should examine whether students’ perceived benefits, barriers and cues to moderate physical activity are similar to those found in this study which assessed vigorous physical activity. Similarly, studies are needed to assess students’ perceived willingness to engage in certain activities and levels of activities. Perhaps students who are not currently active are more willing to begin moderate types of activities as opposed to vigorous types of activities. Research is needed to more fully explore these issues.

Future research should also consider strategies for ensuring consistency among data collection and reporting measures for physical activity. One challenge associated with physical activity research is the inability to compare results of different studies. The literature found that this was in part due to the fact that inconsistent and subjective measures of physical activity have been used (Bridges et al., 2005).

Finally, future studies should continue to examine participants’ understanding of the physical activity guidelines and develop strategies for more effectively communicating that information so that individuals can apply it appropriately. The research regarding physical activity and the recommended amounts needed for health benefits have evolved in the last ten years. While experts have continued to provide new information in an effort to promote physical activity and quality health, there is still a great deal of confusion among the general population regarding sufficient physical activity levels. A multitude of strategies should be employed in order to educate individuals and to effectively communicate clear health messages to the public.


APPENDIX A

SURVEY INSTRUMENT
STUDENT SURVEY

Directions: Please answer the following questions honestly. Your responses will be kept anonymous and private. By completing this survey, you are granting your consent to participate in this study.

PLEASE NOTE:
Vigorous Physical Activity is defined as any activity that is performed for at least 20 minutes that causes one to breathe hard and sweat. Some examples are jogging, running, spinning, kickboxing, and weight training.

Moderate Physical Activity is defined as any activity performed for at least 30 minutes that does not cause one to breathe hard and sweat. Some examples are walking, rollerblading, and leisurely riding a bike.

Strength Training is defined as any activity performed for at least 20 minutes that works the major muscle groups (back, chest, legs, shoulders, arms) by using free weights, weight machines, or doing body sculpting classes. Some examples are squats, lunges, lat pull-downs, bench presses, and shoulder presses.

INVOLVEMENT IN PHYSICAL ACTIVITY

1. During an average week, on how many days do you participate in vigorous physical activity? ___ days

2. During an average week, on how many days do you participate in moderate physical activity? ___ days

3. During an average week, on how many days do you participate in strength training? ___ days

4. In the past 30 days, which of the following activities did you perform? (Please check all that apply.)
   - Jogging/running
   - Brisk walking
   - Jumping rope
   - Step aerobics
   - Yoga
   - Kickboxing
   - Elliptical machine
   - Pilates
   - Spinning class
   - Exercise bike
   - Free Weights
   - Other (specify)____________________
   - Row machine
   - Weight machines

BENEFITS AND BARRIERS TO PHYSICAL ACTIVITY

5. Which of the following do you feel are benefits to engaging in vigorous physical activity? (Please check all that apply.)
   - Improving appearance
   - Enjoyment/fun
   - Learning a new activity/sport
   - Losing weight
   - Reducing stress
   - Doing something active with others
   - Maintaining a healthy weight
   - Improving fitness
   - Meeting new people (socializing)
   - Improving health
   - Improving self-esteem
   - Increasing dating opportunities
   - Increasing energy
   - Other (specify)_____________________

6. Which of the following do you feel are barriers to engaging in vigorous physical activity? (Please check all that apply.)
   - School workload
   - No exercise partner
   - Lack of knowledge about how to exercise/workout
   - Job
   - Inactive friends
   - Do not enjoy exercising
   - Lack of motivation
   - Lack of a place to exercise
   - Do not think exercising is important
   - Lack of sleep
   - Social invitations/parties
   - Embarrassed to exercise with others
   - Current health problems
   - Too hung over to exercise
   - Want to do other things with my time
   - Other (specify)_____________________

7. Which of the following motivates you to engage in vigorous physical activity? (Please check all that apply.)
   - Having an exercise partner
   - Learning how to set up an exercise program
   - Having a friend who exercises
   - Participating in competitive activities or fitness challenges
   - Having a parent who exercises
   - Receiving motivational email reminders to exercise
   - Watching people exercise on television
   - Seeing pictures of physically fit people in magazines, TV or Internet
   - Looking at myself in the mirror
   - Being reminded of the health benefits of physical activity
   - Watching exercise on television
   - Seeing spring/summer clothes you would like to buy (i.e., shorts, tank tops, bathing suits)
   - Reading about exercise in magazines
   - Meeting people at recreation/fitness centers
   - Wanting to look physically fit
   - Other (specify)_____________________

*** PLEASE TURN OVER TO SIDE 2 ***
MOTIVATIONAL FACTORS TO PHYSICAL ACTIVITY

8. Which of the following do you feel would help motivate you to engage in vigorous physical activity? (Check all that apply.)

- ___ Having an exercise partner
- ___ Having a friend who exercises
- ___ Having a parent who exercises
- ___ Watching people exercise on television
- ___ Looking at myself in the mirror
- ___ Reading about exercise in magazines
- ___ Wanting to look physically fit
- ___ Knowing more about how to exercise
- ___ Having access to a gym/recreation center
- ___ Having a personal trainer
- ___ Having better time management skills
- ___ Learning how to set up an exercise program
- ___ Wanting/planning to participate in competitive/fitness activities
- ___ Receiving motivational email reminders to exercise
- ___ Seeing pictures of physically fit people in magazines, TV or Internet
- ___ Being reminded of the health benefits of physical activity
- ___ Seeing spring/summer clothes you would like to buy (i.e., shorts, tank tops, bathing suits)
- ___ Wanting to increase personal appearance
- ___ Wanting to meet people at recreation/fitness centers
- ___ Wanting to increase dating opportunities
- ___ Being encouraged to exercise by a friend/family member
- ___ Being encouraged to exercise by a physician
- ___ Other (specify) __________

ABOUT YOU

9. What is your sex?  ___ Male  ___ Female

10. What is your age?  ___ years

11. What is your height?  ___ inches

12. What is your weight?  ___ pounds

13. What is your grade level in school?  ___ Freshman  ___ Sophomore  ___ Junior  ___ Senior  ___ Graduate student

14. Were you on an athletic team in high school?  ___ Yes  ___ No

15. Are/were you on a university team during the 2008-2009 school year?  ___ Yes  ___ No

16. Are you currently a member of a campus fraternity/sorority?  ___ Yes  ___ No

17. Do you have at least one parent/guardian who engages in vigorous physical activity for at least 20 minutes 3 or more times a week?  ___ Yes  ___ No

18. Do you have at least one friend who engages in vigorous physical activity for at least 20 minutes 3 or more times a week?  ___ Yes  ___ No

19. Do you have at least one parent/guardian who encourages you to engage in vigorous physical activity?  ___ Yes  ___ No

20. Do you have at least one friend who encourages you to engage in vigorous physical activity?  ___ Yes  ___ No

21. What is your race/ethnicity?  ___ African American  ___ Multi-racial  ___ Asian  ___ White  ___ Hispanic  ___ Other (please list) ___________________

THANK YOU 😊