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Predictors of Obesity In African American College Students

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Predictors of Obesity In African American College Students

Acknowledgements

My passion for the last two decades has centered around obesity prevention. This work is excerpted from my doctoral dissertation on obesity.

Introduction

Much has been written about the obesity epidemic and many studies have been conducted over the years, but instead of improving, the obesity trend is worsening (CDC, 2017). This negative trend is cause for major concern as obesity is a known precursor of many serious health problems like diabetes, hypertension, and cancer. According to recent data from Robert Wood Johnson's 2016 report on the State of Obesity in our nation:

Twenty-five states have adult obesity rates above 30 percent, 43 states have rates above 25 percent, and every state is above 20 percent. In 1985, no state had an adult obesity rate higher than 15 percent; in 1991, no state was over 20 percent; in 2000, no state was over 25 percent; in 2006, only Mississippi and West Virginia were above 30 percent. Since 2005, there has been some evidence that the rate of increase has been slowing across the states. In 2005, every state but one experienced an increase in obesity rates from the previous year; from 2007 to 2008, rates increased in 37 states from 2009 to 2010, rates increased in 28 states; from 2010 to 2011, rates increased in 16 states (in 2011, CDC changed methodologies for the Behavioral Risk Factor Surveillance System) Between 2011 and 2012, only one state had an increase. Between 2012 and 2013, six states had increases. Between 2014 and 2015, two states had increases and four decreases. In 2010, the U.S. Department of Health and Human Services (HHS) set a national goal to reduce the adult obesity rate from 33.9 percent to 30.5 percent by 2020, which would be a 10 percent decrease. *Healthy People 2020* also set a goal of *increasing* the percentage of people at a healthy weight from 30.8 percent to 33.9 percent by 2020. As of 2014, 17 states fell short of that.

The same report showed that Texas, with obesity prevalence rate of 32.4%, ranks the 10th on the list of States with the highest obesity rates per the 2015 BRFSS data. The rate for African Americans was reported to be 41.5%, Hispanics, 36.9% and whites 27.9% (Segal et al, 2016). Many comorbid conditions (diabetes, high blood pressure, sleep apnea, and some cancers) are linked to obesity and many critical organ systems are potentially vulnerable to the abuse of obesity (Dunphy & Winland-Brown, 2001). Even more troubling is the increasing prevalence rate of childhood obesity, which has tripled for adolescents in the last 2 decades (Fryar, C.D; Carroll, M.D; and Ogden, C.L, (2016). This trend is also growing in college students, probably as a result of multiple unhealthy lifestyle factors including alcohol use, eating patterns, and weight behaviors (Nelson, M.C., Lust, K., Story, M., & Ehlinger, E., 2007). One particular study by the University of

New Hampshire emphasized the concern regarding increasing rates of obesity among college students and the accompanying serious health problems (University of New Hampshire, 2007). Recently, the environmental determinants of obesity, such as the built environment and the location of fast food restaurants, have come under scrutiny. Many studies regarding the role of environment have focused on elementary and high schools (Austin et al., 2005; Pate et al., 2005; Thorpe et al., 2004; Veugelers & Fitzgerald 2005a, 2005b). College campuses have received little attention. Although it could be argued that obesity is mostly a behavioral problem, the socioeconomic, environmental, and cultural influences that fuel its rising prevalence and incidence, especially in African Americans, cannot be ignored. A better understanding and appreciation of these socioeconomic/cultural influences are critical to framing solutions that can be sustained, especially for the African American college population.

Background of the Problem

Current data from the CDC (2017) reveal that there is a significant increase in the number of adults who are obese in the United States. Current statistics for Texas are even more alarming, especially among minority and low-income populations, with African Americans and Hispanics bearing the greatest burden of overweight and obesity. The overall rate of overweight and obesity among adults was 62.80%. African Americans were 75.50%, Hispanics were 69.80%, and Whites were 59.10% (CDC, 2015). Similar trends were noted for children; the 2008 Texas Behavioral Risk Factor Surveillance System (BRFSS) data revealed that 55.3% of college-age young adults 18-29 years of age were at risk for overweight or obesity. According to Richards et al. (2004), "the best medical research shows that obesity is a lifelong problem that requires fundamental changes in behavior; it is tied up in both how much people eat and how much physical activity they get" (p.3).

Current literature documents show that increasing physical activity can be an effective intervention to combat overweight and/or obesity, and the primary strategies used should include health education efforts to modify individual behavior (Miller & Dunstan, 2004). These authors suggest that, while such approaches are effective with children and youth, multiple interventions that also address nutrition must be applied with adults.

Bauman (2004) provides an expanded understanding of the role of physical activity as a viable response to overweight and obesity. Specifically, Bauman, through a review of literature published from 2000-2003, found that several studies suggested that walking for women, seniors, and special populations is as effective as vigorous activity. Environmental

factors, such as safety concerns and lack of access to exercise facilities may serve as a barrier to physical activity.

Some authors (Gordon-Larsen, Nelson, Page, and Popkin, 2006) have explored the role of the environment on obesity and noted that there may be a relationship between the two. They found that the neighborhoods in the lower socioeconomic areas lacked access to facilities that allowed them to engage in physical activity. In a similar study, Robert and Reither (2004) conducted a multilevel analysis of race, community disadvantage, and body mass index (BMI) among U.S. adults with data from a national survey of adults, and noted that Black women had an age-adjusted BMI score that was three points more than non-Black women following a multi-regression analysis. They concluded that “living in communities with higher socioeconomic disadvantage was associated with higher BMI.” A systematic review of literature to examine the relationship between obesity and the community and/or consumer food environment conducted by Holsten (2008) revealed that five out of seven studies reviewed showed significant association between obesity rates and the community food environment. The author suggested that “future research should directly measure multiple levels of the food environment and key confounders at the individual level” (Holsten, 2008, p. 397). More recent studies (Li et al., 2009; Spence et al., 2009; Wang et al., 2007) indicate a strong relationship between the locations of fast food restaurants in close proximities to neighborhoods in the low socioeconomic population. In each study, they found higher obesity rates in those neighborhoods. Similar findings were noted in other countries like Canada by Spence et al. (2009). These findings and conclusions not only point to a need for education of people in these neighborhoods, but signals the need for public health policy actions that would mandate limitations on proximities of fast food restaurants in low socioeconomic neighborhoods, as well as mandate food preparation requirements. Those in academia who make these discoveries must also ensure that such findings are disseminated to decision makers as well as those who would want further inquiry on the subject. It would appear that emphasis on public health education is the key to success in this regard, so that people will learn to make better food choices no matter how close fast food restaurants are to them.

Among many other concerns about the young adult entering college is the concern for weight gain. The popular “freshman 15” which assumes that a freshman in college is likely to gain 15lbs, is usually referenced as inevitable during the first year of college. The major problem, especially with respect to the African American college community, is that little or no research has

been conducted in that population, hence little is known. The school environment, which includes opportunity and facilities for physical education, dietary offerings in the school cafeteria, presence or absence of vending machines, and what they are stocked with, are all crucial in the weight outcomes of students in any college. Findings from a meta-analysis of 24 previous studies, were slightly contrary to the general belief that students gain weight in their first year (Vella-Zarb & Elgar, 2009). This study revealed that while there was some truth in this belief, it was not to the same magnitude as is usually purported. Vella-Zarb and Elgar (2009) concluded that during the first year of college students are vulnerable to behaviors that predispose them to “a small, but significant amount of weight gain” (p.165).

Other studies noted disparities in overweight and obesity among U.S. college students (Bronner, 2003; Nelson et al., 2007b), citing much higher incidence and prevalence among African American students whose combined overweight and obesity rate was shown to be 37.7% in 1993, and 52.2% in 1999. That of their White counterparts was reported as 25.4% in 1993, and 32.9% in 1999, while their Hispanic counterparts was 27.8% in 1993, and 38.5% in 1999. Almost all of the studies reviewed in the analysis were conducted among students in the general population. In addition, most of the studies utilized only female participants. The authors called for weight prevention programs on campus, to ensure better weight outcomes for students. Yet other authors push for college personal health education courses that would enhance the ability of the students to make wiser lifestyle choices. Becker et al. (2008) reviewed a required general education health course delivered to 4,000 students per year, and concluded that the course was effective in helping students adopt healthy behaviors in the long term. In general, current research/data show that African Americans have the highest obesity prevalence and incidence rates, despite intervention programs that target them.

This study used a mixed-study approach to explore possible combined home and campus influences on obesity in the targeted young adult African American college population. With persistent high incidence and prevalence of obesity in the African American population, it is necessary to target educational institutions with the hope that students would be able to acquire transferable knowledge to their families and even to their own future children.

Nature of the Study

While it is easy to make judgments and arrive at casual conclusions about the challenge of obesity in the African American (AA) population, it is imperative to ask the right questions in the continued search for answers as to why obesity rates remain persistently high among African Americans. This research used a mixed-method design with a correlation study approach for the quantitative arm while a focus group was used for the qualitative arm to examine various factors that are likely to be associated with the development and sustenance of obesity in the African American population. The over-arching question that drove this study was: What are the factors leading to the persistent high incidence and prevalence of obesity in the African American population? There were three specific research questions of interest that directed the focus of the quantitative phase of this study and they necessitated some claims in terms of hypotheses.

Singleton and Straits (2005) provided an added dimension to the definition by stating: “a hypothesis is an expected but unconfirmed relationship between two or more variables” (p. 65). Although hypothesis is derived from many sources (theory, direct observation, guesses, and intuition), Singleton and Straits (2005) noted that the researcher has the responsibility of ensuring that there is a clear speculation about the nature and form of a relationship in the chosen variables. While obesity is the dependent variable in this study, the independent variables are multiple, and they include: age, gender, income status, educational level, dietary habits, cultural perceptions of obesity, knowledge of obesity, definition of obesity, exercise habits, attitude about obesity, and role of the environment.

Research Questions and Hypotheses

1. What are the special behavioral/cultural factors influencing obesity among AA college students?

Hypothesis 1:

H_1 : Poor dietary habits, lack of physical activity, eating more cultural foods, and accepting obesity as norm, are positively associated with obesity in AA college students.

H_0 : Poor dietary habits, lack of physical activity, eating more cultural foods, and accepting obesity as norm, are not positively associated with obesity in AA college students.

2. To what extent do socioeconomic factors fuel obesity in AA college students?

Hypothesis 2:

*H*₁: Lack of knowledge about what constitutes healthy foods, and lack of financial resources to buy healthy foods due low socioeconomic class, are positively associated with making poor dietary choices that predispose AA students to obesity.

*H*₀: Lack of knowledge about what constitutes healthy foods, and lack of financial resources to buy healthy foods due low socioeconomic class, are not positively associated with making poor dietary choices that predispose AA students to obesity.

3. To what extent do unique environmental factors contribute to obesity among AA college students?

Hypothesis 3:

*H*₁: Easy access to *junk* foods/drinks and lack of access to facilities for physical activity are positively associated with obesity in AA college students.

*H*₀: Easy access to *junk* foods/drinks and lack of access to facilities for physical activity are not positively associated with obesity in AA college students.

The qualitative phase focused on finding the answers to the following main questions through the focus group study: What are the perceptions of obesity and the factors influencing its development among the AA population? Lines of questioning were open-ended in the focus group study and evolved into themes as the study progressed through the analysis cycle. The focus group study examined the students' perceptions of obesity and the factors influencing its development in the AA population. This arm comprised of two-pronged focus group sessions, with the first 45 minutes of the fact-finding session utilizing the vital renewal wheel. Specific questions addressing the elements on the wheel were explored in discussion format, then another 1-hour session used five open-ended questions to conclude the discussion sessions.

Purpose of the Study

The continuing rise in the incidence and prevalence of obesity, especially amongst African American populations, necessitates special attention and critical evaluation of the true influences of obesity. The purpose of this study was to explore and better understand the confluence of factors (behavioral, environmental, ethno-cultural, socioeconomic, and genetic) that place the members of this population at greater risk for obesity, by applying a mixed method (quantitative and qualitative) approach. This approach allowed the study to explore a wider range of questions that may not be fully captured by quantitative method alone (O'Cathain, Murphy, & Nicholl, 2007). The study also addressed existing gaps by targeting young adults, both males

and females in a historically Black university or college (HBUC) with the intent to uncover new knowledge about this population. College campuses are notorious for high rates of obesity among students especially in the first year of college; this may be due to initial adjustment from leaving home and unsupervised eating away from home, especially in the freshman year.

Conceptual Framework

This study utilized a hybrid of the PRECEDE-PROCEED and the vital renewal models. PRECEDE is an acronym for Predisposing, Reinforcing, Enabling, Causes in Educational Diagnosis and Evaluation. PROCEED is an acronym for policy, regulatory, organizational constructs in educational and environmental development. Schneiderman et al. (2004) categorized the PRECEDE-PROCEED model into nine phases: social diagnosis, epidemiological diagnosis, behavioral and environmental diagnosis, educational and organizational factors, administrative diagnosis, implementation, process evaluation, impact evaluation, and outcome evaluation. The model is presented as a framework for a systematic development and evaluation of health education programs. The primary premise unveiled by this model is the need for individuals to self-determine behavioral health practices based on the degree of change in their knowledge, which will ultimately be related to the degree of their active participation (Breslow & Cengage, 2006). The emphasis is that appropriate health education results from a proper diagnosis of the problem in the population of interest, with the recognition that by “engaging the population of interest themselves in a process of identifying their most important health or quality of life issues” (Breslow & Cengage, 2006, p.1), program outcomes are more likely to be realized. Using the five-phased PRECEDE process, the practitioner is able to sequentially evaluate each phase in the process, understand the factors that may pose the greatest challenges and appropriately target intervention efforts. Overall, this model emphasizes two main principles: the principle of participation by the target audience, and the environmental factors as the key determinants of health and health behavior (Schneiderman et al., 2004).

This study focused on the first five phases of the PRECEDE-PROCEED model, by adopting the use of a questionnaire that addressed those areas. The PROCEED aspect of the model focused on the importance of environmental influences on behavior (Ransdell, 2001). The Vital Renewal model (a postmodern mental and physical wellness model) developed by Zisman (2008) also supports a comprehensive outlook on intervention approaches to obesity treatment. This dynamic model focuses on a holistic approach that takes into consideration each

individual's whole life experiences when designing an intervention. Because of the two models' similarities, this study benefited from effectively weaving in the most important tenet of the two models (comprehensive appraisal), especially being a mixed study. The quantitative arm utilized the PRECEDE-PROCEED model with a Likert-scaled survey that addressed the independent variables of interest, while the qualitative arm utilized the vital renewal model with open-ended questions for focus groups. Using a hybrid of these models allowed this study to successfully address existing gaps, offer new knowledge and propose ideas for future study, as well as provide positive social impact.

Definition of Terms

The word obesity means different things to different people depending on their orientation and frame of reference. Studies have shown that African Americans tend to be more generous in their definition of obesity with the result that morbidly obese individuals tend to see themselves as either normal weight or just overweight (Davidson & Knafelz 2005). From a clinical practice perspective, this misguided perception may place the members of this population at greater risk than others because without accepting the presence of obesity as a problem, individuals are unwilling to seek necessary help. It is therefore important that clear definitions be provided for the purpose of this study so that those who will stand to benefit from the findings can impart necessary knowledge for this at-risk population.

BMI: Body mass index, derived from calculating the relationship between an individual's weight and height (normal BMI is 18.5-24.5, overweight: 25-29.9 and obese 30 and above). "BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems" (CDC, 2009).

College student: Any individual pursuing a baccalaureate degree in a postsecondary/tertiary institution of higher learning.

Comorbidities: the existence of other diseases that are probably a direct result of obesity (Braveman, 2009).

Culture: A unique social orientation that is adopted by a group of people based on their ethnicity; an accepted way of life- "the ideas, customs, skills, arts, etc. of a given people in a given period" (Webster's, 1980).

Disparity: "A particular type of difference in health (or in the determinants of health that could be shaped by policies) in which disadvantaged social groups systematically experience worse health or more health risks than do more advantaged social groups." (Braveman, 2009, p.1).

Obesity: overabundance of adipose tissue (body fat) evidenced by body weight in excess of 20% above ideal body weight (Dunphy & Winland-Brown, 2001).

Overweight: Overweight is defined as BMI that is 27.3% more for women, and 27.8% for men, above normal weight (NIH).

Literature Review

Method

Empirical studies on the topic of obesity are numerous and available in different peer-reviewed medical and social science journals. A digital search of literature was conducted through the following medical and social science databases: MEDLINE, CINAHL, Medscape, and the Walden University library database. This review focused on research that had been done on obesity in general, and further targeted studies that focused on African Americans. The review was also intended to uncover any gaps in knowledge that require further inquiry so as to inform the research community about a future direction. Qualitative and quantitative studies as well as clinical trials were reviewed and discussed, and they each offered different but unique explanations.

Search Terms and Method of Review

The following terms and concepts were searched: obesity research studies, obesity in minority populations, obesity in African Americans, obesity studies in colleges, obesity study in African American colleges, obesity in elementary schools, obesity and culture, and dietary habits of African Americans. Databases utilized for the search included, MEDLINE and CINAHL, and Walden library, as well as the following peer-reviewed journals: *The Journal of Health Behavior*, *Journal of Public Health*, *Journal of Diabetes*, *Journal of Health and Nutrition*, and *Journal of the American Medical Association*. Internet searches for relevant articles were also undertaken to obtain current epidemiological state and national data. The CDC's Web site was most helpful in this regard. Also, studies that offered explanations about the possible scientific/physiological basis of obesity were included as these would provide a more rounded rather than a myopic view of the subject. However, studies that were purely scientifically experimental in nature were excluded.

The balance between energy consumption and expenditure are both critical to optimal weight and health (CDC, 2006d). Physical inactivity, overeating, and poor dietary choices have all been noted to contribute to overweight and obesity, but unfortunately many Americans remain physically inactive (CDC, 2006d). This review focused on research conducted on obesity in general, but more so in relation to the variables of interest in this study, which include physical activity, dietary habits/practices, attitudes/perceptions, environmental factors, economic factors, and socio/cultural factors. Further, attention was focused more on specific research that targeted African Americans who bear the greatest burden of this disease (CDC 2006b). The review was also intended to uncover any gaps in knowledge that require further inquiry in order to inform the research community about a future direction. Qualitative and quantitative studies as well as clinical trials were reviewed and discussed and they each offered different but unique explanations about what is currently known in order to inform future direction.

The review also aimed at making the case for more in-depth study of the AA population on the subject of obesity. Findings will provide a road map for future intervention programs that will best suit AA's unique needs. Since effective intervention programs will stem from effective intervention studies, a review of intervention studies was critical for this study.

General Obesity Trends/Theories/Explanations

For the most part, many theories about obesity are propounded by researchers, but even individuals have their own concept of what constitutes obesity and what causes obesity. In this regard, it is important to understand some recent bio-physiological explanations of obesity; hence, researchers continue to seek reasons beyond the old paradigms for the origins and cause. It is important to understand this general physiological component and current research findings, in order to integrate them in designing solutions to further knowledge. Emerging theories are now being used to explore the hormonal basis of obesity in attempt to unravel reasons why some people appear unable to lose weight. Wilborn et al. (2005) studied the prevalence, theories, medical consequences, and management of obesity in attempt to determine future research priorities. They concluded that "excessive intake of energy nutrients has been reported to increase the size and number of adipocytes at various stages of lifespan" (Wilborn et al., 2005, p. 6). Of the three macronutrients (proteins, carbohydrate and fats), they noted that "protein requires the greatest metabolic cost to be converted and stored as fat" (2005, p. 6). Along the same line, the authors cited that several researchers have made some

conclusions about the role of protein in weight control, such as weight and fat loss which are improved by restricting carbohydrate intake and replacing it with protein.

The role of other hormones, such as insulin, leptin, ghrelin, cortisol, and neuropeptide Y, and the relationship among them cannot be ignored. Their role in fat storage and weight control has recently begun gaining momentum. Several studies indicate that leptin resistance plays a significant role in obesity (Enriori, Evans, Sinnayah, & Cowley, 2006; Lee, Reed, & Price, 2001; & Zhang & Scarpace, 2006). Insulin is known to play a key role in the storage and utilization of energy in the adipocytes. Leptin, on the other hand, controls fat storage by sensitizing the brain to recognize when an individual has had enough food (the full signal), which in turn helps to prevent overeating (Lee, Reed, & Price, 2001). While these are plausible reasons/causes of obesity, many people lack knowledge about how to counter these biological rhythms that require more than knowing that they exist. To understand the role of intervention studies, Nies and Patridge (2006) conducted a study that compared three interventions to increase walking in sedentary European and African American women. They noted that even though the prevalence of sedentary lifestyle was particularly high among women, minority women had higher incidence of physical inactivity in the nation. Some evidence exists that obesity may manifest itself differently in African Americans from a clinical perspective. For example, Buffington and Marema (2006) in their study of the ethnic differences on obesity and surgical weight loss between AA and Caucasian females found that Roux-en-y gastric bypass (RYG-BP) was less effective in reducing body fat and therefore excess body weight in AA women. These authors utilized a sample of 153 morbidly obese females who were randomly selected from those who had bariatric surgery. They found that morbid obesity is a more severe problem among the AA females than the Caucasian females. They also found that neither difference in caloric intake, type of foods consumed, current age, age when obesity began, level of stress, nor number of children, could explain racial differences in the progression of weight loss after RYG-BP surgery. However, they indicated that there may be some ethnic differences in fat metabolism, hence they concluded that AA females with morbid obesity have greater adiposity.

Future intervention studies may include testing for leptin resistance to see if there could be any relationship or strong association in individuals who are resistant to the traditional weight loss efforts. This observation was addressed by Harvin and Garrow (2008) in a similar study on the impact of race on weight loss after Roux-en Y gastric bypass surgery. These authors conducted a retrospective study in an attempt to determine predictors of

long-term weight loss after gastric by-pass surgery. They analyzed data from one hundred and eleven patients, comprising or seventeen males and ninety four females, (85% Caucasian and 15% AA) two years post- surgery with a primary independent variable of race. They concluded that race, as well as related surgical complications, had somewhat of a negative impact on percentage of weight loss for the patients who participated in the study. The authors called for future research to determine potential genetic and/or other social factors that could be attributed to the differences.

Numerous other differences in the causes, correlates, and manifestation of obesity have been identified by other researchers. In a study by Blixen et al. (2006), they concluded that both African American and Caucasian women's perception of obesity was incorrect based on the definition of obesity (BMI of 30/+). Some of the women in the study though clearly obese, described themselves as "overweight." Weyer et al. (1997) in a study on energy metabolism found that African American women have a lower metabolic rate than Caucasian women. The same study also revealed the likelihood that lower fat oxidation processes are operative in African American men when compared with those of their Caucasian counterparts. Several questions are still unanswered in relation to obesity in the AA population; this study explored possible issues with respect to the AA college community. The most recent study by Keown, Smith, and Harris (2009), revealed that 30-35% of college students are overweight or obese. Also associated with this dismal picture, is the increasing rate of metabolic syndrome among the college population (Keown et al., 2009). This signals need for further study, especially focusing on the more vulnerable, but less-studied group--African American college students.

Research Design and Approach

The study utilized an exploratory approach to examine and understand the potential associations between and among the variables of interest, in a mixed method format. A hybrid of the vital renewal and the PRECEDE-PROCEED theoretical models in a mixed design were employed to explore deeper into the factors that are yet to be known. These models allowed for a more comprehensive appraisal of the many factors that lead to obesity in the AA population, through the use of a survey (quantitative) and focus group sessions (qualitative).

Setting and Sample

The target community was a historically Black university or college (HBUC) in East Texas. The sampling was purposeful; a minimum of 150 adult AA male and female students at various college levels, 18-26 years of age were

targeted. For the quantitative arm, the sample size was determined by using Cohen's d (Cohen, 1988), to obtain the effect size. A medium effect size was targeted at $d.05$ for a two-tailed test with a .80 power; this allowed for a sample size of 64 per the table provided. However, due to the need to achieve a higher sample size, a $d.04$ was eventually utilized to achieve a sample size of at least 100 to allow for more generalization and also to account for possible attrition (Burkholder, 2005). Finally, a minimum of 150 participants were determined to be more appropriate for broader and more meaningful appraisal of the target population.

Study Variables and Measures

The goal of this exploratory study was to determine if there were associations between the variables of interest by using a multiple regression analysis to determine which independent variables constitute predictors of the dependent variable. The following variables were targeted: age, gender, parent's employment status, income status, and educational levels, dietary habits, cultural perceptions of obesity, knowledge of obesity, definition of obesity, exercise habits, attitude about obesity, and role of the environment while obesity was the dependent variable. As previously noted, the qualitative arm of this study utilized a two-pronged focus group interview with 10 open-ended questions. Flip charts and hand written notes were used to capture responses, and audio-tape was employed to ensure no important details were missed.

Data Collection

The quantitative phase was preceded by a pilot study to test the reliability of the survey tool which was newly designed. Four participants, ages 18-24 years, (two males and two females) participated in the test-retest pilot study. The pilot study revealed no significant issues with the survey tool, but there was need for minor adjustment in line spacing between questions; this adjustment was made before proceeding to the full study. To test for reliability, a Cronbach's alpha test was conducted and a score of 0.83 was obtained. According to Burns & Grove (1993), "a reliability of .80 is considered the lowest acceptable coefficient for a well-developed instrument. For a newly developed instrument, a reliability of .70, is considered acceptable" (p. 339). The tools (surveys, and a list of ten open-ended questions) were reviewed and approved by Walden University's IRB committee before the study commenced.

Permission to conduct the study on campus was sought from the school President. The initial public announcement about the study and its importance was made at the school's mid-week chapel worship.

Participants were given the opportunity to give consent for the study by signing the informed consent forms which were distributed at the chapel services after the introduction of the study. These were returned along with completed anonymous surveys for those who chose to participate.

For the qualitative arm, a total of 10 open-ended questions were utilized for the nearly 2-hour long focus group interviews. These questions were based on the framework of the vital renewal model. The first 45 minutes of the sessions were used to do a fact finding group interview based on the important elements on the vital renewal wheel, and five questions were used. The next 1 hour of the focus group utilized another set of five open-ended questions.

The sessions were audio-taped and notes were taken as well, to enable the researcher to review notes later and ensure that no important data was omitted. Since the participants were peers to one another, they interacted comfortably among themselves and shared their views honestly about the subject matter without discomfort. The rule of thumb was applied whereby focus group for adult males and females respectively were conducted with groupings up to two age levels with 11 males and 10 females within the age category already specified, for a total of 21 participants (Burkholder, 2005). Inclusion of about equal number of males and females was strategic because most previous studies had utilized the female population with the assumption that females are generally more obese than males, but current data (Hawthorne, Elliot & Robinson (2003); Lowry et al.; & Nelson et al., 2007) show that men in the AA population are equally at great risk. In order to ensure that adequate representation in terms of different age levels, as well as classification in school, was achieved, two focus group sessions were conducted, with a separate group for each gender to accommodate both age level and classification in school (freshman, sophomore, junior, or senior).

Data Analysis

Because the study utilized surveys to obtain necessary information, the four essential steps necessary in the data analysis process were adopted (i.e., editing, coding, data entry, and data cleaning). These steps are important, in order to ensure that the data obtained can be trusted for its internal validity. A pre-coded questionnaire in the Likert format was employed to gather information about the variables of interest, with obesity being the dependent variable and age, gender, education, income, as well as attitude, knowledge, culture, dietary habits, exercise habits, and environment as the independent variables. Ordinal and nominal levels of measurement were utilized. There was no need for adjustment to the research instrument as a

result of the pilot study before the final data collection. Since this was an exploratory study looking at associations, a logistic regression analysis was employed. The most current Statistical Package for Social Sciences (SPSS) Grad Pack, version 18 was employed for the data analysis. Cell frequencies and correlations between variables were determined by applying the use of the software. The data entry involved over 6,000 data points.

Survey responses were entered into a spreadsheet for PASW (Predictive Analytic Software) SPSS Statistics 18 (SPSS Inc., Chicago, IL), as already noted above. Body mass index (BMI) was computed from weight (in pounds) and height (in inches) using the standard BMI calculator per the SPSS software. The main outcome variable, obesity, was defined as a dichotomous variable from computed BMI as *not obese* (for BMI < 30.0) and *obese* (for BMI ≥ 30.0). For the purpose of assessing the association with obesity, most of the demographic variables were recoded from the original version by collapsing categories as shown on Table 4 in the results section. Odds ratios (*OR*) and 95% confidence intervals (95% *CI*) were computed from binary logistic regression models that assessed the association between obesity and each of the demographic variables and the constructs on attitude, culture, environment, exercise, food habit, and knowledge. A final multiple logistic regression (predictive model) was performed to examine which of the above variables were predictive of obesity in this sample. Kappa statistics was applied in assessing the level of agreement between self-perceived body size and calculated BMI, and evaluated at the 5% level of significance. The results of the associations were examined in terms of each of the specific research question and the related hypothesis. Cell percentage distribution was also computed using the same data, to understand the association between the variables, and to determine the general picture based on the PRECEDE-PROCEED model.

Furthermore, data from analysis results of the information obtained from the qualitative arm of the study were compared with those from the quantitative arm. A manual approach using content analysis was utilized. to determine common themes. Codes and labels that matched the themes were isolated from the text in the specific areas of interest and a code book was created to put the codes in different categories based on the specific questions that were used for the focus group discussion. Using content analysis approach, the text was thoroughly reviewed to determine more important themes/issues and their frequency. From the coded text, the summary of the responses were grouped to fit appropriate themes as shown under results section.

Content analysis was found appropriate because the open-ended questions were specifically designed with the independent variables of

interest in mind. Responses were compared with findings from the survey to see if there were recurring themes to further enlighten the researcher. Data gathered from both the quantitative and qualitative arm of the study were triangulated to determine the agreement in the findings between the two methods with respect to the real issues involved in obesity in this population.

Results

Quantitative Results

For the quantitative arm, a total of 250 surveys were distributed and 169 were received, accounting for a 67.5% response rate. Out of the 152 completed questionnaires obtained for analysis, 10 were later considered invalid with respect to the main outcome variable (obesity) as respondents failed to report either their weights or their heights or both, and so BMI could not be computed. Based on the remaining 142 questionnaires analyzed for this study, 57 (40.1%) were found to be obese based on the computed BMI. Table 1 below summarizes the demographic findings and shows the overall obesity rate to be 40.1% in this population. Of the 57 respondents in the obese category, 34 (59.6%) are males and 23 (40.4%) are females. This was however not statistically significant with $OR=1.7$ 95% $CI=0.8-3.3$. The mean age of the respondents was 20.5; the obesity rate for those who were less than 20 years of age was slightly lower (47.4%) than that of those who were greater than 20 years of age (52.6%), but more freshmen ($n = 29$) were obese than all the other classifications (sophomore, junior, and senior) put together ($n = 28$). Participants with fathers who were high school graduates or have GED were less likely to be obese, but this is not statistically significant ($OR=0.6$, 95% $CI=0.3- 1.3$). Similarly, participants with mothers who were high school graduates or have GED were significantly less likely to be obese, with a 70% decreased odds of being obese compared to those whose mothers have college/graduate or professional degree ($OR=0.3$, 95% $CI=0.1-0.8$); this is statistically significant. Respondents with household annual income between \$30,000 and \$60,000 show a slightly higher odds for obesity at 1.3, but this is not statistically significant 95% $CI=0.4-4.3$.

Comparing the three-category response of self-perceived body size (normal weight, overweight, and obese) to a similarly assessed three-category body size from computed BMI, there was an 85% agreement between the respondents' perception and computed value ($kappa=0.15$, $p=0.001$). Those who were obese by the computed values were more likely to correctly perceive themselves as overweight than as normal weight ($OR=8.0$, 95% $CI = 3.6 - 17.9$); this is statistically significant.

Further analysis of the associations between the dependent variable (obesity) and the independent variables (attitude, culture, environment, exercise, food habits, and knowledge) are presented in the Table below. Odds ratio (OR) and 95% confidence intervals (CI) were calculated to assess the likelihood of being obese, among those who agreed/strongly agreed versus those who disagreed/strongly disagreed to the various statements. All percent (%) calculations in the tables are based on valid number (142) of respondents after subtracting all missing data.

Table 1

Participants' Demographics, Educational Level and Perception of Body Size

N=142 (95%CI)		Total N(%)	Obese n(%)	Not obese n(%)	OR
Overall	-	142 (100)	57 (40.1)	85	
Gender					
	Male	74 (52.1)	34 (59.6)	40	
	1.7 (0.8, 3.3)				
	Female	68 (47.9)	23 (40.4)	45	
	Referent				
	Missing	none			
Mean age (Std)*		20.5 (2.2)	20.8 (2.4)	20.4 (2.1)	
	-				
Age (years)	≤20	78 (54.9)	27 (47.4)	51 (60.0)	
	0.6 (0.3, 1.2)				
	>20	64 (45.1)	30 (52.6)	34 (40.0)	
	Missing	none			
Educational level					
	Freshman	68 (49.6)	29 (51.8)	39 (48.1)	
	1.2 (0.4, 3.0)				
	Sophomore	29 (21.2)	11 (19.6)	18 (22.2)	
	1.0 (0.3, 2.9)				
	Junior	17 (12.4)	7 (12.5)	10 (12.3)	
	1.1 (0.3, 3.9)				
	Senior	23 (16.8)	9 (16.1)	14	
	(17.3)				
	Referent				

Missing	5		
Father's education			
<High school	0 (0)	0 (0)	0 (0)
-			
High school/GED	55 (46.6)	21 (40.4)	21 (40.4)
0.6 (0.3, 1.3)			
College/graduate/professional	63 (53.4)	31 (59.6)	32 (48.5)
Referent			
Missing	24		
Mother's education			
<High school	1 (0.8)	1 (1.9)	0 (0)
-			
High school/GED	40 (30.3)	9 (17.3)	31 (38.8)
0.3 (0.1, 0.8)			
College/graduate/professional	91 (68.9)	42(80.8)	49 (61.3)
Referent			
Missing	10		
Household annual income			
\$0 - \$30,000	41 (31.3)	15 (27.8)	26 (33.8)
0.9 (0.3, 2.9)			
\$30,001 - \$60,000	51 (38.0)	24 (44.4)	27 (35.1)
1.3 (0.4, 4.3)			
\$60,001 - \$90,000	18 (24.3)	9 (16.7)	15 (19.5)
0.9 (0.2, 3.4)			
\$90,001 - \$120,000	15 (11.5)	6 (11.1)	9 (11.7)
Referent			
Missing	11		
Self-perceived body size			
Normal weight	86 (62.8)	20 (35.1)	66 (82.5)
Referent			
Overweight	48 (35.0)	34 (59.6)	14 (17.5)
8.0 (3.6, 17.9)			
Obese	3 (2.2)	3 (5.3)	0 (0)
-			
Missing	5		

Table 2 presents the result of the analysis and shows some notable areas of significance: Culture 2 (most members of my family are on the heavy side) with $OR = 4.7$ 95% $CI = 2.1-10.5$, indicating strong evidence of significance, and Culture5 (I prefer to be thick than thin) which shows OR of 2.3 with 95% $CI = 1.0-5.2$, indicating marginal significance.

Table 2

Likelihood of Being Obese Based on Respondents' Answers About Culture

N=142		OBESE	NON-	OR (95% CI)
		N (%)	OBESE N (%)	
Culture 1	Neutral	13 (9.2)	10 (7.0)	-
	Disagree	14 (9.9)	16 (11.3)	Referent
	Agree	30 (21.1)	59 (41.5)	0.6 (0.3 – 1.3)
Culture 2	Neutral	13 (9.2)	8 (5.6)	-
	Disagree	14 (9.9)	53 (37.3)	Referent
	Agree	30 (21.1)	24 (16.9)	4.7 (2.1 – 10.5)
Culture 3	Neutral	13 (9.2)	5 (3.5)	-
	Disagree	20 (14.1)	47 (33.1)	Referent
	Agree	24 (16.9)	33 (23.2)	1.7 (0.8 – 3.6)
Culture 4	Neutral	7 (4.9)	7 (4.9)	-
	Disagree	42 (29.6)	67 (47.2)	Referent
	Agree	8 (5.6)	11 (7.7)	1.2 (0.4 – 3.1)
Culture 5	Neutral	12 (8.5)	21 (14.8)	-
	Disagree	13 (9.2)	31 (21.8)	Referent

	Agree	32 (22.5)	33 (23.2)	2.3 (1.0 – 5.2)
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All four categories of exercise explored were coded as positive statements, and as shown in Table 3 below, most of the results are statistically significant. For example in Exercise1 (I believe exercise plays an important role in weight and wellness), results revealed $OR=10.6$ 95% $CI=1.2-90.7$, indicating that those who disagreed are more likely to be obese than those who agreed with the statement. Exercise 4 (I have access to exercise facilities on campus) revealed $OR=2.2$ 95% $CI=1.1- 4.7$, therefore indicates that those who disagreed are more likely to be obese compared to those who agreed. Both of these are statistically significant. A marginal statistical significance was noted for Exercise 2 (I exercise at least three times a week) $OR=2.1$ 95% $CI=1.0- 4.4$, showing that those who disagreed are more likely to be obese compared to those who agreed to the statement. Exercise3 (my parents encouraged us to exercise when we were growing up) with $OR=1.6$, was not found to be statistically significant.

Table 3

Likelihood of Being Obese Based on Respondents' Answers About Exercise

N=142		OBESE N (%)	NON- OBESE N (%)	OR (95% CI)
Exercise 1	Neutral	4 (2.8)	1 (0.7)	-
	Disagree	6 (4.2)	1 (0.7)	10.6 (1.2 –
	Agree		83 (58.5)	90.7)

Exercise 2		47 (33.1)		Referent
	Neutral	6 (4.2)	7 (4.9)	-
	Disagree	27 (19.0)	27 (19.0)	2.1 (1.0 – 4.4)
Exercise 3	Agree	24 (16.9)	51 (35.9)	Referent
	Neutral	7 (4.9)	4 (2.8)	-
	Disagree	18 (12.7)	21 (14.8)	1.6 (0.8 – 3.4)
Exercise 4	Agree	32 (22.5)	60 (42.3)	Referent
	Neutral	9 (6.3)	4 (2.8)	-
	Disagree	24 (16.9)	25 (17.6)	2.2 (1.1 – 4.7)
	Agree	24 (16.9)	56 (39.4)	Referent

Some statistically significant findings are noteworthy in the results as shown in the tables. Although the significant results have been noted under each table, there is need to note what they mean in relation to the overall study. First of all, one of the constructs that explored attitudes, namely Attitude 3 “being thin doesn’t mean beauty all the time,” revealed odds ratio that is marginally statistically significant $OR= 2.7$, $95\% CI=1.0-$

7.2. This indicates that those who disagreed to the statement are more likely to be obese compared with those that agreed to the statement. Secondly, the construct of culture was explored and in Culture 2, “most members of my family are on the heavy side,” revealed a strong statistical significance with $OR=4.7$, $95\% CI= 2.1-10.5$; this indicates that those who agreed to this statement are more likely to be obese compared with those who disagreed, similar to Culture 5, “I prefer to be thick than thin,” $OR= 2.3$, $95\%CI=1.0-5.2$. This is however, marginally statistically significant. Thirdly, the construct of exercise was explored and three areas in this construct revealed statistically significant results: Exercise2, “I exercise at least three times a week,” revealed a marginally significant result with $OR=2.1$, $95\% CI=1.0-4.4$; Exercise1, “I believe exercise plays an important role in weight and overall wellness,” $OR=10.6$, $95\% CI=1.2-90.7$; and Exercise4, “I have access to exercise facilities on campus,” with $OR=2.2$, $95\% CI=1.1-4.7$. Each of these, showed that those who disagreed to these positive statements, were more likely to be obese, compared to those who agreed.

Table 4 below shows the results of further analysis of the variables based on the negative and positive statement categorization, with the responses grouped as “good” or “bad.”

Results as shown below with statements coded and summarized into positive (good) or negative (bad), revealed two areas with elevated odds ratios of note. There was a marginally statistically significant finding in the area of environment $OR=2.0$ $95\% CI=1.0-4.0$. Also a highly elevated odds ratio that is statistically significant is noted for exercise $OR=9.9$ $95\%CI=2.1-47.6$. Both of these indicate that those with “bad” responses were more likely to be obese compared to those with “good” responses

Table 4

Likelihood of Being Obese Based on Respondents’ Answers to the Constituted Constructs in Relation to the Independent Variables.

		OBESE N(%)	NON- OBESE N(%)	OR (95% CI)
Attitude	Good	14 (9.9)	11 (7.7)	Referent
	Bad	43 (30.3)	74 (52.1)	

Culture	Good	22 (15.5)	24 (16.9)	0.5 (0.2 – 1.1)
	Bad	35 (24.6)	61 (43.0)	Referent 0.6 (0.3 – 1.3)
Environment	Good	31 (21.8)	60 (42.3)	Referent 2.0 (1.0 – 4.0)
	Bad	26 (18.3)	25 (17.6)	
Exercise	Good	46 (32.4)	83 (58.5)	Referent 9.9 (2.1 – 47.6)
	Bad	11 (7.7)	2 (1.4)	
Food Habits	Good	21 (14.8)	30 (21.1)	Referent 0.9 (0.5 – 1.9)
	Bad	36 (25.4)	55 (38.7)	
Knowledge	Good	44 (31.0)	68 (47.9)	Referent 1.2 (0.5 – 2.7)
	Bad	13 (9.2)	17 (12.0)	

Tables 5 and 6 below show the predictive model from multiple the logistic regression, as well as a correlations analysis between the independent variables and obesity, among this study population. Based on the predictive model as noted in Table 5, the following variables, self-perceived body size ($p < 0.001$), and gender ($p < 0.001$), were the most predictive of obesity, followed by other variables such as exercise

($p=0.029$), age ($p=0.03$), and culture ($p=0.040$). As previously shown in Table 1, more males were obese than females in this study.

Table 5

Predictive Model Obesity from Multiple Logistic Regression Model

Variables in the Equation		P-Value	OR	95% C.I. for OR	
				Lower	Upper
.296	Step* Gender	.001		.060	.012
	Self- Perception	.000	28.395	5.593	144.166
	Father's Ed	.622	1.325	.433	4.056
	Mother's Ed	.213	.395	.091	1.705
	Age group	.035	6.704	1.141	39.389
	Sum of Attitude	.645	.594	.064	5.471
	Sum of Culture	.040	.191	.039	.928
	Sum of Envir	.137	3.651	.661	20.161
	Sum of Exercise	.029	30.474	1.431	648.765
	Sum of Fdhb	.610	.704	.183	2.713
	Sum of Know	.063	.155	.022	1.104
	Classification	.067	.467	.207	1.054
	Annual Income	.881	.954	.517	1.761
	Constant	.884	1.706		

**Variable(s) entered on step 1: Gender, Self-perception, Father's Education, Mother's Education, Age group, Σ Attitude, Σ Culture, Σ Environment, Σ Exercise, Σ Food Habits, Σ Knowledge, Classification, and Annual income*

Results of further analysis to explore the correlations of these variables that showed statistical significance with obesity, as well as correlations with each other are detailed in Table 6 below. The following positive correlations are noted with obesity: Self-perceived body size ($p=.000$), and exercise ($p=.001$). These are highly significant results. There are also other notable correlations among the independent variables. While age and gender correlated positively with a value of ($p=.010$), culture and exercise were negatively correlated, with a highly significant value of ($p=.003$).

Qualitative Results: Common Themes/Results.

The primary interest in the qualitative arm of the study was to corroborate findings from the quantitative arm of the study, as well as explore other influences of obesity that may not be elicited or captured from the quantitative arm. The focus group sessions were very lively and the students were very participatory. There seemed to be an unusual sense of excitement among the group for having the opportunity and privilege to participate in the discussion, both in the female and the male groups. In each group however, there were one or two members that mostly agreed with what the active members shared, rather than express their own personal opinions, even with prodding/probing. Overall, the discussions were lively and productive. Further discussion about each theme follows.

Lack of time, money issues, family upbringing, and concern for lack of healthy food options in the campus cafeteria seemed to be the most concerning for both groups in their ability to make healthy food choices. Also regarding the question about what contributes most to obesity, both the males and the females very easily shared how lack of exercise, parents' influence, and eating habits were major issues for them. The discussion on the question about obesity and life purpose did not attract as much discussion as the others, obviously indicating lack of knowledge about the real life implications of obesity; one male participant actually said "it shouldn't be a problem." Most of the participants indicated that they have considered making lifestyle change in food habits and exercise. Whereas that is the case, they also shared how stressful school schedule, lack of money and other personal issues can be challenges.

Both groups seemed to have a relatively good understanding about what obesity means, but they had several scattered and different opinions about what contributes to healthy eating. There also seemed to be divergent opinions between the males and females about what they thought contributes to healthy eating; there was not even one agreement in their answers, unlike in the other questions. Both groups agreed that necessary lifestyle changes should be both internally and externally motivated, but the males seemed to favor counting on their buddies and other role models more, while the females referred more to their family experiences and influences than the males. Similar results were noted for what they did for remedy if they noted deviation from their set goals. Males seemed to be more dependent on their buddies than on their families to hold them accountable; they also seemed to prefer taking personal responsibility when they saw themselves deviating from their goals than females. However, for what stressful situations they were faced with, both groups (males and females) reported dealing with about the same level of stress at the time of the discussion, albeit for somewhat different reasons.

Overall, there were important recurring themes worth mentioning. In each group there was constant reference to family, money, or finance issues, as well as several mentions of the campus environment, especially in relation to food choices in their cafeteria, and facilities for exercise. These are important findings, especially given that the students see the campus as their new home for the period of their 4 or more years of their college lives away from home. Most importantly, in almost every section discussed, participants had some reference to family, upbringing, parents' lifestyle, family likes, and family dynamics. Many of the participants in both groups had strong opinions about the influence of family and "what we ate growing up."

Data Triangulation

As previously noted, the decision to use a mixed method approach for this study was to ensure a wider exploration of the multiple influences of obesity in the population of interest. Previous studies had used mostly a quantitative approach and a few used a qualitative approach; there were hardly any studies using combined approaches at the time the literature review for this study was conducted. Cresswell (2003) agreed with previous authors that this approach is appropriate when there is need to "confirm, cross-validate or corroborate findings within a single study" (p.217). Hence, the results noted in this study were compared to determine how they relate to the questions posed, with particular focus on the independent variables, as well as some important demographic variables.

Based on the analysis of the demographic data, there were no statistically significant findings in any of the income categories. Although the focus group discussion did not include specific income categories, about 22% of the participants expressed that lack of money was an issue. Some of them noted that they had children too, and the cost of childcare adds undue financial pressure, hence they buy cheaper foods which may not necessarily be healthy. The findings from both the quantitative and qualitative arm showed no evidence that economics was a major issue.

The exploration of the home and school environment revealed that several focus group members, both males and females, expressed concern about the campus food and exercise environment, as well as made several references to their upbringing. Also, in the quantitative arm, statistically significant result, $OR=2.2$, 95% CI= 1.1-4.7, was noted in the exploration of Exercise 4 (I have access to exercise facilities on campus). Thus there is agreement between the quantitative and qualitative arm regarding the campus environment. The goal of this comparative analysis is twofold: to see if the results from the quantitative arm reveal any associations between obesity and the independent variables included in this study based on participants' responses to the questions, as well as to see if the qualitative arm, will offer deeper understanding from the focus group discussion. In this regard, the goal was met. This can be interpreted in different ways. A focus group allows individuals full expression, while a survey forces respondents to a particular answer that may not necessarily represent their full range of feelings about a particular subject.

Another important aspect explored is knowledge of obesity versus lifestyle choices that prevent it, namely dietary and exercise habits. Findings from the quantitative arm showed no statistically significant results in relation to obesity and knowledge in any of the individual questions, nor with respect to the categorical construct of knowledge. From the qualitative arm, most of the participants in the focus group easily voiced their concept of obesity correctly- "substantially overweight, grossly overweight, out of control," and "above natural weight, within control" for overweight; this implied that they have a relatively good knowledge about the differences. They also correctly noted some related health issues. Seventy-eight percent (78%) of the respondents in the quantitative arm agreed that obesity can lead to major health problems, similar to the participants in the focus groups. However, in both cases (quantitative and qualitative arms respectively) knowledge did not translate to behaviors that would ensure normal weight outcomes. Many of the participants in the focus groups stated that they had considered making appropriate lifestyle changes, but during the discussion, they had several excuses why it was not easy, and

many of them blamed others, but excused themselves from making needed changes. Similarly, the results from the quantitative arm showed that almost 70% agreed that balanced meals that include fruits and vegetables were important for optimal health, 78.3% agreed that they understood the importance of eating balanced meals, but only 36.9% agreed that they eat three balanced meals. Therefore both arms were in agreement as both suggested that participants seemed to know what to do, but showed less tendency to do it.

Two other areas explored were culture and attitude. While there were no specific related questions asked in the focus groups, observation of the group revealed several behaviors in the form of jokes and facial expressions among the groups that tended to make obesity look like a culturally accepted phenomenon that “we have to live with.” There were also references to “cultural foods, leftovers from the master, you know, chitterlings and other not very good food,” and comments like “you got to eat what you find;” all of which bordered on accepted cultural nuances. Although the quantitative arm revealed no statistically significant findings of an association between attitude and obesity in the population studied, overall, 82.4% had negative attitude about obesity, 64.1% had a negative cultural outlook on dietary practices, and 63% had cultural acceptance of obesity. Hence both the qualitative arm and quantitative arm show similar results which confirm agreement of both arms.

In summary, results from this mixed study revealed the main factors that are associated with obesity. Many of the findings from the quantitative arm were also corroborated by the qualitative arm, which also shed more light about other factors like stress and attitude toward obesity, all of which may predispose college students to obesity. .

Interpretation of Findings

Results on food habits revealed no statistically significant findings both in the individual questions and the grouped constructs. This was quite surprising, especially given that previous studies had noted dietary habits among other behaviors, to be an issue. The study tool used for this study addressed specific direct questions to ensure broad coverage on dietary habits, however the tool may not be flawless. As best as possible, the questions were worded in simple and clear language for the population, but other explanations are possible. It is possible that they did not fully comprehend some of the questions; also they may not have represented their true feelings. It could also mean that this very population did not have any major issues of significance. The answers to these questions may lie

in future studies using other methods or tools. However, the focus group participants provided a slightly different picture; they noted food habits to be the major thing that they have to change to improve their weight outcomes, but they also expressed helplessness due to limited healthy food choices in their campus cafeteria and lack of money. Although there were casual remarks and references to “eating whatever we get or whatever one can afford”, they did not seem very perturbed about it. It appeared from the group dynamics that their attitude was quite liberal and non-committal. This observation is consistent with result noted by previous researchers. While a lot of work has been done already about what appears to be a resistant problem, more work is yet to be done. New approaches that will intentionally integrate members of this population as part of the solution regard to research, policy development and intervention may offer better solutions to this problem. Results from both exercise and culture were statistically significant. With respect to exercise, a high odds ratio was noted with important statistical significance as already noted in the results section. It is evident from the results that lack of exercise and/or lack of facilities for exercise seem to pose a major problem for the population studied.

With respect to culture, results shared in, Culture showed a marginally significant result. This picture may imply that individuals in this study who have obese family members may have grown to see “thickness” as a norm, and are therefore more likely to be obese due to adoption of similar behaviors as those ones that are already obese. They may even see thin people as abnormal, hence they “prefer to be thick than thin.” Family influences with regard to behaviors may deserve more attention in this regard in future studies. While participants in this study seemed to understand what obesity implies in terms of its definition and health outcomes, there was somewhat a general indifference that obesity is “not such a big deal” after all. References were made to “slavery, and leftovers from the master.” This was surprising coming from a much younger generation that has the freedom to choose healthier options rather than the leftovers, but also understandable given that histories and habits are passed on from generation to generation. This may be true of every distinct culture whose contemporary ways of life are driven or influenced, albeit unconsciously, by years of cultural legacies tele-guided by preceding generations. However, when the accepted ways of life for any group jeopardizes its continued existence, there is need for targeted intervention.

Findings from this study also indicated that neither lack of knowledge nor lack of financial resources appeared to be of any statistical significance in the population studied. The predictive model did not show any different picture. On the other hand, the focus group discussions

revealed that the participants believed that socioeconomics played a role. Hence, the focus group findings did not corroborate the results from the quantitative arm. This may be because the focus groups members had the opportunity to voice their feelings rather than being “boxed” in to specific answers. However, future studies may focus on further exploration on the subject of economics and its association/relationship with obesity, especially in AA college students. Claims are usually made by patients in clinical settings about their inability to make healthy food choices, because they perceive that healthy foods cost more.

Table 12 highlights an apparent discrepancy between knowledge and application of that knowledge in everyday food habits and practices. Changing a behavior or adopting new behaviors requires specific actions by the individual needing to change. The individual first has to understand that there is need for change, the process of change can then occur. Each of these requires action by the individual that has to change. Another possibility with regard to knowledge is that the respondents’ knowledge may just be a surface knowledge that may not entail full and clear understanding of the subject matter (obesity) and its full ramifications. This outlook was quite evident with the focus group members. This may imply lack of true knowledge about what constitutes obesity based on the current standard objective measure with BMI. This signals need for proper re-education of the other groups to ensure that they become truly knowledgeable about what constitutes obesity, as well as the measure used to determine who is obese and who is not. Also while participants readily gave the right answers to questions about the definition of obesity and related complications, their responses to important actions like exercise and making right food choices seemed to counter the very thing they claimed to know. This implied lack of true knowledge about the subject matter. These findings are significant and important; they signal need for further studies or at least focused intervention on AA college campuses.

While this study did not specifically focus on educational level as an independent variable, the educational level of the respondents’ parents was explored in the demographics section in an attempt to get a glimpse of their parents’ socio-economic capability. There is usually a general presumption that educated people would have more knowledge about behaviors that would prevent obesity. Surprisingly though, in this study higher parental educational level did not protect individuals from being obese, rather, the results showed that respondents from mothers with high school had lower odds of being obese, than those whose mothers had college education. There were very few or no respondents with parents in the less than high school education category, hence similar comparison or conclusion could

not be made. Studies that seek to understand the role of education or its association with obesity are lacking. Perhaps practical studies that focus on comparing high and low educational level and lifestyle choices that prevent obesity will offer a clearer picture in this regard.

The third question sought to determine whether there were unique environmental factors that contribute to obesity among AA college students. None of the areas explored revealed any statistically significant results, based on the multiple regression analysis, neither were there any significant associations based on the predictive model. It is also important to note that sizeable percentages of respondents agreed that easy access to vending machines on campus increased their consumption of sodas, disagreed that they had easy access to healthy foods on campus, and agreed that they had access to healthy food options in the neighborhood where they grew up. The high percent of respondents who said they had access to healthy foods in the neighborhood where they grew up countered what previous researchers had found. Being a student population from different parts of the country and given the reported household income levels, they could have grown up in either upper or lower class neighborhoods. Hence for respondents in this study the lack of access to healthy foods in the neighborhoods where they grew up may not necessarily have been an issue.

Also, 66.9% of the respondents agreed that they had access to recreational and exercise facilities where they grew up, while a slightly lower percentage (56.3%) agreed that they have exercise facilities on campus. "Facilities" for exercise on campus may have different meaning to different individuals; some may consider the ability to walk to and from class as adequate, while others may understand it to mean a standard gym. The study instrument did not specify these details. Most respondents (64%) in the quantitative arm, aggregately reported that their environment was "good," but a closer look at the specific questions related to environment revealed that more respondents declared that their home environment was "good," while their campus environment was "bad," especially with regard to access to healthy food options and exercise facilities. The focus group participants confirmed the results about the lack of access to healthy food options on campus, but also strongly verbalized how absence of exercise facilities on campus is a major concern for them. Based on these findings, there appears to be an imbalance between the home and campus environments in this population. This may partially explain why young adults tend to gain weight once they leave home for college, especially in their first year.

Summary/Discussion

Although the sample for this study was not randomly selected, the high obesity rate noted among the study population calls for attention to ensure that these young adults do not have to deal with associated health risks as they get older. Several features and findings in this study are noteworthy. First, most studies on obesity tend to focus on females probably because females are more likely to be obese. This study was designed to purposefully include males in response to the noted gaps in literature. Also noted in this study, is that AA male college students appear to have the same and possibly more propensity for obesity. Because obese young adults tend to become more disabled as they get older, and the risk of associated health problems tend to further complicate their health status, prevention is critical.

Given the apparent cultural acceptance of obesity as a norm and seeming lack of inability to apply related knowledge, culturally sensitive and appropriate education is important. This is especially critical in the area of exercise, and clarification of knowledge base about obesity. Therefore, it can be concluded that a positive environment and exercise tend to protect individuals from becoming obese. This study also revealed a statistically significant association between the campus environment and obesity. Exercise is a preventive strategy that is important not only for preventing obesity, but also to prevent many other chronic diseases (CDC, 2010).

In this study of the multiple influences of obesity in the AA college students two broad theoretical frameworks—PRECEDE-PROCEED and the Vital Renewal Models were used. This approach allowed for a broader outlook on this population. The qualitative arm through the focus group, made it possible to isolate factors like stressors which may have a negative impact on dietary and exercise practices of the population studied. As was noted from the focus group results, college students deal with a lot of stressors—leaving home, school work, relationship issues, money issues, family dynamics and inadequate support systems. Some of them are actually single parents worrying about themselves, school work and the welfare of their child or even children in some cases. Some of them also take on part or fulltime employment to help meet their personal needs, as they may not have parents who can provide for them. These unique situations make it difficult for them to adopt, sustain or maintain weight control efforts. Conversely, it can be surmised that individuals who lack the capacity and resources to adopt healthy lifestyles (exercise, healthy food practices, correct attitude, clear knowledge and understanding, supportive environment, positive support systems, and healthy cultural orientation) necessary to combat obesity are more likely to become obese. The

PRECEDE-PROCEED model emphasizes the need for appropriate diagnosis at various points, with particular reference to pre-disposing, reinforcing and enabling factors, in order for effective intervention to occur. The use of this dynamic framework as a guide, served this study well in many aspects. The study was able to uncover the predisposing (lack of money, lack of exercise, cultural food practices), reinforcing (wrong attitudes, lack of facilities for exercise, environment that does not offer healthy food options) and enabling factors (abundance of unhealthy foods, television advertisements of unhealthy foods, and cultural preference of being thick versus being thin) in the target population. There is need for specific actions to be taken, notwithstanding any statistical insignificance in some areas. Early preventive actions starting from home will ensure that obesity prevalence rate in this population is further decreased to at least mirror the national rate. Second, cultural pre-dispositions/orientations that make obesity generally acceptable and almost resistant in this group must not be ignored as they were obvious in this study, both in the qualitative and quantitative arms.

The recommendations that are offered below are in line with the specific aspects of the PRECEDE-PROCEED theoretical model, with respect to actions that must be taken based on appropriate diagnosis, in order for sustainable solutions to be realized.

Implications for Social Change

The findings from this study reveal important areas with statistically significant results, thus confirm and, to some degree, strengthen the notion that causes of obesity in the AA population are multifaceted, especially in the area of exercise, which showed the strongest significance in this study. The college campus where this study was conducted stands to benefit from the findings which can assist them in seeking ways to create social change to make the college environment more supportive in terms of food choices, exercise facilities, and stress reduction. The need to stress the necessity of exercise in reducing obesity among this AA college population cannot be overemphasized. Also, findings from this study may be beneficial for other AA and even non-AA college campuses. Offering an exercise credit course will not only provide the students with stress relief, but will also ensure that they get required exercise while earning degree credit; this may motivate/compel them to engage in exercise. Ensuring that supportive systems are in place to address the disabling factors in the AA population will yield long term results, including decrease in the incidence and prevalence of obesity in the African American population, a decrease in the healthcare spending associated with obesity, improved quality of life for the

students, and improvements for the campus whose students will be healthier and better learners. Ultimately, the wider society stands to gain through a healthier and more productive citizenry.

Recommendations for Action

Some of the findings are statistically significant and some are not. Nevertheless, they are all important. First, to the campus leadership where the study was conducted, second to academia for publication purposes and further inquiry, and also to other public health advocates and policy makers. College campuses need to provide more conducive college environments that will provide support for healthy dietary and exercise practices by ensuring healthy food options in their cafeteria, as well as making a fitness center a priority. They should also consider having a counseling center to support students who may be going through stressful situations that often predispose them to unhealthy dietary practices. Colleges/Universities may even choose to establish a campus-wide health education program in response to the concerns (stress, limited exercise facilities) shared by many of the focus group members during the discussions. Some colleges like Camden County College have been reported to have established what they called “Gym Electives,” a program that allows students to get in shape by taking a 1-3 hour course that focuses on exercise, (Mandes, 2010). These actions will not only ensure optimal weight and wellness for students, but will also positively impact their learning. The government could encourage/support or require colleges to adopt healthy dietary standards on their campuses to ensure the health of their students. Public policy mandates may require college cafeterias to appropriately label their food offerings to students. Fast food outlets on college campuses may also be required to adopt specific practices in food preparations, as well as ensure availability of healthy choices. Public health advocates and program planners should intensify efforts in mass media and education campaigns targeting the AA communities and college campuses.

Recommendations for Future Study

This study was mainly exploratory in nature and has provided information to guide those who must take action to stem the tide of obesity, not only among the population of interest in this study, but also members of the wider community. Beyond the recommended actions for change as noted above, this study provides a spring board for further inquiry. This study unveiled some important ingrained cultural dynamics and orientations that make the AA population more vulnerable to unhealthy dietary and exercise practices. Further research on this subject is warranted, and may focus on how culture

and habits are intertwined, and whether they fuel each other in a cyclic fashion. The success of future research on culture may depend on intentional inclusion of qualified members of the AA community both in policy making and research endeavors.

Although the quantitative arm did not reveal issues with economic deprivation, a lot of reference was made by the participants in the focus groups to the lack of money to buy healthy foods. It may be that the issue is not necessarily lack of money, but lack of knowledge about how to acquire healthy foods economically. It may also be a result of cultural food preferences and orientations, or simply environmental in nature. It may be necessary for other scholars to replicate this study in other AA college campuses, as well as other traditional college campuses, using other study approaches. May be a clinical trial or intervention studies comparing different AA college campus environments will shed a different light. It will be necessary to target males and females in future studies, rather than females alone, especially in college campuses. Future studies using different methodologies with a random sample selection may shed more light on this subject, especially in similar college campuses. This exploratory study used a mixed approach, but many other studies as noted in the literature review utilized single methods like qualitative approaches with focus groups or quantitative approaches with surveys. Intervention studies were few and far between, but may be preferred, especially in the college population. Studies utilizing different theories or models like the change theory, theory of reasoned action, social support theory and health belief model, may serve future studies on this subject well, especially in AA population on college campuses. Also given that research on obesity in relation to educational level is very limited and almost non-existent, it would be necessary to further explore this relationship. In summary, future studies in AA campuses may focus on seeking answers to the following simple questions: how does culture influence obesity, how does culture affect exercise habits, what is the relationship between obesity and educational level, and finally, does economic status have any influence on obesity? While it is important to focus on AA college campuses, it may benefit the entire AA community at large if studies can target other members of the AA population.

Conclusion

Overall, the subject of obesity has become more complex in recent years as it has gradually become a pandemic. In the United States, current data continue to show that the minority populations, especially the African American populations, are at greatest risk of not just obesity, but its

comorbidities. Many studies have been conducted by researchers and government agencies, and many different programs have been instituted in response to the continued high prevalence (CDC, 2010). Unfortunately, real solutions remain somewhat elusive.

This study explored multiple factors that influence obesity in the AA population of young adult college students aged 18-26 years. The use of a mixed model was effective in exploring the multiple factors known or unknown until now. Findings from the study shed more light with regard to the role of the independent variables of interest (i.e., attitude, culture, knowledge, exercise, food habits, and environment). The most significant findings are in the area of exercise, culture, self-perceived body size, and gender. Also, some of what is already known regarding this population was confirmed, such as lack of exercise. However, a discovery that the AA population faces a unique cultural dietary orientation and challenges that may be different from other segments of the American population is important. Targeting the specific unique cultural issues, as well as behavioral issues that are common to other Americans may be the key to unlocking the obesity problem in this group. It seems that generational cultural traits or habits are responsible, at least in part, for the adherence to old paradigms that prevent them from adopting healthier lifestyles. Overcoming these traits and habits should involve concerted efforts among academia, public health advocates, public policy makers, professional organizations, and members of the AA community itself. This study revealed more of what makes obesity resistant in the AA community, but the quest for better understanding of the subject will need to continue not just in the AA population. Targeted interventions based on what is known are also important for this population.

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