

**Racial Differences in College Students' Dietary Intake,
Anthropometric Measures, Physical Activity, and Stress Levels**

by

Ty-anne Callie Tench

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Approved by

Onikia Brown, Chair, Assistant Professor of Nutrition, Dietetics, and Hospitality
Management

Kevin Huggins, Associate Professor of Nutrition, Dietetics, and Hospitality Management

Patricia Marincic, Director, Didactic Programs in Dietetics & Associate Professor of
Nutrition, Dietetics, and Hospitality Management

Abstract

Background: Approximately one-third of college students (33.7%) are overweight or obese. Additionally, three-fourths of American Americans are overweight or obese with higher risks of obesity-related diseases.

Objective: To determine differences in dietary intake, anthropometric measures, physical activity, and stress levels between African American and White college students using baseline data for participants of Project Young Adults Eating and Active for Health (Project Y.E.A.H.).

Methods: This is a cross-sectional, secondary data analysis of baseline data for African American (n=195) and White (n=1073) college students who attended thirteen different universities across the United States. Students were recruited using social media, newspaper advertisement, flyers, and emails through campus communication. Self-reported data on diet, physical activity, and stress levels were collected using online validated surveys completed by each participant. Height, weight, and waist circumference (WC) for all students were measured and recorded by trained study personnel. Data were analyzed using χ^2 test, t-test, and Mann Whitney U. A level of significance was reached if the p-value was equal to or less than 0.05.

Results: The sample (n=1268) consisted of 84.6% White and 68.5% female college students with a mean age of 19.35 years old. There was not a significant difference in gender, age, or year in school between African American (n=195) and White (n=1073)

students. African Americans consumed significantly less cups of fruit (1.27 ± 1.26 vs. 1.78 ± 1.28 , $p < 0.001$), vegetables (1.09 ± 1.13 vs. 1.39 ± 1.24 , $p = 0.003$), and servings of whole grains (1.59 ± 1.38 vs. 2.26 ± 1.47 , $p < 0.001$) per day. African Americans also consumed more calories from sugar sweetened beverages (SSB) (283.67 ± 391.99 vs. 139.84 ± 195.00 , $p < 0.001$) and a higher estimated percentage of energy from fat (34.33 ± 6.26 vs. 30.77 ± 4.64 , $p < 0.001$) per day. Furthermore, African Americans had significantly higher measured BMI (25.99 ± 6.08 vs. 23.99 ± 4.07 , $p < 0.001$) and WC ($85.36 \text{ cm} \pm 13.63$ vs. $82.57 \text{ cm} \pm 10.74$, $p < 0.001$). Lastly, African Americans participated in less physical activity ($1656.76 \text{ MET-min/week} \pm 1784.29$ vs. $2421.94 \pm 1662.01 \text{ MET-min/week}$, $p < 0.001$) and had a significantly higher perceived stress score (23.61 ± 7.30 vs. 22.18 ± 7.09 , $p = 0.013$) compared to White college students..

Conclusions: African American college students are at a greater risk of becoming overweight or obese compared to White college students due to significantly lower fruit, vegetable, and whole grain consumption; significantly higher SSB and fat consumption; lower physical activity; and higher perceived stress. Culturally relevant interventions must be created in order to encourage African American college students to adopt a healthful lifestyle that will last a lifetime.

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List of Abbreviations

ACHA	American College Health Association
ACSM	American College of Sports Medicine
BMI	Body Mass Index
CDC	Center for Disease Control and Prevention
CT	Computerized tomography
CVD	Cardiovascular Disease
DEXA	Dual Energy X-ray
HTN	Hypertension
IPAQ	International Physical Activity Questionnaire
MRI	Magnetic Resonance Imaging
NHANES	National Health and Nutrition Examination Survey
NCHA	National College Health Assessment
PA	Physical Activity
Project Y.E.A.H.	Project Young Adults Eating and Active for Health
SSB	Sugar Sweetened Beverages
TTM	Trans-Theoretical Model
WC	Waist Circumference

Chapter 1

Introduction

Obesity-related diseases such as heart disease, cancer, chronic lower respiratory disease, stroke, and diabetes, rank in the top seven causes of death in the United States.^{1,2} By 2030, healthcare costs in the United States are expected to reach \$861-957 billion as a result of the growing obesity trend.³ Over two-thirds of US adults ages 20 years and older are overweight or obese. More astonishingly, over three-fourths of the African American population is overweight or obese.⁴ Furthermore, over 30% of 18-24 year olds in the US are overweight; and more than half of this population attends college.⁵

The transition from high school to college is a critical period for unhealthy and unwanted weight gain to occur.⁶ About one-third of college students (33.7%) are overweight or obese,⁵ gaining 2.6-7.4 pounds during their freshman year.^{7,8} Weight gain in college students is connected to consuming an unhealthful diet,⁹⁻¹² decreased physical activity,¹³ and increased stress.¹⁴⁻¹⁶ College students are at a high risk for consuming an unhealthful diet because of their fast paced lifestyle, increased consumption of fast food, tight budgets, and lack of knowledge and cooking skills.⁹⁻¹¹ Most students have a diet that is high in sodium, fat and sugar, and low in fruits, vegetables and dairy products.^{9,12,13} In addition to poor eating habits, 40-50% of college students are physically inactive.¹⁷ Additionally, students who do not meet the

recommendations for physical activity tend to have a higher level of stress and are more prone to depression.¹⁸ In fact, over half of college students experience higher stress than normal or tremendous stress due to academic pressure, finances, family problems, intimate relationships, or other factors.⁵ An unhealthful diet, low physical activity, and high level of stress make college students at risk for weight gain. If the pattern of weight gain continues throughout students' college career, they will be at risk for obesity and obesity-related diseases.¹⁹

Similar to the college student population, African American adults in the US are at risk for overweight and obesity due to unhealthful diet patterns, lack of physical activity, and increased stress levels. African Americans tend to have diets low in fruit, vegetable, and fiber, but high in sodium, fat, and empty calories.²⁰ Furthermore, over half of the African American population did not meet the 2008 Physical Activity Guidelines for Americans in 2012.²¹ An unhealthful diet and low physical activity are two modifiable risk factors that can be targeted to decrease the prevalence of diet-related chronic diseases in the African American population. The African American population also suffers from anxiety and general distress due to perceived discrimination.²² Chronic levels of stress can lead to weight gain due to hormonal changes that occur in the body.

Additionally, African Americans have higher risks of obesity-related diseases. African Americans have higher rates of obesity and are twice as likely to suffer from heart disease²³ and stroke compared to White adults in the US.²⁴ African Americans are also 1.3 to 2.5 times as likely to be diagnosed with certain cancers²⁵ and 1.7 times as likely to be diagnosed with diabetes²⁶ which are obesity-related diseases. The disproportionate risk of obesity, heart disease, stroke, certain cancers, and diabetes in

the African American population necessitates an investigation of the health status of African American college students. College is a critical transitional period in an individual's life that could provide a window for early intervention to prevent unwanted weight gain and encourage the adoption of a healthful lifestyle for life-long health. Thus, the purpose of this study is to compare dietary intake, BMI, waist circumference, physical activity, and stress among African American and White US college students.

Chapter 2

Literature Review

This literature review is divided into five main sections to discuss any current literature on racial difference in college students or characteristics of the college student population specifically on lifestyle, diet, anthropometric measures, physical activity, and stress.

Lifestyle of an Average College Student

Starting college adds stress to a student's life because of the new environment and first time students would be living on their own. Students must learn how to manage their money, time, and relationships which can add stress to their lives. Balancing late nights, social pressure, academic pressure, and relationships can be a difficult task during this transitional period.^{7,27,28} Some students turn to alcohol or smoking in order to ease the stress and tension of college and choosing a career.¹⁵ The American College Health Association's (ACHA) National College Health Assessment II (NCHAII) reported that 62.5% of college students used alcohol; with 23.4% of students having 7 or more drinks the last time they consumed alcohol.⁵ During fall of 2012 through spring of 2013, 84.3% of students "felt overwhelmed by all [they] had to do" and 51.3% felt an overwhelming anxiety.⁵ Students reported academics, finances, intimate relationships, family problems, and sleep difficulties as the top five most difficult things to handle during the 2012-2013 school year.⁵

College students are at high-risk for having an unhealthful lifestyle because of their fast-paced lifestyle, tight budgets, lack of nutrition knowledge and cooking skills,⁹⁻¹¹ low physical activity,¹⁷ and increased stress. These variables act as barriers to a healthful lifestyle during college years. The barriers to a healthful lifestyle in college can be more influential in choices that students make than the perceived benefits for eating a healthful diet and exercising regularly.²⁹ Also, college students believe that the cafeteria and vending options do not promote a healthful diet,²⁷ which is a barrier for college students consuming a healthful diet, especially when students are required to buy a meal plan on campus. A study conducted by DeBate, Topping, and Sargent reported that 44.2% of students “never/rarely” had breakfast due to their face-paced lifestyle.¹² Also, almost two-thirds of college students ate fast food “always/often,” and 41.9% consumed fast food “sometimes.”¹² According to current literature, college life does not promote healthy living or healthy choices. In order to help decrease the risk of weight gain and obesity in college students, a healthful diet, physical activity, and stress management must be encouraged.¹⁹

When students adopt healthful habits such as a balanced diet and regular exercise during their college years, there is a higher probability that these habits will continue during post-college life. Research suggests that that 84.7% of people who were physically active during their senior year in college remained physically active 5 to 10 years later.³⁰ Also, over 80% of those who were not physically active as college seniors remained inactive 5 to 10 years later.³⁰ Thus, students have a tendency to continue habits that are formed during the transitional years of college as they move into the next stage of their life.³⁰ Students report that social support from friends and

campus gyms with group fitness classes or adequate amounts of machines help enable them to increase their physical activity during their college years.²⁷ Friends are able to encourage each other to be physically active, group fitness classes give students accountability for physical activity, and adequate amounts of machines in the facility make students comfortable to finish their workout without interruptions. These enablers can be implemented on college campuses to help encourage students to become physically active and form habits that they will continue on for the next 10 years of their life after college.

Also, living arrangements can influence college students' lifestyle including diet, physical activity, smoking, and drinking.³¹ A research study by Small and colleagues (2013) indicated that most students live on campus during their first semester; however, by their seventh semester a majority of students live off campus (apartments or houses).³¹ Students' fruit and vegetable consumption as well as physical activity declined from their first semester to their seventh semester. However, students who lived off campus had a more drastic downward trend of fruit and vegetable consumption and physical activity.³¹ Living off campus may present unique barriers to fruit and vegetable consumption and physical activity such as sharing food with roommates or transportation to facilities.³¹ Additionally, students living off campus are more likely to drink alcohol, smoke, and consume less dairy products.⁹ Students who live off campus have a higher average BMI than those who live on campus or at their parents' house.⁹ Living situations can have an impact on the lifestyle students will adopt, and students have different risk factors depending on the lifestyle they adopt during their time at college.

Diet

Most college students have a diet that is high in sodium, fat and sugar, and low in fruits, vegetables and dairy products.^{9,13} The lifestyle of college students is typically busy and hectic; as such, fast food restaurants are a place where students can sit with friends and consume low cost meals already prepared for them.^{9,10} More and Driskell¹⁰ reported college student (n=259 college students, 39% male, 61% female) self-reported fast-food, fruit, and vegetable consumption as well as other dietary practices and beliefs.¹⁰ More than half of the college students agreed to the statement that they “did not consume enough fruits and vegetables,” and two-thirds agreed that they consumed too many processed foods and sugar in their diet.¹⁰ Other researchers reported that college students believe that they rely on precooked meals, have limited access to healthful foods, limited budget to purchase healthy foods, and little knowledge on how to shop and prepare foods.²⁷ These factors are considered to be barriers to healthful eating during college.²⁷

Fruit and Vegetable Consumption

According to 2010 Dietary Guidelines for Americans, the average consumption of fruits and vegetables in the United States is less than the recommended amount. Using NHANES data, Guenther and colleagues³² (2006) reported that only 40% of the American population met the recommendation for fruit and vegetable consumption. The average consumption of total fruits from the 1073 sample of 19-30 year old participants from NHANES was 1.1-1.3 servings/day whereas 4 servings were recommended.³²

Similarly, the average consumption of total vegetables was 3.1-3.8 servings/day where the recommendation was 6.³² Participants reported an over consumption of starchy vegetables and low consumption of legumes and dark green and orange vegetables.³² Likewise, the Behavioral Risk Factor Surveillance System (BRFSS), a telephone survey conducted by the CDC and local health departments to determine health risks in the population, reported that 37.7% of adults consume fruits less than once a day, and 22.6% of U.S. adults consume vegetables less than once a day.³³ On average, adults consume fruit 1.1 times per day while they consume vegetables 1.6 times per day.³³ The average consumption of both fruits and vegetables is below the recommendation, which may lead to health problems such as higher risk of developing chronic diseases.

On average, college students also do not meet recommendations for daily fruit and vegetable consumption and have data similar to the general population on fruit and vegetable consumption. According to ACHA, 6.3% of college students reported consuming 5 or more servings of fruits and vegetables per day while 6.1% reported consuming no fruits and vegetables per day.⁵ Only 31.2% of students consume the recommended serving for fruit, and 1.3% of students consume the recommended serving for vegetables.¹² African American female and male college students consumed significantly less fruits and vegetables compared to White female and male college students.¹² Only 29.3% of African American males met the recommendation for fruits while 32.0% of White male college students met the recommendation for fruit.¹² None of the African American male college students met the recommendation for vegetables, and 1.3% of White males met the recommendation for vegetables.¹² Only 26.1% of African American female college students consumed the recommended amount of fruit

per day compared to 32.5% of White female students.¹² Also, less than one percent of African American female students consumed the recommended vegetables per day compared to 1.6% of White female students.¹² African American female college students had the lowest consumption of fruits and African American males had the lowest consumption of vegetables of both races and genders.¹²

Health Benefits of Fruits and Vegetables

Researchers indicate that increased consumption of fruits and vegetables may reduce the risk of many diet-related chronic diseases including cardiovascular disease, diabetes, cancer, Alzheimer disease, and even cataracts.^{34,35} The Centers for Disease Control and Prevention (CDC) reports that 7 out of 10 deaths are caused by chronic diseases with heart disease and cancer causing over 50% of deaths in America.³⁶ The CDC stated that 36% of adolescents and 38% of adults ate fruit less than once a day, and 38% of adolescents and 23% of adults ate vegetables less than once a day in 2011 which is a contributing factor for high rates of chronic diseases in America.³⁶ Increasing the consumption of fruits and vegetables provides protective properties through antioxidants, and increased nutrient availability.^{34,35} Fresh or frozen fruits are packed with nutrients and phytochemicals.³⁵ The phytochemicals in fruits and vegetables help decrease oxidative stress from free radicals through antioxidant activity thereby decreasing the risk for diet-related chronic diseases.³⁴ He and colleagues³⁷ conducted a meta-analysis on cohort studies that assessed fruit and vegetable consumption with respect to risk of stroke. Results suggested that people who consume 3-5 servings of fruits and vegetables a day decrease their risk of having a stroke by 11%; those who

consume more than 5 servings of fruits and vegetables decrease their risk of having a stroke by 26%.³⁷

Whole Grains

Along with low consumption of fruits and vegetables, college students also consume low amounts of whole grains. Baseline data from a 3-day food record and follow-up with 80 college students revealed that only 49% of the students reported consuming any whole-grain products.³⁸ In addition, the average daily consumption of whole-grains was 0.37oz, which was below the recommendation.³⁸ The major sources of whole grain foods were granola bars and ready-to-eat cereals.³⁸ Rose and colleagues (2007) collected two sets of 7-day food records from 159 college students.³⁹ Students reported consuming an average of 5.4 servings of total grains per day and 0.7 servings from whole grains.³⁹ Consumption of whole grains was significantly higher in students with a normal BMI than overweight/obese students.³⁹

Literature on whole grain consumption is scarce, but one study noted specific differences in grain consumption among races. Participants in a study conducted by Sharma and colleagues⁴⁰ were between 56 and 62 years old with 16% African American and 23% White participants. African American women had the highest whole grain to total grain ratio compared to all other ethnicities and genders.⁴⁰ Whole wheat or rye bread was the most commonly consumed whole grain product followed by popcorn and cooked cereals.⁴⁰ Although there is a study reporting racial differences in whole-grain consumption, supporting data on racial differences in college students' whole-grain consumption does not yet exist.

Health Benefits of Whole Grain Consumption

Whole grains have a wide range of health benefits that can help decrease risk of chronic diseases and obesity. In order for a product to be considered “whole grain,” it must have all components of the actual grain – bran, germ and endosperm.⁴¹ The bran consist of insoluble, or non-digestible, fiber, and the germ and endosperm contain soluble fiber, vitamins, minerals, oils, and phytonutrients.⁴¹ Having a diet that meets the recommendation (3 ounce-equivalents per day)³⁵ for whole grains can help with weight management because whole grain and fiber consumption delays gastric emptying which keeps individuals feeling full longer. The consumption of whole grain foods can help with weight management and decrease risk of heart disease, hypercholesterolemia, diabetes, and some cancers.³⁸ Whole grain consumption that meets the recommendation of 3 to 4 ounce-equivalents per day (1 ounce equivalent is equal to a slice of whole grain bread, ½ c of cooked oatmeal, or ½ c of cooked brown rice) has an inverse relationship with visceral adipose tissue.⁴¹ Evidence supports that consuming the recommended amount of whole-grains decreases risks for chronic diseases and obesity.

Sugar Sweetened Beverage Consumption

Excessive calories from sugar sweetened beverages (SSB) can lead to unwanted weight gain, dental decay, type 2 diabetes, and poor nutrition.⁴² Adolescents/young adults report consuming 20% of their calories per day from SSB.⁴² Block et al. (2013) used focus groups to determine the reasons why college students consumed SSB.⁴³ They stratified focus groups by gender to determine the appealing

factors of SSB to collect data that would help create interventions for college students that would promote healthier drinking choices. According to focus group themes, the most popular choices of beverages in college students were water (72%), juice (72%), and soda (68%).⁴³ The top reasons for choosing beverages were taste (93%), price (58%), and calorie content (30%).⁴³ Some students admitted that changing to another low calorie/healthier option would be very difficult.⁴³ Cost consideration was the second most important factor in choosing a beverage and was the primary motivation for drinking water because it is normally free. Students confessed that if the water was not free, they are more likely to choose a SSB instead of purchasing water.⁴³ The majority of the students who participated in the focus group was unaware of their daily calorie needs,⁴³ so educating students on daily caloric needs as well as how many calories are in SSB would be a beneficial segment in future interventions for this population.

Similarly, a study conducted by West et al.⁴⁴ surveyed undergraduate students on their SSB consumption habits using a food-frequency questionnaire. Out of 265 undergraduate students, 65% consumed some type of SSB on a daily basis (soda, fruit, energy, sports drink, sweet tea, etc).⁴⁴ African American college students had an estimate of 796 ± 941 kcal/d of SSB, which was significantly greater than White college student consumption of 397 ± 396 kcal/day of SSB ($p=0.0003$).⁴⁴ Also, African American college students preferred fruit drinks while White college students preferred soda.⁴⁴ Overall, college students reported consuming an average of 543kcal/day from SSB.⁴⁴

SSB was a major source of calories per day according to results by West et al. and is a major contributing factor in weight gain among college students who consume SSB on a regular basis. Although this is self-reported data, results convey that an

intervention must focus on decreasing the amount of calories from SSB in college students. Also, education on healthful beverage choices is imperative to encourage weight maintenance and a healthful diet.

Fat

Most studies in the literature focus on college students' consumption of fruits, vegetables, and sugar sweetened beverages; however, few studies focus on the fat consumption by college students or the general African American population. Researchers reported that 50% of college students eat both fried foods and high-fat fast foods at least twice a week.⁴⁵ Although not all fast food is high in fat, students admitted to eating "high-fat fast foods" on the survey.⁴⁵ Fast food is not the only source of fat in college students' diet, but it can be a main contributing factor to total calories from fat when consumed on a regular basis.

Anthropometric Measures

Anthropometry is a way of assessing nutrition status and body fat of adults and children. In adults, anthropometric data is used to determine disease risks and to evaluate health and dietary status.⁴⁶ Typical anthropometric measures used include height, weight, skinfold thickness, Body Mass Index (BMI), and body circumference, such as waist or hip circumference. A combination of anthropometric measures is recommended to assess a person's health status and to estimate body fat because a single anthropometric measure may not give an accurate measure. Dual Energy X-ray (DEXA), Computerized Tomography (CT), Magnetic Resonance Imaging (MRI) scans are the gold-standard for reporting body fat, but these instruments are not always available or accessible. DEXA scans use one high energy x-ray beam and one low energy x-ray beam to measure bone density, total body composition, and fat mass.⁴⁷ CT scans use multiple x-rays to produce cross-sectional images of the body and are used to look at internal organs, body composition, fat mass, and bone density.⁴⁷ Lastly, MRI scans use an external magnetic field to develop computerized images that can produce data on organ structure, body fat, and lean body mass.⁴⁷

Body Mass Index is the measurement of weight in kilograms divided by height in meters, squared ($BMI = \text{kg}/\text{m}^2$) and is an estimation of body fat. A BMI of 18.4 or below is considered underweight, 18.5 to 24.9 is normal weight, 25 to 29.9 is considered overweight, 30 to 39.9 is categorized as obese, and over 40 is categorized as extreme obesity.² Individuals categorized as "obese" and "extreme obesity" have higher risks of heart disease, hypertension, sleep apnea, type 2 diabetes, and other chronic diseases.² BMI is not always an accurate assessment of health status because individuals with

more muscle mass or high bone density may be characterized as overweight, but they may have a low percentage of body fat. Using BMI in conjunction with other anthropometric measures, such as waist circumference (WC), can give a better picture of the overall health of an individual.

High waist circumference (WC) is another determinant for increased risk of chronic diseases. Men with a WC greater than 102 centimeters (40 inches) and women with a WC greater than 88 centimeters (35 inches) have an increased risk for developing chronic diseases such as heart disease, type 2 diabetes, hypertension, and hypercholesterolemia.¹

Weight Change during College

The “Freshman 15” is a myth most college students have heard about before attending their first year in college. Researchers have reported weight changes in college students during their first year as well as throughout their time at college to determine their risk of obesity and obesity-related diseases. Rita DeBate et al.¹² published a study in 2001 using data from 630 college students (32% male, 66% White, and 23% African American) and reported that the BMIs of college students ranged from 23 to 26.¹² College students report gaining between 2.6 to 7.4 pounds during their first year of college due to their changes in lifestyle.^{7,8} The weight gain during freshman year can be due to a higher frequency of late nights and increased consumption of fast food and prepared meals.⁴⁸ Another study, conducted by Gropper and colleagues, reported that 68.7% of college students gained 4.1 ± 3.1 pounds during the first semester of college.⁸ Approximately two-thirds of the college students gained weight during their first

year of college, and of the students who gained weight, percent body fat increased by $1.1 \pm 1.8\%$.⁸ According to a meta-analysis conducted by Fedewa et al., if weight gain trends from freshman year continue throughout college, students would have an average of 3.0% or greater of weight change.⁴⁹ Weight gain greater than 3.0% of baseline weight can increase students' risk of negative health impacts in adulthood such as insulin resistance, cardiovascular disease, or hypertension.⁴⁹ Obesity is a disease that gradually occurs over years of slow and continued weight gain. Weight gain during the transitional life stage of college increases students' risk for obesity and obesity-related diseases.

Racial differences

Currently, there is only one study that has reported racial differences in college students' anthropometric measures. Debate et al.¹² (2001) reported that there are racial differences in self-reported weight status and categorized BMI using self-reported heights and weights between African American and White college students. The results from their study concluded that African American female college students weigh more than White females (155 lb v. 135 lb), and show a significant difference in BMI between African American and White females (26 v. 22). African American females gained an average of 11 pounds during their college career compared to White females who gained an average of 4 pounds.¹²

There are also racial differences in visceral adipose tissue in the general White and African American populations. High amount of visceral adipose tissue, also known as visceral obesity, can predispose individuals to chronic diseases such as metabolic

syndrome, insulin resistance, cardiovascular disease, and certain cancers.⁵⁰ Visceral adipose tissue, or visceral fat, is hormonally active fat distributed in the abdominal area around central organs. Research reported by Carroll et al.⁵⁰ (2008) concluded that fat distribution in the body differs between African Americans and Whites. Participants (n=200) over the age of 45 with no previous history of cardiovascular disease included 76 African Americans, 74 Hispanics, and 50 Whites.⁵⁰ African American and White participants had similar BMI and waist circumference (WC), but the White participants had higher visceral adipose tissue;⁵⁰ therefore, it is plausible that specific equations or ranges for estimating BMI and WC might be needed in order to have a more accurate scale for obesity and obesity related diseases for each race.

Research by DeBate et al. that reported racial differences in BMI and weight was published in 2001; therefore, more research is needed to report current BMI and weights of college students. The researchers reported BMI as the only anthropometric measure; therefore, current literature lacks present racial differences in college students' anthropometric measures to determine risk factors of obesity in African American and White college students. Also, DeBate et al. used self-reported data which is not as accurate as measured heights and weights. Furthermore, current meta-analysis by Fedewa et al. did mention of race-based differences in college students' measured anthropometric measures.⁴⁹ Therefore, more research including BMI and WC is needed to determine accurate anthropometric measures including BMI and WC to determine accurate risk factors for obesity in African American and White college students.

Physical Activity

Recommendations

Physical activity recommendations for adults are primarily governed by the Physical Activity Guidelines for Americans by the U.S. Department of Human and Health Services. It is science-based recommendations for Americans ages 6 and older aimed at improving health and reducing risk of chronic diseases.⁵¹ The Physical Activity Guidelines for Americans proclaims any activity is better than none, but most health benefits occur with 150 minutes of physical activity per week.⁵¹ This activity could include, but is not limited to, a brisk walk, a jog in the park, or a moderate intensity bike ride.⁵¹ Also, individuals should practice endurance activity as well as strength/resistance training. At least 150 minutes a week of moderate intensity at a minimum of 10 minute intervals, as well as resistance training that work all muscle groups two or more days a week is recommended for adults.⁵¹ At least seventy-five minutes of vigorous exercise a week is also equivalent to standard recommendations for the same health benefits. For additional health benefits, individuals must participate in aerobic activity for 300 minutes a week of moderate-intensity exercise or 150 minutes of vigorous intensity exercise per week.⁵¹

Health Benefits

Regular physical activity has been shown to have a wide range of health benefits. Physical activity includes aerobic exercise, resistance training, bone-strengthening, and flexibility activities.⁵¹ Regular physical activity lowers the risk of premature death, CVD, stroke, HTN, hypercholesterolemia, type 2 diabetes, metabolic

syndrome, colon cancer, breast cancer, and depression.⁵¹ Regular physical activity has also been scientifically proven to decrease the relative risk of premature death. The more physically active an individual is during the week, the lower their risk for premature death.⁵¹ Few lifestyle choices positively impact premature death like increasing physical activity – a healthful diet and not smoking are among those lifestyle choices that can decrease the risk of premature death.⁵¹

Other factors that contribute to health benefits of physical activity are intensity, frequency, and repetition.⁵¹ Physical activity, especially aerobic activity, helps the body become more efficient at providing the body tissues and cells with sufficient amounts of oxygen. Physical activity increases lung and heart efficiency by increasing air movement and the heart becoming more efficient at pumping blood through the body, thereby, increasing cardiorespiratory fitness.⁵¹

College Students and Physical Activity

College students have the opportunity to continue or begin a lifelong lifestyle of regular physical activity. Many college students have ample physical activity resources (gym, fitness classes, physical activity elective class, and personal trainers) that are included in tuition/fees and available for student use. However, there is limited research on how often students take advantage of these resources. Unlike the adult population, walking is not a popular form of physical activity in the college population.¹⁷ Students have a tendency to get involved in physical activity they are already comfortable performing; participating in physical activity and group fitness classes with the intent of “having fun” over “being healthy.”¹⁷ Therefore, if students are uncomfortable or

unfamiliar with resources provided on campus to encourage physical activity, they are less likely to take advantage of what is provided on-campus to increase physical activity.

Living arrangements and year in college can impact the amount of physical activity students engage in. Researcher, Mary Dinger analyzed differences in self-reported physical activity according to students' living arrangements.¹³ Overall, students (n=743) participated in vigorous physical activity an average of 2.39 days per week.¹³ Students with a fraternity/sorority affiliation had a higher mean number of days of vigorous physical activity (2.75 vs 2.23, p=.0001).¹³ However, students who were not affiliated with a fraternity/sorority had a higher mean number of days of moderate physically active (2.89 vs 2.00, p=.0001).¹³ Also, 29% of freshmen and 25% of seniors did not participate in any physical activity.⁴⁵

Approximately half of college students do not meet the American College of Sport Medicine's (ACSM) recommendation for aerobic physical activity.¹⁷ About 50% of college students participate in regular aerobic physical activity and 45% participated in strengthening exercises.⁴⁵ Research indicates that 84.7% of people who were physically active during their senior year in college remained physically active 5 to 10 years later.³⁰ Similarly, results concluded that 81.3% of students who were not physically active as college seniors remained inactive 5 to 10 years later.³⁰ These statistics support the importance of encouraging physical activity during college years because habits that are formed during those years will heavily influence the habits students will adopt as adults.

Racial Differences

Studies that compare physical activity between White and African American college students are rare, but one study noted that significantly more African American and Asian students were in the precontemplation stage of the Transtheoretical Model Stages of Change regarding physical activity.¹⁷ Individuals that are in the precontemplation stage are not ready to make any behavior change and might not be aware that a change should be made.

Link between Physical Activity and Quality of Life Stress

Regular physical activity has been linked to higher quality of life for older adults,⁵² and research demonstrates that this is also true for college students.^{53,54} Joseph Rodney and colleagues⁵³ collected data from 590 university students using a series of questionnaires to determine the correlation between regular physical activity and improved quality of life in college students.⁵³ Students had a mean age of 20.4 and a BMI of 23.6; 52% were male, and 51% were White.⁵³ Results concluded that physical activity improved physical self-esteem in college students, and having a higher physical self-esteem improved quality of life.⁵³ Physical activity, measured in metabolic equivalents from the Godin Leisure Time Exercise Questionnaire, was positively associated with exercise self-efficacy, but self-efficacy was not related to a higher quality of life in this sample.⁵³ The authors concluded that college students do not place as much importance in their ability to be physically active, but they are very concerned with physical self-esteem.⁵³ Researchers also noted that White college students from

this sample reported a lower exercise self-efficacy and physical self-esteem compared to African Americans.⁵³

Link between Physical Activity and Depression

Sitting, lying down, watching television or surfing the internet are behaviors that define sedentary behavior, which is different from physical inactivity.⁵⁴ Sedentary behavior is defined as less than 1.5 METs, where 1 MET is considered to be sleeping or Resting Metabolic Rate and 2 MET is normally walking at a slow pace of 3km/h.⁵⁴ A meta-analysis performed on 24 observational studies including 193,166 participants concluded that sedentary behavior significantly increases risk of depression.⁵⁴ The researchers of the meta-analysis concluded that sedentary behavior, which often displaces physical activity, is a form of social withdrawal.⁵⁴ Individuals who are socially withdrawn increase their risk of depression.⁵⁴ Physical activity is thought to be a social activity and can help alleviate symptoms of depression in some individuals.⁵⁴ Roughly 40-50% of college students are characterized as sedentary,¹⁷ which can increase stress levels and risk of depression.

Stress

Students' stress level can interfere with their academic success, relationships, and mental health. American College Health Association's Spring 2013 National College Health Assessment II reported that anxiety, depression, sleep difficulties, stress, and work are among the top reasons hindering students' academic performance.⁵ In a research study examining the correlation between binge drinking and stress/depression among college students, researchers found that binge drinking (5 or more drinks) in college students was significantly correlated with depression or stress levels.¹⁴ Stress levels of female college students result from academic or class pressure to succeed and make good grades, while male college students' stress levels increase with the increase in class level.¹⁴ The stress for male college students could be from the pressure to find a successful job after they graduate.¹⁴ During their freshman year, female students have higher levels of depression and stress and engage more frequently in binge drinking compared to male students.¹⁴

Stressors can vary during a student's college career. These stressors may include the transition from living with parents to living on your own, finding a career path, finding a potential partner or relationship, financial stress and student loans, finding a job after graduation or during school, succeeding in classes, or any health or family issues that could arise while at college.¹⁵ Changes in sleeping and eating habits, new responsibilities, and class workload were listed as some of the top stressors along with intrapersonal relationships, financial difficulties and changes in social activities.¹⁵ These daily stressors can affect students' learning, academic success, and cognitive health.⁵⁵

Financial stress can be a major determinate for student success as well as students' dropout rates.⁵⁶ A majority of students have high debt and low monthly income. Results from a study conducted at a mid-western university show that the college student population (n=307) had an average of \$16,457 of student loans, \$843 in credit card debit, and earned \$596 a month.⁵⁶ Also, ten percent of the population reported experiencing all of the following anxiety symptoms due to financial stress: sleeplessness, lack of concentration, irritability, worry, tension, and fatigue.⁵⁶ Students' financial situation can negatively impact their stress level and learning ability while at college.

Racial Stress

Racial minority stress has been shown to negatively affect mental health of college students due to perceived discrimination, racism, insensitive comments, and questioning their belonging on campus, which can be a contributing factor to the stress of minority students' lives in college.²⁸ Minority stress occurs when students belong to a minority group on campus or in their community that causes stress from perceived prejudice or discrimination.²⁸ Different races have different factors that affect their stress level. For example, body dissatisfaction, impostor feelings, and academic success are a few stressors that have been identified by certain ethnic groups.^{28,57}

Body dissatisfaction is a factor associated with racial stress. Some races are more prone to being dissatisfied with different parts of their body or their whole body.⁵⁷ Women are particularly prone to body dissatisfaction.⁵⁷ White and Hispanic women tend to be more dissatisfied with their bodies in general, including their lips, lower body, and

overall body.⁵⁷ African American women, however, tend to be more satisfied with their overall body.⁵⁷

Another stressor that is related to race is impostor feelings. Impostor feeling is defined as feeling like a fraud in the racial group, a feeling of not belonging. This is clinically associated with depression, anxiety and low self-esteem.²⁸ Asian American college students reported having higher impostor feelings because of the stigma of academic success, and their perception of failure or not living up to that stereotype.²⁸ Students at predominately White institutions have to endure culturally insensitive policies, instructors, or discrimination, which can also negatively impact mental health as well as academic success. Researchers suggest that there are racial and ethnic discriminations and stereotypes that put pressure on minorities to “fit in” to their certain race.²⁸ Cokley, McCain, Enciso et al.²⁸ (2013) conducted a study to observe the impact of minority status stress, impostor feelings and mental health on minority populations in college by recruiting students through the psychology department’s subject pool. Students (n=240) were Hispanic, African American, or American Indian with ages ranging from 17 to 39 years old.²⁸ Subjects were instructed to fill out a series of online surveys that measured minority student stress, impostor feelings, and mental health.²⁸ The researchers concluded that African American students had a higher minority status stress.²⁸ African American students enrolled in a predominately White college tend to have increased feelings of alienation from White college students and perceive more racism and hostility.¹⁶ Also, African American students at predominately White colleges are less likely to seek out counseling services offered on campus because the staff is

predominately White.¹⁶ These students are more likely to discuss personal issues with a friend or parent instead of using the counseling services on campus.¹⁶

Gaps in Literature

From reviewing the literature on racial difference in college students, it is apparent that there is a lack of information describing differences between dietary intake, anthropometric measures, physical activity, and stress levels of African American and White college students.

Research Question:

Do healthful behaviors and characteristics, such as dietary intake, anthropometric measures, physical activity, and stress level, differ in college students by race?

Hypothesis:

Null: At a significance level of 0.05, there is no difference in healthful behaviors and characteristics, such as dietary intake, anthropometric measures, physical activity, and stress level, differ by race in college students between the ages of 18 and 24.

Alternative: At a significance level of 0.05, there is a difference in healthful behaviors and characteristics, such as dietary intake, anthropometric measures, physical activity, and stress level, differ by race in college students between the ages of 18 and 24.

Chapter 3:
**Racial Differences in College Students Dietary Intake,
Anthropometric Measures, Physical Activity, and Stress Levels**

Abstract

Purpose: One third of college students are overweight or obese. Furthermore, African Americans have an increased risk of obesity and obesity related diseases. This study examined differences in dietary intake, anthropometric measures, physical activity, and stress levels between African American and White college students.

Methods: This is a secondary analysis of African American and White participants' (n=1268) baseline data. Diet, physical activity, and stress were assessed using a series of online surveys. Height, weight, and waist circumference for all students were measured and recorded by trained researchers. Categorical data were analyzed using χ^2 test, all other data were analyzed using t- and Mann Whitney U. A level of significance was reached if the p-value was less than 0.05.

Results: African American college students reported consuming a greater estimated percentage of energy from fat (34.33 ± 6.26 vs. 30.77 ± 4.64 , $p < 0.001$) and more calories from sugar sweetened beverages (SSB) per day (283.67 ± 391.99 vs. 139.84 ± 195.00 , $p < 0.001$) compared to White college students. African American college students had a significantly higher waist circumference (WC) (85.36 ± 13.63 vs. $82.57 \pm$

10.74, $p < 0.0001$), lower levels of physical activity ($1656.76 \text{ MET-min/week} \pm 1784.29$ vs. $2421.94 \pm 1662.01 \text{ MET-min/week}$, $p < 0.001$) and a higher perceived stress (23.61 ± 7.30 vs. 22.18 ± 7.09 , $p = 0.013$).

Conclusions: African American college students are at a higher risk for becoming overweight or obese. Culturally relevant interventions for this population must be created to encourage students to adopt a healthful lifestyle for long-term health. Results from the current study can be used to target specific behaviors of college students.

Key words/phrases: college students, health, race, obesity, dietary intake, stress, physical activity, Body Mass Index.

INTRODUCTION

Obesity-related diseases such as heart disease, cancer, chronic lower respiratory disease, stroke, and diabetes, rank in the top seven causes of death in the United States.^{1,2} By 2030, healthcare costs in the United States are expected to reach \$861-957 billion as a result of the growing obesity trend.³ Over two-thirds of US adults ages 20 years and older are overweight or obese. More astonishingly, over three-fourths of the African American population is overweight or obese.⁴ Furthermore, over 30% of 18-24 year olds in the US are overweight; and more than half of this population attends college.⁵

Although the majority of the US college population is White (61%), African American college students represent approximately 12% of students currently enrolled in postsecondary institutions in the United States.⁶ Like the college population, African American tend to have low fruit, vegetable, and fiber intake, but a diet high in sodium, fat, and calories.⁷ Furthermore, in 2012, over half of the African American population did not meet recommendations for aerobic physical activity or muscle-strengthening training.⁸ Low physical activity and an unhealthy diet are two modifiable risk factors that can be targeted to decrease the prevalence of diet-related chronic diseases in the African American population; starting with the critical transitional period of college. The disproportionate risk of obesity, heart disease, diabetes, cancer and stroke as well as unhealthy diets and low physical activity in the African American population necessitates an investigation of the health status of African American college students.

The transition from high school to college is a critical period for the occurrence of unhealthy and unwanted weight gain.⁹ Weight gain in college students has been

associated with consuming an unhealthful diet,¹⁰⁻¹³ decreased physical activity,¹⁴ and increased stress.¹⁵⁻¹⁷ College students are at high risk for consuming an unhealthful diet because of their fast paced lifestyle, increased consumption of fast food, tight budgets, and lack of knowledge and cooking skills.¹⁰⁻¹² Most college students have a diet that is high in sodium, fat and sugar,¹¹ and low in fruits, vegetables and dairy products.^{10,13,14} In addition to poor eating habits, 40-50% of college students are physically inactive.¹⁸ Students who do not meet the recommendations for physical activity tend to have a higher perceived stress and are more prone to depression.¹⁹ Low physical activity, an unhealthful lifestyle and stress make college students at risk for becoming overweight or obese.²⁰ The purpose of this study is to examine dietary intake, BMI, waist circumference, physical activity, and stress between African American and White US college students.

METHODS

Study Design

The current study is a secondary analysis of the Project Young Adults Eating and Active for Health (Y.E.A.H.) baseline data of African American and White college students. Project Y.E.A.H. was a 15-month web-based health intervention for college students at 13 different US universities (East Carolina University, University of Florida, Kansas State University, Michigan State University, University of New Hampshire, Purdue University, University of Rhode Island, Rutgers University, South Dakota State University, Syracuse University, Tuskegee University, West Virginia University, and University of Wisconsin-Madison) with the primary focus on diet, physical activity, and

stress management.²⁵ The Institutional Review Board (IRB) affiliated with each school approved Project Y.E.A.H. before the project began.

Population

The students were eligible to participate in the study if they were 18-24 years old, full-time first, second, or third year student, and not currently enrolled in a nutrition class or health related major.²¹ Students were recruited through various methods; emails, fliers, social media, and ads in school newspapers.²² Baseline data for participants of Project Y.E.A.H. were collected through a series of on-line surveys and appointments with the researchers to measure height and weight.

Surveys

Students completed thirteen online surveys for Project Y.E.A.H. Data from the following surveys were used in the current analysis: NCI Fruit and Vegetable Screener; Healthy Eating Index (grains); NCI Fat Screener; Sugar Sweetened Beverages, Energy and Coffee Drinks; International Physical Activity Questionnaire (IPAQ); Physical Activity Behavior Questionnaire (PABQ); ACHA National College Health Assessment; Cohen's Perceived Stress Scale; The Brief Multidimensional Students' Life Satisfaction Scale: College Version; Weight Related Behavior Questionnaire (WREQ); and a demographics survey.

Analysis

Descriptives, frequencies, t-tests, Mann Whitney U test, and chi square were calculated using IBM's Statistical Package for Social Sciences (SPSS) (version 20.0; IBM, Armonk, New York). T-tests were computed on variables with a normal distribution comparing the means between African American and White college students. Mann

Whitney U test was used on non-parametric data where there was not a normal distribution or the variances between the variables were significant. Lastly, chi-square tests were computed on categorical data to determine if there were any significant differences between the races. Level of significance was reached if the p-value was less than 0.05.

RESULTS

Demographics

Data from 1268 students (195 African American and 1073 White) who participated in Project Y.E.A.H. were used in this analysis. The sample consisted of 84.6% White and 68.5% female students. The mean age was 19.35 years old, and 71.4% of the students were freshmen and sophomores (Table 1). A majority of the students lived on campus (73.4%)—"campus residence hall," "sorority/fraternity house," or "other college housing"—while the remaining lived "off campus", at "parent's house", or "other." There was no difference between African American and White students' gender, age, or year in school, but there was a significant difference in living arrangements. A higher percentage of African American college students live in campus residence halls (71.8%) or other college housing (11.8%) while a higher percentage of White college students live in sorority/fraternity houses (3.8%) or off campus housing (23.9%).

Diet

Students' diet was assessed based on self-reported data from the following surveys: NCI Fruit and Vegetable Screener; Healthy Eating Index (grains); NCI Fat Screener; and West et al's Sugar Sweetened Beverages, Energy and Coffee Drinks.

White college students reported consuming more cups of fruit per day (1.78 ± 1.28 vs. 1.27 ± 1.26 , $p < 0.001$), as well as more cups of vegetables per day (1.39 ± 1.24 vs. 1.09 ± 1.13 , $p = 0.003$) compared to African American college students (Table 2). White students also reported consuming more servings of whole grains per day compared to African American college students (2.26 ± 1.47 vs. 1.59 ± 1.38 , $p < 0.001$), while African American college students reported consuming a higher estimated percentage of energy from fat than White college students (30.77 ± 4.64 vs. 34.33 ± 6.26 , $p < 0.001$) (Table 2).

Self-reported energy drink consumption did not differ between African American and White college students, but calories/day from specialty coffee was significantly higher in White college students compared to African American college students (4.92 ± 23.07 vs. 4.09 ± 14.01 , $p < 0.001$) (Table 2). African American college students reported consuming more calories and ounces from soda and fruit drinks than White college students (Table 2). African American college students consumed significantly more calories from sugar sweetened beverages on average per day compared to White college students (283.67 vs. 139.84 , $p < 0.001$).

Anthropometric

White college students had significantly lower measured weights compared to African American college students ($69.47 \text{ kg} \pm 14.49$ vs. $74.06 \text{ kg} \pm 19.22$, $p = 0.004$), but there was no difference between White and African American college students' measured height (169.6 ± 9.2 vs. 169.8 ± 9.3 , $p = 0.057$). White college students had a mean BMI of 23.99 ± 4.07 and African American college students had a mean BMI of 25.99 ± 6.08 , which was significantly different (Table 3). Using measured BMI, 67.4% of

the students were under/normal weight, 23.3% were overweight, and 9.2% were obese and there was a significant relationship between measured BMI categories and race (χ^2 (3, N=1268)=22.740, $p < .001$). Approximately 30% of White college students were overweight or obese; however, approximately 45% of African American students were overweight or obese (Figure 1). Additionally, African American college students also had a significantly larger measured waist circumference (cm) than White college students (82.57 ± 10.74 vs. 85.36 ± 13.63 , $p < .0001$) (Table 3).

There was a significant relationship between self-reported weight categories and race, χ^2 (4, n=1238)=27.53, $p < .001$, Figure 2). Frequencies show that 61.8% of White college students reported that they were trying to lose weight, and 7.0% reported that they were trying to gain weight. On the other hand, 57.1% of African American college students reported that they were trying to lose weight and 16.8% reported that they were trying to gain weight. There was a significant relationship between self-reported weight control and race χ^2 (3, n=1242)=21.171, $p < .001$).

Physical Activity

Physical activity was assessed using the PABQ and IPAQ surveys. IPAQ is used to assess duration, frequency, and intensity of physical activity; and Sue Schembre's PABQ survey measured self-regulation, outcome expectation, and personal barriers regarding physical activity. Results of the Mann Whitney U test conclude that White college students reported significantly higher amounts of physical activity by duration and intensity (Table 4). White college students IPAQ walking MET-min/week, IPAQ moderate MET-min/week, and IPAQ vigorous MET-min/week were all significantly higher than African American college students (Table 4). Also, there was a significant

relationship between the IPAQ categorical score and race, $\chi^2 (2, n=1244)=93.624$, $p<.001$ (Figure 3).

Surprisingly, African Americans students reported a higher score of outcomes expectation of physical activity believing there are positive outcomes related to physical activity. White college students reported higher scores of self-regulation compared to African American students (Table 5). There was no difference in personal barriers effecting physical activity between the races.

Stress

The Cohen's Perceived Stress Scale measures how unpredictable, uncontrollable, and over loaded respondents find their lives to be, using a 5-point Likert scale (0=Never, 4=Very Often). Results of the t-test concluded that African American college students had a significantly higher Cohen's Perceived stress rate than White college students (23.61 ± 7.30 vs. 22.18 ± 7.09 , $p=0.013$). There was no difference in satisfaction of life mean score between African American and White college students (Table 6)

The WREQ survey measures students' stress related to eating, such as compensatory restraint, routine restraint, and emotional eating. White college students had significantly higher scores on all three variables of stress related to eating compared to African American college students (Table 6).

DISCUSSION

The results support the hypothesis that there are racial differences in anthropometric measures, dietary intake, physical activity, and stress levels in college students. This research supports current statistics from ACHA that approximately one-

third of the total population of college students are overweight or obese,⁶ but 45.1% of the African American college students from the current sample are overweight or obese. Also, WC, a measure of abdominal fat, was higher in African American college students, which supports current literature that African Americans are more likely to have a higher WC than Whites.²³ This is a concerning statistic that should be addressed in culturally relevant programs and interventions to promote healthful lifestyles among African American college students.

According to MyPlate recommendations, individuals who are 19-30 years of age should consume 2 cups of fruit per day.²⁴ Neither White nor African American college students' average intake of fruit met the MyPlate recommendation. Guenther et al.²⁵ (2006) noted from NHANES data that 19-30 year olds consumed 1.1 ± 0.1 cups of fruit per day, which was comparable to results of this study. Recommended vegetable intake for the same population ranges from 2.5-3cups/day (2.5 cups for females and 3 cups for males).²⁶ Although White college students consumed an average of approximately 0.8 more cups of vegetables per day than African American college students, neither race met the recommendation for vegetables, which supports current literature on vegetable consumption by college students.¹³ Both populations could benefit from encouraging messages to increase fruit and vegetable intake in the diet.

Minority college students (Hispanic, African American, Asian, Pacific Islander) dislike certain foods mainly due to poor taste, poor quality, and high costs while only 10.9% of minority races dislike food due to poor nutrition.²⁷ High costs, more so than poor nutrition, is a barrier for African American college students consuming certain foods, while White college students are more concerned with nutrition than high costs of

foods.²⁷ These differences in food choices indicate that specialized programs must be developed to address issues such as preparing healthful food at lower costs. Fruits and vegetables are perceived as high cost foods,²⁸ but educating the college population on lower cost preparations can increase their likelihood of consumption of fruits and vegetables.²⁸

Along with increased fruit and vegetable consumption, whole grain consumption can help decrease the risk of chronic diseases and obesity. A study conducted in 2007 reported that students consumed an average of 5.4 servings of total grains per day and only 0.7 servings from whole grains.²⁹ Results from the current study found that students consumed less total grains per day, but more whole grains per day than the study conducted in 2007.

Excessive calories from sugar sweetened beverages (SSB) can lead to unwanted weight gain, dental decay, type 2 diabetes, and poor nutrition. West et al.³⁰ (2006) reported that African American college students consumed 796 ± 941 kcal/day of SSB, which was significantly greater than White college student consumption of 397 ± 396 kcal/day of SSB ($p=0.0003$).³⁰ Results from the current study noted a lower estimated kcal/day of SSB in both the African American and White college students compared to West et al.'s results; however, current results agree with West et al.'s results that African American college students consume significantly more total calories from SSB than White college students.³⁰ Excessive consumption of SSB can increase students' risk of obesity, and interventions should promote healthful beverage choices for college students.

The Acceptable Macronutrient Distribution Range (AMDR) for individuals 19-20 years of age is 20-35% of total kcals from fat³¹; both White and African American college students had an average within this range. However, the standard deviations illustrate that there are a substantial amount of college students consuming fat above the recommended percent of calories per day set by the Institute of Medicine, which increases the risk of chronic diseases.³¹ Educating this population about the recommendations could help college students consume fat within the recommended range, but it is important when developing interventions not to focus too heavily on what the target audience should not eat but focus more on what a healthful diet includes. This could cause unwanted obsessions over food intake and lead to possible disordered eating.

Researchers discovered that 84.7% of people who were physically active during their senior year in college remained physically active 5 to 10 years later.¹⁸ Those who were not physically active as college seniors, 81.3% remained inactive 5 to 10 years later.¹⁸ It is important to encourage this healthy habit as soon as students enter into college so that they are more likely to continue exercising throughout their life. Results from this student and results in the literature on college students' physical activity report that students were not meeting recommendations for physical activity.¹⁴ According to the Guidelines for Processing IPAQ scores, a total MET-min/week score of less than 600MET-min/week would be considered low physical activity, 600 to 3000 MET-min/week is categorized as moderate physical activity, and 3000 MET-min/week or more is categorized as vigorous physical activity.³² Both African American and White college students would be categorized as having moderate physical activity based on

their total MET-min/week IPAQ score. According the Physical Activity Guidelines for Americans, however, students would not meet recommendations for physical activity.

This research adds to the current literature on the racial differences of college students as it is the first to use the BRFSS Section 21: Emotional Support and Life Satisfaction; Cohen's Perceived Stress Scale; Sue Schembre's Weight Related Behavior Questionnaire (WREQ); Sue Schembre's Physical Activity Behavior Questionnaire (PABQ); and The Brief Multidimensional Students' Life Satisfaction Scale: College Version to analyze the stress of college students related to eating behaviors, physical activity, life satisfaction, and perceived stress. Literature does suggest that African American college students have higher stress than White college students due to minority stress³³ and alienation,¹⁷ which could account for the higher perceived stress in the current study. Also, research supports that White college students have higher stress due to body dissatisfaction,³⁴ which can support that the current study found that White college students have significantly higher weight related stress than African American college students.

The current research supports and adds to the current literature that African American college students consume of few whole grains, fruits, and vegetables and have a low amount of physical activity. African American college students also have a higher BMI and WC, as well as a higher perceived stress which can all negatively impact health.

Limitations

More White college students participated in the study, but the sample size was close to a representative sample size of college students in the Fall of 2012 according

to National Center for Educational Statistics.³⁵ Also, some data for certain survey questions were missing because the students did not have to answer every question. Because most of the data was based on survey questions and answers, the analysis relied heavily on self-reported data. This can cause underreported or over-reported information; especially in dietary intake and physical activity. Some gender differences were discovered during the analysis of the data which could cause generalizations to be incorrect for the different races as a whole. Gender differences were demonstrated in the reference tables but not discussed in detail. Some of the variables had high variability in the standard deviations, so it is hard to make a generalization about those variables. Despite these limitations, the results add to existing research and support the limited research on college students' behaviors that affect their overall health and wellness.

Future Research

Regular exercise, good nutrition, and stress management can all play a role in preventing obesity and decreasing the risk for certain chronic diseases;²⁰ therefore, interventions should be designed to promote regular physical activity, healthful diet, and stress management in the college student population. It is apparent that there are racial differences that impact health, so it is important to keep these differences in mind when developing health interventions on college campuses. The current research can be used to help create culturally relevant interventions and programs to promote healthful lifestyles on college campuses that will reach minority college students and encourage healthful habits.

References

1. Guidelines on Overweight and Obesity: Electronic Textbook. National Institute of Health web site.
http://www.nhlbi.nih.gov/guidelines/obesity/e_txtbk/txgd/4142.htm
Updated July 2014. Accessed August 2014.
2. Body Mass Index. U.S. National Library of Medicine Web site.
<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0004463/>
Last Updated August 2012. Accessed July 2014.
3. Statistical Fact Sheet 2013 Update: Overweight & Obesity. American Heart Association Web Site.
http://www.heart.org/idc/groups/heart-public/@wcm/@sop/@smd/documents/downloadable/ucm_319588.pdf
Updated 2013. Accessed August 2014.
4. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of Childhood and Adult Obesity in the United States, 2011-2012. *Journal of American Medical Association*. 2014;311(8):806-814.
5. College Health Assessment in the Spring of 2013. American College Health Association National Web site.
http://www.acha-ncha.org/docs/ACHA-NCHA-II_UNDERGRAD_ReferenceGroup_ExecutiveSummary_Spring2013.pdf
Accessed July 2014.
6. College Health Assessment in the Spring of 2013. American College Health Association National Web site.
http://www.acha-ncha.org/docs/ACHA-NCHA-II_UNDERGRAD_ReferenceGroup_ExecutiveSummary_Spring2013.pdf
Accessed July 2014.
7. Delores C.S. James. Factors Influencing Food Choices, Dietary Intake, and Nutrition-Related Attitudes among African Americans: Application of a Culturally Sensitive Model. *Ethnicity & Health*. 2004; 9(4):349-367.
8. Health, United States, 2013: With Special Feature on Prescription Drugs. U.S. Department of Health and Human Services, Center for Disease Control and Prevention Web site.
<http://www.cdc.gov/nchs/data/hus/hus13.pdf#069>
[Accessed August 2014.](#)
9. Anderson DA, Shapiro JR, Lundgren JD. The freshman year of college as a critical period for weight gain: An initial evaluation. *Eating Behaviors*. 2003; 4: 363-367.
10. Brunt AR, Rhee YS. Obesity and lifestyle in U.S. college students related to living arrangements. *Appetite*. 2008; 51: 615-621.

11. Morse KL, Driskell JA. Observed sex differences in fast-food consumption and nutrition self-assessments and beliefs of college students. *Nutrition Research*. 2009; 29: 173-179.
12. LaCaille LJ, Dauner KN, Krambeer RJ, Pedersen J. "Psychosocial and environmental determinants of eating behaviors, physical activity, and weight change among college students: a qualitative analysis." *Journal of American College Health*. 2011; 59(6): 531-538.
13. DeBate RD, Topping M, Sargent RG. Racial and Gender Differences in Weight Status and Dietary Practices among College Students. *Adolescence*. 2001; 36(144): 819-833.
14. Mary K. Dinger. Physical Activity and Dietary Intake Among College Students. *American Journal of Health Studies*. 1999; 15(3):139-148.
15. Daphne E. Pedersen. Gender differences in college binge drinking: Examining the role of depression and school stress. *The Social Science Journal*. 2010; 50: 521-529.
16. Ross, SE, Niebling BC, Heckert TM. Sources of stress among college students. *College Student Journal*. 1999; 33(2): 312-318.
17. Chonda Walden. "The Health Status of African American College Students: A literature Review" *Journal of American College Health*. 2010; 42(5): 199-205.
18. Keating XD, Guan J, Pinero JC, Bridges DM. A Meta-Analysis of College Students' Physical Activity Behaviors. *Journal of American College Health*. 2005; 54(2): 116-126.
19. VanKim, NA, Nelson TF. Vigorous Physical Activity, Mental Health, Perceived Stress, and Socializing Among College Students. *American Journal of Health Promotion*. 2012; 28(1): 7-15.
20. How Can Overweight and Obesity Be Prevented? National Heart, Lung and Blood Institute Web Site.
<http://www.nhlbi.nih.gov/health/health-topics/topics/obe/prevention.html>
Updated July 2012. Accessed August 2014.
21. Kattelman KK, White AA, Greene GW, et al. Development of Young Adults Eating and Active for Health (YEAH) Internet-Based Intervention via a Community-Based Participatory Research Model. *Journal of Nutrition Education and Behavior*. 2014; 46(2): S11-S25.
22. Brown O, Quick V, Colby S, et al. Recruitment lessons learned from a tailored web-based health intervention project Y.E.A.H. (Young Adults Eating and Active for Health). *Health Education*. (In Review)
23. Giardina EV, Mull L, Sciacca RR, et al. Relationship Between Cardiovascular Disease Knowledge and Race/Ethnicity, Education, and Weight Status. *Clinical Cardiology*. 2012;35(1):43-48.
24. How Much Fruit Is Needed Daily? USDA, MyPlate Web Site.
<http://www.choosemyplate.gov/printpages/MyPlateFoodGroups/Fruits/food-groups.fruits-amount.pdf>
Accessed August 2014.

25. Guenther PM, Dodd KW, Reed J, Krebs-Smith SM. (2006). Most Americans Eat Much Less than Recommended Amounts of Fruits and Vegetables. *Journal of the American Dietetic Association*. 2006; 106(9): 1371-1379.
26. How Many Vegetables Are Needed Daily or Weekly? USDA, MyPlate Web Site. <http://www.choosemyplate.gov/printpages/MyPlateFoodGroups/Vegetables/food-groups.vegetables-amount.pdf>
Accessed August 2014.
27. Boek S, Bianco-Simeral S, Chan K, Goto K. Gender and Race are Significant Determinants of Students' Food Choices on a College Campus. *Journal of Nutrition Education and Behavior*. 2012;44(4):372-378.
28. Haynes-Maslow L, Parsons SE, Wheeler SB, Leone LA. A Qualitative Study of Perceived Barriers to Fruit and Vegetable Consumption Among Low-Income Populations, North Carolina, 2011. *Preventing Chronic Diseases*. 2013;10. DOI: 10.5888/pcd10.120206.
29. Rose N, Hosig K, Davy B, Serrano E, Davis L. Whole-Grain Intake is Associated with Body Mass Index in College Students. *Journal of Nutrition Education and Behavior* 2007;39(2):90-94.
30. West DS, Bursac Z, Quimby D, Prewitt TC, et al. Self-Reported Sugar-Sweetened Beverage Intake among College Students. *Obesity*. 2006; 14(10): 1825-1831.
31. Dietary Reference Intakes: Macronutrients. Institute of Medicine website. http://www.iom.edu/~media/Files/Activity%20Files/Nutrition/DRI/DRI_Macronutrients.pdf
Accessed July 2014.
32. Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire IPAQ. <http://www.ipaq.ki.se/scoring.pdf>
Revised November 2005. Accessed July 2014.
33. Cokley K, McClain S, Enciso A, Martinez M. An Examination of the Impact of Minority Status Stress and Impostor Feelings on the Mental Health of Diverse Ethnic Minority College Students. *Journal of Multicultural Counseling and Development*. 2013; 41(2):82-95.
34. Cortney S. Warren. Body area dissatisfaction in white, black and Latina female college students in the USA: an examination of racially salient appearance areas and ethnic identity. *Ethnic and Racial Studies*. 2014; 37(3):537-556.
35. Characteristics of Postsecondary Students. Institute of Education Sciences Web site. http://nces.ed.gov/programs/coe/indicator_csb.asp
Updated May 2014. Accessed July 2014.

Table 1: Demographics^{a,1}

	Total W+B (n=1268) (%)	White (n=1073) (%)	African American (n=195) (%)	<i>p-value</i>
Sex				
Male	398 (31.4)	326 (30.4)	58 (29.7)	0.827
Female	868 (68.5)	724 (67.5)	135 (69.2)	
Age				
18	292 (23.0)	242 (22.6)	50 (25.6)	0.878
19	445 (35.1)	383 (35.7)	62 (31.8)	
20	338 (26.7)	284 (26.5)	54 (27.7)	
21	141 (11.1)	121 (11.3)	20 (10.3)	
22	24 (1.9)	19 (1.8)	5 (2.6)	
23	3 (0.2)	2 (0.2)	1 (0.5)	
24	4 (0.3)	3 (0.3)	1 (0.5)	
Year in School				
Freshmen	470 (37.1)	402 (37.5)	68 (34.9)	0.364
Sophomore	435 (34.3)	367 (34.2)	68 (34.9)	
Junior	319 (25.2)	270 (25.2)	49 (25.1)	
Senior	20 (1.6)	14 (1.3)	6 (3.1)	
Graduate	2 (0.5)	1 (0.1)	1 (0.5)	
Residence				
Campus residence hall	795 (62.7)	655 (61.0)	140 (71.8)	0.003
Sorority/Fraternity house	43 (3.4)	41 (3.8)	2 (1.0)	
Other college housing	93 (7.3)	70 (6.5)	23 (11.8)	
Off campus housing	277 (21.8)	256 (23.9)	21 (10.8)	
Parent's house	28 (2.2)	21 (2.0)	7 (3.6)	
Other	10 (0.8)	10 (0.9)	0 (0)	
^a Percentages may not add up to 100% due to rounding and missing responses or "choose not to answer" option. ¹ Mann Whitney U test. A p-value ≤0.05 used to determine statistical significance				

Table 2: Diet*

	White (n=1073) <i>Mean ± SD</i>	African American (n=195) <i>Mean ± SD</i>	<i>p-value</i>
Fruit			
Total cups of fruit/day ^{1,†,‡}	1.78 ± 1.28	1.27 ± 1.26	<0.001
Vegetable			
Raw, cooked, canned, frozen vegetables (no lettuce, beans, rice, potatoes) cups/day ¹	0.62 ± 0.73	0.35 ± 0.49	<0.001
French fries, cups/day ¹	0.18 ± 0.21	0.43 ± 0.53	<0.001
Lettuce salad cups/day ²	0.68 ± 0.39	0.55 ± 0.40	<0.001
Total cups of vegetables/day ^{2,†,‡}	1.39 ± 1.24	1.09 ± 1.13	0.003
Whole Grains			
Grain servings ^{1,†,‡}	3.45 ± 1.46	2.66 ± 1.45	<0.001
Whole grain servings ^{1,†,‡}	2.26 ± 1.47	1.59 ± 1.38	<0.001
Fat			
Estimated percentage of energy from fat ^{1,†,‡}	30.77 ± 4.64	34.33 ± 6.26	<0.001
Sugar Sweetened Beverages			
Ounces soda ^{1,†}	9.42 ± 7.16	11.79 ± 8.95	<0.001
Ounces fruit drink ^{2,†,‡}	10.51 ± 7.42	14.23 ± 9.37	<0.001
Ounces energy drink ¹	2.78 ± 5.20	2.30 ± 4.81	0.389
Ounces specialty coffee ^{1,†}	7.48 ± 7.17	5.70 ± 6.86	0.001
Estimated kcals from alcohol ^{1,†,‡}	347.69 ± 336.25	171.43 ± 267.31	<0.001
Kcal from soda ^{1,†}	55.77 ± 121.81	117.33 ± 221.56	<0.001
Kcal from fruit drinks ^{1,†,‡}	50.63 ± 102.72	149.21 ± 272.78	<0.001
Kcal from energy drinks ¹	4.92 ± 23.07	4.09 ± 14.01	0.730
Kcal from specialty coffee ^{1,†}	29.60 ± 72.66	15.42 ± 37.21	<0.001
SSB kcal sum ^{1,†}	139.84±195.00	283.67 ± 391.99	<0.001
* All data used was self-reported using the NCI Fruit and Vegetable Screener; NCI Fat Screener; and West et al's Sugar Sweetened Beverages, Energy and Coffee Drinks			
¹ Mann Whitney U test. A p-value ≤0.05 used to determine statistical significance			
² T-test. A p-value ≤0.05 used to determine statistical significance			
† Significant difference in African American and White females			
‡ Significant differences in African American and White males			

Table 3: Measured Anthropometrics³

	White (n=1073)	African American (n=195)	P-value
WC (cm) ^{2†}	82.57 ± 10.74	85.36 ± 13.63	<0.001
BMI ¹	23.99 ± 4.07	25.99 ± 6.08	<0.001
Height (cm) ^{2‡}	169.6 ± 9.2	169.8 ± 9.3	0.057
Weight (kg) ^{1†}	69.47 ± 14.49	74.06 ± 19.22	0.004
¹ Mann Whitney U test. A p-value ≤0.05 used to determine statistical significance ² T-test. A p-value ≤0.05 used to determine statistical significance ³ Measured data [†] Significant difference in African American and White females [‡] Significant differences in African American and White males			

Figure 1: Measured BMI by Race

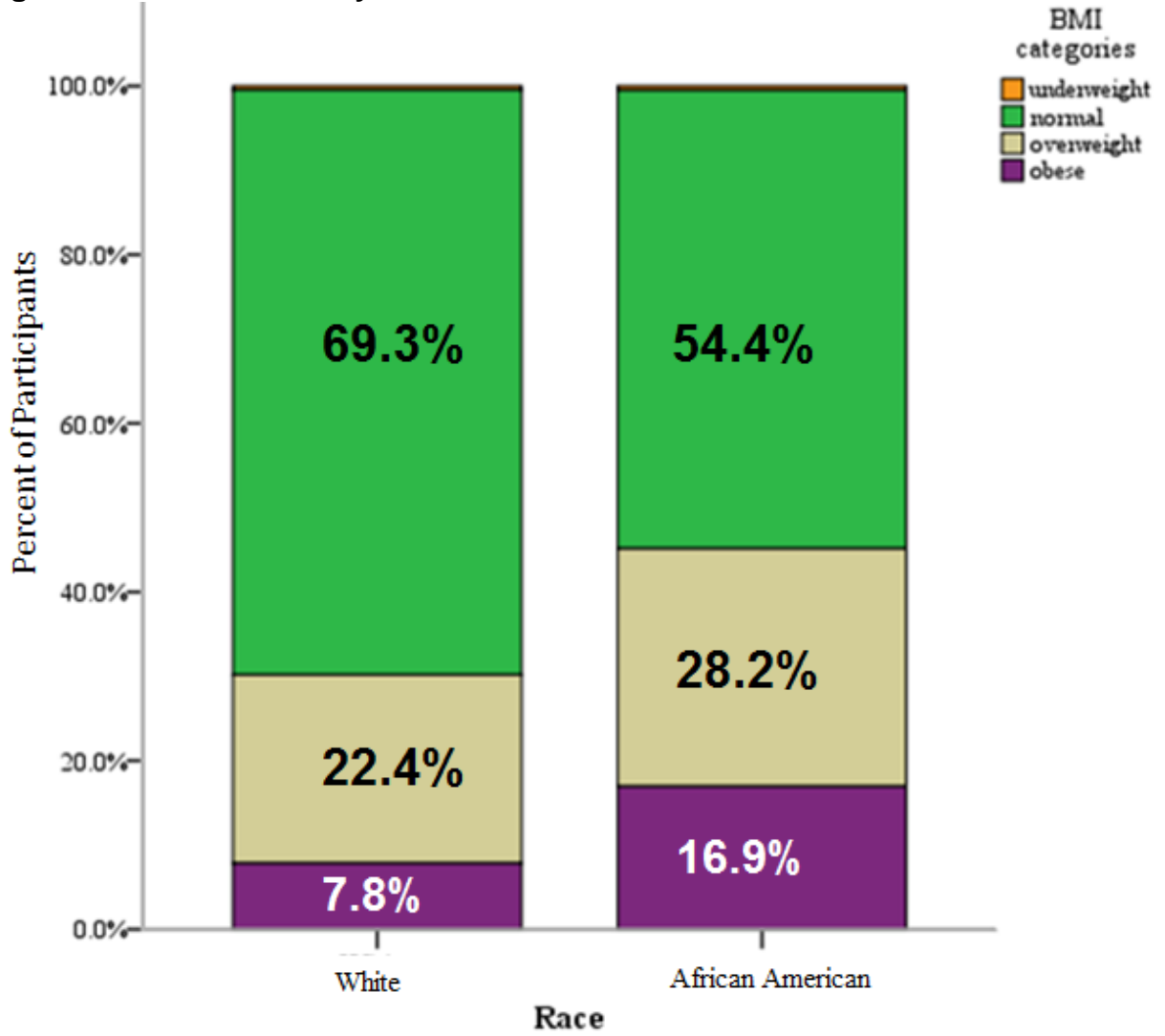
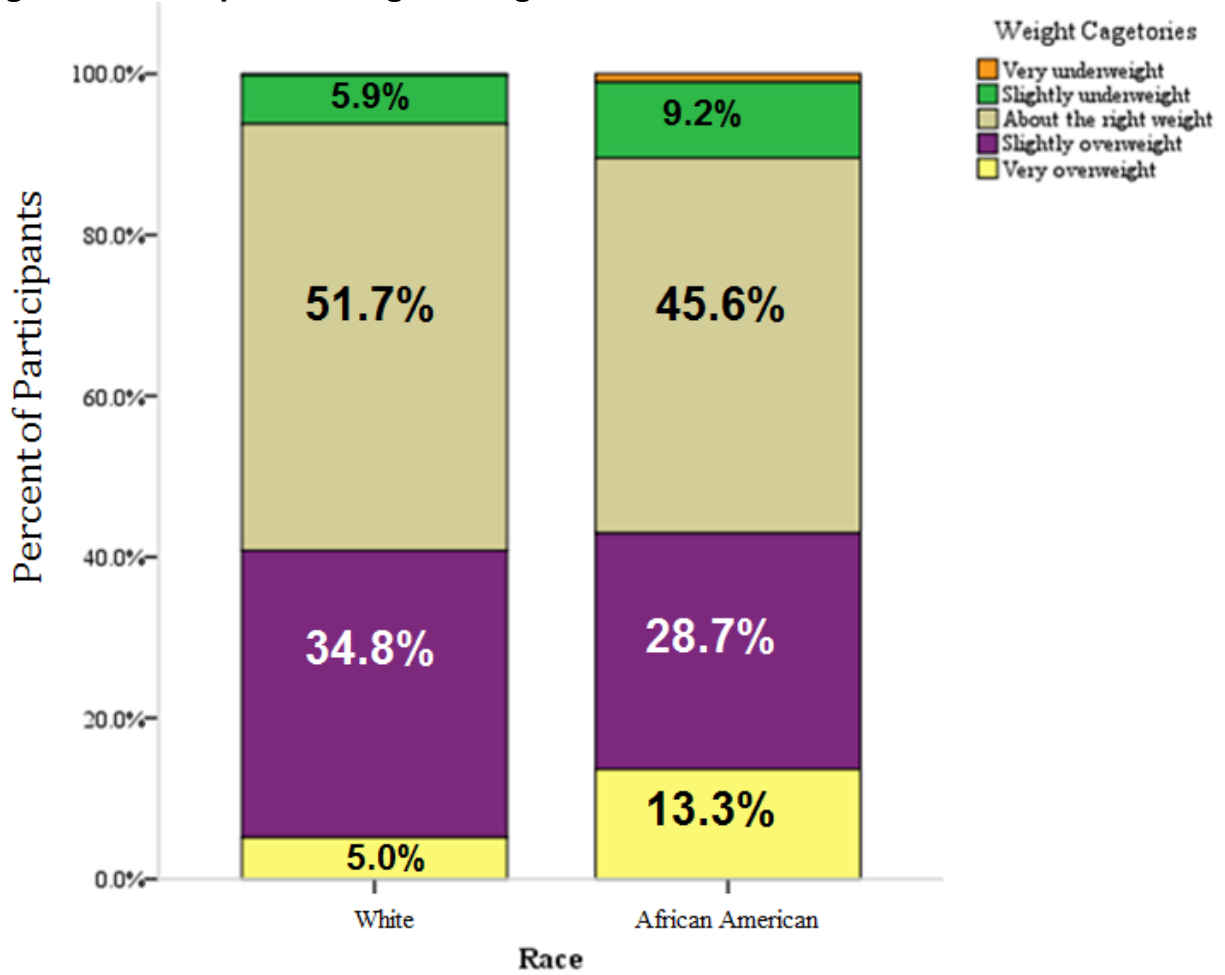


Figure 2: Self-reported Weight Categories^{3,b,†}



³Chi-square test performed on categorical data.

^b Self-reported weight Categories: $\chi^2 (4, n=1238)=27.53, p < 0.001$.

[†] Significant difference in African American and White females

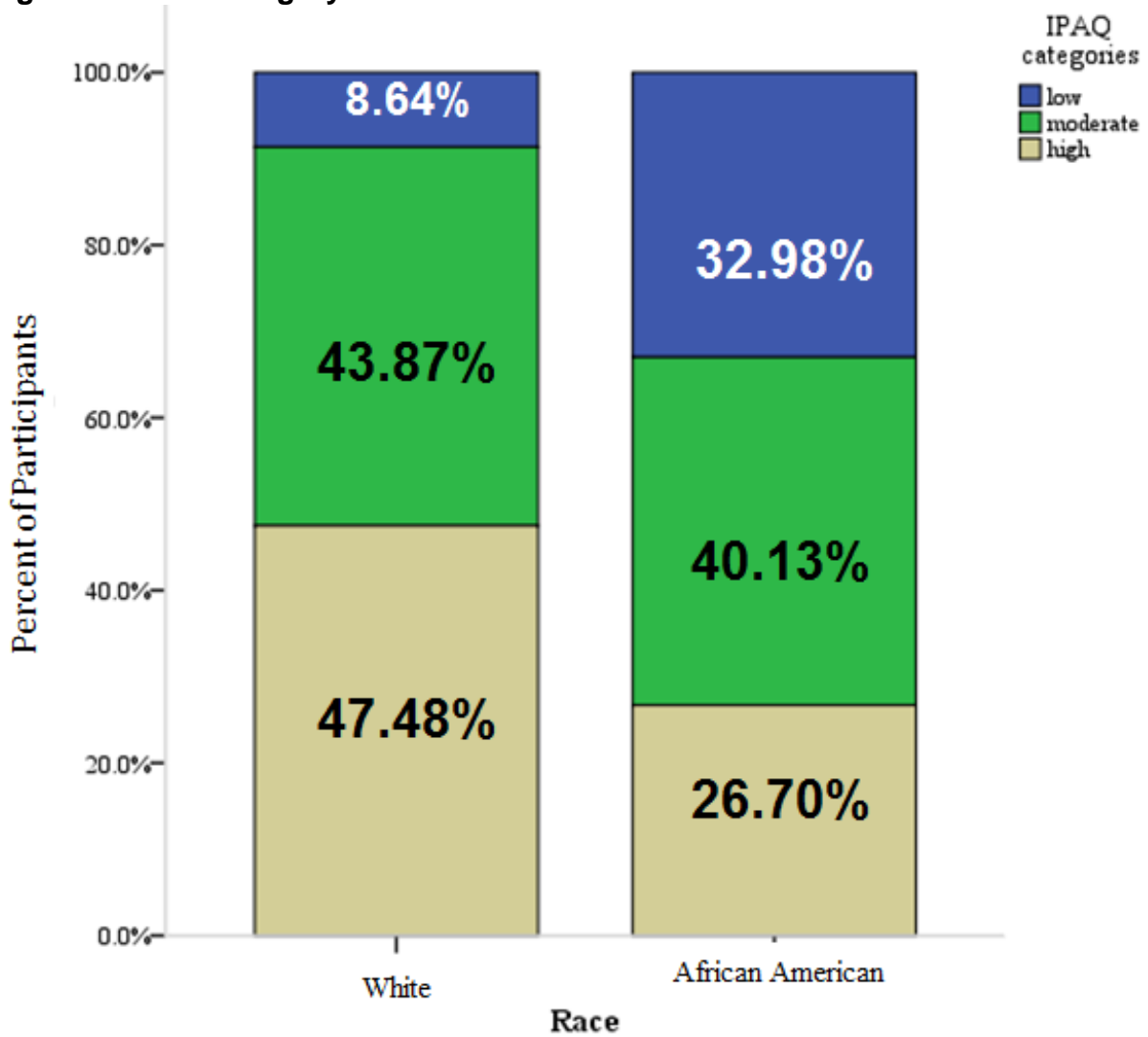
Table 4: Physical Activity^{1,*}

	White Mean ± SD	Black Mean ± SD	p-value
walking days/week †	5.85 ± 1.64	4.93 ± 2.36	<0.001
walking time ‡,†	43.5790 ± 35.69957	35.44 ± 35.55	<0.001
moderate days/week †	2.81 ± 2.16	2.04 ± 2.10	<0.001
moderate time †	32.10 ± 31.30	24.46 ± 34.12	<0.001
vigorous days/week ‡,†	2.74 ± 2.01	1.77 ± 1.86	<0.001
vigorous time †	44.47 ± 34.09	32.87 ± 36.63	<0.001
walking MET-min/week ‡, †	821.29 ± 669.41	602.02 ± 652.92	<0.001
moderate MET-min/week †	424.46 ± 547.11	288.52 ± 532.93	<0.001
vigorous MET-min/week ‡,†	1229.2234 ± 1285.55852	797.43 ± 1116.80	<0.001
total MET-min/week ‡,†	2421.94 ± 1662.01	1656.76 ± 1784.29	<0.001
IPAQ total time †	540.48 ± 400.73	393.18 ± 423.84	<0.001
¹ Mann Whitney U test. A p-value ≤0.05 used to determine statistical significance [*] All variables calculated from the participants' answers to the International Physical Activity Questionnaire (IPAQ) which asks questions about duration, intensity, and frequency of exercise [†] Significant difference in African American and White females [‡] Significant differences in African American and White males			

Table 5: Physical Activity Behaviors ^{1,c}

STRESS	White (n=1073)	Black (n=195)	
	<i>Mean ± SD</i>	<i>Mean ± SD</i>	<i>p-value</i>
Outcome Expectations [†]	2.3676 ± 1.11054	3.9429 ± .92493	0.027
Self-Regulation [†]	2.5566 ± 1.02488	2.3676 ± 1.11054	0.008
Personal Barriers	2.2002 ± .86522	2.1978 ± .90391	0.881
[†] Mann Whitney U test. A p-value ≤0.05 used to determine statistical significance ^c From Sue Schembre's Physical Activity Behavior Questionnaire (PABQ) using a 5-point Likert scale (1=Not at all, 5=Completely) [†] Significant difference in African American and White females			

Figure 3: IPAQ Category^{3,c,‡}



³ Chi-square test performed on categorical data

^c Categorical IPAQ Score: $\chi^2(2, n=1244)=93.624, p<0.001$

[‡] Significant differences in African American and White males

Table 6: Stress and Weight Related Behaviors

STRESS	White (n=1073)	African American (n=195)	
	<i>Mean ± SD</i>	<i>Mean ± SD</i>	<i>p-value</i>
Cohens Perceived stress sum ^{2,d}	22.18 ± 7.09	23.61 ± 7.30	0.013
Satisfaction with life mean ^{1,e}	5.30 ± 0.75	5.22 ± 0.90	0.680
Routine Restraint ^{1,f, †} †, ‡	1.87 ± 0.81	1.62 ± 0.84	<0.001
Compensatory Restraint ^{1,f, †}	2.48 ± 1.00	2.10 ± 0.96	<0.001
External Cues ^{2,f, †, ‡}	2.86 ± 0.89	2.59 ± 1.03	<0.001
Emotional Eating ^{1,f} †, ‡	2.16 ± 0.98	1.89 ± 1.03	<0.001

¹Mann Whitney U test. A p-value ≤0.05 used to determine statistical significance

²T-test. A p-value ≤0.05 used to determine statistical significance

^d Measured by Cohen's Perceived Stress Scale. This questionnaire uses a 5-point Likert scale (0=Never, 4=Very Often) and assesses how unpredictable, uncontrollable, and overloaded respondents feel to life situations.

^e From: Zullig KJ, Huebner ES, Patton JM, Murray KA. The brief multidimensional students' life satisfaction scale – college version. *Am J. Behav.* 2009; 33(5): 483-493. Using a 7-point Likert scale (1=Terrible, 7=Delighted)

^f From Sue Schembre's Weight Related Behavior Questionnaire (WREQ) using a 5-point Likert scale (1=Not at all, 5=Completely)

† Significant difference in African American and White females

‡ Significant differences in African American and White males

Chapter 4

Conclusions

There are racial difference in college students' anthropometric measures, dietary intake, physical activity, and stress levels. Baseline data from Project Y.E.A.H. concludes that approximately one-third of college students are overweight or obese.⁵ African American college students have a higher rate of overweight and obesity compared to White college students, and African American college students have a higher WC compared to White college students.

Dietary intake also differs between African American and White college students, including fruit and vegetable, SSB, whole-grain, and fat consumption. Although African American college students consume less fruits and vegetables and whole-grains and more SSB and fat than White college students, both African American and White college students do not meet recommendations for any of the listed foods. Both races could benefit from culturally relevant interventions encouraging a long-lasting healthful diet.

Physical activity, along with diet, is a modifiable behavior that can have significant effects on weight loss. Results conclude that physical activity is also significantly different in African American college students and White college students. White college students are more physically active than African American college students by frequency and intensity of the activity. Interventions for college students should encourage physical activity in both African American and White college students.

Interventions can educate college students about the health benefits of physical activity but can also target the population using messages that encourage physical activity for stress management and physical appearance.

Perceived stress was higher in African American college students compared to White college students, but White college students had a higher level of weight and diet related stress. African American female college students have a higher body satisfaction than White female college students,⁵⁷ which could be a factor in White college students having a higher level of stress related to weight and diet in the current study. Interventions can focus on educating students about resources on campus to help with stress management as well as having racially diverse counselors on campus to make every student feel comfortable when seeking advice from counselors on campus.¹⁶

Regular physical activity, good nutrition, and stress management can all play a role in preventing obesity and decreasing the risk for certain chronic diseases. Therefore, interventions should be designed to promote regular physical activity, healthful diet, and stress management in the college student population. Current and new programs and interventions can use results from the current student and existing literature as a guide to determine which behaviors to target in college students. Racial differences must be considered when designing interventions so that the interventions or programs will be culturally relevant and successful.

Programs and interventions that have already been created can be modified to target the college student population to increase healthful behaviors. These programs include the More Matters campaign, *We Can!* program, and point-of-test

counseling. Fruits and Vegetables—More Matters is an on-going national campaign launched in March, 2007 by Produce for Better Health Foundation, a non-profit organization, and CDC with the goal of increasing consumption of fruits and vegetables and creating an awareness about the recommended daily servings of fruit and vegetables (7-13 servings a day for an adult).⁵⁸ Research suggests that an increase in knowledge of the recommended intake for fruits and vegetables increases consumption, which will decrease the risk of diet-related chronic diseases.⁵⁹

Another more expensive, but effective option is point-of-testing counseling. In point-of-testing counseling, the individual has tests performed and a health provider reviews those results with the subject to provide individualized counseling and advice. For example, blood samples are taken from patients to determine blood lipid levels, glucose levels, or other biochemical levels.⁶⁰ Biochemical results are then used to counsel the patient during the same visit. Murimi et al.⁶⁰ conducted research in a rural African American population and discovered that point-of-testing counseling with community health mentors had positive effects on lifestyle changes.⁶⁰ Interventions specifically designed for African American college students in rural areas can use the point-of-testing counseling strategy to educate individual college students on fruit, vegetable, whole grain, and fat intake as well as physical activity and stress management.

We Can!, a national education program, could also be adapted for use with the college population. The *We Can!* program targeted 8 to 10 year olds in order to combat the childhood obesity epidemic.⁶¹ This program used science-based programs to educate children and parents in the community. The main goal of this program is to

increase physical activity and healthful diets while decreasing the amount of time children and adults sit in front of the television or computer screen.⁶¹ Some of these goals and activities could be helpful in encouraging college students to adopt healthful habits using text-messaging or social media to reach the college student population.

Most college students are texting or using Facebook daily,⁶² so a group of researchers designed an intervention using Facebook plus text messaging to encourage weight loss in college students that were overweight or obese.⁶¹ Students were invited to a private Facebook group where podcasts and activities were posted to encourage healthful eating and physical activity.⁶² Along with Facebook, students selected a support buddy that was not enrolled in the program. They also received daily text messages with weekly topics to encourage changes in diet and/or physical activity to decrease weight.⁶² Students lost an average of 2.4kg \pm 2.5 over eight weeks for an average weight loss of 2.8%.⁶² Facebook and text messaging are relevant ways to reach college students. Modified *We Can!* activities as well as Facebook and text messaging can be used in the college student population to induce change to a healthful lifestyle. Research on current and past interventions as well as research on characteristics of college students can be used to change existing programs or develop new programs which encourage college students to consume a healthful diet, increase their physical activity, and manage their stress in a healthy way.

It is apparent that there are racial differences that impact health, so it is important to keep these differences in mind when developing health interventions on college campuses. The current research can be used to help create culturally relevant

interventions and programs to promote healthful lifestyles on college campuses that will reach minority college students and encourage healthful habits. Additional analysis of Project Y.E.A.H. data are needed to examine gender differences, geographical differences, and residential status (on/off-campus housing) to further understand and describe the factors of obesity and obesity-related diseases in the college student population.

References

1. Guidelines on Overweight and Obesity: Electronic Textbook. National Institute of Health web site.
http://www.nhlbi.nih.gov/guidelines/obesity/e_txtbk/txgd/4142.htm
Updated July 2014. Accessed August 2014.
2. Body Mass Index. U.S. National Library of Medicine Web site.
<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0004463/>
Last Updated August 2012. Accessed July 2014.
3. Statistical Fact Sheet 2013 Update: Overweight & Obesity. American Heart Association Web Site.
http://www.heart.org/idc/groups/heart-public/@wcm/@sop/@smd/documents/downloadable/ucm_319588.pdf
Updated 2013. Accessed August 2014.
4. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of Childhood and Adult Obesity in the United States, 2011-2012. *Journal of American Medical Association*. 2014;311(8):806-814.
5. College Health Assessment in the Spring of 2013. American College Health Association National Web site.
http://www.acha-ncha.org/docs/ACHA-NCHA-II_UNDERGRAD_ReferenceGroup_ExecutiveSummary_Spring2013.pdf
Accessed July 2014.
6. Anderson DA, Shapiro JR, Lundgren JD. The freshman year of college as a critical period for weight gain: An initial evaluation. *Eating Behaviors*. 2003; 4: 363-367.
7. Smith-Jackson TS, Reel JJ. "Freshman Women and the 'Freshman 15': Perspectives on Prevalence and Causes of College Weight Gain." *Journal of American College Health*. 2012; 60(1): 14-20.
8. Gropper SS, Simmons KP, Faines A, Drawdy K, Saunders D, Ulrich P, Connell LJ. The Freshman 15- A Closer Look. *Journal of American College Health*. 2009; 58(3): 223-231.
9. Brunt AR, Rhee YS. Obesity and lifestyle in U.S. college students related to living arrangements. *Appetite*. 2008; 51: 615-621.
10. Morse KL, Driskell JA. Observed sex differences in fast-food consumption and nutrition self-assessments and beliefs of college students. *Nutrition Research*. 2009; 29: 173-179.
11. LaCaille LJ, Dauner KN, Krambeer RJ, Pedersen J. "Psychosocial and environmental determinants of eating behaviors, physical activity, and weight change among college students: a qualitative analysis." *Journal of American College Health*. 2011; 59(6): 531-538.

12. DeBate RD, Topping M, Sargent RG. Racial and Gender Differences in Weight Status and Dietary Practices among College Students. *Adolescence*. 2001; 36(144): 819-833.
13. Mary K. Dinger. Physical Activity and Dietary Intake Among College Students. *American Journal of Health Studies*. 1999; 15(3):139-148.
14. Daphne E. Pedersen. Gender differences in college binge drinking: Examining the role of depression and school stress. *The Social Science Journal*. 2010; 50: 521-529.
15. Ross, SE, Niebling BC, Heckert TM. Sources of stress among college students. *College Student Journal*. 1999; 33(2): 312-318.
16. Chonda Walden. "The Health Status of African American College Students: A literature Review" *Journal of American College Health*. 2010; 42(5): 199-205.
17. Keating XD, Guan J, Pinero JC, Bridges DM. A Meta-Analysis of College Students' Physical Activity Behaviors. *Journal of American College Health*. 2005; 54(2): 116-126.
18. VanKim, NA, Nelson TF. Vigorous Physical Activity, Mental Health, Perceived Stress, and Socializing Among College Students. *American Journal of Health Promotion*. 2012; 28(1): 7-15.
19. How Can Overweight and Obesity Be Prevented? National Heart, Lung and Blood Institute Web Site.
<http://www.nhlbi.nih.gov/health/health-topics/topics/obe/prevention.html>
Updated July 2012. Accessed August 2014.
20. Delores C.S. James. Factors Influencing Food Choices, Dietary Intake, and Nutrition-Related Attitudes among African Americans: Application of a Culturally Sensitive Model. *Ethnicity & Health*. 2004; 9(4):349-367.
21. Health, United States, 2013: With Special Feature on Prescription Drugs. U.S. Department of Health and Human Services, Center for Disease Control and Prevention Web site.
<http://www.cdc.gov/nchs/data/hus/hus13.pdf#069>
Accessed August 2014.
22. Pieterse AL, Neville HA, Todd NR, Carter RT. Perceived Racism and Mental Health Among Black American Adults: A Meta-Analytic Review. *Journal of Counseling Psychology*. 2012;59(1);1-9.
23. Obesity and African Americans. U.S. Department of Health and Human Services Office of Minority Health Web site.
<http://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlID=25>
Updated October 2013. Accessed August 2014.
24. Stroke and African Americans. Office of Minority Health website.
<http://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlID=28> Accessed September 2014. Updated June 2014.
25. Cancer and African Americans. Office of Minority Health website.
<http://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlID=16> Accessed September 2014. Updated September 2013.

26. Diabetes and African Americans. Office of Minority Health website.
<http://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlID=18> Accessed September 2014. Updated June 2014.
27. Greaney ML, Less FD. College Students' Barriers and Enablers for Healthful weight Management: A qualitative Study. *Journal of Nutrition Education and Behavior*. 2009; 41(4): 281-286.
28. Cokley K, McClain S, Enciso A, Martinez M. An Examination of the Impact of Minority Status Stress and Impostor Feelings on the Mental Health of Diverse Ethnic Minority College Students. *Journal of Multicultural Counseling and Development*. 2013; 41(2):82-95.
29. Deshpande S, Basil MD, Basil DZ. Factors Influencing Healthy Eating Habits Among College Students: An Application of the Health Belief Model *Health Marketing Quarterly*. 2009;26:145-164.
30. Sparling PB, Snow TK. Physical Activity in Recent College Alumni. *Research Quarterly for Exercise and Sport*. 2002; 73(2): 200-205.
31. Small M, Bailey-Davis L, Morgan N, Maggs J. Changes in Eating and Physical Activity Behaviors Across Seven Semesters of College: Living On or Off Campus Matters. *Journal of Health Education & Behavior*. 2013;40(4):435-441.
32. Guenther PM, Dodd KW, Reed J, Krebs-Smith SM. (2006). Most Americans Eat Much Less than Recommended Amounts of Fruits and Vegetables. *Journal of the American Dietetic Association*. 2006; 106(9): 1371-1379.
33. State Indicator Report on Fruits and Vegetables 2013. Center for Disease Control and Prevention Web site.
<http://www.cdc.gov/nutrition/downloads/State-Indicator-Report-Fruits-Vegetables-2013.pdf>
Published May 2013. Accessed January 2014.
34. Rui H. Liu. "Health benefits of fruit and vegetables are from additive and synergistic combinations of phytochemicals." *American Journal of Clinical Nutrition*. 2003; 78: 517-520.
35. US Department of Agriculture, US Department of Health and Human Services. Dietary guidelines for Americans.
<http://www.health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf>
(Accessed December 17, 2013).
36. Chronic Diseases and Health Promotion. Centers for Disease Control and Prevention Web site.
<http://www.cdc.gov/chronicdisease/overview/index.htm>
Updated May 2014. Accessed September 2014.
37. He FJ, Nowson CA, MacGregor GA. Fruit and vegetable consumption and stroke: meta-analysis of cohort studies. *Lancet*. 2006; 367: 320-326.
38. Ha E-J, Caine-Bish N. Interactive Introductory Nutrition Course Focusing on Disease Prevention Increased Whole-Grain Consumption by College Students. *Journal of Nutrition Education and Behavior*. 2011;43(4):263-267.
39. Rose N, Hosig K, Davy B, Serrano E, Davis L. Whole-Grain Intake is Associated with Body Mass Index in College Students. *Journal of Nutrition Education and Behavior* 2007;39(2):90-94.

40. Sharma S, Sheehy T, Kolonel LN. Ethnic differences in grains consumption and their contribution to intake of B-vitamins: results of the Multiethnic Cohort Study. *Nutrition Journal*. 2013;12(65).
41. Jonnalagadda SS, Harnack L, Liu RH, et al. Putting the Whole Grain Puzzle Together: Health Benefits Associated with Whole Grains – Summary of American Society for Nutrition 2010 Satellite Symposium. *Journal of Nutrition*. 2011: doi:10.3945/jn.110.132944.
42. The Negative Impact of Sugar-Sweetened Beverages on Children’s Health. Robert Wood Johnson Foundation web site. <http://www.rwjf.org/content/dam/farm/reports/reports/2009/rwjf50143> Accessed September 2014. Published November 2009.
43. Block JP, Gillman MW, Linakis SK, Goldman RE. “If It Tastes Good, I’m Drinking It”: Qualitative Study of Beverage Consumption Among College Students. *Journal of Adolescent Health*. 2013; 52: 702-706.
44. West DS, Bursac Z, Quimby D, Prewitt TC, et al. Self-Reported Sugar-Sweetened Beverage Intake among College Students. *Obesity*. 2006; 14(10): 1825-1831.
45. Racette SB, Deusinger SS, Strube MJ, Highstein GR, Deusinger RH. Changes in Weight and Health Behaviors from Freshman through Senior Year of College. *Journal of Nutrition Education and Behavior* 2008;40(1):39-42.
46. Anthropometric Reference Data for Children and Adults: United States, 2007-2010. Center for Disease Control and Prevention Web site. http://www.cdc.gov/nchs/data/series/sr_11/sr11_252.pdf Published October 2012. Accessed June 2014.
47. Gropper SS, Smith JL, Groff JL. Chapter 8: Body Composition, Energy Expenditure, and Energy Balance. In: *Advanced Nutrition and Human Metabolism*. 5th ed. Belmont, CA: Wadsworth; 2009:285-288.
48. Webb JB, Hardin AS. A preliminary evaluation of BMI status in moderating changes in body composition and eating behavior in ethnically-diverse first-year college women. *Eating Behaviors*. 2012; 13: 402-405.
49. Fedewa MV, Das BM, Evans EM, Dishman RK. Change in Weight and Adiposity in College Students. *American Journal of Preventative Medicine*. 2014. DOI: <http://dx.doi.org/10.1016/j.amepre.2014.07.035>
50. Carroll JF, Chiapa AL, Rodriguez M, et al. Visceral Fat, Waist Circumference and BMI: Impact of Race/ethnicity. *Obesity*. 2008;16(3):600-607.
51. 2008 Physical Activity Guidelines for Americans. U.S. Department of Health and Human Services Web site. <http://www.health.gov/paguidelines/pdf/paguide.pdf> Published October 2008. Accessed July 2014.
52. Elavsk S, McAuley I, Motl RW, et al. Physical activity enhances long-term quality of life in older adults: Efficacy, esteem, and affective influences. *Annals of Behavioral Medicine*. 2009;30(2):138-145.
53. Joseph RP, Royse KE, Benitez TJ, Pekmezi DW. Physical activity and quality of life among university students: exploring self-efficacy, self-esteem, and affect as potential mediators. *Quality of Life Research*. 2013; 23: 661-669.

54. Zhai L, Zhang Y, Zhang D. Sedentary behavior and the risk of depression: a meta-analysis. *British Journal of Sports Medicine*. 2014; doi:10.1136/bjsports-2014-093613.
55. Palmer LK, Economou P, Cruz D, et al. The Relationship Between Stress, Fatigue, and Cognitive Functioning. *College Student Journal*. 2013;47(1):198-211.
56. Sages RA, Britt SL. The Correlation Between Anxiety and Money Management. *College Student Journal*. 2013;47(1):1-11.
57. Cortney S. Warren. Body area dissatisfaction in white, black and Latina female college students in the USA: an examination of racially salient appearance areas and ethnic identity. *Ethnic and Racial Studies*. 2014; 37(3):537-556.
58. Centers for Disease Control and Prevention (CDC). Fruits and Veggies—MoreMatters. About Fruits and Veggies—More Matters. <http://www.fruitsandveggiesmorematters.org/about-fruits-and-veggies-more-matters>. (Accessed December 18, 2013).
59. Erinosh TO, Moser RP, Oh AY, et al. Awareness of the Fruits and Veggies—More Matters campaign, knowledge of the fruit and vegetable recommendation, and fruit and vegetable intake of adults in the 2007 Food Attitudes and Behaviors (FAB) Survey. *Appetite*. 2012; 59: 155-160.
60. Murimi M, Chrisman MS, McAllister T, McDonald OD. Fostering Healthy Lifestyles in the African American Population. *Journal of Health Education and Behavior*. DOI: 10.1177/1090198114540465.
61. About *We Can!*. National Institute of Health Web site. <http://www.nhlbi.nih.gov/health/educational/wecan/about-wecan/index.htm> Updated February 2013. Accessed September 2014.
62. Napolitano MA, Hayes S, Bennett GG, Ives AK, Foster GD. Using Facebook and Text Messaging to Deliver a Weight Loss Program to College Students. *Obesity*. 2013;21:25-31.

Appendix

GLOSSARY

Aerobic activity: also known as endurance activity, this activity gets the body moving in a repetitive, rhythmic manner over a continuous period to improve cardiovascular health. E.g. walking, running, jogging, swimming, cycling,

Moderate intensity aerobic activity: This type of activity increases an individual's heart rate a moderate amount. On a scale of 0 to 10, where 0 is at rest or sleeping and 10 is about to pass out from strenuous exercise, this activity is a 5 or 6.

Muscle-strengthening/resistance activity: This type of activity helps to increase the strength of skeletal muscles while increasing bone strength. E.g. weight training

Vigorous intensity aerobic activity: This type of activity increases an individual's heart rate substantially. On a scale of 0 to 10, where 0 is at rest or sleeping and 10 is about to pass out from strenuous exercise, this activity is a 7 or 8.

Appendix B: Surveys

Sue Schembre's Weight Related Behavior Questionnaire (WREQ)

Schembre S, Greene G, Melanson K. Development and validation of a weight-related eating questionnaire. *Eating Behaviors*. 2009;10:199-124.

*****Not enough time to finish this survey now? You can come back later and finish, just remember to finish this page and click next at the bottom to save this page. When you return, you will start with the next survey.***

Note: WREQ scale scores are calculated as the average of the summed item raw scores by the following criteria: Not at all = 1; Slightly = 2; More or Less = 3; Pretty Well = 4; Completely = 5.

Routine Restraint = (Item 1 + Item 3 + Item 7)/3

Compensatory Restraint = (Item 10 + Item 12 + Item 16)/3

Susceptibility to External Cues = (Item 5 + Item 8 + Item 9 + Item 11 + Item 13)/5

Emotional Eating = (Item 2 + Item 4 + Item 6 + Item 14 + Item 15)/5

Please choose the response that best describes you.

1) I purposefully hold back at meals in order not to gain weight.

(1) Not at all

(2) Slightly

(3) More or less

(4) Pretty well

(5) Completely

(6) Choose not to answer

2) I tend to eat more when I am anxious, worried, or tense.

(1) Not at all

(2) Slightly

(3) More or less

(4) Pretty well

(5) Completely

(6) Choose not to answer

3) I count calories as a conscious means of controlling my weight.

(1) Not at all

(2) Slightly

(3) More or less

- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

4) When I feel lonely I console myself by eating.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

5) I tend to eat more food than usual when I have more available places that serve or sell food.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

6) I tend to eat when I am disappointed or feel let down.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

7) I often refuse foods or drinks offered because I am concerned about my weight.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

8) If I see others eating, I have a strong desire to eat too.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

9) Some foods taste so good I eat more even when I am no longer hungry.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

10) When I have eaten too much during the day, I will often eat less than usual the following day.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

11) I often eat so quickly I don't notice I'm full until I've eaten too much.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

12) If I eat more than usual during a meal, I try to make up for it at another meal.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

13) When I'm offered delicious food, it's hard to resist eating it even if I've just eaten.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

14) I eat more when I'm having relationship problems.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely

(6) Choose not to answer

15) When I'm under a lot of stress, I eat more than I usually do.

(1) Not at all

(2) Slightly

(3) More or less

(4) Pretty well

(5) Completely

(6) Choose not to answer

16) When I know I'll be eating a big meal during the day, I try to make up for it by eating less before or after that meal.

(1) Not at all

(2) Slightly

(3) More or less

(4) Pretty well

(5) Completely

(6) Choose not to answer

NCI Fat Screener http://riskfactor.cancer.gov/diet/screeners/fat/percent_energy.pdf

*****Not enough time to finish this survey now? You can come back later and finish, just remember to finish this page and click next at the bottom to save this page. When you return, you will start with the next survey.***

Thinking about your eating habits over the past 12 months. About how often did you eat or drink each of the following foods? Remember breakfast, lunch, dinner, snacks, and eating out. Click on only one bubble for each food.

1) Cold cereal

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

2) Skim milk, on cereal or to drink

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

3) Eggs, fried or scrambled in margarine, butter, or oil

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

4) Sausage or bacon, regular-fat

- (1) never
- (2) Less than once per month

- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

5) Margarine or butter on bread, rolls, pancakes

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

6) Orange juice or grapefruit juice

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

7) Fruit (not juices)

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

8) Beef or pork hot dogs, regular-fat

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week

- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

9) Cheese or cheese spread, regular-fat

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

10) French fries, home fries, or hash brown potatoes

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

11) Margarine or butter on vegetables, including potatoes

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

12) Mayonnaise, regular-fat 14

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week

- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

13) Salad dressings, regular-fat

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

14) Rice

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

15) Margarine, butter, or oil on rice or pasta

- (1) never
- (2) Less than once per month
- (3) 1-3 times per month
- (4) 1-2 times per week
- (5) 3-4 times per week
- (6) 5-6 times per week
- (7) 1 time per day
- (8) 2 or more times per day
- (9) Choose not to answer

16) Over the past 12 months, when you prepared foods with margarine or ate margarine, how often did you use a reduced-fat margarine?

- (1) Didn't Use Margarine 15

- (2) Almost Never
- (3) About $\frac{1}{4}$ of the time
- (4) About $\frac{1}{2}$ of the time
- (5) About $\frac{3}{4}$ of the time
- (6) Almost always or always
- (7) Choose not to answer

17) Overall, when you think about the foods you ate over the past 12 months, would you say your diet was high, medium, or low in fat?

- (1) High
- (2) Medium
- (3) Low
- (4) Choose not to answer

NCI Fruit and Vegetable Screener

Available at: <http://riskfactor.cancer.gov/diet/screeners/fruitveg/allday.pdf>

***Not enough time to finish this survey now? You can come back later and finish, just remember to finish this page and click next at the bottom to save this page. When you return, you will start with the next survey.*

Think about what you usually ate last month. Please think about all the fruits and vegetables that you ate last month. Include those that were:

- Raw and cooked,**
- Eaten as snacks and at meals**
- Eaten at home and away from home (restaurants, friends, take-out), and**
- Eaten alone and mixed with other foods.**

Report how many times per month, week, or day you ate each food, and if you ate it, how much you usually had.

**If you mark “never” for a question, follow the “Go to” instruction.
Choose the best answer for each question. Mark only one response for each question.**

1) Over the last month, how many times per month, week, or day did you drink **100% juice** such as orange, apple, grape, or grapefruit juice? **Do not count** fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.

- (1) never (go to question 3)
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

2) Each time you drank **100% juice**, how much did you usually drink?

- (1) Did not drink 100% juice
- (2) Less than $\frac{3}{4}$ cup (less than 6 ounces)
- (3) $\frac{3}{4}$ to $1\frac{1}{4}$ cup (6 to 10 ounces)
- (4) $1\frac{1}{4}$ to 2 cups (10 to 16 ounces)
- (5) More than 2 cups (more than 16 ounces)
- (6) Choose not to answer

3) Over the last month, how many times per month, week, or day did you eat **fruit**? Count any kind of fruit—fresh, canned, and frozen. **Do not count** juices. Include fruit you ate at all mealtimes and for snacks.

- (1) never (go to question 5)
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

4) Each time you ate **fruit**, how much did you usually eat?

- (1) Did not eat fruit
- (2) Less than 1 medium fruit (less than ½ cup)
- (3) 1 medium fruit (about ½ cup)
- (4) 2 medium fruits (about 1 cup)
- (5) More than 2 medium fruits (more than 1 cup)
- (6) Choose not to answer

5) Over the last month, how often did you eat **lettuce salad (with or without other vegetables)**?

- (1) never (go to question 7)
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

6) Each time you ate **lettuce salad**, how much did you usually eat?

- (1) Did not eat lettuce salad
- (2) About ½ cup
- (3) About 1 cup
- (4) About 2 cups
- (5) More than 2 cups
- (6) Choose not to answer

7) Over the last month, how often did you eat **French fries** or **fried potatoes**?

- (1) never (go to question 9)
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

8) Each time you ate **French fries** or **fried potatoes**, how much did you usually eat?

- (1) Did not eat French fries or fried potatoes
- (2) Small order or less (About 1 cup or less)
- (3) Medium order (About 1½ cups)
- (4) Large order (About 2 cups)
- (5) Super-Size order or more (About 3 cups or more)
- (6) Choose not to answer

9) Over the last month, how often did you eat **other white potatoes**? Count **baked, boiled, and mashed potatoes, potato salad, and white potatoes that were not fried.**

- (1) never (go to question 11)
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

10) Each time you ate **these potatoes**, how much did you usually eat?

- (1) Did not eat these types of potatoes
- (2) 1 small potato or less (1/2 cup or less)
- (3) 1 medium potato (1/2 to 1 cup)
- (4) 1 large potato (1 to 1½ cups)
- (5) 2 medium potatoes or more (1½ cups or more)
- (6) Choose not to answer

11) Over the last month, how often did you eat **cooked dried beans**? Count **baked beans, bean soup, refried beans, pork and beans** and **other bean dishes.**

- (1) never (go to question 13)
- (2) 1-3 times last **month**

- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

12) Each time you ate **these beans**, how much did you usually eat?

- (1) Did not eat cooked dried beans
- (2) Less than $\frac{1}{2}$ cup
- (3) $\frac{1}{2}$ to 1 cup
- (4) 1 to $1\frac{1}{2}$ cups
- (5) More than $1\frac{1}{2}$ cups
- (6) Choose not to answer

13) Over the last month, how often did you eat **other vegetables**?

DO NOT COUNT:

- o Lettuce salads
- o White potatoes
- o Cooked dried beans
- o Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
- o Rice

COUNT: All other vegetables—raw, cooked, canned, and frozen

- (1) never (go to question 15)
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

14) Each of these times that you ate **other vegetables**, how much did you usually eat?

- (1) Did not eat these vegetables
- (2) Less than $\frac{1}{2}$ cup
- (3) $\frac{1}{2}$ to 1 cup
- (4) 1 to 2 cups

- (5) More than 2 cups
- (6) Choose not to answer

15) Over the last month, how often did you eat **tomato sauce**? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.

- (1) never (go to question 17)
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

16) Each time you ate **tomato sauce**, how much did you usually eat?

- (1) Did not eat tomato sauce
- (2) About $\frac{1}{4}$ cup
- (3) About $\frac{1}{2}$ cup
- (4) About 1 cup
- (5) More than 1 cup
- (6) Choose not to answer

17) Over the last month, how often did you eat **vegetable soups**? Include tomato soup, gazpacho, beef with vegetable soup, minestrone soup, and other soups made with vegetables.

- (1) never (go to question 19)
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

18) Each time you ate **vegetable soup**, how much did you usually eat?

- (1) Did not eat vegetable soup
- (2) Less than 1 cup
- (3) 1 to 2 cups
- (4) 2 to 3 cups
- (5) More than 3 cups

(6) Choose not to answer

19) Over the last month, how often did you eat **mixtures that included vegetables?**
Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.

- (1) never
- (2) 1-3 times last **month**
- (3) 1-2 times per **week**
- (4) 3-4 times per **week**
- (5) 5-6 times per **week**
- (6) 1 time per **day**
- (7) 2 times per **day**
- (8) 3 times per **day**
- (9) 4 times per **day**
- (10) 5 or more times per **day**
- (11) Choose not to answer

20) Including snacks, how many cups of fruit and 100% fruit juice do you usually eat each day?

- (1) Less than $\frac{1}{2}$ cup
- (2) $\frac{1}{2}$ cup
- (3) 1 cup
- (4) $1 \frac{1}{2}$ cups
- (5) 2 cups
- (6) $2 \frac{1}{2}$ cups
- (7) 3 cups
- (8) $3 \frac{1}{2}$ cups
- (9) 4 cups
- (10) $4 \frac{1}{2}$ cups
- (11) 5 cups
- (12) $5 \frac{1}{2}$ cups
- (13) 6 cups or more
- (14) Choose not to answer

21) Including snacks, how many cups of vegetables do you usually eat each day?

- (1) Less than $\frac{1}{2}$ cup
- (2) $\frac{1}{2}$ cup
- (3) 1 cup
- (4) $1 \frac{1}{2}$ cups
- (5) 2 cups
- (6) $2 \frac{1}{2}$ cups
- (7) 3 cups
- (8) $3 \frac{1}{2}$ cups
- (9) 4 cups
- (10) $4 \frac{1}{2}$ cups
- (11) 5 cups
- (12) $5 \frac{1}{2}$ cups

(13) 6 cups or more

(14) Choose not to answer

The next 2 questions are about grains.

**22) How many servings of grains do you eat on average per day?
From Healthy Eating Index**

NOTE: Any food made from wheat, rice, oats, cornmeal, barley or another cereal grain is a grain product. Bread, pasta, oatmeal, breakfast cereals, tortillas and grits are examples of grain products.

Examples: 1 serving = 1 slice of bread; 1 cup of ready-to-eat cereal; ½ cup cooked rice or pasta

1) Less than one

2) 1

3) 2

4) 3

5) 4

6) 5

7) 6 or more

8) Choose not to answer

23) How many servings of whole grains do you eat on average per day?

NOTE: All grains begin as whole grains; however, if after milling they keep all the parts of the original grain in their original proportions they are still considered a whole grain. Whole grains should be the first ingredient listed on the label.

Examples: 1 serving = 1 slice whole wheat bread; 5-6 whole grain crackers; ½ cup cooked brown rice; ½ cup oatmeal

1) Less than one

2) 1

3) 2

4) 3

5) 4

6) 5

7) 6 or more

8) Choose not to answer

From West et al. Obesity 2006 14:1825

*****Not enough time to finish this survey now? You can come back later and finish, just remember to finish this page and click next at the bottom to save this page. When you return, you will start with the next survey.***

1) On average, how often in the past month did you consume a non-diet, sugar-sweetened soft drink (pop)? (For example, Coke, Sprite, Dr. Pepper, Pepsi, Mountain Dew, Orange Crush, Mr. Pibb, 7-Up, Fanta, root beer)

- (1) Never or less than one per month
- (2) One to four per month
- (3) Two to six per week
- (4) One per day
- (5) Two per day
- (6) Three per day
- (7) Four per day or more
- (8) Choose not to answer

2) If you consumed any non-diet, sugar-sweetened soft drinks last month, what was the typical serving size you consumed?

- (1) I have not had a non-diet sugared soft drink in the last month
- (2) 12-ounce can
- (3) Restaurant glass or cup
- (4) 20-ounce bottle
- (5) 2-liter bottle
- (6) Choose not to answer

3) On average, how often in the past month did you consume fruit drinks or other sugar sweetened beverages? (For example, Hawaiian Punch, Hi-C, Kool-Aid, Ocean Spray cranberry juice cocktail, Snapple, Sunny Delight, Country Time Lemonade, Sobe, Arizon Ice Tea, sugar sweetened tea, etc.)

- (1) Never or less than one per month
- (2) One to four per month
- (3) Two to six per week
- (4) One per day
- (5) Two per day
- (6) Three per day
- (7) Four per day or more
- (8) Choose not to answer

4) If you consumed any fruit drinks last month, what was the typical serving size you consumed?

- (1) I have not had a fruit drink in the last month
- (2) 11.5-ounce can or less
- (3) 20-ounce bottle
- (4) 64-ounce bottle

(5) Choose not to answer

Note: The following energy drink and coffee drink items were designed by Mallory Koenings, Susan Nitzke, Beatrice Phillips.

5) On average, how often in the past month did you consume non-diet (**NOT** sugar-free) energy drinks (For example, RockStar, Red Bull, Monster, Full Throttle)?

- (1) Never or less than one per month
- (2) One to four per month
- (3) Two to six per week
- (4) One per day
- (5) Two per day
- (6) Three per day
- (7) Four per day or more
- (8) Choose not to answer

6) If you consumed any non-diet energy drinks last month, what was the typical serving size you consumed?

- (1) I have not had a non-diet energy drink in the last month
- (2) 2-6 oz. (energy shot)
- (3) between 6 and 16 oz.
- (4) more than 16 oz.
- (5) Choose not to answer

7) On average, how often in the past month did you consume sugar-sweetened specialty coffee drinks (For example, Frappuccino, flavored latté/cappuccino)?

- (1) Never or less than one per month
- (2) One to four per month
- (3) Two to six per week
- (4) One per day
- (5) Two per day
- (6) Three per day
- (7) Four per day or more
- (8) Choose not to answer

8) If you consumed any sugar-sweetened specialty coffee drinks last month, what was the typical serving size you consumed?

- (1) I have not had a sugar-sweetened specialty coffee last month
- (2) 12 oz. or less
- (3) more than 12 oz.
- (4) Choose not to answer

International Physical Activity Questionnaire (IPAQ)

(used in Project WebHealth & named in proposal)

<http://www.projectwebhealth.com/lesson/survey.php?sid=76>

*****Not enough time to finish this survey now? You can come back later and finish, just remember to finish this page and click next at the bottom to save this page. When you return, you will start with the next survey.***

How Active Are You?

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal or make your heart beat much harder than normal. Think only about those vigorous physical activities that you did for at least 10 minutes at a time, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate.

1) During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?

- (1) 0 days (Skip to question 3)
- (2) 1 day
- (3) 2 days
- (4) 3 days
- (5) 4 days
- (6) 5 days
- (7) 6 days
- (8) 7 days
- (9) Choose not to answer

2) How much time did you usually spend doing vigorous physical activities on one of those days?

- (1) Did not do vigorous physical activities
- (2) 10 minutes
- (3) 20 minutes
- (4) 30 minutes
- (5) 40 minutes
- (6) 50 minutes
- (7) 60 minutes
- (8) 70 minutes (1 hr 10 min)
- (9) 80 minutes (1 hr 20 min)

- (10) 90 minutes (1 hr 30 min)
- (11) 100 minutes (1 hr 40 min)
- (12) 110 minutes (1 hr 50 min)
- (13) 120 minutes (2 hrs)
- (14) 130 minutes (2 hrs 10 min)
- (15) 140 minutes (2 hrs 20 min)
- (16) 150 minutes (2 hrs 30 min)
- (17) 160 minutes (2 hrs 40 min)
- (18) 170 minutes (2 hrs 50 min)
- (19) 180 + minutes (3 hrs or more)
- (20) Don't know/not sure
- (21) Choose not to answer

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal or make your heart beat somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breathing or heart rate.

3) During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

- (1) 0 days (Skip to question 5)
- (2) 1 day
- (3) 2 days
- (4) 3 days
- (5) 4 days
- (6) 5 days
- (7) 6 days
- (8) 7 days
- (9) Choose not to answer

4) How much time did you usually spend doing moderate physical activities on one of those days?

- (1) Do not do moderate physical activities
- (2) 10 minutes
- (3) 20 minutes
- (4) 30 minutes
- (5) 40 minutes
- (6) 50 minutes
- (7) 60 minutes
- (8) 70 minutes (1 hr 10 min)
- (9) 80 minutes (1 hr 20 min)
- (10) 90 minutes (1 hr 30 min)
- (11) 100 minutes (1 hr 40 min)

- (12) 110 minutes (1 hr 50 min)
- (13) 120 minutes (2 hrs)
- (14) 130 minutes (2 hrs 10 min)
- (15) 140 minutes (2 hrs 20 min)
- (16) 150 minutes (2 hrs 30 min)
- (17) 160 minutes (2 hrs 40 min)
- (18) 170 minutes (2 hrs 50 min)
- (19) 180 + minutes (3 hrs or more)
- (20) Don't know/not sure
- (21) Choose not to answer

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise or leisure.

5) During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

- (1) 0 days (Skip to question 7)
- (2) 1 day
- (3) 2 days
- (4) 3 days
- (5) 4 days
- (6) 5 days
- (7) 6 days
- (8) 7 days
- (9) Choose not to answer

6) How much time did you usually spend walking on one of those days?

- (1) Did not walk
- (2) 10 minutes
- (3) 20 minutes
- (4) 30 minutes
- (5) 40 minutes
- (6) 50 minutes
- (7) 60 minutes
- (8) 70 minutes (1 hr 10 min)
- (9) 80 minutes (1 hr 20 min)
- (10) 90 minutes (1 hr 30 min)
- (11) 100 minutes (1 hr 40 min)
- (12) 110 minutes (1 hr 50 min)
- (13) 120 minutes (2 hrs)
- (14) 130 minutes (2 hrs 10 min)
- (15) 140 minutes (2 hrs 20 min)
- (16) 150 minutes (2 hrs 30 min)
- (17) 160 minutes (2 hrs 40 min)
- (18) 170 minutes (2 hrs 50 min)

- (19) 180 + minutes (3 hrs or more)
- (20) Don't know/not sure
- (21) Choose not to answer

This question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television.

7) During the last 7 days, how much time did you spend sitting on a week day?

- (1) 10 minutes
- (2) 20 minutes
- (3) 30 minutes
- (4) 40 minutes
- (5) 50 minutes
- (6) 60 minutes
- (7) 70 minutes (1 hr 10 min)
- (8) 80 minutes (1 hr 20 min)
- (9) 90 minutes (1 hr 30 min)
- (10) 100 minutes (1 hr 40 min)
- (11) 110 minutes (1 hr 50 min)
- (12) 120 minutes (2 hrs)
- (13) 130 minutes (2 hrs 10 min)
- (14) 140 minutes (2 hrs 20 min)
- (15) 150 minutes (2 hrs 30 min)
- (16) 160 minutes (2 hrs 40 min)
- (17) 170 minutes (2 hrs 50 min)
- (18) 180 + minutes (3 hrs or more)
- (19) Don't know/not sure
- (20) Choose not to answer

Think about the time you spent doing any physical activities specifically designed to strengthen your muscles such as lifting weights, push-ups or sit-ups. Include all such activities even if you have reported them before.

8) During the last 7 days, how many days did you do any physical activities designed to strengthen muscles such as lifting weights, push-ups or sit-ups?

- (1) 0 days (Skip to question 68)
- (2) 1 day
- (3) 2 days
- (4) 3 days
- (5) 4 days
- (6) 5 days
- (7) 6 days
- (8) 7 days
- (9) Choose not to answer

9) How much time did you usually spend doing strength training activities on one of those days?

- (1) Did not do strength activities
- (2) 10 minutes
- (3) 20 minutes
- (4) 30 minutes
- (5) 40 minutes
- (6) 50 minutes
- (7) 60 minutes
- (8) 70 minutes (1 hr 10 min)
- (9) 80 minutes (1 hr 20 min)
- (10) 90 minutes (1 hr 30 min)
- (11) 100 minutes (1 hr 40 min)
- (12) 110 minutes (1 hr 50 min)
- (13) 120 minutes (2 hrs)
- (14) 130 minutes (2 hrs 10 min)
- (15) 140 minutes (2 hrs 20 min)
- (16) 150 minutes (2 hrs 30 min)
- (17) 160 minutes (2 hrs 40 min)
- (18) 170 minutes (2 hrs 50 min)
- (19) 180 + minutes (3 hrs or more)
- (20) Don't know/not sure
- (21) Choose not to answer

Sue Schembre's Physical Activity Behavior Questionnaire (PABQ)

Note: PABQ scale scores are calculated as the average of the summed item raw scores by the following criteria: Not at all=1; Slightly=2; More or Less=3; Pretty Well=4; Completely=5.

Outcome expectations=sum of raw scores (Item 1+Item 2+Item 9+Item 13+Item 14)/5

Self Regulation=sum of raw scores (Item 3+Item 4+Item 5+Item 6+Item 8)/5

Personal Barriers=sum of raw scores (Item 7+Item 10+Item 11+Item 12+Item 15)/5
(Personal communication: January 22, 2010)

***Not enough time to finish this survey now? You can come back later and finish, just remember to finish this page and click next at the bottom to save this page. When you return, you will start with the next survey.*

Please choose the response that best describes you.

All answers are: Describes me: not at all, slightly, more or less, pretty well, and completely.

1) I find being physically active gives me a lot of energy.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

2) I feel good physically after I've exercised.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

3) I schedule all events in my life around my exercise routine.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

4) I schedule exercise at specific times of the week in order to maintain a routine.

- (1) Not at all
- (2) Slightly
- (3) More or less

- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

5) I set goals for myself in order to keep physically active.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

6) I make commitments to exercise and stick to them.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

7) I'm just too lazy to exercise regularly.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

8) I make back up plans to be sure I get enough exercise.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

9) Being physically active gives me a strong sense of accomplishment.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

10) I have too many things to do during the day and can never find time to exercise.

- (1) Not at all

- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

11) My lack of motivation stops me from being physically active.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

12) When I am exercising, I often feel as though I would rather be doing something else.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

13) Being physically active improves my mood.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

14) I consider being physically active an effective way of relieving stress.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

15) I don't exercise as regularly when I get depressed or upset about something.

- (1) Not at all
- (2) Slightly
- (3) More or less
- (4) Pretty well
- (5) Completely
- (6) Choose not to answer

Zullig KJ, Huebner ES, Patton JM, Murray KA. **The brief multidimensional students' life satisfaction scale- college version.** *Am J Behav.* 2009; 33(5): 483-493

*****Not enough time to finish this survey now? You can come back later and finish, just remember to finish this page and click next at the bottom to save this page. When you return, you will start with the next survey.***

These questions are about satisfaction with different areas of your life. Please choose the best answer for each.

1) I would describe my satisfaction with my family life as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied
- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

2) I would describe my satisfaction with my friendships as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied
- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

3) I would describe my satisfaction with my school experience as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied
- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

4) I would describe my satisfaction with myself as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied

- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

5) I would describe my satisfaction with where I live as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied
- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

6) I would describe my satisfaction with my relationships as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied
- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

7) I would describe my satisfaction with my physical appearance as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied
- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

8) I would describe my satisfaction with my job as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied
- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

9) I would describe my satisfaction with my overall life as:

- (1) Terrible
- (2) Unhappy
- (3) Mostly dissatisfied
- (4) Mixed (about equally satisfied and dissatisfied)
- (5) Mostly satisfied
- (6) Pleased
- (7) Delighted
- (8) Choose not to answer

BRFSS Section 21: Emotional Support and Life Satisfaction

10) How often do you get the social and emotional support you need?

- (1) Always
- (2) Usually
- (3) Sometimes
- (4) Rarely
- (5) Never
- (6) Don't know/ Not Sure
- (7) Choose not to answer

Demographics Survey

****Not enough time to finish this survey now? You can come back later and finish, just remember to finish this page and click next at the bottom to save this page. When you return, you will start with the next survey.**

Source: Lucia L Kaiser, Marilyn S Townsend, Hugo R Melgar-Quinonez, Mary L Fujii, and Patricia B Crawford. Choice of instrument influences relations between food insecurity and obesity in Latino women. *Am J Clin Nutr* 2004;80:1372– 8.

1) How old are you?

- (1) Less than 18 years old
- (2) 18
- (3) 19
- (4) 20
- (5) 21
- (6) 22
- (7) 23
- (8) 24
- (9) More than 24 years old
- (10) Choose not to answer

2) What is your gender?

- (1) Male
 - (2) Female
 - (3) Choose not to answer
- 3) Are you Hispanic or Latino?
- (1) Yes
 - (2) No
 - (3) Don't know / Not sure
 - (4) Choose not to answer

4) Which one or more of the following would you say is your race?

- (1) White
- (2) Black or African American
- (3) Asian
- (4) Native Hawaiian or Other Pacific Islander
- (5) American Indian or Alaska Native
- (6) Other [specify]_____

5) What is your year in school?

- (1) Freshman
- (2) Sophomore
- (3) Junior
- (4) Senior
- (5) Graduate

(6) Choose not to answer

6) Where do you live?

- (1) Campus residence hall
- (2) Sorority or fraternity
- (3) Other university/college housing
- (4) Off campus housing
- (5) Parent or guardian's home
- (6) Other, specify _____

7) Where is the university you attend?

- (1) Alabama
- (2) Florida
- (3) Maine
- (4) Kansas
- (5) Indiana
- (6) Michigan
- (7) New Hampshire
- (8) New Jersey
- (9) New York
- (10) North Carolina
- (11) Rhode Island
- (12) South Dakota
- (13) Wisconsin
- (14) West Virginia
- (15) Choose not to answer

8) How would you define your current relationship status?

- (1) Single
- (2) In a committed relationship
- (3) Choose not to answer

9) What is your height?

** (If you choose not to answer, please type CNA in the box)

Feet _____

Inches _____

10) What is your weight (in pounds)?

** (If you choose not to answer, please type CNA in the box)

11) How much do you want to weigh (in pounds)?

** (If you choose not to answer, please type CNA in the box)

12) How would you describe your weight?

- (1) Very Underweight
- (2) Slightly Underweight
- (3) About The Right Weight
- (4) Slightly Overweight
- (5) Very Overweight
- (6) Choose not to answer

13) Are you trying to do any of the following about your weight?

- (1) I am not trying to do anything
- (2) Stay the same weight
- (3) Lose weight
- (4) Gain weight
- (5) Choose not to answer

14) Do you participate in...? (Check all that apply)

- (1) Intercollegiate sports team (varsity)
- (2) Club sports team
- (3) Intramurals
- (4) None

15) How many hours a week do you work for pay during the school year?

- (1) I do not work
- (2) 1 to 9 hours
- (3) 10 to 19 hours
- (4) 20 to 29 hours
- (5) 30 to 39 hours
- (6) 40 hours
- (7) More than 40 hours
- (8) Choose not to answer

16) Are you an international student?

- (1) Yes
- (2) No
- (3) Choose not to answer