

## EXAMINING FACTORS CONTRIBUTING TO BMI AMONG AFRICAN AMERICAN FRESHMAN COLLEGE STUDENTS AT A RURAL HBCU

<sup>1</sup>DR. ANGELA BRANCH-VITAL, <sup>2</sup>PATRICK BROOKS, <sup>3</sup>JALICIA HINES,  
<sup>4</sup>DR. CATHERINE W. KISAVI-ATATAH & <sup>5</sup>DR. PARK E. ATATAH

<sup>1</sup>Ph.D. Associate Professor, Departmental Head, Prairie View A&M University, Prairie View, TX, USA,

<sup>2</sup>Oncology Researcher MD Anderson Research Center

<sup>3</sup>Assistant Graduate, Prairie View A&M University, Prairie View, TX, USA

<sup>4</sup>Ph.D., Adjunct Professor, Prairie View A&M University, Prairie View, TX, USA

<sup>5</sup>D.Ph.D., Associate Professor, School of Advanced Studies (SAS), University of Phoenix, Phoenix, AZ, USA

### ABSTRACT

*The purpose of this study was to explore the frequency of gender and Body Mass Index (BMI) of African American Freshman College Students and to determine the difference between self-value and BMI by gender and physical activity level. This research used a sample population of male (N=92) and female (N=153) African American college freshmen (N=245). Participants from the primary data included 329 African American male and female college freshman students at a HBCU in the south region area of the U.S. These participants was recruited as part as Cancer Awareness Project (Project CAP). Eligible students for this study were first time freshman between the ages of 18-25. The study assumed that females would have a higher BMI than males and the findings of this study showed that there were more females with a higher BMI than males. Both the hypotheses and findings were consistent with other studies regarding high BMIs for females. The study recommends continued BMI levels interventions should be implemented; regardless of gender. The implications of this study should eventually bring some positive social changes to students in African American Freshman College Students at a Rural HBCU and possibly beyond.*

**Key Words:** BMI, HBCU, Interventions, Cancer Awareness Project (Project CAP).

### INTRODUCTION:

Having an attractive body image may be prominent to college students. In fact, there are some who feel being “thick” is more attractive than being thin (Blixen, Singh, Meng, Mascha & Thacker, 2006, pp. 1160-2006). Although being “thick” may be a striking attraction, the possible outcome is having a higher BMI. Reaching and

maintain a healthy weight deserves serious attention because overall health is determined. Besides, maintaining the proper Body Mass Index (BMI) level can help prevent and control many diseases and conditions (National Institute of Health, 2014). Those who have a BMI at a recommended weight level may be at lower risk of developing many conditions and a variety of diseases (National Institute of Health, 2014). Those who are categorized as overweight or obese are at higher risk of developing serious health conditions; including heart disease, high blood pressure, type 2 diabetes, gallstones, breathing problems, and certain cancers, and many others just to mention a few (National Institute of Health, 2014).

The results from having a high BMI has a negative effect to one's health and should make it a top priority. Through past decades, Body Mass Index (BMI) has steadily increase, which has made it one of the greatest health concerns. Unfortunately, African American freshman college students' BMI has increased so significantly that they have higher rates of obesity and is more likely to be obese than their counterparts (Larsen, Ouwens, Engels, Eisinga, & van Strien, 2008; Cluskey, & Grobe, 2009; Cohen, Signorello, & Blot, 2009; Gunnare, Silliman, & Morris, 2013). Data shows that the prevalence rates of obesity has risen from 10.5% to 18.1% for all young adults, but has increased from 13.4% to 24% for African American young adults (Overweight and Obesity, 2010). The quality of life and health of each African American college freshman can be erupted by having a high BMI. An increase of BMI is an important phenomenon that African Americans should not ignore. As such, the purpose of this study was to explore the frequency of gender and Body Mass Index (BMI) of African American Freshman College Students and to determine the difference between self-value and BMI by gender and physical activity level.

## **REVIEW OF THE RELATED LITERATURE:**

For years, BMI has been one of the greatest health concerns, but there are several factors relating to BMI. BMI is one popular factor in incorporating physical activity. Physical activity has to be incorporated in one's daily life to help improve health, including lowering BMI and improving quality of life (US Department of Health and Human Services, n.d.). In addition, a major portion of health including BMI is affected by physical activity or the lack thereof (US Department of Health and Human Services, n.d.). Physical activity is "any body movement that works muscles and requires more energy than resting (National Institute of Health, 2011). Being physically active involves a goal to steadily strive, to improve the wholeness of health, to cease risk of various health ailments and to decrease the BMI level. It is recommended that adults ages 18 and older should participate in 150 minutes of moderate-intensity activity per week (World Health Organization, 2014). If one applied and met the recommendation of being physically active, they would reap many benefits such as lowering their BMI, and maintaining a healthy body weight to reduce the risk of having chronic diseases (National Institute of Health,

2011). Moreover, “physically active people have longer life expectancy and are less likely to be diagnosed with chronic diseases” (Ainsworth & Macera, 2010).

In 2012, over one-third of adolescents ages 12-19 had a BMI of 25% and beyond including a BMI higher than 30% (Ogden et al., 2014; Centers for Disease Control and Prevention, 2014A). Jeffrey Arnett (2000) strongly believes that when young people are transitioning from adolescence to adulthood, they begin to develop behaviors that carry over into adulthood (Arnett, 2000). This is an extreme issue because that would mean that over one-third obese young adults in 2012 may develop health complications over time that could exist while they are adults. Furthermore, obese young adults are more likely to become obese adults (Biro & Wien, 2010).

The CDC reports that how one value themselves is considered as a barrier of physical activity (Centers for Disease Control and Prevention, 2011). Some may feel as though they are satisfied with themselves and as a result, disregard their health. Fennell states that self-efficacy is “a reflection of central beliefs about the self” (CDC, 2011, p. 236). If one is highly satisfied with them and value themselves positively, this could dictate if they consider maintain proper weight. If self-value affects the physical activity level, it could affect the BMI level as well. This study will contribute to further knowledge on this issue.

Being physically active may benefit the body in numerous ways, but many Americans do not meet the physical active criteria (National Institute of Health, 2011). In 2008, men (52.1%) were more likely than women (42.6%) to meet the Physical Activity Guidelines for aerobic activity, while only 48% of adults as a whole met the guidelines (Centers for Disease Control and Prevention, 2014B; World Health Organization, 2014). Although almost half met the criteria, only 17.3% of non-Hispanic black adults successfully met the Physical Activity Guidelines for aerobic and muscle-strengthening activity compared to their non-Hispanic white counterparts at 22.8% (Centers for Disease Control and Prevention, 2014B). Thus, studies have shown that African Americans are more likely to have or develop diabetes, high blood pressure, and cardiovascular disease than any other race (Kurian & Cardarelli, 2007; Centers for Disease Control and Prevention, 2014C; National Institute of Health, 2012; U.S. Department of Health & Human Services, 2001).

Consequently, all can be managed by physical activity. A second point, there are 37.9% of African American males average age of 20 who are obese and 39.9% that have hypertension (Centers for Disease Control and Prevention, 2014D). Also, there are 57.6% of African American females’ average age of 20 who are obese and 44.5% that has hypertension (Centers for Disease Control and Prevention, 2014D). The rates of chronic diseases occurring in the lives of African Americans are related to the lack of physical activity levels of African Americans

(World Health Organization, 2014). Moderate amounts of physical activity seems to be absent in the daily lives of most African Americans because only 36% of African Americans reported to be physically active consistently (Whitt-Glover, Taylor, Heath & Macera, 2007). Nevertheless, if more African Americans would consistently participate in physical activity, not only will they lower their BMI, but there may be a chance of not developing chronic diseases more frequently than other races because physical activity aids in controlling chronic diseases (National Institute of Health, 2011).

### **PURPOSE OF STUDY:**

The purpose of this study was to explore the frequency of gender and Body Mass Index (BMI) of African American Freshman College Students and to determine the difference between self-value and BMI by gender and physical activity level.

### **BODY MASS INDEX BY GENDER:**

There should be an extreme urgency to decrease BMI levels among the African American freshman college population because it have been concluded that the first year in college is the starting point for high rates in overweight and obesity (Racette, Deusinger S.S., Strube, Highstein & Deusinger R.H., 2008). To improve and maintain healthier weight status and to decrease high numbers of BMI for college students, the American College Health Association created the Healthy Campus 2010 objectives (American College Health Association 2002; American College Health Association 2012). The main focus of the objective targeted overweight individuals and individuals lacking physical activity and fitness (American College Health Association 2002; American College Health Association 2012). This strategic operation was implemented as designed, however BMI and physical activity levels of college students were still not meeting the criteria for the set objectives (Deng & Castelli, 2011).

The goal for vigorous physical activity objective was to have 55% of students being active for least three times per week (Deng & Castelli, 2011); nevertheless the goal displayed a huge deficit. Unfortunately, only 26% of students participated in moderate physical activity and 17.5% in vigorous physical activity. This made it extremely difficult to decrease BMI levels. The number of overweight and obese students did not decrease to the target percentage of 16 %; instead, it was nearly 30% (Deng & Castelli, 2011). Moreover, health conditions will only become more of a problem if the lack of decreasing BMI continues to exist. This study will hopefully encourage African American freshman college students to engage in recommended physical activity levels.

The transition of becoming a freshman in college is a radical point of time where the risk of weight gain is significantly higher than any other period of time (Ferrara, 2009). College freshmen may undergo an abundance of experiences that are unknown to them during their first year in college. Besides the plethora of experiences, the popular “Freshman 15” could be a part of the adapted experiences. The well-known “Freshman 15” is the idea that freshman students gaining fifteen pounds during their first year of college (Vella-Zarb & Elgar, 2009). Gaining fifteen pounds means that there may be an increase in BMI. It has been noted that the “Freshman 15” is overestimated or exaggerating (Vella-Zarb & Elgar, 2009), however, there is a chance that freshman students still may gain weight. Whether they gain a significant amount of weight or not, it is still extremely important to identify those students who may be at risk for health conditions due to weight gain and current high BMI levels. (Gillen & Lefkowitz, 2011).

Investigating the BMI of African American females during freshman year of college is significant because data identifies African American females having high BMI rates and high risk for being overweight and obese (Larsen, Ouwens, Engels, Eisinga, & Van Strien, 2008; Cohen, Signorello, & Blot, 2009; Gunnare, Silliman, & Morris, 2013). In fact, African American females have the highest rates of being overweight or obese compared to other groups in the U.S (The Office of Minority Health, 2013). Furthermore, four out of five African American women are overweight or obese (The Office of Minority Health, 2013). In 2011, African American women were 80% more likely to be obese than their Non-Hispanic and White counterparts (The Office of Minority Health, 2013). The idea that African American women are leading in rates of obesity should initiate counteract. Identifying the BMI for African American college women should be diligently sought to determine how to solve this problem of high rates of obesity frequently. This study will aid in identifying the BMI of African American freshman college women and contribute to solutions.

Although other studies have not reported 20 pounds per year in African American college women (Larsen, Ouwens, Engels, Eisinga, & van Strien, 2008; Cohen, Signorello, & Blot, 2009; Gunnare, Silliman, & Morris, 2013), they are still leading in obesity rates as well as leading in weight gain before middle age among any other racial or ethnic groups (Rosenberg, Kipping-Ruane, Boggs, & Palmer, 2013). African American freshman college women should take precautions of what they eat along with physical activity levels entering college.

It is important for Black males who are freshmen to establish good habits to control their BMI starting their freshman year. Although health habits are likely to transition from high school to college, there is also a transition period from college and beyond. African American males who are freshman should establish their recommended BMI because it could affect them, years after their freshman year. Centers for Disease Control and Prevention states

that African American males with a higher income are more likely to be obese than those with a lower income (2014E). Although income may not be a concern the freshman year in college, it may be eventually. Ideally, most college graduates will make more money than those who do not complete or attend college. (U.S. Department of Education, 2014) If Black males complete college, chances are that they will have a higher income. Consequently, black males with a higher income are more likely to become overweight or obese (Centers for Disease Control and Prevention, 2014E). It should be relevant for the identification of African American freshman college males BMI because the aim should be to maintain a healthy BMI and develop healthy habits that are beneficial post freshman year of college. This study will give further information on African American males and their BMI.

### **SELF-VALUE & BMI BY GENDER & PHYSICAL ACTIVITY LEVEL:**

BMI may not be a concern to those who have a high value of themselves. However, just because one has a high value of themselves, does not mean that they have a recommended BMI. Moreover, the fact cannot be repelled that African Americans are already leading in conditions related to and caused by having a high BMI (National Institute of Health, 2014). This study will further explain how having a high self-value may contribute to BMI.

It may seem as though that over the years, African American college students have increased in body size. This phenomenon could result from their positive perceptions about themselves. A study released in 1994 showed that African American college women between 17 and 23 years of age reported to have a strong satisfaction with themselves than their Euro-American women counterparts (Women Health, 1994). A similar study published in 2013 also showed that African American college women have pride about themselves. (Cough, Friedman, Clemow & Ferrante, 2013). Given that they are comfortable with themselves, African American college women may not be fully cognizant of how high their BMI really is and how unhealthy they are.

Bennette and Wolin examined racial/ethnic differences existence in weight status and perception among overweight adults (Bennette, & Wolin, 2006). Participants included 3,115 overweight and obese young adult men. Weight status were self-reported and misperception was identified among respondents who reported being normal weight and underweight (Bennette, & Wolin, 2006). Unfortunately, African American males were not accurate with their weight status. Results showed that odds of misperception were higher in obese African American men compared to White men (Bennette, & Wolin, 2006). Bennette and Wolin stated that most Black males were “inaccurate” with their perception (2006). These subjects may have been highly satisfied with themselves as well and concluded that they were healthy.

Younger adults were more likely to meet the 2008 Physical Activity Guidelines; however, roughly 82.7% of African American adults did not successfully meet the Physical Activity Guidelines for aerobic and muscle-strengthening activity (Centers for Disease Control and Prevention, 2014B). Also, students who are average age of 20 were less likely to participate in aerobic activity and less likely to engage in strength training activities (Huang, Harris, Lee, Nazir, Born, Kaur, 2003). More surprisingly, physical activity levels tend to decrease between high school and college (Pullman, Masters, Zalot, et al., 2009). Since weight can be controlled by physical activity, this implies that African American college freshman should become fully aware of their weight by maintaining the recommended physical activity levels.

Raynor and Jankowiak (2010) states that “a physically inactive lifestyle that develops during young adulthood (ages 18 – 25), may endure throughout the lifespan” (Raynor & Jankowiak, 2010). In addition, physical inactivity has been found to affect BMI (World Health Organization, 2014); therefore it is essential that African American college freshman participate in the recommended physical activity levels. Given that habits have been found to carry over to adulthood (Arnett, 2000), the habit of being physically active should be properly implemented.

It was determined that fewer overweight people during the National Health and Nutrition Examination Survey (NHANES 1999–2004 survey) perceived themselves as overweight when compared to overweight people during the NHANES III survey, however, the change in distortion between the survey periods was greatest among African American males (Johnson-Taylor, Fisher, Hubbard, Starke-Reed & Eggers, 2008). Indications also showed that there may be a trend for African American males to have a good value about themselves but are overweight (Johnson-Taylor, Fisher, Hubbard, Starke-Reed & Eggers, 2008). African American college freshmen males, indeed, must not develop this trend because BMI is determined by weight and if they misperceived their weight, they may not take action to decrease their BMI.

Although self-value may affect one’s weight, overweight and obesity rates are still on the rise and part of the solution is to become physically active (US Department of Health and Human Services, n.d.). Wengreen & Moncur (2009) found that those who gained weight during the first 6 months of college have decreased levels of physical activity during the first 3 months of college (Wengreen & Moncur, 2009). However, while being physically active may play a significant role during the freshman year of college, African American college freshman may not be engaging in the recommended amount of physical activity.

It should behoove African American college freshmen to be cognizant of their physical activity level because it controls their BMI. Developing the habit of being physical active decreases the chances of many health conditions (National Institute of Health, 2011). They should be aware that being physically active beginning freshman year is significant due to the fact that African Americans are already leading in many categories of the propensity of developing a plethora of varies health ailments (Kurian & Cardarelli, 2007; Centers for Disease Control and Prevention, 2014C/D; National Institute of Health, 2012; U.S. Department of Health & Human Services, 2001). The purpose of this study is to explore the frequency of gender and Body Mass Index of African American Freshman College Students and to determine the difference between self-value and BMI by gender and physical activity level.

## **METHODOLOGY:**

### **Data source**

This quantitative non-experimental descriptive statistical secondary data analysis was conducted using a sample of African American college freshman at a HBCU in the south region of the U.S. These analyses used data drawn from the primary study Behaviors Related to Cancer Risk among African-American College Students, funded by the National Institute of Health grant number: 1 R03 CA171835. This data was collected in Fall 2013 on a HBCU campus. The data analysis provided a better understanding of factors contributing to BMI among college freshman students.

### **Research Questions:**

This research was guided by the following research questions and hypotheses:

**Research Question 1:** What is the frequency of Body Mass Index among males and females students?

**Research Question 2:** What is the difference between self-value and BMI by gender and physical activity level?

### **Research Hypotheses:**

**Hypothesis 1:** Female students will have a higher BMI than male students.

**Hypothesis 2:** There is a difference between self-value and BMI and physical activity level among male and female students.

**Procedures:**

This cross sectional study used data collected from a survey use to explore behaviors related to cancer risk among African-American college students. The primary data collection included recruitment by the researchers of the study. The research team conducted recruitment by email, and flyer advertisement and face to face recruitment. Researchers as well as the emails, flyers and face-to-face recruitment informed the participants the details and purpose of the primary study. Prospective participants were informed that their information that they reported would be confidential. Furthermore, they were also informed that following their completion of the survey, they would receive a \$20 gift card.

This study was approved by the Institution Research Board of Prairie View A&M University before any research is conducted, after receiving IRB approval, the data was cleaned prior to analyzing. This research used a sample population of male (N=92) and female (N=153) African American college freshmen (N=245). From the primary data collection, this research drawn data from items geared around socio-demographics, general health, and mental health. Any variables that were in the primary study but was not related to this study was eliminated.

**Participants:**

Participants from the primary data included 329 African American male and female college freshman students at a HBCU in the south region area of the U.S. These participants was recruited as part as Cancer Awareness Project (Project CAP). Eligible students for this study were first time freshman between the ages of 18-25.

This secondary data analysis used a sample of 245 African American male (N=92) and female (N=153) college freshman students at a HBCU from the primary data. These participants was African American first time freshman college students between the ages of 18-25.

**Instrument:**

The purpose of the primary research study is to assess the incidence of cancer-related health risk behaviors and the role of culturally-based social and environmental factors in the adoption of those behaviors, among African American freshman students enrolled at Prairie View A&M University. The study included 57 questions of:

- Demographics: Race/ethnicity, gender, age, college enrollment, class standing, program of study, education level, sexual orientation, relationship status, income status, parental income status;

- Contextual factor: campus life; General Health: Overall health, health insurance, health services, safety, weight, physical activity, nutrition;
- Health Risk Behaviors: Cigarette use, Alternate tobacco products, alcohol use, marijuana use, illicit drug use;
- Sexual Risk--Taking Behavior: Sexual partners, sexual activity, condom use;
- Mental Health: Depressive Symptomology Scale, Stress Scale, Health Services; Internet Usage: how often use internet, number of times, internet sources;
- Culture-based measures: Describe measures that may have some relevance to minorities and low SES populations and has been used to describe negative health risk behaviors (Discrimination, Racial Identity, Religiosity, Coping);
- African-Cultural Coping System Inventory: Perceived support, Academic Self-efficacy (College Adjustment, College Commitment, Future and Present Orientation);
- Neighborhood Influences, Social Support (Support Networks, Social Cohesion, Resiliency).

The purpose of this study is to explore factors connected to Body Mass Index among African American college students at a Historically Black College and University. Secondary data derived from 27 questions including: Socio-Demographics: gender, height and weight; General Health: health insurance, physical activity, and nutrition; Value; Mental Health: Perceived Stress Scale.

## MEASUREMENTS:

**Gender:** One question was used to determine the gender of the participants. An example of this question is: “What is your gender? (a. Male b Female).

**Body Mass Index (height and weight):** Two questions was used to determine Body Mass Index BMI. Self-reported height and weight was calculated to determine BMI using the formula  $\text{Body Height weight (in (.)lbs}^2) \times 703$ . An example of these questions are: “What is your current height?” ( \_ Ft. \_ \_ in.). “What is your current weight?” ( \_ \_ \_lbs.). Overweight is defined as having a BMI of 25.0 and over and obesity is defined as having a BMI of 30.0 and over.

**Physical activity:** Two items indicated physical activity level. Respondents stated the amount of days they were physically active. An example of this question is: “During the past 7 days, how, many days were you do moderate-intensity cardio or aerobic exercise (caused a noticeable increased in heart rate, such as a brisk walk) for a

total of at least 30 minutes per day?" (a. 0 days; b. 1 day; c. 2 days; d. 3 days; e. 4 days; f. 5 days; g. 6 days; h. 7 days). Physically active was defined as - those who participated in physical activities at least 150 minutes per week. Not physically active was defined as- those who participated in no physical activities or less than 150 minutes per week. The lower the number of days being physically active indicated that the participant participated in the least amount of daily physical activity. Meanwhile the higher the number of days being physically active indicated the participant participated in the most amount of physical activity level. Although the two items are significantly correlated, the absolute value is not high enough to support using only one item or merging both items together. Therefore, for statistical analyses involving physical activity levels, both variables was analyzed individually.

**Self-value:** There were be six items use to measure self-value. These items are will be indicated using a scale. Examples are: On the whole, I am satisfied with myself (1 Exactly true, 2 Moderately true, 3 Barely true, 4 Not true at all); At times, I think I am no good at all (1 Exactly true, 2 Moderately true, 3 Barely true, 4 Not true at all) I feel that I have a number of good qualities (1 Exactly true, 2 Moderately true, 3 Barely true, 4 Not true at all). Coding for the scores consisted of "3 points for Exactly true, 2 point for Moderately true, 1 points for Barely true, and 0 points Not true at all." Some items required reverse coding which consisted of 0 points for Exactly true, 1 point for Moderately true, 2 points for Barely true, and 3 points Not true at all." The scores was added to determine self-value and the sum will give the indication of high or low self-value. Self- value is defined as satisfaction, fulfillment and positive functioning. The Cronbach's alpha reliability was .674. The internal consistency reliability test for self-value items was acceptable as well as merging the items into a single variable was acceptable.

## RELIABILITY AND VALIDITY

The dependent variables for this study were Body Mass Index, Self-Value, and Perceive Stress level. The independent variable for this study were physical activity level, gender, healthcare and nutritious food consumptions. The Cronbach's alpha reliability for this study was .742. Reliability measures the consistency of the test. This study is validity because this study is proven to be valid in other studies from which instrument was drawn (Cohen et al., 1983; Brown et al., 2010.; ACHA, 2011). Validity measures whether if a test is measuring what it is designed to measure.

## RESULTS:

This chapter describes results from the quantitative secondary data analysis derived from the study Behaviors Related to Cancer Risk among African-American College Students. The results of this study are based on a representative sample of African American male (N=92) and female (N=153) college freshman (N= 245) 18-

25 years of age at a HBCU in the rural south. The results are based on data geared around socio-demographics, general health, and mental health variables. The results of this study address the three research questions and hypothesis:

**Research Question 1:** What is the frequency of Body Mass Index among males and females students?

**Research Question 2:** What is the difference between Self-Value and BMI by gender and physical activity level?

**Research Hypothesis**

**Hypothesis 1:** Female students will have a higher BMI than male students.

**Hypothesis 2:** There is a difference between perceived weight and BMI and physical activity level among male and female students.

Participants for this secondary data analysis consisted of a sample of 245 male (N=92) and female (N=153) students at a HBCU in a rural area. Frequency distribution was used to asses BMI of male and female students. Participants responded to their gender by selecting male, female or other. One participant classified himself or herself as other, however that person was not included because this study only focus on males and females. BMI was calculated using the formula  $\text{BMI} = \frac{\text{Body weight (in lbs)} \times 703}{\text{Height}^2}$  using self-reported height and weight. This formula was used to calculated BMI in excel, then BMI was imported to SPSS. Table 1 shows BMI by gender. Majority of the entire sample were normal weight (N=118), followed by overweight (N= 75), and obese (N=47). There were more female students classified as overweight (N=50) than male students (N=25). In addition, there were more female students obese (N=34) opposing to male students (N=13). Table 1 provides an overview of BMI by gender.

**Table 1**

BMI_category	Underweight	Count	Male	Female	Total
			2	3	5
	(BMI<18.5)				
	% within BMI_category		40%	60%	100%
	% within What is your gender		2%	2%	2%
	Normal	Count	52	66	118
	(BMI 18.50-24.99)				

	% within BMI_category	44%	56%	100%
	% within What is your gender	57%	43%	48%
Overweight	Count	25	50	75
(BMI 25-29.99)				
	% within BMI_category	33%	67%	100%
	% within What is your gender	27%	33%	31%
Obese	Count	13	34	47
(BMI > 35)				
	% within BMI_category	18%	72%	100%
	% within What is your gender	14%	22%	19%
Total	Count			245
	% within BMI_category	38%	62%	100%
	% within What is your gender	100%	100%	100%

Objective 2 is to determine the difference between self-value and BMI by gender and physical activity level. Variables used for this objective consisted of self-value scale, general health: physical activity level, and socio-demographics to determine BMI by gender. A T-test was used to determine if there was a difference in BMI and self-value by gender. Only males and females were included in this analysis. ‘Other’ was excluded as there was only one case in this group. There is no significant difference in self-value and BMI by gender. Table 2 and 3 provides an overview.

A One-way ANOVA was used to test for a difference in BMI by Level of Moderate-intensity Exercise. There was significant difference in BMI by level of moderate-intensity exercise. Both the Bonferroni-corrected test and Tukey test indicate a significant difference in bmi between those who do those who not engage in moderate-intensity exercise and those who engage in moderate-intensity exercise 3 to 5 days a week. Table 4 provides an overview.

**Table 2**

		N	Mean
BMI	Male	92	25.4041
	Female	153	26.55554
Self Value	Male	88	3.2098
	Female	147	3.2551

**Table 3**

		Sig.	t	Sig. (2-tailed)
bmi	Equal variances assumed	.136	1.605	.110
	Equal variances not assumed			.104
SelfValue	Equal variances assumed	.666	1.635	.542
	Equal variances not assumed			.544

**Table 4**

	N	Mean	Std. deviation
0 days	65	27.4446	7.04170
1-2 days	71	26.2639	5.37867
3-5 days	61	24.6432	3.76635
6-7 days	42	26.0464	4.30974
Total	239	26.1331	5.44653



		Sum of Square	df	Mean Square	F	Sig
	Between groups	248.737	3	82.912	2.861	.038
	Within Groups	6811.455	235	28.985		
	Total	7060.192	238			

  

			Mean Difference	Std. Error	Sig.
Tukey HSD	0 days	1.50	1.18072	.92421	.578
		4.00	2.80138*	.95973	.020
		6.50	1.39821	1.06585	.556
	1-2 days	.00	-1.18072	.92421	.578
		4.00	1.62066	.93989	.313
		6.50	.21748	1.04802	.997
	3-5 days	.00	-2.80138*	.95973	.020
		1.50	-1.62066	.93989	.313
		6.50	-1.40318	1.07948	.564
	6-7 days	.00	-1.39821	1.06585	.556
		1.50	-.21748	1.04802	.997
		4.00	1.40318	1.07948	.564
Bonferroni	0 days	1.50	1.18072	.92421	1.000
		4.00	2.80138*	.95973	.023
		6.50	1.39821	1.06585	1.000
	1-2 days	.00	-1.18072	.92421	1.000
		4.00	1.62066	.93989	.023
		6.50	.21748	1.04802	1.000
	3-5 days	.00	-2.80138*	.95973	.023
		1.50	-1.62066	.93989	.516
		6.50	-1.40318	1.07948	1.000
	6-7 days	.00	-1.39821	1.06585	1.000
		1.50	-.21748	1.04802	1.000
		4.00	1.40318	1.07948	1.000

\*. The mean difference is significant at the 0.05 level.

One-way ANOVA to Test for a Difference in BMI by Level of Strength Training Exercise. There is no significant different in BMI by level of strength training exercise. Table 5 provides an overview.

**Table 5**

	N	Mean	Std. Deviation
0 days	116	26.4474	6.37892
1-2 days	56	25.6991	4.37507
3-5 days	49	25.5868	4.23699
6-7 days	16	27.5551	4.97983
Total	237	26.1674	5.45963

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	68.702	3	22.901	.766	.514
Within Groups	6965.877	233	29.896		
Total	7034.579	236			

**Table 6**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
3 (Constant)	25.226	1.077	23.432	.000	
What is your	-.431	.382	-.079	-.126	.261
BMI	-.019	.035	-.038	-.541	.589

**Table 7**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
4 (Constant)	24.761	.649	38.150	.000	
What is your	-.435	.382	-.079	-1.140	.256
gender					

## DISCUSSION AND CONCLUSION

The purpose of this study is to explore factors associated with Body Mass Index among African American college freshman at a Historically Black College and University. Many health complications resulted from having a high BMI classified as overweight or obese. Furthermore, having a high BMI, African American Freshman College students have higher rates of overweight and obesity and is more likely to be overweight and obese than their counterparts (Gunnare, Silliman, & Morris, 2013). African American college freshman may experience unhealthy occasions that can affect their BMI.

Hypothesis 1 of this study states that females would have a higher BMI than males and the findings of this study shows that there were more females with a higher BMI than males. Both the hypothesis and findings are consistent with other studies regarding high BMIs for females (Cohen, Signorello, & Blot, 2009; Gunnare, Silliman, & Morris, 2013; Centers for Disease Control and Prevention, 2014D). In the United States, obesity is still on the rise. This can lead to serious health ailments such as many chronic illnesses and death. African Americans already have higher BMI rates and chronic illnesses than any other group (Centers for Disease Control and Prevention, 2014D; Gunnare, Silliman, & Morris, 2013; Ogden et al., 2014). Interventions should consider focusing on the population that are normal weight but with a BMI between 22-24 because these populations are close to being overweight.

Findings of this study also indicated that there was a significant difference between BMI and physical activity level. These finding are consisted to other findings in regards of physical activity is a significant factor to BMI (Rimmer et al., 2010; Ainsworth & Macera, 2010; Watkinson et al., 2010; Wi-Young et al., 2012). Physical activity should be incorporated in the lives of African American freshman college students. These individuals face decisions during freshman year that may impact their health such as inadequate physical activity level. This can lead to obesity and health ailments that are deadly.

## LIMITATIONS OF THE STUDY

Several limitations were encountered in this study. One limitation of this study is that there was self-reported height and weight was used in this study. It was previously shown by Graves and Adams (2009) that college-aged males and females tend to over-report heights. BMI is based off of height and weight measurements, and inaccuracies can affect BMI calculations.

Another limitation is the use of BMI. BMI may not be accurate for those with high amounts of muscle (Centers of Disease Control and Prevention, 2015). Thus, BMI may over- or underestimate overweight or obesity in these types of people muscle. Although BMI may be considered an alternative for direct measures of body fat, it is moderately known as a reliable indicator of body fatness for most people (“About BMI for Adults,” 2011). However, according to the CDC, BMI does not measure body fat directly (“About BMI for Adults,” 2011), nevertheless research indicates that BMI is associated directly to measures of body fat (Mei et al., 2002). Another limitation to this study was a convenience sample was used to recruit participants in the original study. Using a convenience sample makes it difficult to describe the population from which the sample was drawn and the results are less likely to be generalizable to the entire population (Gay et al., 2009). Lastly, self-reported questionnaires may cause participants to select responses that they feel are acceptable to society rather than reporting the truth.

### **IMPLICATIONS FOR FUTURE STUDIES**

Implications of this study, based on the discrepancy of total number of males and females, a focus need to be placed on recruitment of a larger population of males as to balance the scale of measurements. There was a discrepancy between the number of male and female students. Increasing the number of males will give a better equivalent for future studies. In addition, there need to be a further look into BMI and the number of days of being physically active. This study showed that those who were overweight were physically active for 0 days per week, while those who were normal weight were physically active for 3-5 days per week. Lack of physical activity is a major cause for overweight and obesity. More interventions should accommodate and target those who are not physically active. The implications of this study should eventually bring some positive social changes to students in African American Freshman College Students at a Rural HBCU and possibly beyond.

### **RECOMMENDATIONS FOR FUTURE STUDIES**

Based on the current results and findings, more focus need to be placed on the African American female population. Although there were no significant difference between females and males, they had higher BMIs than males. Investigating the BMI of African American females during freshman year of college is significant because other studies identifies African American females having high BMI rates and high risk for being overweight and obese (Larsen, Ouwens, Engels, Eisinga, & van Strien, 2008; Cohen, Signorello, & Blot, 2009; Gunnare, Silliman, & Morris, 2013). In fact, African American females have the highest rates of being overweight or obese compared to other groups in the U.S (The Office of Minority Health, 2013). There should be interventions tailored for African American freshman women. Their BMI average was 25.19, meaning on average, they were overweight; therefore,

interventions applications to decrease the BMI levels of African American freshman woman are highly suggested to future studies.

## ACKNOWLEDGMENT

We thank National Institute of Health (NIH) for grant number: 1 R03 CA171835 which made this study possible. We also want to use this opportunity to thank “Prairie View A&M University Prairie View, TX, USA” research collaborative teams; due to their unequivocal assistances in completing this social scientific public health research study successfully.

## CONFLICT OF INTEREST

We shared no conflict of interests in this study.

## REFERENCES

1. Ainsworth, B., & Macera, C. (2010). Physical Activity. Chronic Disease Epidemiology and Control: *American Public Health Association*.
2. American College Health Association. (2012). *Healthy Campus*. American College Health Association. Retrieved from <http://www.acha.org>.
3. American College Health Association – Task Force on National Health Objectives (2002). *Healthy campus 2010: Making it happen*. Retrieved from <http://www.acha.org/topics/hc2010.cfm>.
4. Arnett, J. J. (2000). Emerging Adulthood. *Am Psychol*. 55(5):469-480.
5. Barrington, W. E., Ceballos, R. M., Bishop, S. K., McGregor, B. A., Beresford, S. A. A. (2012). Perceived Stress, Behavior, and Body Mass Index Among Adults Participating in a *Worksite Obesity Prevention Program*. *Prev Chronic Dis*. 9:120001. DOI: <http://dx.doi.org/10.5888/pcd9.120001>
6. Bennette, G., & Wolin, K. (2006). Satisfied or unaware? Racial differences in perceived weight status. *International Journal of Behavioral Nutrition and Physical Activity*. 3(40) doi:10.1186/1479-5868-3-40
7. Biro, F. M., Wien, M. (2010). Childhood obesity and adult morbidities. *Am J Clin Nutr*. 91(5):1499S-1505S
8. Blixen, C., Singh, A., Meng, Edward Mascha, X., Thacker, H., & Mascha, E. (2006). What Women want: Understanding obesity and preferences for primary care weight reduction interventions among African-American and Caucasian women. *Journal of National Medicine Association*, 98(7), 1160–1170. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2569457/?page=2>

9. Block, J., He, Y., Zaslavsky, A., Ding L., & Ayanian, J. (2009). Psychosocial Stress and Change in Weight Among US Adults. *Am. J. Epidemiol.* 170 (2):181-192. doi: 10.1093/aje/kwp104
10. Boyle J. R., LaRose, N. R. (2003). Personal beliefs, the environment and college students' exercise and eating behaviors. *American Journal of Health Studies.* 52(2).
11. Brunt, A., Rhee, Y., Zhong, L. (2008). Differences in dietary patterns among college students according to body mass index. *J Am Coll Health.* 56(6):629-634 doi:http://www.ncbi.nlm.nih.gov/pubmed/18477517
12. Centers for Disease Control and Prevention. (2011). Overcoming Barriers to Physical Activity. *Centers for Disease Control and Prevention.* Retrieved , from [http://www.cdc.gov/physicalactivity/everyone/getactive/barriers.html\(B\)](http://www.cdc.gov/physicalactivity/everyone/getactive/barriers.html(B))
13. Centers for Disease Control and Prevention. (2013A). Black or African American Population. *Centers for Disease Control and Prevention.* Retrieved from <http://www.cdc.gov/nchs/hus/black.htm>
14. Centers for Disease Control and Prevention. (2014A). Obesity and Overweight. *Centers for Disease Control and Prevention.* Retrieved from <http://www.cdc.gov/nchs/fastats/obesity-overweight.htm>
15. Centers for Disease Control and Prevention. (2014B). Some Americans are getting enough, but too many are not. *Centers for Disease Control and Prevention.* Retrieved from <http://www.cdc.gov/physicalactivity/data/facts.html>
16. Centers for Disease Control and Prevention, (2014C). American Heart Disease Burden. *Centers for Disease Control and Prevention.* Retrieved from <http://www.cdc.gov/heartdisease/facts.htm>
17. Centers for Disease Control and Prevention. (2014D). Health of Black or African American non-Hispanic Population. (2014). *Centers for Disease Control and Prevention.* Retrieved from <http://www.cdc.gov/nchs/fastats/black-health.htm>
18. Centers for Disease Control and Prevention, (2014E). Overweight and Obesity. *Centers for Disease Control and Prevention.* Retrieved from website: <http://www.cdc.gov/obesity/data/adult.html>
19. Cluskey, M., & Grobe, D. (2009). College weight gain and behavior transitions: Male and female differences. *Journal of the American Dietetic Association*, 109(2), 325-329. doi:http://dx.doi.org/10.1016/j.jada.2008.10.045
20. Cohen, S. S., Signorello, L. B., & Blot, W. J. (2009). Adult weight gain and diabetes among African American and white adults in southeastern US communities. *Preventive Medicine*, 49(6), 476-481. doi:http://dx.doi.org.ezproxy.pvamu.edu/10.1016/j.ypmed.2009.10.010
21. Collins, J., & Bentz, J., (2009). Behavioral and Psychological Factors in Obesity. *Journal of Lancaster Gen Hosp.* 4(4). Retrieve from <http://www.jlgh.org/Past-Issues/Volume-4---Issue-4/Behavioral-and-Psychological-Factors-in-Obesity.aspx>

22. Cough, M., Friedman, A., Clemow, L., & Ferrante, J. (2013). Women weigh in: Obese African American and white women's perspectives on physicians' roles in weight management. *Journal of American Board of Family Medicine*, 26(4), 421-428.
23. DeBate RD, Topping M, Sargent R. (2001). Racial and gender differences in weight status and dietary practices among college students. *Adolescence*. 36(144):819-833. doi: <http://www.ncbi.nlm.nih.gov/pubmed/11928885>
24. DeNavas-Walt, C., Bernadette, D., Proctor., Smith, J. C., & U.S. Census Bureau, (2013). Current Population Reports, Income, Poverty, and Health Insurance Coverage in the United States: 2012. Pg 60-245 Retrieved from <http://www.census.gov/prod/2013pubs/p60-245.pdf>
25. Department of Health and Human Services. (2009). State Indicator Report on Fruits and Vegetables, 2009 Centers for Disease Control and Prevention. doi: <http://www.cdc.gov/nutrition/downloads/StateIndicatorReport2009.pdf>
26. Deng X, & Castelli, D. (2011). University students meeting the recommended standards of physical activity and body mass index. *J Res. Health Phys. Educ.* 6(1):20-26. Retrieved from: <http://eric.ed.gov/?id=EJ936016>
27. DiGioacchino, R. F., Sargent, R. G., & Topping, M. (2001). Body dissatisfaction among white and African American male and female college students. *Eating Behaviors*, 2(1), 39-50. doi:[http://dx.doi.org.ezproxy.pvamu.edu/10.1016/S1471-0153\(00\)00022-2](http://dx.doi.org.ezproxy.pvamu.edu/10.1016/S1471-0153(00)00022-2)
28. Duncan, D., Wolin, K., Scharoun-Lee, M., Ding, E., Warner E., & Bennett, G. (2011). Does perception equal reality? Weight misperception in relation to weight-related attitudes and behaviors among overweight and obese US adults. *International Journal of Behavioral Nutrition and Physical Activity*, 8:20 doi:10.1186/1479-5868-8-20
29. Erinosh, T.O., Oh, A. Y., Moser, R. P., Davis, K. L., Nebeling, L. C., Yaroch, A. L. (2011). Association between the perceived food environment and self-efficacy for fruit and vegetable consumption among US adults, 2007. *Prevention Chronic Disease*.
30. Fennell, M. (2005). Low Self-Esteem. *Encyclopedia of Cognitive Behavior Therapy*. (pg. 236-240) Springer US.
31. Ferrara, Cynthia. (2009). The College Experience: Physical Activity, Nutrition, And Implications For Intervention For Future Research. *Journal of Exercise Physiology*. 12(1).
32. Fowler-Brown, A. G., Bennett, G. G., Goodman, M. S., Wee, C. C., Corbie-Smith, G. M., & James, S. A. (2009). Psychosocial stress and 13-year BMI change among blacks: *The pitt county study*. *Obesity*, 17(11), 2106-2109. doi:10.1038/oby.2009.130

33. Gillen M., & Lefkowitz, E. (2011). The “freshman 15”: Trends and predictors in a sample of multiethnic men and women. National Institute of Health. Retrieved from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3208822/>
34. Gunnare, N. A., Silliman, K., & Morris, M. N. (2013). Accuracy of self-reported weight and role of gender, body mass index, weight satisfaction, weighing behavior, and physical activity among rural college students. *Body Image*, 10(3), 406-410. doi:<http://dx.doi.org/10.1016/j.bodyim.2013.01.006>
35. Huang, T. T., Harris, K. J., Lee, R.E., Nazir, N, Born, W, Kaur, H. (2003). Assessing overweight, obesity, diet, and physical activity in college students. *J Am Coll Health*. 52(2):83-86. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/14765762>
36. Johnson-Taylor, W., Fisher, R., Hubbard, V., Starke-Reed, P., Eggers, P. (2008). The change in weight perception of weight status among the overweight: comparison of NHANES III (1988–1994) and 1999–2004 NHANES. *International Journal of Behavioral Nutrition and Physical Activity*. 5(9) doi:10.1186/1479-5868-5-9
37. Kasperek, D. G, Corwin, S. J., Valois, R. F., Sargent, R. G., Morris, R. L. (2008) Selected health behaviors that influence college freshman weight change. *J Am Coll Health*. 56(4):437-444. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/18316289>
38. Kurian, A. K., & Cardarelli, K. M. (2007). Racial and ethnic differences in cardiovascular disease risk factors: a systematic review. *National Institute of Health*. 17(1). Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/17274224>
39. Larsen, J. K., Ouwens, M., Engels, R. C. M. E., Eisinga, R., & van Strien, T. (2008). Validity of self-reported weight and height and predictors of weight bias in female college students. *Appetite*, 50(2-3), 386-389. doi:<http://dx.doi.org/10.1016/j.appet.2007.09.002>
40. McCabe-Sellers, B., Bowman S., Stuff, Champagne, Simpson & Bogle. (2007). Assessment of the diet quality of US adults in the Lower Mississippi Delta. *Am J Clin Nutr*. 86(3) 697-706. doi:<http://ajcn.nutrition.org/content/86/3/697.full>
41. Mihalopoulos, N. L., Auinger, P., Klein, J. D. (2008). The freshman 15: Is it real? *J Am Coll Health*. 56(5):531-533. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/?term=The+freshman+15%3A+Is+it+real%3F>
42. National Institute of Health. (2011). What Is Physical Activity? National Institute of Health. Retrieved from <http://www.nhlbi.nih.gov/health/health-topics/topics/phys/>
43. National Institute of Health. (2012). Who is at risk for High Blood Pressure? Retrieved from <http://www.nhlbi.nih.gov/health/health-topics/topics/hbp/atrisk.html>

44. National Institutes of Health. (2012a). What causes overweight and obesity? *National Institutes of Health*. Retrieved from website: <http://www.nhlbi.nih.gov/health/health-topics/topics/obe/causes.html>
45. National Institute of Health. (2014). Why is Healthy weight important? *National Institute of Health*. Retrieved from [http://www.nhlbi.nih.gov/health/public/heart/obesity/lose\\_wt/index.htm](http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/index.htm)
46. Nguyen-Rodriguez, S. T., Chou, C., Unger, J. B., & Spruijt-Metz, D. (2008). BMI as a moderator of perceived stress and emotional eating in adolescents. *Eating Behaviors*, 9(2), 238-246. doi:<http://dx.doi.org/10.1016/j.eatbeh.2007.09.001>
47. Ogden, C. L., Carroll, Kit B. K., Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association*. 311(8):806-814.
48. O'Neil, A., Williams, E., Browne, J., Horne, R., Pouwer, F., & Speight, J. (2014). Associations between economic hardship and markers of self-management in adults with type 2 diabetes: results from Diabetes MILES - Australia. *National Institute of Health*. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/24750399>
49. Overweight and obesity among African American youth. (2010). *Overweight and obesity among African American youth*. Robert Wood Johnson Foundation. Retrieved from [http://www.rwjf.org/content/dam/farm/reports/issue\\_briefs/2010/rwjf59623](http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2010/rwjf59623)
50. Pullman, A. W., Masters, R. C, Zalot, L. C, et al. (2009). Effect of the transition from high school to university on anthropometric and lifestyle variables in males. *App Physiol Nutr Metab*. 34:162-17. Retrieved from: [http://aha.the-ria.ca/PDF/Duncan\\_Transition\\_2009.pdf](http://aha.the-ria.ca/PDF/Duncan_Transition_2009.pdf)
51. Racette SB, Deusinger SS, Strube MJ, Highstein GR, Deusinger RH. (2008). Changes in weight and health behaviors from freshman through senior year of college. *J Nutr Educ Behav*. 40(1):39-42). Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/18174103>
52. Raynor DA, Jankowiak NM. (2010). Accelerometry-determined adherence to the 2008 physical activity guidelines for Americans among college students. *Am J Health Educ*. 41(6):353-362. Retrieve from <http://files.eric.ed.gov/fulltext/EJ910860.pdf>
53. Rosenberg, L., Kipping-Ruane, K. L., Boggs, D. A., & Palmer, J. R. (2013). Physical activity and the incidence of obesity in young african-american women. *American Journal of Preventive Medicine*, 45(3), 262-268. doi:<http://dx.doi.org.ezproxy.pvamu.edu/10.1016/j.amepre.2013.04.016>
54. Rimmer, JH, et al. (2010). Barrier removal in increasing physical activity levels in obese African American women with disabilities. *J Womens Health* (10):1869-76. doi: 10.1089/jwh.2010
55. Serlachius A, Hamer M, Wardle J. (2007). Stress and weight change in university students in the United Kingdom. *Physiology and Behavior*. 92:548-553.

56. Sims, R., Gordon, S., Garcia, W., Clark, E., Monye, D., Callender, C., Campbell, A. (2008). Perceived stress and eating behaviors in a community-based sample of African Americans. *Eat Behav.* 9(2):137-42. doi: 10.1016/j.eatbeh.2007.06.006
57. Sominsky L & Spencer, S. (2014). Eating behavior and stress: a pathway to obesity. *Front Psychol.* 5:434. doi: 10.3389/fpsyg.2014.00434
58. Sparling PB, Snow TK. (2002). Physical activity patterns in recent college alumni. *Res Q Exerc Sport.* 73(2):200-205. Retrieved from: <http://www.ncbi.nlm.nih.gov/pubmed/?term=Physical+activity+patterns+in+recent+college+alumni>
59. The Office of Minority Health. (2013). Obesity and African Americans. U. S. Department of Health and Human Services. Retrieved from: <http://minorityhealth.hhs.gov/templates/content.aspx?ID=6456>
60. United States Department of Agriculture Marketing Service, (2013). Food Deserts. Retrieved from website: <http://apps.ams.usda.gov/fooddeserts/foodDeserts.aspx>
61. The Office of Minority Health. (2014). U.S. Department of Health and Human Services Office of Minority Health. Retrieved from <http://minorityhealth.hhs.gov/templates/browse.aspx?lvl=2&lvlID=51>
62. U.S. Department of Education, National Center for Education Statistics. (2014). The Condition of Education 2014 (NCES 2014-083), Annual Earnings of Young Adults.
63. U.S. Department of Health and Human Services. (2001). Diabetes Disparities among Racial and Ethnic Minorities. US Department of Health and Human Services. Retrieved from <http://www.ahrq.gov/research/findings/factsheets/diabetes/diabdisp/index.html>
64. US Department of Health and Human Services. (n.d.). Physical Activity and Health: Report of the Surgeon General. US Department of Health and Human Services. Retrieved from <http://www.cdc.gov/nccdphp/sgr/pdf/execsumm.pdf>
65. Wang Y, Beydoun M. A., Caballero B., Gary, T. L., Lawrence R. (2010). Trends and correlates in meat consumption patterns in the US adult population. *Public Health Nutr.* 13(9):1333-1345. doi: 10.1017/S1368980010000224.
66. Watkinson, C, et al. (2010). Overestimation of physical activity level is associated with lower BMI: a cross-sectional analysis. *International Journal of Behavioral Nutrition and Physical Activity* 2010, 7:68 doi:10.1186/1479-5868-7-68
67. Wengreen, H.J., Moncur, C. (2009). Changes in diet, physical activity, and body weight among young-adults during the transition from high school to college. *Nutr J.* 8(32). Retrieved from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2720988/>

68. Whitt-Glover, M., Taylor, W., Heath, G., & Macera, C. (2007). Self-reported physical activity among Blacks: Estimates from national surveys. *American Journal of Preventive Medicine*, 33. Retrieved from <http://www.icpsr.umich.edu/icpsrweb/ICPSR/biblio/resources/92219?collection%5B0%5D=DATA&q=blacks+physical+activity>
69. Wi-Young So, et al. (2012). Relationships between Body Mass Index and Social Support, Physical Activity, and Eating Habits in African American University Students. doi. <Http://dx.doi.org/10.1016/j.anr.2012.10.004>
70. Women Health. (1994). Racial differences in predictors of college women's body image attitudes. *National Institute of Health*. 21(4):89-104. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/7941613>
71. World Health Organization. (2014). Physical Activity. *World Health Organization*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs385/en/>
72. Vella-Zarb RA, Elgar FJ. (2009). The 'freshman 5': A meta-analysis of weight gain in the freshman year of college. *J Am Coll Health*. 58(2):161-166.