January 2018

The Link between Overweight, Obesity, and Perceived Exercise Benefits and Barriers among College Students

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THE LINK BETWEEN OVERWEIGHT, OBESITY, AND PERCEIVED EXERCISE BENEFITS AND BARRIERS AMONG COLLEGE STUDENTS

BY

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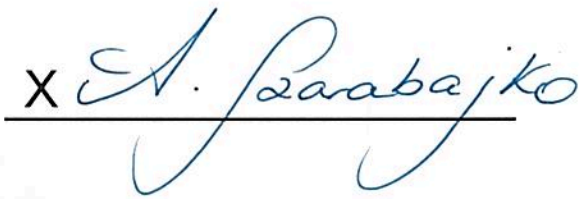
X 

Date: 4/10/2018

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ALEXANDRA SZARABAJKO

Submitted to the Faculty of the Graduate School of
Eastern Kentucky University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

2018

DEDICATION

This thesis is dedicated to my parents

Lech and Krystyna Szarabajko

for their loving support and unlimited trust

in letting me strive for my own success.

ACKNOWLEDGEMENTS

I would first like to thank my thesis chair Dr. Jim Larkin of the Department of Exercise & Sport Science at Eastern Kentucky University for his continuous support of my master's study, his patience, motivation, and enthusiasm. He consistently allowed this paper to be my own work, but steered me in the right direction whenever he thought I needed it.

I would also like to thank the rest of my thesis committee: Dr. Heather Adams-Blair of the Department of Exercise & Sport Science and Dr. Jonathan S. Gore of the Department of Psychology, for their encouragement, insightful comments and guidance throughout my master's degree. Without their passionate participation and input, the thesis could not have been successfully written.

Finally, I must express my very profound gratitude to my parents, Lech and Krystyna Szarabajko, as well as my siblings, Sebastian and Barbara Szarabajko for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them.

ABSTRACT

The transition to college is a critical period in a young adult's life. Education about obesity and physical activity has significant effects on lifetime wellness before graduating and reaching adulthood. The purpose of this study was to examine exercise benefits and barriers of overweight, obese, and normal weight college students. Participants (*n* = 595) were college students who completed a questionnaire and whose body composition was measured. Results of this study revealed significant differences in perceived exercise benefits and barriers based on weight group. Slight group differences were mainly found between normal weight and obese students. Implications for future studies were addressed.

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I. INTRODUCTION

Overweight and obesity in the United States have been a long known problem. The Center for Disease Control and Prevention (CDC) has conducted studies in order to monitor the obesity trends in the United States. Statistics revealed 36% of adults and 21% of youth (aged 12-19) were considered obese between 2011 and 2014 (Odgen, Carroll, Fryar & Flegal, 2015). The researchers also found the obesity rate increased between 1999 and 2014. In 2015, the United States ranked number one in obesity (38%) compared to 36 countries from Europe, Latin American, and Asia (Organization for Economic Cooperation and Development, 2017). The same study also predicted the percentage of obese people in the United States will increase to 47% of the population in 2030 with a body mass index (BMI) greater than 30. In other words, almost half of the American adult population is expected to be obese within the next two decades.

The transition between high school and college is considered to be a critical time period due to life changes (such as living without parents) that leads to making key living and eating choices for the first time. Studies have shown freshmen tend to gain weight in their first college weeks due to lifestyle changes that occur during college (Anderson, Shapiro & Lundgren, 2003; LaCaille, Dauner, Kramber, & Pedersen, 2011). They typically gain up to two kilograms (around 4.5lbs) in the first twelve weeks of college (Levitsky, Halbmaier, & Mrdjenovic, 2004). Changes in residency, and factors such as social support from family, self-efficacy and time management/constraints were found to contribute to a decrease in physical activity from high school to college (Dyck, Bourceaudhuik, Deliens, & Deforche, 2014). Thus, the transition to and time spent in college appears to impact the obesity rate of American students.

Even though current data show the obesity rate is increasing in the general population and also on college campuses, more and more required physical education course requirements are being eliminated each year at universities. State budget cuts have “forced” universities to eliminate health-related programs and decrease funding in those departments. Often physical education courses are the first programs to be eliminated despite the concerning obesity epidemic around college campuses. This

course requirement elimination may have a negative effect on knowledge about a healthy and active lifestyle, which in turn may increase obesity rates even further. The purpose of this study was to examine normal weight, overweight, and obese college students and their perceived exercise benefits and barriers, and to find reasons why students exercise or avoid exercising. Furthermore, this study will use waist circumference measurements in addition to BMI to prevent misclassification of students and their weight group.

Definition of Overweight and Obesity

The condition of excess weight in relation to height that consists of adipose tissue or fat mass is defined as overweight or obese. Even though BMI has gained some critical views regarding its inaccuracy and tendency to misclassify muscular people as unhealthy (Tomiyama, Hunger, Nguyen-Cuu, & Wells, 2016), it is still widely used by the CDC and an accepted measure to assess one's body composition in nationwide studies. The BMI is calculated by dividing one's weight in kilograms by the square of height in meters (Garrow & Webster, 1985). Blackburn and Kanders (1987) classified obesity using BMI in six categories (see Table 1).

Table 1 *Classification of Obesity by BMI*

BMI	Classification	Obesity Grade
>50	Super Morbid Obese	6
45	Morbid Obese	5
40	Super Obese	4
35	Medically Significant Obese	3
30	Obese	2
25	Overweight	1
20	Desirable Weight	0

Recent statistics published by the CDC (2016) show a map with the percentage of people living in the United States who are classified as overweight (see Figure 1) and obese (see Figure 2) between the ages of 18 and 24 years, which is the typical college

age range. Figure 1 illustrates that in 2016, up to 34% of young adults (18-24 years of age) in 12 out of 50 states were considered overweight. In 13 other states, up to 28% of the young adult population were classified as overweight.

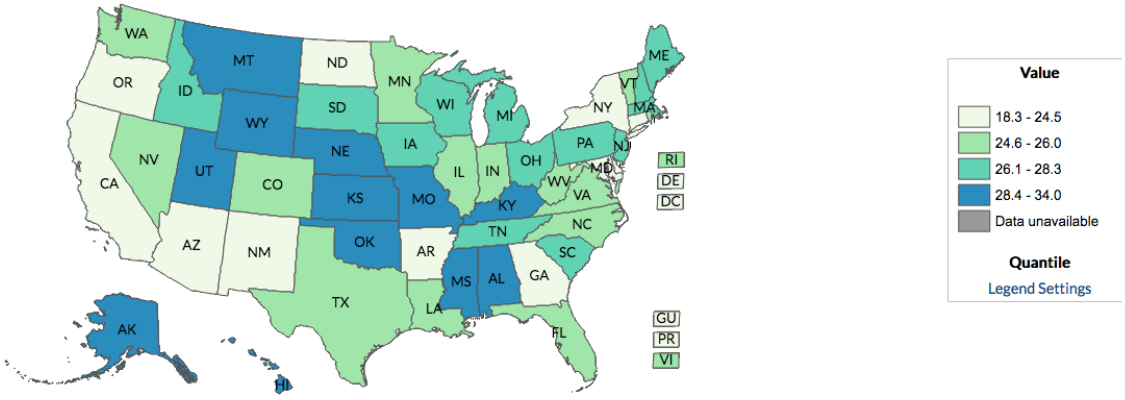

Figure 1 Percent of Young Adults (age 18-24) Classified as Overweight

Source: Centers for Disease Control and Prevention (2016). National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity, and Obesity. Data, Trend and Maps [online]. Retrieved from https://www.cdc.gov/nccdphp/dnpao/data-trends-maps/index.html

Figure 2 shows the percentage of young adults classified as obese. Thirteen states, mostly in the south, have the highest percent of young adults classified as obese (up to 28%). These statistics are alarming as the numbers are increasing in each state every year.

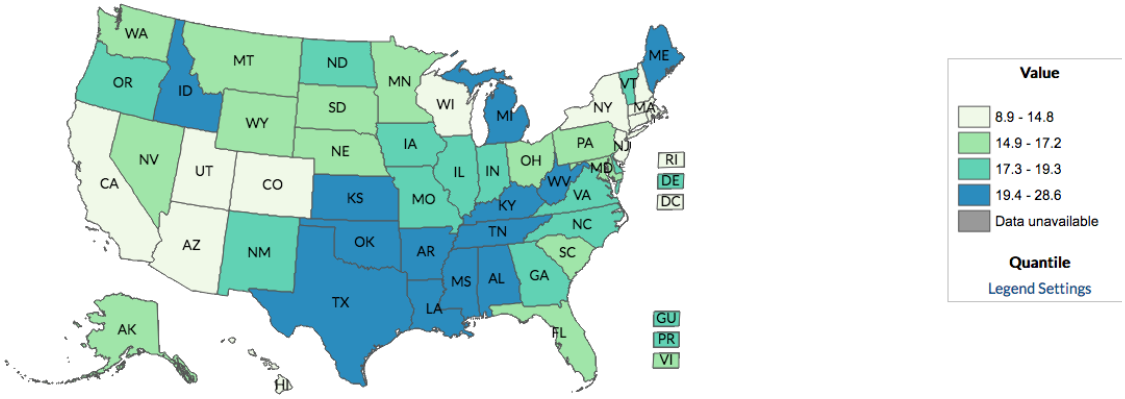

Figure 2 Percent of Young Adults (Age 18-24) Classified as Obese

Source: Centers for Disease Control and Prevention (2016). National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity, and Obesity. Data, Trend and Maps [online]. Retrieved from https://www.cdc.gov/nccdphp/dnpao/data-trends-maps/index.html.

Health Risks of Overweight and Obesity

Overweight and obesity have been linked to a number of health problems. According to the American Heart Association (AHA) summary statement (Poirier, et al., 2006), obesity leads to numerous health diseases that are described as metabolic syndromes (Eckel, Grundy & Zimmet, 2005). Research by Jequier (1987) discovered a relationship between BMI and mortality rates. According to the researcher, people with a BMI of 20 to 25 have the lowest mortality risk with a mortality ratio of below 100. People with a BMI of 30 have a mortality risk of 125, whereas obese people (BMI 35) show a mortality risk of 170, which is linked to the development of cardiovascular disease, diabetes, and stroke. Statistics on mortality in the United States in 2014 illustrated the 13 leading causes of death (Kochanek, Murphy, Xu, & Tejada-Vera, 2016). Out of those 13 causes, six were related to obesity and physical inactivity (see Table 2). The top two causes were heart diseases and cancer with each accounting for over 20% of deaths in 2014.

Table 2 *Top 13 Leading Causes of Death in 2014*

No.		Causes of Death %
1	**Diseases of heart**	**23.4%**
2	**Cancer**	**22.5%**
3	**Chronic lower respiratory disease**	**5.6%**
4	Accidents (unintentional injuries)	5.2%
5	**Stroke**	**5.1%**
6	Alzheimer	3.6%
7	**Diabetes**	**2.9%**
8	Influenza and pneumonia	2.1%
9	Kidney disease	1.8%
10	Suicide	1.6%
11	Septicemia	1.5%
12	Chronic liver disease	1.5%
13	**Hypertension**	**1.5%**

Note: Bold causes of death are related to obesity and physical inactivity

Obesity and Health in College Students

Weight gain occurs in college at a frequent rate. Lloyd-Richardson, Bailey, Fava and Wing (2009) conducted a study to identify the presence of weight gain during college freshman and sophomore years. The researchers summarized findings of two studies. In study one (*N* = 904), students' body weight was assessed four times in their freshman year and one time at the end of their sophomore year. In study two (*N* = 382), students' body weight and height was measured to calculate their BMI. The results revealed in study one, students gained on average about 3.5kg (7.7lbs), and in study two, females gained 1.6kg (3.5lbs) and males 2.5kg (5.5lbs). This study showed weight gain takes place on college campuses. A recent study conducted by Lederer and Oswalt (2017), pointed out misconceptions regarding health promotion in college. One of the misconceptions among people is that college students are believed to not reflect the general population because they are "privileged." Another misconception that the researchers challenged is the argument that colleges should not be responsible for students' health. The researchers argue that students' health is an important component of strong academic outcomes.

Next, different studies will be discussed that investigated the relationship between weight gain and its effect on health. Due to the great amount of studies linking obesity with health risks, only those health risks that concern college students will be addressed for the purpose of this current study.

Diabetes

According to the National Diabetes Statistics Report published by the CDC (2017), 30.2 million adults (18 and older) suffered from diabetes in 2015 and it was the seventh leading cause of death in adults (ages 25-34). Of those adults, 87.5% were classified as overweight or obese. A longitudinal study conducted by Resnick, Valsania, Halter and Lin (2000), looked at the effects of weight gain and weight loss on diabetes risks in overweight adults. They hypothesized that over a span of ten years, weight gain in obese people will increase the risk of diabetes whereas weight loss will

decrease the risk of diabetes. For this study, non-diabetic obese people (*N* = 1,929) were recruited and medically examined assessing height, weight, BMI, triceps skinfold thickness, and systolic blood pressure. The researchers used an obesity criteria for women as a BMI of >27.3, and a BMI for men of >28.7. Three follow-ups within a ten year span were arranged to measure the participants' weight change and self-reported physical activity. The results revealed a significant relationship between weight gain and increased risk of diabetes. Furthermore the findings suggested losing weight (10kg/22lbs) decreased the risk of diabetes by 33%.

College students seem to underestimate their susceptibility to their own health risks. One study looked at this particular incongruence between risk perception and preventative risk behavior (Mongiello, Freudenberg, Jones, & Spark, 2015). In this study, college students (*n* = 1,579) from a diverse background were asked to take a 60-minute survey that assessed their health behaviors, health care access, health status, diabetes knowledge, and diabetes risk factors. They grouped those students into "under-estimators" which were students at high risk for diabetes with an optimistic view on their susceptibility, and "realistic-estimators" which were also students at high risk for diabetes but recognized their susceptibility for diabetes. The findings showed 34% of the students were identified as high-risk diabetes students. Of those 34%, there were 39% who did not acknowledge their susceptibility for diabetes and were categorized as "under-estimators." Even though the number of "realistic-estimators" was greater than the number of "under-estimators," it is still important to focus on those who are classified as "under-estimators" and educate them about their actual risk for diabetes and other health problems that are related to obesity.

Cardiovascular Diseases

Overweight and obesity are known to have a negative effect on the cardiovascular system, increasing the prevalence of heart diseases, stroke, and high blood pressure. According to the Heart Disease and Stroke Statistic Update (2017) around 92.1 million U.S. citizens suffer from a form of cardiovascular disease (CVD)

and one in three deaths can be traced back to CVD. A study conducted by Schilter and Dalleck (2010) looked at the relationship between CVD risk factors, such as obesity, physical activity, and cardiorespiratory fitness, and increased CVD and metabolic syndromes in college students. Participants' (*N* = 203) body composition, height, weight, waist circumference, resting heart rate, blood pressure, blood lipid profile, blood glucose, and aerobic fitness were measured. In addition, they were asked to take a survey regarding their family health history, personal health history, physical activity, and use of medication. The results of this study showed 66% of the students had one or more CVD risk factors. The most prevalent risk factors for CVD in college students were fatness, physical inactivity, and dyslipidemia.

Tran, Zimmerman, Kupzyk, Shurmur, Pullen and Yates (2017) were interested in college students' awareness and perception about CVD. In this cross-sectional study, students (N=158) completed questionnaires on heart diseases, health beliefs related to CVD, and risk assessment. In addition, their blood glucose, lipid panels, height, weight, and blood pressure were measured. The results revealed 53% had between one and three risk factors for CVD. When looking at the correlation between knowledge, perception and risk assessment, knowledge of CVD and lifetime risk assessment were positively associated, while knowledge was not significantly related to perception. Obesity does not only influence physical health risks in college student, but it also may affect mental health.

Mental Health

Research shows an existing relationship between obesity and depression (Blaine, 2008; Rathee, 2017). Students face a lot of stress when going to college that can contribute to their anxiety and depression level. In addition to college students' mental states, obesity is also associated with low academic performance (Rajagopal, Briggs, & Omar, 2017), as well as low academic self-efficacy and higher depressive symptoms especially in females (Aime, Villatte, Cyr, & Marcotte, 2017). Between the 2015-2016 academic year, 50% of college students attended counseling for mental

health issues and college clinicians were asked to indicate the primary concern of college students who sought counseling (Center for Collegiate Mental Health, 2016). The report illustrated college students' number one concern was anxiety (23%), followed by depression (18%).

The role of obesity in college students' mental health was of concern to several researchers. A study conducted by Odlaug, et al. (2014) looked at the prevalence of obesity in college students and how it affected mental health and academic performance. Students (*N* = 2,108) completed an online survey that assessed their demographics, height, weight, health history, academic performance, and self-reported mental health. The findings revealed there were overweight (20%) and obese (8%) students present in this study. Students, who were either overweight or obese, reported lower academic performances in the form of lower GPA and higher depressive symptoms. Overweight or obese females also reported greater symptoms of panic disorder.

Another recent study (Aime, et al. 2017) investigated the effect of BMI specifically in college females' self-efficacy, absenteeism, and mental health. Participants (*N* = 298) from a college in Canada completed an online survey that assessed their demographics, BMI, academic performance, self-efficacy, school attendance and depressive symptoms. Results showed 22% were considered overweight while 10% were considered obese. In addition, female obese college students displayed lower academic performances and greater mental health issues. The researchers also found low academic self-efficacy mediates the relationship between BMI and GPA. Hence, obesity seems to add to the likelihood of the development of low academic grades and mental illness, and should be an area of concern when creating prevention programs.

Physical Activity and Health Benefits

Physical activity is related to preventing and reducing several chronic diseases, such as heart disease, stroke, high blood pressure, diabetes, breast and colon cancer

(American College of Sports Medicine, 2014; Warburton, Nicol, & Bredin, 2006; World Health Organization, 2017).

Analyses demonstrate physical activity can reduce the risk of coronary heart disease (CHD) between 20% and 30% (Sofi, Capalbo, Cesari, Abbate, & Gensini, 2008). A review done by Sattelmair, et al. (2017) summarized research findings on the amount of physical activity and coronary heart disease reduction. The researchers found a 14% reduced risk of CHD in people who participated in physical activity for 60 minutes a day compared to those with no physical activity. People who exercised more than 60 minutes per day lowered the risk of CHD by 20%. A longitudinal study on physical activity and chronic diseases conducted in 16 different European countries found exercising even less than the physical health recommendations (once a week) lowered the risk of diabetes, heart diseases (de Souto Barreto, Cesari, Andriue, Vellas, & Rolland, 2017).

There is evidence physical activity reduces the risk of colon cancer (Aleksandrova, et al., 2017; Boyle, Keegel, Bull, Heyworth, & Fritschi, 2012; de Vries et al., 2010). A review done by Wolin, Yan, Colditz and Lee (2009) found physically active people had a 24% lower risk for developing colon cancer when compared to people who are not physically active. Several studies have also revealed the importance of physical activity in breast cancer prevention (Kruk, 2010; Wu, Zhang, & Kang, 2013). Lynch, Neilson, and Friedenreich (2011) analyzed 73 studies on physical activity and breast cancer. The researchers found an average risk reduction of 25% between physically active and non-active women.

Physical activity also shows to lower the risk of stroke. Lee, Folsom, and Blair (2003) looked at 23 studies dealing with stroke risk in active versus inactive people. Their analysis revealed people who are moderately active had a 20% lower risk of stroke and mortality compared to physically inactive people. In addition, people who were highly physically active had a 27% reduced risk of stroke and mortality.

Perceived Physical Activity Benefits

For the purpose of the current study, research will be discussed that will focus on perceived physical activity benefits important to college students.

Health Motives

Research has found the most common motives for college students to exercise were to maintain or improve either physical health, fitness, or weight management (Brown, 2005; Henry, Sanborn, Senne, & Nichols, 2011; Kilpatrick, Hebert, & Bartholomew, 2005; Savage, 1998; Smith, Handley, & Eldredge, 1998). This means most college students are aware of the benefits physical activity has on their health. Ebben and Brudzynski (2008) also investigated exercise motivation and barriers in college student athletes. Participants (*N* = 4001) received an email with a questionnaire that assessed their physical activity participation, exercise motivation and barriers, and motives that would lead to more exercise. The researchers found in concordance with past findings, college students were motivated to exercise by increasing their health, fitness, and weight management. In addition the study identified factors that would lead to college students to exercise more, including more time and less schoolwork.

A different study investigated physical activity benefits in college students and looked at the differences in gender (Dhurup, 2012). A sample of students (*N*= 280) completed a two-section survey that assessed their background information, including demographics and health status, and the perceived benefits of physical activity. The findings revealed college students have four motives for engaging in physical activity, namely: (1) health promotion, (2) revitalization, (3) physical appearance, and (4) stress management. The most common perceived benefit to exercise was health promotion. In this particular study, no differences in physical activity benefits were found between female and male college students.

Social Benefits

Social benefits, such as interaction with friends, fun and enjoyment also play a role in students' motivation to be physically active. Research done by Savage (1998) looked at college students' motivation for exercise participation. Students (*N* = 795) completed a survey that assessed the most important factors for participating in exercise. The findings revealed, together with physical benefits, students rated fun and enjoyment as one of the highest motives for exercise.

Belanger & Patrick (2018) looked at the influence of social support on physical activity in college students. Data from college students (N = 733) regarding their physical activity and social support was collected through an online survey. The results revealed students with higher reported social support were more likely to participate in physical activity behavior. Peers in particular, showed a greater influence on physical activity than family support. College students typically spend more time with their peers in college, and thus, are more motivated to engage in exercise.

Social factors, in the form of relational motivation, have also been shown to influence college athlete's performance. Szarabajko, Gore and Katzman (under review) investigated the role of relational motivation in athletes, specifically relationally-autonomous reasons (RARs) in athletic performance. In a four-part study, the researchers found relational motivation correlates with exercise performance, effort and progress in female college athletes. Thus, social relations seemed to increase the likelihood of college students to perform better in their sport, which in turn makes it more fun and enjoyable. Socializing has also shown to mediate the relationship between physical activity and mental health, and physical activity and perceived stress, which means the benefits of physical activity on mental health and perceived stress can be attributed to social benefits (VanKim, Toben, & Nelson, 2013).

Psychological Benefits

Mental stressors, caused through pressure students are exposed to in college, are an undeniable issue. A study done in the United Kingdom investigated the

relationship between physical activity and mental health problems (Tyson, Wilson, Crone, Brailford, & Laws, 2010). A sample of college students (*N* = 100) completed an anxiety and depression scale and a physical activity questionnaire. The findings revealed students who reported to participate in high levels of physical activity had lower levels of depression and anxiety. Based on the findings of the study, the researchers concluded the greater the level of physical activity of a student, the lower the level of depression and anxiety.

VanKim and Nelson (2012) investigated the relationship between physical activity, mental health, perceived stress and socializing in college students. Participants (*n* = 14,804) completed several self-report questionnaires that measured their perceived stress, physical activity, mental health, and socializing. The results showed females in particular were more likely to report mental health problems and perceived stress than their male counterparts.

Another study conducted by Barney, Benham and Haslem (2014) looked at how participation in physical activity affected college students' perceived stress. Participants in this study (*n* = 356) were enrolled in one of the following activity classes: basketball, bowling, racquetball, tennis and volleyball. These students were then asked to complete a survey that identified stress in different settings. Results indicated students indeed perceive physical exercise reduces the stress in their lives. Hence, evidence suggests that in addition to health reasons and social benefits, college students also participate in physical activity to reduce their level of stress and increase their mental health.

Body Image

In the age of social media, body image has become more and more important to young adults. Physical appearance and fitness is therefore a critical reason why college students decide to exercise, and numerous studies have shown this relationship. When looking at motivation and physical activity, there seems to be a difference between male and female college students. One study looked at the

motivators of physical activity between male and female college students (Pauline, 2013). Participants (*N* = 871) completed several survey instruments including a physical activity behavior questionnaire, physical motivation inventory, and a physical activity self-efficacy questionnaire. The findings revealed significant differences in motivation for physical activity between female and male college students. Females showed greater motivation by weight management, physical appearance, and positive health and stress management. On the contrary, male college students were motivated by challenge, social recognition, affiliation, strength, and competition.

Another similar study conducted by Kilpatrick, et al. (2005) investigated the relationship between college students' physical activity motivation but distinguished between sport and exercise activities. The researchers made group distinctions between sport and exercise activities to investigate if the motivators differed in either group. The results showed college students' motivation for sport or exercise did indeed differ. Students who participated in exercise tended to be motivated by health and physical appearance reasons, whereas students who engaged in sports were motivated by the competition, challenge, enjoyment, and affiliation. When looking at gender differences, female students were physically active mostly for weight management purposes, whereas male students were motivated by factors, such as challenge, social recognition, strength, and endurance.

Perceived Physical Activity Barriers

Despite the extensive literature on physical activity health benefits, physical inactivity in college students is undeniably present. In the past, questions have been raised why those college students remain physically inactive. Besides campus food related problems, Nelson, Kocos, Lytle, and Perry (2009) revealed physical activity barriers reported by students, included negative experiences with campus recreation facilities, motivation, social support, and time constraints. A study conducted by Grubbs and Carter (2002), looked at the perceived exercise benefits and barriers in college students. Participants (*N* = 147) completed a survey that evaluated their

perceived benefits and barriers to exercise and their exercise habits. Results revealed the most common exercise barriers were that exercise caused fatigue, involved too much time, and feelings of embarrassment. Henry, Sanborn, Senne and Nichols (2011) studied female college students (*N* = 83) and their motives to engage in sports. The female participants completed an online survey that assessed their motives for sports participation. The results showed the main reason why female college students did not engage in physical activity was due to time constraints and low motivation.

Those findings coincide with the study conducted by Dhurup and Garnett (2011) whose purpose was to solely look at barriers to physical activity. College students (N = 251) participated in the study and were asked to complete a questionnaire, which assessed their barriers to physical activity. The analysis revealed the number one barrier was personal constraints that included: bad weather, health reasons, and family obligations. Next, academic obligation, e.g. not enough time, was the second highest barrier to exercise. There seems to be a trend in the literature showing college students report "time constraints" as the biggest barrier to physical activity, which is attributed to schoolwork and other personal/family obligations (Gomez-Lopez, Gallegos, & Extremera, 2010; Gyurcsik, Bray, & Brittain, 2004; Kimm, et al., 2006; Leslie, Sparling, & Owen, 2001).

Problem Statement

Universities are expected to promote critical thinking in their students so they can become well-rounded individuals. Based on literature, the transition to college and the following college years are critical time periods for weight gain where certain bad habits could be improved before graduating and reaching adulthood (Anderson, et al., 2003). Sedentarism and physical inactivity on college campuses are a major concern, even though students are aware of the benefits that physical activity has on their life. According to Levitsky et al. (2004), universities become a barrier to a healthy lifestyle due to time constraints, schoolwork, and all-you-can-eat cafeteria-style eating.

Physical education course requirements were first introduced in 1861 at Amherst College in Massachusetts and have spread over American college campuses (Welch, 1970). The courses started as basic hygiene and health instruction classes. The nature of physical education has evolved over time and has become a science that includes many topics, such as biomechanics, exercise physiology, fitness and wellness, kinesiology, and sports medicine to name a few. Even though the knowledge surrounding physical education has increased, the course requirements at American colleges have decreased. A study conducted by Cardinal, Sorensen, Spencer and Cardinal (2012) looked at the physical education requirement trends in American 4-year universities between 1920 and 2010. They found between 1920 and 1930, 97% of American colleges required physical education courses in their curriculum. However, between 2009 and 2010, only 40% of American colleges required those courses. Since obesity rates increased drastically since the 1930's, the question remains as to why colleges have eliminated physical education requirements in light of the concerning obesity statistics.

The present study aimed to expand upon past literature and looked at perceived exercise benefits and barriers and identified differences between overweight, obese, and normal weight college students. Studies in the past have used the BMI as a measure to categorize their participants into obese, overweight, or normal weight (Donovan, Walters-Edwards, McPartland, Nicholson, & Walters, 2010). This current study differs in comparison to past studies, because it used body fat percentage and waist circumference measurements in addition to the BMI to provide more data in determining body fatness. It is known that the BMI's biggest weakness is that it cannot differentiate between three factors, namely body fatness, muscle mass, and skeletal mass (Freedman & Sherry, 2009; Prentice & Jebb, 2001). Thus, this study used additional information to minimize the error in classifying participants into the three categories. Significant findings could be of interest for colleges to make positive changes on campus and enable college students to receive a well-rounded education that teaches them healthy lifestyle habits. It is hypothesized that: (1) overweight and

obese students will report greater perceived barriers, while it is expected that normal weight students will report greater benefits to exercise. Secondly, it is hypothesized that (2) normal weight students will differ in perceived benefits from overweight and obese students by showing higher perceived benefits for life enhancement and preventative health. Lastly, (3) normal weight students' perceived exercise barriers will be higher on exercise place and time constraints, while overweight and obese students will show greater perceived barriers to exercise for physical exertion and social discouragement.

II. METHOD

The study used secondary data that was collected in 2014 from a Fitness Five Project Event at Eastern Kentucky University. This event was held to provide free fitness testing to the student population and to educate them about their own fitness level.

Participants

A total of (*N* = 629) students from Eastern Kentucky University volunteered in this study. Of those students, several cases (*n* = 34) were deleted because of missing data of either body fat, BMI, waist circumference information, or incomplete survey responses. The final number of participants (*n* = 595) consisted of male (*n* = 310) and female (*n* = 285) college students (freshmen through seniors). Participants with medical health issues were encouraged not to take part in the fitness testing to prevent further injuries. All participants who volunteered to take part in the fitness testing participated at their own risk.

Materials

Overall, the survey measured perceived exercise benefits and barriers. Within those variables, there were nine sub-categories, including five categories within the benefit variable and four categories within the barriers variable. After reverse coding the benefit questions, high scores on the benefit items reflected high levels of the category. In contrast, low scores on the barriers questions reflected high agreeableness with the category. Furthermore, body fat percentage, BMI, and waist circumference were measured and recorded. A fitness test battery measured the participants' fitness, including: (1) grip strength using a hand dynamometer, (2) body composition (body fat and BMI) using a handheld body fat analyzer, (3) waist circumference using a measuring tape, (4) push – up test, (5) vertical jumps test, (6) jump rope test, (7) flexed arm hang, (8) sit and reach test using a sit and reach trunk flexibility box, and (9) and a wall sit. For this study, only the survey materials and body composition information were examined.

Exercise Benefits and Barriers Scale (EBBS)

A 43-item scale from Sechrist, Walker & Pender (1985) was used to measure perceived exercise benefits and barriers with high internal consistency (α = .954). In this scale, 29 items measured exercise benefits (α = .95), whereas 14 items measured exercise barriers (α =. 87). Participants rated these items on a four-point scale (1 = *strongly agree*, 2= *agree*, 3 = *disagree* 4 = *strongly disagree*). The benefits scores ranged between 29 and 116, after they were reverse-coded. The higher the score on the benefits scale, the more positively one perceived physical activity. The barriers scores ranged from 14 to 56, where the lower the score on the barriers scale equated to greater perception of barriers to physical activity. The EBBS was subdivided into nine factors, where five factors fall into the benefits category and four relate to the barriers category.

Life enhancement. Eight items from this scale measured the level of one's perceived life enhancement due to exercise. Some of the items were: "I enjoy exercise," "Exercise gives me a sense of personal accomplishment," and "Exercising helps me sleep better at night" (M =3.31, SD = .46, α = .86).

Physical Fitness. Eight items from this scale measured the level of one's perceived physical fitness due to exercise. Some of the items were: "Exercise increases my muscle strength," "Exercising increases my level of physical fitness," and "My muscle tone is improved with exercise" (M = 3.46, SD = .42, α =. 89).

Psychological Outlook. Six items from this scale measured the level of one's perceived psychological outlook due to exercise. Some of the items were: "Exercise decreases feelings of stress and tension for me," "Exercise improves my mental health," and "Exercising makes me feel relaxed" (M = 3.24, SD = .50, α = .83).

Social Support. Four items from this scale measured the level of one's perceived social support due to exercise. Some of the items were: "Exercising is a good way for me to meet new people," "Exercising lets me have contact with friends and persons I enjoy," and "Exercising increases my acceptance by others" (M = 3.16, SD = .50, α = .73).

Preventative Health. Three items from this scale measured the level of one's perceived preventative health due to exercise. Some of the items were: "I will prevent heart attacks by exercising," "Exercising will keep me form having high blood pressure," and "Exercising improves functioning of my cardiovascular system" (*M* = 3.46, *SD* = .45, *α* = .77).

Exercise Place. Six items from this scale measured the level of one's perceived exercise place restrictions preventing one from exercising. Some of the items were: "Places for me to exercise are too far away," "It costs too much to exercise," and "Exercise facilities do not have convenient schedules for me" (*M* = 3.20, *SD* = .52, *α* = .77).

Time Constraints. Three items from this scale measured the level of one's perceived time constraints to exercise. Some of the items were: "Exercising takes too much of my time," "Exercise takes too much time from family relationships," and "Exercise take too much time from my family responsibilities" (*M* = 3.00, *SD* = .57, *α* = .69).

Physical Exertion. Three items from this scale measured the level of one's perceived physical exertion. Some of the items were: "Exercise tires me," "I am fatigued by exercise," and "Exercise is hard work for me" (*M* = 2.12, *SD* = .57, *α* = .65).

Social Discouragement. Two items from this scale measured the level of one's perceived social discouragement regarding exercising. Some of the items were: "My spouse (or significant other) does not encourage exercising," and "My family members do not encourage me to exercise" (*M* = 3.25, *SD* = .64, *α* = .55).

Body Composition

Participants' body composition was measured, including body fat percentage, body mass index (BMI), and waist circumference. The Omron Handheld Body Fat Monitor was used to track body fat percentage and BMI. Participants' height and weight was entered into the handheld machine to receive the end-scores. Participants'

waist circumferences were measured manually with a measuring tape by the researcher.

Procedure

The fitness test was held in one of the campus gyms, which was open to everyone who was interested in participating. Upon arrival, students were greeted and asked to take part in the fitness testing, which involved filling out a 10-minute survey that was voluntary. Participants were given an informed consent/waiver/release form (see Appendix A) prior to taking part in the testing. This form also included contact information for follow-up questions. After signing the informed consent, participants were given a questionnaire that assessed their perceived exercises benefits and barriers (see Appendix B). Once they completed the questionnaire, they were asked to go through the eight stations that measured their fitness levels.

III. RESULTS

Sample Description

Participants (*n* = 595) in the study were college students (n = 285 female; 310 male) from Eastern Kentucky University. Participants were classified into three categories based on their body composition information: (1) normal weight (*n* = 341), (2) overweight (*n* = 129), and (3) obese (*n* = 115). Over half of the participants were classified as normal weight (57%), and the rest were either overweight (24%) or obese (19%). This means that almost half of the sample size (43%) was considered at least overweight.

Data Analysis

The data were analyzed using SPSS software. Frequency distributions were calculated to find how many cases were misclassified with the BMI handheld machine. The results revealed 22% of participants were incorrectly placed into one of the three weight categories, showing that using waist circumference measurements in addition to BMI and body fat percentage helps counteract these BMI inaccuracies. Descriptive statistics were conducted to find overall agreeableness and disagreeableness to perceived exercise benefits and barriers (see Table 3). It was revealed students, overall, perceived greater exercise benefits and smaller exercise barriers.

Table 3 *Descriptive Statistics of Perceived Exercise Benefits and Barriers*

Variables	*M*	*SD*	*N*
Benefits	96.68	12.01	595
Life enhancement	3.31	.45	595
Physical Fitness	3.46	.42	595
Psychological Outlook	3.24	.50	595
Social Support	3.16	.54	595
Preventative Health	3.46	.45	595
Barriers	41.07	5.97	595
Exercise Place	3.20	.52	595
Time Constraints	3.00	.57	595
Physical Exertion	2.12	.57	595
Social Discouragement	3.25	.64	595

Note: M = Mean, SD = Standard Deviation, N = Number of participants

A one-way between subjects MANOVA was performed with weight class (normal weight, overweight, and obese) entered as the independent variable and perceived benefits and barriers entered as the dependent variables. The results of the first analysis showed a significant difference in perceived exercise benefits and barriers based on weight group ($\lambda = .958$, $F(4,1182) = 6.41$, $p<.05$, $\eta^2 = .021$). Univariate analyses revealed that weight group had a significant effect on both, benefits ($F = (2,592) = 5.75$, $p<.05$, $\eta^2 = .019$) and barriers ($F = (2,592) = 11.98$, $p<.05$, $\eta^2 = .039$). Even though significant differences have been found, effect sizes for those variances were rather small. The Tukey's HSD Post Hoc test revealed significant differences between normal weight ($M = 97.98$, $p<.05$) and obese students ($M = 93.78$, $p<.05$) in perceived exercise benefits. When looking at perceived exercise barriers, significant differences were found between obese ($M = 38.97$, $p<.05$) and normal weight students ($M = 41.98$, $p<.05$) and obese and overweight students ($M = 40.59$, $p<.05$). Thus, the first hypothesis, that obese students would show greater perceived barriers while normal weight students will report greater benefits to exercise, was supported.

For the second analysis, another one-way between subjects MANOVA was performed with weight class entered as the independent variable and the nine sub-factors (life enhancement, physical fitness, psychological outlook, social support, preventative health, exercise place, time constraints, physical exertion, and social discouragement) entered as the dependent variables. The result of this analysis showed a significant difference between those sub-factors based on weight group (λ = .938, $F(18,1168) = 2.12$, $p<.05$, $\eta^2 = .032$). Table 4 illustrates the univariate analysis results of weight group differences for each the sub-factors.

Table 4 *MANOVA Comparison Analysis for Differences in Weight Group for each Sub-Factor*

	Weight Group		
	F	p	η^2
Benefits			
Life enhancement	4.22	**.01***	.014
Physical Fitness	2.98	**.05***	.010
Psychological Outlook	6.45	**.00***	.021
Social Support	6.45	**.00***	.021
Preventative Health	2.98	**.05***	.010
Barriers			
Exercise Place	12.656	**.00***	.041
Time Constraints	4.93	**.01***	.016
Physical Exertion	5.65	**.00***	.019
Social Discouragement	2.99	**.05***	.010

Note: * p<.05.

Even though significant differences were found for each benefit and barrier sub-category, effect sizes for those variances remained small again. The Tukey's HSD Post Hoc test was performed to look at weight group mean differences among the significant benefit sub-factors, including life enhancement, physical fitness, psychological outlook, social support, and preventative health (see Table 5).

Table 5 *Multiple Comparisons of Mean Differences and their Significances for Benefits Sub-Factors*

	Weight Group			
	Normal Weight		Obese	
	MD	*p*	*MD*	*p*
Life Enhancement				
1	-	-		
2	-.06	.39	-	-
3	**-.14**	**.05***	-.08	.34
Physical Fitness				
1	-	-		
2	-.06	.36	-	-
3	-.11	.06	-.05	.64
Psychological Outlook				
1	-	-		
2	-.08	.22	-	-
3	**-.18**	**.00***	.10	.21
Social Support				
1	-	-		
2	-.12	.074	-	-
3	**-.19**	**.00***	.07	.51
Preventative Health				
1	-	-		
2	-.07	.31	-	-
3	-.11	.06	-.04	.72

Note: *p<.05. Weight Category: Normal = 1 / Overweight = 2 / Obese = 3. *MD* = Mean difference.

Based on the results, the second hypothesis that normal weight students will show higher perceived benefits for life enhancement and preventative health due to exercise was partially supported. Only life enhancement was statistically significant between normal weight (*M* = 3.36) and obese students (*M* = 3.22), while there were no significant mean differences between the weight groups for preventative health. In addition to life enhancement, significant mean differences were found between normal weight (*M* = 3.30) and obese students (*M* = 3.11) for perceived psychological outlook, and normal weight (*M* = 3.21) and obese students (*M* = 3.03) for perceived

social support. It is important to note that students in all weight groups perceived life enhancement, psychological outlook, and social support as an exercise benefit and that despite the statistical significance the mean differences were rather small. No significant mean differences were found for physical fitness. Table 6 illustrates group mean differences for exercise place, time constraints, physical exertion, and social discouragement.

Table 6 *Multiple Comparisons of Mean differences and their significances for barrier sub-factors*

	Weight Group			
	Normal Weight		Obese	
	MD	*p*	*MD*	*p*
Exercise Place				
1	-	-		
2	**-.13**	**.04***	-	-
3	**-.28**	**.00***	-.16	**.04***
Time Constraints				
1	**-**	**-**		
2	-.05	.66	-	-
3	**-.15**	**.04***	-.10	.35
Physical Exertion				
1	-	-		
2	**-.14**	**.05***	-	-
3	**-.18**	**.01***	-.04	.88
Social Discouragement				
1	-	-		
2	-.03	.85	-	-
3	**-.17**	**.04***	-.13	.22

Note: *p<.05. Weight Category: Normal = 1 / Overweight = 2 / Obese = 3. *MD* = Mean difference.

The third hypothesis which predicted normal weight students to show higher perceived barriers to exercise place and time constraints, while overweight and obese students would show greater perceived barriers to exercise for physical exertion and social discouragement, was not supported. Overall, significant differences were found for all four barrier sub-factors; however, mean differences were too small to indicate a large effect of weight group on the exercise barrier sub-factors. For exercise place, all three groups did not perceive exercise place as a barrier, with obese students (*M* = 3.00) showing less disagreement than overweight (*M* = 3.16) and normal weight students (*M* = 3.29). When looking at time constraints, obese students (*M* = 2.89) had slightly greater perceived time constraints to exercise than overweight (*M* = 2.99) and normal weight students (*M* = 3.05); however, those differences were not large enough to be significantly different from each other. Although statistically significant weight group differences were found for physical exertion and social discouragement, the effect size remained small again, showing that both obese students (*M* = 2.00) and normal weight students (*M* = 2.18), perceived physical exertion to be an exercise barrier. This also applied to social discouragement, with obese students (*M* = 3.12) and normal weight students (*M* = 3.29) not perceiving social discouragement as an exercise barrier despite the existing statistical significance.

IV. DISCUSSION

The purpose of this study was to identify the differences in perceived exercise benefits and barriers between normal weight, overweight, and obese students. In order to classify a person's body fat composition, the BMI is a common and inexpensive tool used in research to determine one's body fat based on weight and height. This study used body fat percentage and waist circumference measurements to help better detect misclassifications by BMI inaccuracies. After the comparison between BMI, body fat percentage, and waist circumference, it was found that 22% of students were misclassified. This means that some of the students were either given a false high BMI due to high muscle or skeletal mass, or a lower BMI due to low muscle, skeletal, or body fat mass in the upper extremities but failing to acknowledge greater waist circumference due to visceral fat. This finding supports previous literature (Freedman & Sherry, 2009; Prentice & Jebb, 2001) indicating that BMI individually can provide misleading categorization and that other measures should be used, such as waist circumference measurements.

Overall, the results revealed weight group differences in perceived exercise benefits and barriers exist, which supported the first hypothesis. When looking at perceived exercise benefits, it was found normal weight students perceived exercise more positively compared to obese students. Unlike the findings of Deforche, Bourdeaudhuij, and Tanghe (2006), where no differences between weight groups in regard to perceived benefits to physical activity were found, this study does illustrate that normal weight students have more positive attitudes toward exercise than obese students. No differences were found between normal weight and overweight, or overweight and obese students. Obese and normal weight students are the extremes of the classification used in this study; hence, they had greater discrepancies regarding perceiving positive benefits to physical activity than between normal weight and overweight or overweight and obese students. It was also found that obese students tended to have a greater perception of barriers to exercise compared to normal weight and overweight students. It is important to mention that those differences had

low effect sizes, meaning that the actual effect of those differences was less than five percent.

The second purpose of this study was to identify what benefits and barriers were perceived based on weight group. It was hypothesized that normal weight students would show higher perceived benefits for life enhancement and preventative health, which was partially supported. Normal weight students did perceive life enhancement as a benefit to exercise, but so did the other two groups, overweight and obese, which means the overall mean differences were slim despite the present significance. The third hypothesis predicted that normal weight students' perceived exercise barriers will be higher on exercise place and time constraints, while overweight and obese students will show greater perceived barriers to exercise for physical exertion and social discouragement. The results did not support this prediction but other interesting findings were revealed.

Significant differences were found in perceived benefits based on weight status in life enhancement, psychological outlook, and social support. No differences were found between the groups and perceived benefits for physical fitness and preventative health. All groups agreed upon the perception that physical fitness can increase their physical abilities and prevent health related issues. Statistically, normal weight and obese students differed in the perception of life enhancement, psychological outlook, and social support, meaning that obese students perceived physical activity to have a less positive effect on their life, mental status, and social support than normal weight students. Even though previous research has shown that physical activity tends to reduce stress and anxiety (Barney et. al, 2014) and has a positive effect on mental health and well-being (Dhurup, 2012), this study indicates that it may not be true for all students, such as obese students. Deforche et al. (2006) found that overweight students tend to see physical activity more likely as a barrier because of negative thoughts of low exercise competence or insecurities about appearance. Having those thoughts while exercising may increase one's stress and comfort level, which would explain why obese students are less likely to perceive exercise as a psychological

benefit. Obese students have also indicated a lower perceived social benefit through exercise than normal weight students. This finding is in accordance with research (Belanger & Patrick, 2018; Nelson et al. 2009) whose findings indicated that lack of social support could be a factor that contributes to inhibiting physical activity in college students.

When looking at perceived exercise barriers, significant differences were found for exercise place, physical exertion, and social discouragement. No group differences were found for time constraints. This means that weight status was irrelevant in regard to perceived exercise barriers for time constraints because all subjects perceived time constraints as a barrier to exercise the same, which is supported by past research (Gomez-Lopez, Gallegos, & Extremera, 2010; Gyurcsik, Bray, & Brittain, 2004; Kimm, et al., 2006; Leslie, Sparling, & Owen, 2001). Overall, students did not to perceive exercise place as a barrier to exercise, but group differences were found between obese and normal weight students within the disagreement. Student populations generally have the same access to campus recreation resources. However, some students may perceive exercise place as a barrier because of negative experiences with using those resources. Nelson et al. 2009 found that students reported long waiting times for machines or feelings of embarrassment due to lack of knowledge of gym machine usage. Thus, normal weight students who engage in physical activity regularly using campus resources might feel more confident navigating through a gym environment than obese students, which could explain the slight mean difference between normal weight and obese students. Due to the fact that obese students have greater body mass in the form of adipose tissue, this study showed that those students slightly greater perceived physical exertion due to exercise than normal weight students. Even though all students tended to disagree to perceive social discouragement as a barrier to exercise, obese students showed slightly greater disagreement for social discouragement to exercise than normal weight students.

To the author's knowledge, this study is among the first of its kind to classify students' body composition with the help of waist circumference measurements to

avoid BMI and body fat percentage inaccuracies and use it to determine differences in perceived exercise benefits and barriers based on weight status in college students. The findings illustrated that 47% of the 595 students were considered at least overweight, with 19% of them considered obese. This finding supports Lederer and Oswalt's (2017) argument that college students do in fact represent the U.S. population in terms of health and weight gain, regardless of the their believed "privilege" status. The current study has shown that differences in perceived exercise benefits and barriers mostly exist between two groups, normal weight and obese students.

All students regardless of their weight classification, perceived more exercise benefits than barriers. Slight mean differences between obese students and normal weight students on life, psychological, social benefits, exercise place, physical exertion, and social discouragement were found. Due to the small effect sizes for all results, other, larger factors have to be considered that may have greater practical instead of statistical significance.

Limitations and Future Implications

There are some limitations that need to be addressed in this study. Some of the barrier constructs, such as social discouragement, should be revised or rephrased due to their low alpha. The scale was developed in 1985, where barrier statements such as "I think people in exercise clothes look funny" might be outdated due to today's trend to wear sports clothes on an everyday basis. Those sentences should be revised in future studies to make it more relevant to the target population. A further limitation is that the BMI calculation relied on self-reported weight and height of the participant, where one could have responded with a bias toward their own weight and height to make one look better. The actual weight and height should be measured on the day of the study with a scale and measuring tape to prevent false self-reported numbers.

Overall, the study has shown significant differences of perceived exercise benefits and barriers based on weight group. However, it is important to mention the low effect sizes (less than 5%). This means that even though those findings are

significant, the degree to how much impact interventions could have based on this study is rather small. The data were collected before the elimination of a physical education graduation requirement course, which could explain the small effect sizes. Weight group for this sample specifically could be a small predictor for exercise benefits and barriers among college students because all students shared the same knowledge that has been taught in the physical education class. Future research should conduct a "post-elimination" study and compare to "pre-elimination" studies to identify if those perceived exercise benefits and barriers have changed. This study did not look at participants' actual physical activity levels, which could be added in future studies as an independent variable. Differences in perceived exercise benefits and barriers based on weight group and gender and race could also be of interest in order to better understand benefits and barriers and find solutions tailored specifically to those demographic groups.

Conclusion

This study revealed significant differences between the perception of exercise benefits and barriers based on weight status, specifically between normal weight and obese students. It was one of the first studies with a large sample size that used other body composition measures (waist circumference and body fat percentage) in addition to BMI to prevent misclassification of participants. Slight differences were mainly found between normal weight and obese students in perceived exercise barriers and benefits. Future research is needed to confirm these findings and "post physical course elimination" studies could be compared to this study in order determine the effect of the loss of required physical education courses on weight gain and physical activity level among college students.

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APPENDICES

APPENDIX A: Consent, Waiver, and Release Form

The Fitness Five (F^5) Project strives to improve the nation's health by providing fitness testing and an opportunity to offer fitness education and assess personal progress in achieving fitness goals.

By participating in the Fitness Five (F5) Project fitness testing event, you are consenting to having your personal fitness data (PFD) recorded and stored in a secure facility. Your PFD may include fitness measurements and also your responses to survey or interview questions. Although the data may be used for purposes of (1) research, (2) grant-writing, and (3) publications, no names will ever be associated with your PDF. Your information will remain confidential.

You are free to end your participation in the fitness testing or the survey at any time without consequences. The event is offered free of $ charge to participants. The purpose of the survey is to gain insight about the perceived benefits and perceived barriers to exercise that individuals may have. You may stop answering questions at any time.

Because physical exercise can be strenuous and carries a slight risk of injury, participants in fitness testing are encouraged to be aware of their physical health and not to exceed their limitations. You agree that by participating the physical exercise, you do so **entirely at your own risk**. Individuals should consult with their physician before beginning any lifestyle change (exercise regimen or diet) that may affect their health. You agree that you are voluntarily participating in these activities and use of these facilities and premises and **assume all risks** of injury, illness, or death. We are not responsible for any loss of your personal property. You acknowledge that you have carefully read this "waiver and release" form and fully understand that it is a **release of liability**. You expressly agree to release and discharge the Fitness Five (F5) Project, its collaborative partners, and designees from any and all claims or causes of action and you agree to voluntarily give up or waive any right that you may otherwise have to bring a legal action against the aforementioned parties for personal injury or property damage.

If any portion of this release from liability shall be deemed by a Court of competent jurisdiction to be invalid, then the remainder of this release from liability shall remain in full force and effect and the offending provision or provisions severed here from.

If you have questions about the Fitness Five (F5) Project fitness testing event, its purposes, the types of information collected from participants and how it may be used, please feel free to contact the following person: Jim Larkin, Ph.D.: 859-622-1893; jim.larkin@eku.edu

Your signature here indicates that you have read and understand this informed consent waiver and release, and agree to participate in the Fitness Five (F5) Project fitness testing event.

_____ _____

Signature Date

APPENDIX B: Questionnaire

Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statement by circling SA from strongly agree, A for agree, D for disagree, or SD for strongly disagree.

		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
1.	I enjoy exercise.	SA	A	D	SD
2.	Exercise decreases feelings of stress and tension for me.	SA	A	D	SD
3.	Exercise improves my mental health.	SA	A	D	SD
4.	Exercising takes too much of my time.	SA	A	D	SD
5.	I will prevent heart attacks by exercising.	SA	A	D	SD
6.	Exercise tires me.	SA	A	D	SD
7.	Exercise increases my muscle strength.	SA	A	D	SD
8.	Exercise gives me a sense of personal accomplishment.	SA	A	D	SD
9.	Places for me to exercise are too far away.	SA	A	D	SD
10.	Exercising makes me feel relaxed.	SA	A	D	SD
11.	Exercising lets me have contact with friends and persons I enjoy.	SA	A	D	SD
12.	I am too embarrassed to exercise.	SA	A	D	SD
13.	Exercising will keep me from having high blood pressure.	SA	A	D	SD
14.	It costs too much to exercise.	SA	A	D	SD
15.	Exercising increases my level of physical fitness.	SA	A	D	SD
16.	Exercise facilities do not have convenient schedules for me.	SA	A	D	SD
17.	My muscle tone is improved with exercise.	SA	A	D	SD
18.	Exercising improves functioning of my cardiovascular system.	SA	A	D	SD
19.	I am fatigued by exercise.	SA	A	D	SD
20.	I have improved feelings of well being from exercise.	SA	A	D	SD

21.	My spouse (or significant other) does not encourage exercising.	SA	A	D	SD
22.	Exercise increases my stamina.	SA	A	D	SD
23.	Exercise improves my flexibility.	SA	A	D	SD
24.	Exercise takes too much time from family relationships.	SA	A	D	SD
25.	My disposition is improved with exercise.	SA	A	D	SD
26.	Exercising helps me sleep better at night.	SA	A	D	SD
27.	I will live longer if I exercise.	SA	A	D	SD
28.	I think people in exercise clothes look funny.	SA	A	D	SD
29.	Exercise helps me decrease fatigue.	SA	A	D	SD
30.	Exercising is a good way for me to meet new people.	SA	A	D	SD
31.	My physical endurance is improved by exercising.	SA	A	D	SD
32.	Exercising improves my self-concept.	SA	A	D	SD
33.	My family members do not encourage me to exercise.	SA	A	D	SD
34.	Exercising increases my mental alertness.	SA	A	D	SD
35.	Exercise allows me to carry out normal activities without becoming tired.	SA	A	D	SD
36.	Exercise improves the quality of my work.	SA	A	D	SD
37.	Exercise takes too much time from my family responsibilities.	SA	A	D	SD
38.	Exercise is good entertainment for me.	SA	A	D	SD
39.	Exercising increases my acceptance by others.	SA	A	D	SD
40.	Exercise is hard work for me.	SA	A	D	SD
41.	Exercise improves overall body functioning for me.	SA	A	D	SD
42.	There are too few places for me to exercise.	SA	A	D	SD
43.	Exercise improves the way my body looks.	SA	A	D	SD

APPENDIX C: Organization Sheet

Please answer these questions:

GENDER: _____ AGE: _____

HEIGHT: _____ WEIGHT: _____

BODY COMPOSITION

(Filled out by researcher)

Body Fat: _____% BMI: _____kg7m^2

Waist Circumference: _____ inches