

**RISK INCREASE OF YOUNG ADULT OBESITY USING STUDENT FIPS-CODE
FOR HEALTH PROGRAM INITIATIVE (PILOT)**

A Thesis

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Master of Science in Public Health Degree

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DEDICATION

I dedicate this publication to my father, Anthony Dixon, who has paved the way for me educationally and morally, to give back to in any way that I can. May my HBCU's (Kentucky State University and Meharry Medical College) and other supportive institutions find this information resourceful, to help us live longer like the Okinawans.

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ABSTRACT

Trends in obesity usually start with a young adult's diet and nutrition (age 18-24), and the greatest obesity rates are within the ages of 18-29. This study was created to show trends of diet and nutrition in young adults at Tennessee State University (TSU) during their transition into college. Results would show what methods are needed to reverse and/or hinder the impact of results in young adult obesity, based on behaviors, with the help of the Social Ecological Model. This study shows usefulness in program development and implementation to other HBCU campuses such as Fisk University and Meharry Medical College in the Nashville area, in hope to expand to all HBCU's nation.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION.....	1
II. LITERATURE REVIEW.....	10
III. METHODOLOGY.....	23
IV. RESULTS.....	31
V. DISCUSSION/ CONCLUSION.....	38
LIST OF REFERENCES.....	41
APPENDICES.....	47-61
Appendix1.SEM Adoption Model to Study.....	48
Appendix 2. Histogram of Standardize Residuals.....	49
Appendix 3. TSU Health Initiative Survey.....	50-59
Appendix 4. Variable Used in Data Analysis.....	60-61
Appendix 5 IRB Approval Letter.....	62
VITA.....	63

LIST OF TABLES

TABLE		PAGE
1.	Variables extracted from GIS.....	27
2.	Variables in Equation.....	33
3.	Analysis of Variance (ANOVA).....	38
4.	All Variable Used in Data Analysis.....	64
5.	All Variable Used in Data Analysis Part 2.....	65

LIST OF FIGURES

FIGURE		PAGE
1.	SEM Adoption Model.....	4
2.	SEM Level of Influence.....	6
3.	Normal P-Plot Observed and Expected Cumulative Probability Distribution.....	37
4.	Scatterplot of Standard Residual vs Dependent Variables.....	39
5.	SEM Adoption Model Study.....	52
6.	Histogram of Standard Residuals.....	53

LIST OF ABBREVIATIONS

Geographic Information System.....GIS
Federal Information Processing Standard Code.....FIPS-Code
Historically Black Colleges and Universities.....HBCU
Tennessee State University.....TSU
Healthy Campus 2020.....HC2020
Socioeconomic Status.....SES
Social Ecological Model.....SEM

INTRODUCTION

Background

Obesity has a greater risk increase among African-American adults than any other ethnical or racial groups. Trends in obesity usually start with a young adult's diet and nutrition (age 18-24), and the greatest obesity rates are within the ages of 18-29 (Caspersen, Perieira, & Curran, 2000). Although many journal articles mention risks and improvement techniques for child and adult obesity, there is minimum literature regarding prevalence and rates of young adult obesity.

African American students are at greater risk for weight gain during college and following college. (Abjibade, 2011). It is also shown that African Americans are more likely to retire at age 65 due to increase health risks associated due to overweight issues and associated health problems (Houston, Cai, & Stevens, 2008). It is shown that college students gain excessive weight as they transition from high school to college (Wengreen & Moncur, 2009). College years are the time when many begin to form lifestyle behavior pattern that strongly influence adult behaviors later in life. (Pearman & Valois, 1997).

Few studies regarding health behaviors have been done at historically Black colleges and universities (HBCUs; Gary et al., 2006; Owens, 2008), and BMI and weight gain increases significantly during 4 years of college (Racette et al., 2008). With newly adapted health behaviors and factors that contribute to young adult obesity, high environmental (community built) determinants, are shown as strong as strong influence as well.

Purpose

This study is designed to show diet and nutrition trends of young adults (men and women between the ages of 18-24) who are enrolled as students at Tennessee State University (TSU). Surveys were given to incoming freshman students (n=385) to complete at freshman orientation. The use of Social-Ecologic Model has provided a necessary chart of external influences for the student(s) in regards of overall well-being (mentally and physically). This model has shown what factors can be and addressed for specific levels in the behavior of the student while enrolled.

This study will also show di physical and mental behavior trends of young adults at Tennessee State University (TSU), for the potential initiation of program development and implementation. The results will show reversal and/or enabler effects of continuous results that may contribute to young adult obesity, of current students, as they transition into adulthood. With intentions, it will also show the contribution of various factors that directly contribute to obesity, and factors of overall well-being, and show how it can be managed by program development.

Surveys were given to participants include questions of health behaviors, daily activities, FIPS codes (designated to giving a consensus of where the student relocated). Also included were demographic characteristics that could serve as

potential contributors to young adult obesity. As the program falls into place overall health improvements within the faculty, staff, and mostly students, helping the decrease in obesity trends or other positive relationships in other health outcomes.

Geographical Information System (GIS) will be used to gather specific independent variables that influence obesity based on associated FIPS code. This shows possible increase risk of obesity are likely to be higher based on their assessment due to associated factors. This has helped target certain populations and health related impacts through the program for students of specified areas.

Results have revealed potential programs, resources, and other student oriented health sessions needed to reduce young adult obesity risks, and increase overall health that will reduce adult obesity later in life. This model will be used for program development and sustainability of a health program similar to Healthy Campus 2020 on TSU's campus in hopes of expanding to Fisk University, Meharry Medical College and all HBCU's nationwide. Resources given to TSU through funding this program will serve students to help create networking opportunities and partnerships within the community. These changes made at TSU will serve as a mold to revamp disadvantaged health outcomes and resources in North Nashville, Tennessee.

Theoretical Framework

The Social- Ecological model was first introduced by McLeroy and colleagues in 1988. It followed the similar pattern and ideas to the Social Cognitive Model, but focuses mainly on two concepts. These concepts are multiple levels and reciprocal causation of an individual's health behavior. The first key concept, multiple levels, is the behavior affects and is affected by multiple levels of influence. The second concept, reciprocal causation, is the individual's shape, which is formed by, the social environment, or other external influences such as social norms, rules, regulations, and guidelines set for the individual. This particular health behavior model looks into five levels of influence to why the individual makes such decisions. The American College Health Association (ACHA) uses the Social-Ecological Model for the Healthy Campus 2020 initiative modeled after Healthy People 2020.

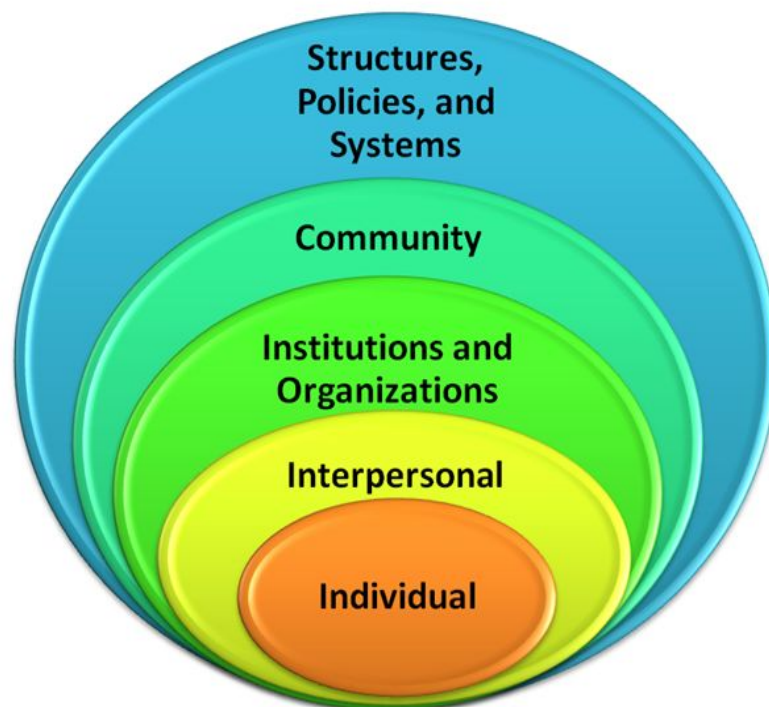


Figure 1. SEM Adoption Model

These five levels consist of, Intrapersonal, Interpersonal, Organizational, Community, and Public Policy.

This model focus' on both the population level and individual level determinants of health and intervention needs. It serves more as a community based model, and not solely focusing on the individuals (NASPA, 2004, p 3). It shows that a person is influenced at multiple levels (public policy, community, institutional, interpersonal, and intrapersonal) rather than accountable for self-influence. Interventions are most likely to be effective when addressed at all levels, instead of just one (being the individual). According to Summins and Macintyre (2005), obesity and socioeconomic status have a high correlation, with the association of lower

income area. Low education levels leads to areas of high prevalence of obesity, especially among certain ethnic groups 11-13, primarily African Americans

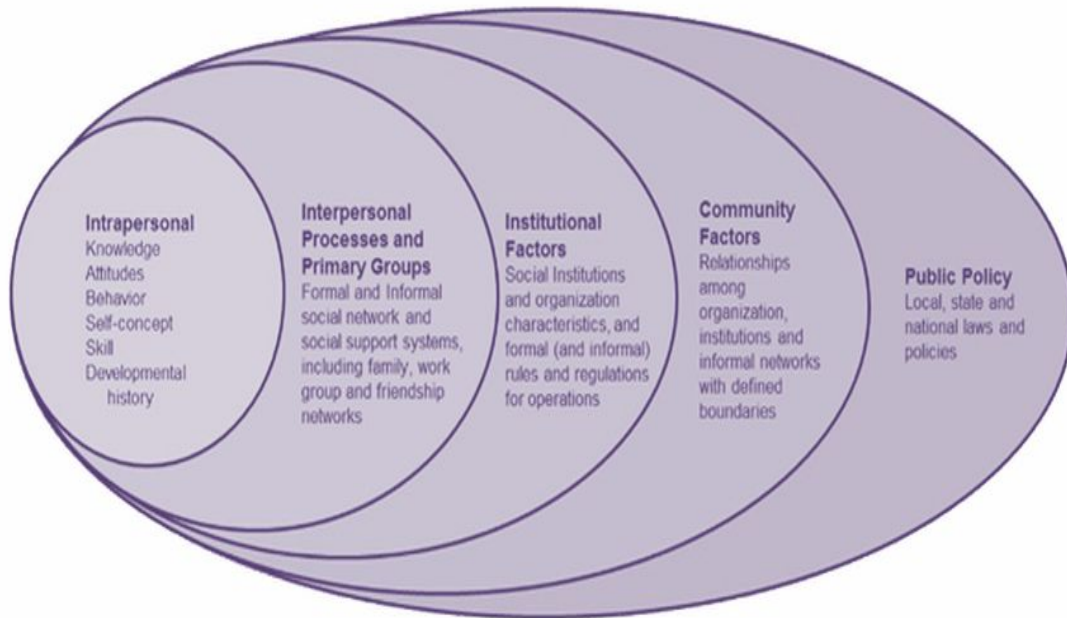


Figure 2. SEM Level of Influence

A Social Ecological Approach to Nutrition

Noted, is a process called “deprivation amplification,” (McIntyre) where exposure to poor quality food environments amplifies individual’s risk factors for obesity (low income, absence of transport, or knowledge). High rates of obesity can be contributed by the lack of access to healthy foods and convenience of fast-food

and choices due to time availability or financially (Swinburn et al., 2004). Limited ecological and multi-level studies of the built environment have proven that areas deprived of health food choices and density of fast-food outlets contribute greatly to obesity. Most of these areas of deprivation are in neighborhoods, primarily of African-Americans, or in this case, where most HBCU's are centrally located including TSU.

Public policy is on the local, state, federal, and global level, which restrict or allow certain behaviors to occur. Community levels are relationships among organizations, institutions, and informational networks within defined boundaries, such as locations, built environments, community leaders, etc. Institutional factors are social institutions with organizational characteristics and formal (and informal) rules and regulations for operations. These characteristics can include class schedules, competitiveness, distance to class, availability of study or lounging spaces, etc.).

This model was chosen to see what external influences serve as a direct impact (correlation) of such poor health behaviors that have contributed to young adult obesity at Tennessee State University. Diagram and illustrations of this health behavior framework has show the different barriers and enablers of TSU's campus.

These results has aided the program's foundation and built structure in the development of health program at Tennessee State University

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The survey instrument helped gather key information of the student's perspective and thought process of health behaviors, which tackled the intrapersonal level of this health behavior model. Questions such as rating eating habits, knowing about vaccinations, and being knowledgeable about current insurance coverage, makes the participant aware of self-efficacy needs as they transition into college and creates and awareness of personal accountability of health behavior choices.

Levels of Influence

Intrapersonal factors include characteristics of the individual such as knowledge, attitudes, behaviors, self-concept, skills, and development history (i.e ethnic identity, sex status, financial resources, and health literacy. Using this level of influence within this study showed ways that self- efficacy can be maximized to make sure that an individual's knowledge is heightened which in turn will help later in life and such health behaviors.

Of the interpersonal level (social support), parents can gather or select from optional food packages to send their child while in school. These options can include healthier options of snacks such as fruit snacks, on the-go applesauce, 100% juice content, and other array of healthy items. These particular lists can be collected and prepared by the student government groups or nursing program, which can include facts and statistics regarding behavior trends. This can also include negative impact information if proper nutrition, or actions, are not taken seriously. With the help of peers and other campus organizations, this process creates a personal bond of friends, family, and close acquaintances that has been shown to set particular trends because of developed associations. With this fact being said, peer pressure and persuasion can create optimal and better health behavior choices of eating, which in turn create better lifestyles.

On the organizational level, patterns of food served at the cafeteria or other food outlets have to be addressed as program implementation is set on campus. This will stereotypical "Fried Chicken Wednesdays" and give alternative solutions, such as grilled chicken or lean meats that are broiled, steamed, or grilled. When the students gain an appetite during later hours, and regular food operations are closed, there can be an option of a snack bar or latter food cafeteria that serves healthier food choices.

This can curve appetites so the student does not have to settle for high fat, sodium, or sugar content food choices at the local food/convenience store or fast food restaurants.

Community level speaks volumes when dealing with TSU. With the position of most HBCU's being developed in the primary African American community, the development is the institution in 1932, has not grown or become fully competent for the students that attend this college. North Nashville, where TSU is located, is considered a food desert due to the lack of distance to affordable grocery and fresh produce from the campus' entrance. With three fast food restaurants and four family-style fried food option diners around the area, the access to healthier food options are slim to none. With this bit of information and growing enablers around the campus, farmer's market food trucks create an option for students to have access to these needs. Creating a bus system on campus that allows those students without car to travel a specific day of the week, to have access to grocery stores and nutritional items. Gathering of community churches and external organizations to volunteer their time to partner with a student with an Adopt-a-student program, will allow the student get accustomed to the area and have accessibility as needed.

Lastly, public policy holds great value to why these needs are not met for these students at TSU. Policy that is a continuous struggle within this area particularly is zoning and gentrification. Zoning allows select personnel to build a specific structure in a specific area. If this does not meet particular building criteria, then either no building is built, or some structure is built out of context or consideration of the community. Gentrification is also a main struggle that the TSU community faces. With the distance to downtown and demand of growing jobs, individuals choose to buy certain property around the school, and build a foreign environment that only fits the needs of those that are financially able. This creates a community uproar and moves those who are natives of the area out to another area that is more affordable. Small businesses are affected and this move brings in more business, not for the sake of the students, but for the newest owners at a higher price until all unwanted people or business are drawn out the potential area.

With the different levels and knowing possible enablers and barriers to food accessibility on and off campus, this model can mold certain policy and procedure for initiative within the community of Tennessee State University. Implementing such model in program development is a necessity for program succession to address the

needs of the students. (Visual assignment of intervention to levels of influence can be found in appendices).

Keywords: Geographical Information System (GIS), obesity, Healthy Campus 2020, Social-Ecological Model, college students, HBCU's

LITERATURE REVIEW

Obesity

Overweight and obesity has been proven to be a consistent link to long term chronic disorders such as hypertension, hyperlipidemia, diabetes mellitus, depression, and osteoarthritis to name a few. The United States alone has been on an upward trail for obesity since health data has been recorded from the National Health and Nutrition Examination Survey (NHANES II) since the 1960's. The NIH Consensus Conference endorsed the use of the body mass index chart (BMI; weight (kg)/ height (m) squared), in 1985 (KM Flegal, 1998), to determine if an individual is a risk of being overweight or obese and assess the risk of the continued lifestyle if it should occur.

Data has been shown that the United stated obesity prevalence in adults has increased by eight percent from 1999-2008 in both genders and among all ages (KM Flegal, 2010). NHANES allows to record and track data trends from each year based on health behaviors and weight Body mass index is recorded to categorized the individuals health status of weight, for adults 20 years or older (KM Flegal, 2010). NHANES allows to record and track data trends from each year based on health behaviors and weight Body mass index is recorded to categorized the individuals

health status of weight, for adults 20 years or older (KM Flegal, 2010), overweight is defined with a BMI of 25.0 to 29.9, and obesity ranking with a BMI over 30.0, compared to normal BMI status of 18.5 to 24.9 (CDC.gov).

The prevalence of obesity in the United States exceeds 30% in most age and gender groups, excluding most men aged 20 to 39 years old. Among the highest, non-Hispanic black women had the highest percentage of obesity 49.6, followed by non-Hispanic black men 37.3%, contributing to a trend of obesity, 32.2% among adult men and 35.5% among adult women (KM Flegal, 2010).

According to Adjibade, 2011, it is shown in research that Health Campus 2010 identifies physical activity as a top priority for improving college health for college students. Physical activity protects against heart disease, diabetes, high blood pressure, obesity and different types of cancer. The World Health Organization (WHO), declared that Physical activity is the top ten cause of death, and one of the top six priorities of health behaviors within college students (American College Health Association (ACHA), 2002). Weight gain among college students is a problem that is now receiving increased attention in the research literature.

College students increase and gain excessive weight as they transition from high school to college (Wengreen & McNair, 2009). The greatest increase in obesity rates occur between ages 18-29 years (Capersen & Curra, 2000). Physical activity and overweight/obesity is the number two leading health indicator of relation health development disorders, and students in college do not meet standard recommendations of health professional to sustain healthy weight and/or reduce those increased risks, according to Racette et al. (2008).

It is constantly shown through studies led by Becker et al. (2008), that the college years are the times when many begin to form lifestyle behavior patterns that strongly influence adult behaviors (Pearman & Lavois). The Youth Risk Behaviors Surveillance Systems show a high percentage of high school students that drive under the influence, and the amount almost doubles when the individual is enrolled in college. The best strategies to empower these individuals and improve their health behaviors and decision makings though education (Marlett, Wittkenwitz; Wechsier).

Studies by Nelson and Story (2009), that transition from adolescence to young adulthood is important for adverse change in weight related behaviors, especially in young adults (ages 18-24). The food environment plays a heavy role for food availability that influence dietary intake among many group and racial groups.

Students usually maintain and increased amount of high salty and sugary content foods in their rooms or households because the limited access to outside food and health choices due to the environment. Care packages that some of the students show to be unhealthy and contribute to unhealthy eating patterns. The campus environment may be an important component for nutrition interventions to start.

Approximately 29.9% students are overweight or obese based on recall bias of height and weight. BMI and weight increase is shown to increase during the four years that the student is in college (over time). Habits such as healthy food intake and exercise decline after graduation due to selective occupation choices and access to centers due to financial stability or transportation. On average, 35% and 42% of college students fail to maintain the recommended 150 minute per week physical activity uptake while in college (Muller, 2005, Racette et al., 2005). It is critical for HBCU's to continue to offer participation in physical activity due to the fact that obesity trends are more issues that the African American population deal with. This creates burdens since most HBCU's are comprised of the African American student population.

Portions of weight gain represents adipose tissue deposition, which increases health risks if risky health behaviors continue. University efforts hope to incorporate

health awareness, and promote favorable exercise and dietary behaviors in the student's collegiate career. Brunt, et al., (2007) stated that many college students practice unhealthy lifestyles which in turn increases the risk of developing health problems down the road into late adulthood (CDC 1997; Douglas 1997; Lowry et al. 2007). An unhealthy dietary intake on a consistent basis is one of six risk behaviors in college students (Douglas et al. 1997). The choices of food, nutrient content, diet choice, alcohol consumption, and smoking are variables that are consistently seen that contribute to risky health behaviors and weight gain which can turn into young adult obesity.

A bigger issue is that generalization limits most of collegiate studies due to the different sizes and composition of school. It is reported by studies led by Mungas (2014), that there is an increase prevalence rates of anxiety and depression (Stewart & Brown 2008), that can contribute to obesity. Increased levels of stress can suppress the immune system's ability to respond, contribute to development of coronary heart disease, different types of cancer, diabetes, and different levels of depression.

Prolonged stress negatively impacts academic performance and achievement which can alter forms and habit of eating, which can contribute to obesity depending

on the person. Stress can also decrease the amount and quality of sleep, which increases the failure to function appropriately and also decrease academic performance, alter eating habits of high sugary foods. Even though nontraditional and traditional student fall in this age range of students being assessed, the transition from a regular work or home schedule both have an impact on eating habits and health behaviors, according to Hermon and Davis (2004).

Studies by Nelson and Story (2009), that transition from adolescence to young adulthood is important for adverse change in weight related behaviors, especially in young adults (ages 18-24). The food environment plays a heavy role for food availability that influence dietary intake among many group and racial groups. Students usually maintain and increased amount of high salty and sugary content foods in their rooms or households because the limited access to outside food and health choices due to the environment. Care packages that some of the students show to be unhealthy and contribute to unhealthy eating patterns. The campus environment may be an important component for nutrition interventions to start.

Another contributor that has been studied is short sleep and obesity. Ko, et al., postulated long hours and short sleep may be symptomatic of individual under high levels of stress, that could be contributed from work, home, or other external and

internal influences. This leads to a fluctuation of stress and level of happiness, which in turn can heavily contribute to fluctuating eating habits and other health behaviors. Dallman et al. (2005) and Percoraro et al. (2004) mentioned and showed high evidence of increase food intake among stressed individuals. There are 4 in 10 adults are shown to be physically inactive in leisure time, and the lowest physical activity participation is in those adults who sleep six hours or less, or nine hours or more (Schoenborn and Adams (2008).

Looking into overall physical and emotional well-being and its contributions to obesity, Doll, Petersen, and Brown (2000), showed that chronic illness and obesity are positively correlated with reports of suffering emotionally from burdens that come with the condition (i.e., confidence, self-esteem, suicidal thoughts, pressures of normality, etc.). Numbers proved that even in other developed countries obesity rates are between seven and fifteen percent, while in the United States, that number is approximately 33%. Of the study, the difference between other countries is the pressure of the “perfect image,” and is evident though the study that overweight and obesity is highly associated with decreasing levels of both physical and emotional well-being. Family meals are another contributing factor of childhood and young adult obesity and health behaviors. Chan and Sobell (2011) found that the frequency of

family meals away from home are directly associated with body mass index (BMI). Family meals exist not only as significant social institution but context of family dynamics according to McIntosh, 1999, she suggest that these meals have an influence on obesity if there is lack of them. Woodruff and Hanning (2008) mentioned that family meals may both quantitatively and qualitatively influence the eating behavior that shape body weight.

Another article on family meals written by Larson et al. (2007), shows a trend of meal patterns and structure that are related to these gathered meals, which sets behaviors that are carried on into social environments, especially in college. These structures and patterns are related to dietary intake (Affenito et al., 2005) and create social eating a norm to these individuals according to Neumark-Sztainer and colleagues 2004. Falk, Bisogni, and Sobal found that more engagement of family meals during adolescence creates healthier behaviors and decrease the risk of young adults to engage in risky behaviors or have a decrease in their level of happiness.

It has also been shown that obesity and the quality of life in chronic illness has a strong association to why health behaviors are poor or not adjusted accordingly. Individuals that have chronic illness account for 42% of the obesity prevalence. Comparing amongst different classes of obesity, the morbid obese cases (Class II-III)

are highly associated with mental stability, more so depression. Class I obese patients are due to mild hypertension or at the onset of a diagnosed chronic disease, according to Katz et al. (2000).

Dr. Wayne Katon (2010) at the University of Washington gave insight to depression buildup and the association of medical illness that it can have. He suggests that depression amplifies physical symptoms and has a high correlation to specific medical (chronic) illnesses. He shows an adverse bidirectional interaction of increased major depression and increase of obesity. This is also increases chances of high mortality rates and an increase in functional impairment. With this being said, mental stability is another major contributor to obesity, especially in young adults. With new transitions and changes of environment when going to school, a burden of emotions can come about and create unhealthy eating or overall health behaviors to deal with, and can carry on into adulthood.

Having such demographic information to test as well, studies have been made to show that there is a positive relationship between socioeconomic status (SES) and health (Smith 2004). Even though weight increases with age, and is inversely related to SES according to Baum and Ruhm (2009), as adults become who are obese, were likely to have low SES as a child, and shown as an independent effect when

controlling for childhood status. Even though rarity and difference are shown through race and ethnicity, disadvantage youth shows to become disadvantage adults, and likely to become obese based on SES status. With this being said, SES (crime rate within residential area, poverty rate, average income, etc.) is served as a potential contributing factor of obesity as an individual transition from childhood to adulthood.

Costs

Looking into the costs and what financial burdens come with obesity, Naibro et al. (2002) reported that one to six percent of health expenses are attributable to obesity, and spending money on ways to prevent or treat this condition. It is also shown that 30% of this money being spent on obesity treatment is used primarily for pharmaceutical drugs and homeopathic regimes (roughly six to nine percent). If that is the case, and on average we are spending roughly \$147 billion in health expenditures, than \$13.1 billion is being used to treat obesity, and of that monetary value, approximately \$3.9 billion dollars are used for pharmaceutical treatments.

Finkelstein and colleagues (2009), showed that the burden of obesity is over 10% of medical spending, approximating \$147 billion in 2008. An obese person is paying 42% (or \$1,429) more than a normal or non-obese person on average in medical spending. When looking at Medicare, the average annual cost for obesity

drugs for eligible patients is roughly \$7 billion. Looking at both Medicare and Medicaid spending, there would be an 8.5 and 11.8 percent decrease in spending if obesity was not a major problem in the United States.

Of all healthcare expenditures, roughly 50% are covered by Medicare and Medicaid. Since obesity accounts for 20% of the U.S. population, it is shown that the number of Medicare and Medicaid enrollees are high due to various external (SES, environmental, etc.) and demographic factors (age, race/ethnicity, etc.). Of the enrolled individuals, 21% of the obese population is Medicare recipients, while and increased 30% of the obese population is Medicaid recipients (Finkelstein et al., 2003). It is shown that Medicaid enrolls more of the obese populations and contributes greater obesity-attributable costs on average. According to Finkelstein and colleagues, if obesity attributable medical expenditures were financed through tax paying people, every single adult would have to spend roughly \$350 per year to cover costs associated with obesity as a country to recover full costs.

Community Engagement

Partnerships between community and campus organizations will ensure the best info available for the student while the best way to deliver such valid information is through the recommended method at the choice of the student that fits their need.

Community and campus relationship are complex due to cultural differences that may exist between higher education and community knowledge, as well as problem solving methods, proven through studies by Hatcher (2002). Partnerships are often rooted in charity (resources and surplus are given from one community to the next) rather than justice cases (Morton 1995). These partnerships have to come to an agreement before an establishment is made, 1) decide what type of relationship is needed to pursue and 2) convey interest (or lack of interest) to the other person (Wright 1999). If this is established then a clear stated mission needs to be made, along with compatibility of staff and personnel, effective communication, and skilled staff to execute the purpose.

According to CE Kaestle (2004), benefits of delaying educational resources or tools used to reduce risky health behaviors does not last or stay with individuals when transitioning into adulthood. Different strategies addressing health educations and service needs of young adults should be emphasized majorly when dealing with adolescence in that transitional stage. Public Health professionals must understand the intermediate and long-term impact of behavioral interventions in order to allocate needed resources in an optimal way, and design needed strategies for reducing

sexual transmitted diseases, and other risky behaviors that the individual may pick up.

On average 7.0% (approximately 70 billion) of United State dollars that spend national health expenditures on conditions based on overweight or obesity, shown in studies by Houston et al. (2009). Obese persons are likely to be absent from work, report limitations, receive workers' compensation and disability related income. Individuals retire early due to obesity represent a potential burden to society in reduction of market productivity, which will increase demand for public assistance. Within the studies African American men and women are two times more likely to retire early, compared to whites because of being overweight or obese, 17.9% and 36.0% respectively, which pose a greater problem of developing chronic conditions.

According to Cluskey and Grobe (2008), college presents a time for young adults that involves behavioral adaptations in a new environment due to changes of peers and support systems. Behaviors during these times potentially initiate life-long struggles with weight and associated behaviors that may contribute to it. It is found that weight gains range from 1.3 to 3.3 kg (Anderson, 2003) depending on gender, involvement, and other internal and external influences, which usually move the individual from a healthy weight to overweight or obese category of weight. Failure to

consume needed fruit and vegetable recommendations due to choices available on campus, continues to drive these numbers up over the years.

During these transitions, individuals seek certain strategies to cope or find a type of regularity (Washington, 2005) of cultural practices that may or may not work, then the individuals has to settle for the population or culture service that the college or environment caters on, not taking into account financial burdens that may occur with this principle. This study showed that intrinsic motivation was needed for successful transitions and practice of healthier behaviors, bringing to the attention of potential long-term health risk associated with risky health behaviors would help the student to develop a positive and consistent lifetime behaviors.

According to Stettler et al., 2003, obesity accounts for a large portion of preventable deaths and health care costs in the United States, but has become a global public health priority to reduce health disparities in the U.S. Even though genetic make-up predisposes anyone for obesity in adulthood, the built environment that any individual is exposed to during a transition, impacts their risk for unhealthy behaviors that contribute to obesity in adulthood. Looking at enablers and barriers, Greaney et al., (2009), proved that the transition to college and new experiences are associated with excessive weight gain. Rapid weight gain for adults is usually during

their twenties which rapid body fat increases above normal which in turn is not controlled, will create greater health problems and/or conditions. Intrapersonal barriers that create this problem with college students would be not eating healthy foods, lack of exercising, temptation, lack of discipline, and with females stress. Interpersonal barriers could include social circles and pressure from friends of non-healthy food choices and alcohol consumption.

Environmental barriers that can contribute to weight gain of college students are time constraints of the students or schedules college life of involvement, unhealthy foods served at the cafeteria, college meal plan and selective or unlimited access to foods, fast food selection around the campus. There is also the access to healthy choices due to transportation or cost of these needed foods, that is not within the student's budget.

Intrapersonal enablers that could counteract and prevent excessive weight gain would be regulating food intake or eating in moderation, tracking caloric intake with limiting snack and eating only when hungry. Also, overindulging in food and binge drinking will counteract high metabolism and sustaining healthy behaviors, with the help of friends and family. Environmental enablers would be to change the selections or add variety to the food served at the cafeteria, remodel or add to the

university's environment that support physical activity, and increase access to gyms with the addition of intramural sports for both genders.

Peter Winch of John Hopkins (2012) made mention that different levels should be specified and put particular emphasis on effectiveness of rule, regulations, and guidelines when creating and through implementation of interventions. Reidpath et al. (2001), showed that an obesogenic type environment (obese increased environment), encourages consumption of food and discourage physical activity. With this particular discouragement, it changed the balance and increase the risk of obesity, according to Chisholm (1998) and Weinsier et al. (1998), so growth within the particular community will become hindered or increase at slow rates.

Reidpath and equals suggested that social determinants and environmental determinants (density of fast food outlets) create an environment that is poorly maintained and keeps an increase of such exposure to non-attainable energy dense foods. They showed that those who were on weekly incomes, had a 2.5 increased exposure to fast food outlets, while richer areas have no exposure (or minimal) to fast-food outlets within their postal districts.

Preventions Programs

An article written by Helen Thomas studied the results of effectiveness of physical activities and show that of mixed and modest results. She has shown that within a 15 study population, positive association of child obesity develops later on into adulthood, with a risk increase of two to six more times heavily, than those children that are not obese, during childhood. The relationship between physical activity and obesity in children is one of the most top contributing factors that link adulthood obesity (Denker et al., 2006). Although this is shown, physical activity and dietary restrictions have the largest impact on obesity together, than they do alone (Jacici et al., 2005). And with all programs and initiatives in place at the local and state level, we are still spending approximately \$139 billion dollars on direct and indirect expenses, as well as a total of five to seven percent of the nation's dollars on healthcare expenditure linked to obesity alone. Although self-report reduce internal barriers to change (lack of will power and perception according to Zieblan et al., 1998), succession of obesity prevention program, measurements can be easily evaluated for overall program effectiveness, shown by Shaw and colleagues.

Of these particular programs, insufficient physical activity and poor nutrition due to consumption of caloric dense foods (Nicklas and Johnson, 2004) that are only available to the students certain times of the day, they are the primary mechanism for

rise in excess body weight and challenges that come with weight gain. Nicklas and Johnson, has studies and shown that physical and nutrition are and should continuously be the primary foci of health initiative to reduce obesity and/or weight gain on a national level. It is critical and evident that both factors (physical activity and healthy eating) justify improvements and give higher succession to programs (Veugelers and Fitzgerald, 2005).

Strong et al. (2008) showed that regular engagement in exercise is difficult due to time/planning management of college students, satisfaction with their body appearance (shape), lack of accountability, and pure laziness. If the mean of weight gain an individual experience freshman year is four to nine pounds, certain recommendations need to be addressed and/or implemented to move the “freshman 15” to the mythical section. When creating health programs, Story and equals showed that involvement of more intramural sports were more flexible to students and their work/school schedules, access to healthier and tastier food choices outside of standard working hours, daily or weekly recommendations of how to reduce chronic risks such as taking 10,000 steps a day of 30 minute vigorous activity, or make the fast and convenient foods more healthier in choice.

Story, Nanny and Schwartz (2009) defines that obesity rates are highly unlikely to be reversed without school-based programs and other surrounding programs to support. It is shown that children spend more time in schools than any other environment away from home, and that time increases as these adolescents transition into college. Programs usually fail or have lower succession rates due to the competitive foods that go against their teaching, such as local fast food chains, snack bars/convenience stores, and snack machines to name a few, that goes against nutritional regulation mandated by the schools (Gleason and Suutor, 2011).

Specific laws and programs have been developed to increase health initiative succession such as nutritional education and curriculum standard, involvement of school gardens and agricultural programs, enforcing federal laws and policies, and creating and establishing a tighter bond of schools, policymakers, and advocates to work together (Story et al., 2006). According Lytle et al., (2004) eating patterns are likely to improve when changes in school environment are enforced and integrated within school function. To make sure that the succession of the school wellness policy is carried out, the Federal Law demands that school wellness programs (primary and secondary) must:

- “
- 1) Establish goals for nutrition education, physical activity, and other contributing factors on a school-based level.
 - 2) Create nutritional guidelines for all foods available on campus.
 - 3) Ensuring that guidelines for reimbursable school meals, and be less restrictive.
 - 4) Plan appropriately for measuring implications.
 - 5) make sure that there is active involvement for parents, students, and representatives of these respective school. (Story et al., 2009).”

If these respective laws are set for primary and secondary school succession, we can hope to implement them for post-secondary schooling health program initiatives. Aronne (2002) mentioned that succession of any health initiative program whether on a small individual basis or wide spread population basis, effective managing includes patient goals, level of readiness, possible obstacles that may prevent efficacious of programming, and implied motivation to keep the program (or person) successful through incentives or basic cues of praise based on their actions

METHODOLOGY

This study showed physical and mentally healthy behavior trends of young adults at Tennessee State University (TSU), and the potential foundation structure for program initiation. Reversing and/or enabling effects gave continuous results of overall well-being and young adult obesity as they transition into adulthood. This study was exempted and approved by Meharry Medical College Institutional Review Board (IRB). Protocol 14-11-314 was submitted for exempt review as of January 30, 2015.

Study Population

The data was collected from a personal health survey administered by the College of Health Science at Tennessee State University (TSU) during the Freshman Orientation in the fall semester of 2014. Participants had to be registered as full-time (taking more than 12 credit hours) and classified as a freshman students (having 30 or fewer credit hours once registered). TSU, on average has approximately 1500 annual student enrollees in at the fall semester with a 16:1 student faculty ratio.

Of the registered 1749 freshman students in the fall semester of 2014, only 386 (approximately 22% of freshman population) completed the personal health

assessments survey during student orientation. Out of all active participants, only 312 of survey were considered as the study sample for statistical analysis.

Survey

All active participants were required to complete the personal health survey at freshman orientation of August 22, 2015. Tennessee State University IRB approved

for the collection of material, with the inclusion of consent form of all active participants. The personal health survey was designed to measure level of overall health of the freshman class to assess various social and behavioral determinants that may contribute to “freshman 15” and young adult perception of health and well-being. This study was also used to measure level of happiness, physical activity, and external factors that may contribute to health behaviors based on residential location. (See appendix for applied measurements).

Data was extracted by using Qualtrics, a web-based survey software designed to capture data as the participant completes the questionnaire (similar to programs such as RedCap and Survey Monkey). Data that is entered can be downloaded into SPSS via Microsoft Excel. Of the data collected, missing data within the survey was handled by probability/ likelihood within SPSS. Those individuals who failed to include their zip code, their questionnaire was thrown out altogether.

Study Variables

The dependent variable used was overall well-being, a measurement scale given to score the following contributors: rating overall health (physicality) rating of level of happiness, and rating of well-being (mentally). Perception and factors that

contribute to the linear combination of these variables construct the outcome variable (score of overall health) of the participant. This gives mold to the program and pin point what particular variable(s) contribute to the participant being or not being in the best shape (physically) while in college.

Independent variables were then analyzed to show significant contributions to overall well-being. Questionnaire items related to independent variables included “participant receives annual exams”, “any provider has confirmed a chronic illness”, “medications taken daily (yes or no)”, “participatory in physical activities within the past week”, and “participation in moderate activities for a minimum of 10 minutes per week”. The following questionnaire items were also considered as independent variables: (1) if the person felt as if they were in the best shape, (2) if family meals were enforced at home, and (3) if nutrition classes were offered in high school. In addition, other demographic characteristics such as gender, race/ethnicity, zip code and age range were also included in the study.

As shown in Table 1, ten independent variables were extracted by the Geographic Information System (GIS) from difference sources such as United State Census Bureau, National Center for Education Statistics, and County Business Patterns. The extraction was based on the following three steps: (1) locating ZIP

codes of student residential location listed in the student health survey; (2) converting Zip codes into the Federal Information Processing Standard (FIPS) codes; and (3) using FIPS code as a key to match the data source files mentioned to extract ten independent variables.

Statistical Analysis

Regression analysis is one of the most practical tools for analyzing a multifaceted data. It can be used to examine variables at once and provide a number of models or solutions for investigating relationships among variables, as well as making predictions. The reason for choosing linear regression analysis for this dataset was the continuous outcome variables, it identifies significant variables associated with the outcome variable of interest. The standard approach in regression analysis is to find the 'best fit' line or curve for a given dataset. The 'best fit' line provides the description of the relationship among variables. The estimated equation

Table 1: Variables Extracted from GIS

Variable Names	Variable Descriptions	Data Source
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adult_obese	Rate of adult obesity	Center for Disease Control and Prevention
mdn_household_income	Median household income	U.S Census Bureau
unemployment_rate	Unemployment rate	U.S Census Bureau
poverty_rate	Poverty rate	Office of Management and Budget's Statistical Policy Directive
child_lunch	Percentage of children eligible for free lunch program	National Center for Education Statistics
uninsured_adult	Percentage of uninsured adults	Center for Disease Control and Prevention
access_recreation_facility	Percentage of people access to recreation facility	County Business Patterns
crime_rate_rate	Crime rate	Uniform Crime Reporting
physical_inactive	Percentage of people reporting no leisure time for physical inactivity	National Center for Chronic Disease Prevention and Health Promotion

fast_food	Percentage of fast food restaurant	County Business Patterns
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The estimated equation is used to predict the values of dependent variable based on independent variables, given that model assumptions are met accordingly. Multiple linear regression (MLR) is based on the concept of least squared regression to establish a relationship between multiple independent variables (X) and a single dependent variable (Y). This relationship is expressed in form of the equation.

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 \dots + e_x$$

Where the independent or explanatory variables (X's) is are chosen as continuous or discrete measures used to predict a response or dependent variable (Y), which must be a continuous variable. The constant (B₀), represents the point at which the regression line intercepts the y axis, representing the value of the individual independent variable being zero. If slope B is positive, as the explanatory variable increases by one unit, the outcome variable increases by b units, when holding other independent variables as constant. However, if the slope B is negative, as the explanatory variable increases by one unit, the outcome variable decreases by B

unit. IBM Statistical Package Version 2013 for the Social Sciences (SPSS) is used for data analysis in this study.

Statistical test for model fitting is used first when selecting specific variables in the equation based on the following four procedures: Enter, Forward, Backward, and Stepwise. In the Backward Procedure, all independent variables enter the equation at the first step. Thereafter, all insignificant independent variables meeting the removal criterion are removed one at a time from the model. Once the significant independent variables are selected, a summary of printouts is used to interpret and evaluate the appropriateness of a fitted multiple linear regression model.

To assess how well the model is fitted to the data, the R-squared value (also known as the coefficient of determination or goodness of fit statistic) was involved. The R-squared value showed the linear relationship between the dependent variable and its independent variables, indicating that observations fall closely on the regression line. The closer that the value is to one, the closer the relationship is to being perfectly linear.

Model Assumptions

In this study, it is important to ensure that the assumptions of linearity between the dependent and independent variables, or the normality and the constant variance of the error term appear to be met. To determine significant variables, SPSS shows statistical test results with the derived p-value, If p-value, ($p\text{-value} < 0.05$) is lower than the significant level, then a significant variable were found Model assumptions of linearity, normality, and independence were verified before the study results were interpreted.

Linearity: Assumption of linearity can be confirmed by the F-Test in the Analysis of Variance (ANOVA) table, which assumes that the underlying relationship between dependent variables and a set of independent variables is linear.

Normality: Assumption of normality was verified by confirming normal distribution based on the histogram of residuals. Within this histogram, visualizing a bell shape curve and most observations underneath that curve, proves normal distribution of the residuals. Also, the normal P-P plot of the regression standardized residuals is used to show the observed and expected cumulative probability distributions that lie closely on the diagonal line.

Independency: Assumption of independence can be verified by examining the Durbin Watson (DW) statistic. If DW statistics is between 1.5 and 2.5., meaning that all residuals are statistically independent from each other.

Analysis of Variance (ANOVA)

ANOVA was used to test whether the null hypothesis against the alternative hypothesis is to be accepted, rejected, or if it accepts or fails to reject the alternative, hypothesis, meaning that either all regression coefficients are equal to zero (null) or at least one of regression coefficient is not equal to zero.

Since variation can exist in the data set, ANOVA can be used to use make sure that model fitting is appropriate, especially in reference to linearity assumption. Regression variables that are found can be used to explain certain variations. However, any variations that are shown as residuals cannot be explained. Therefore, they can cause error or uncertainty within the data. Although variation can be an issue, p-values associated with model fitting will show whether or not that the tested hypothesis is sound.

Using IBM SPSS with overall well-being being the dependent variable and all health behavior risks as independent variables, ANOVA was performed to determine

the overall score of a student's well-being was based on their responses of behavior engagement in the student health survey.

Statistical Hypothesis

Null hypothesis states that all slopes equal zero, meaning that there are no significant health behavior risk factors contributing to overall health outcomes.

Alternate hypothesis states that there is at least one slope that does not equal zero, indicating that there is at least one significant health behavior risk factors contributing to overall health outcomes.

If the p-value associated with individual explanatory variable is found to be greater than 0.05 level, the null hypothesis is rejected. One can conclude that at least one independent variable significantly contribute to particular outcome variable health behavior.

RESULTS

In this study, the R squared value was low (0.255), indicating that approximately 26% of the variation in the dependent variable was explained by all the observed independent variables such as engagement in weekly physical activity, rating of level of happiness, and specific diet type regimes.

The overall health rate of the variable (Y) was composed of health, level of happiness, and well-being collectively, which had an average score of 8.421, with a minimum of 5.27, and a maximum of 12.29. The outcome variable gave a consensus of individual variables within the questionnaire having most influential effect. With this information, measuring the students' overall health and the areas of improvement can evolve into a comprehensive application.

Using a 0.05 significance level, the significant variables (in Table 2) were an engagement of the following: weekly physical activity (VAR_X1), rating of the level of stress (VAR_X2), having your sugar tested or checked at least once before (VAR_X27), getting physical exams (VAR_X32), perception (rating) on being in the best shape (VAR_X43). There is also an inclusion of having a caloric restriction diet regime (VAR_X49a) or following a diet regime that includes increased exercise (VAR_X49e).

Of the contributing factors given in the table below, there were four variables that have a negative coefficient in relation to the outcome variable. Rating of level of happiness, ever being tested for diabetes, caloric restriction type diet regime, and excluding both diet type regimes had a positive association, showing that with an

increase exercise type diet regime. Of these significant contributing factors, all factor excluding both diet type regimes had a positive association, showing that with an increase of those variables, there is an increase in overall well-being. The caloric restriction and increased exercise diet regime had a negative coefficient that showed with every one-unit increase in these factors, showed a decrease in the student's overall well-being. These variables that are shown in the equation, can be shown in table 3 below.

Table 2 Variable in Equation

Variables	Regression Coefficient	P value	Variable Name
VAR_X1 (<u>engage in physical activity weekly</u>)	0.897	< .000*	<u>Wkly PA</u>
VAR_X2 (<u>Rate Your health</u>)	-0.193	0.041*	<u>Rate Health</u>
VAR_X18 (<u>not able to see doc - bc of other reasons</u>)	3.603	0.065 (n.s)	<u>No Doc Ot</u>
VAR_X27 (<u>diabetic or sugar checked</u>)	-0.480	0.026*	<u>Dia chkd</u>
VAR_X32 (<u>do you get physical exams</u>)	0.616	0.034*	<u>Phys exams</u>
VAR_X33	0.339	0.085 (n.s)	<u>Phys exam timeago</u>

(last time you received physical exams)			
VAR_X43 (consider yourself in best shape)	0.0454	0.099 (n.s)	<u>Bstshape YorN</u>
VAR_X49b (caloric restriction)	-1.000	0.042*	<u>DIET type</u>
VAR_X49e (exercise increase)	-0.429	0.063*	<u>Diet type</u>

Direction of the Relationship

As shown in Table 2, five variables were identified as having a significant effect on overall health and wellness, such as engaging in physical activity, perception of level of happiness, and caloric restriction as a diet regimen to name a few. With respective p-values of 0.000, 0.041, 0.026, and 0.042, being smaller than the 0.05 level of significance.

Positive variables contributing to the model fitting were engagement in physical activity, other reasons of not being able to visit the doctor other than lack of transportation, cost, distance or fear. Other positive associations with the outcomes were if the student had received an annual exam before, the last time that annual

exam was done, and the student's perception of being in the best shape. For variables compared to the association of caloric restriction type, caloric association (VAR_X49e) only had a positive relationship (0.083) with receiving physical exams (VAR_X32) by the participant. Also, the only positive association (0.089), when comparing other reasons on why the participant could not see the doctor (VAR_X18) was with time lapse of the last time receiving a physical exam (VAR_X33). Although these associations are not a significant, they can be implemented when dealing with program evaluation and resource establishment

Model Assumptions

As shown in Figure 3, the assumption of normality was not violated because the bell-shape curve along with the histogram contained most residuals underneath the curve. Also, the normal P-P plot of the regression standardized residuals demonstrated that the assumption of normality exists based on the observed and expected cumulative probability distributions of standardized residuals and the predicted cumulative probability distributions are closely on the diagonal line.

Table 3 Variables in equations

Variables Name	Variable Description	Measurement Scale
VAR_X1	Do you engage in Physical Activity every week?	Yes or No
VAR_X2	Rate Level of Happiness	Very Poor(1) to Excellent (5)
VAR_X18	Are there reasons that prevent the individual to see a doctor?	Yes or No
VAR_X27	Have you ever been tested for diabetes?	Yes or No
VAR_X32	Do you receive annual exams?	Yes or No
VAR_X33	When was the last time you received and annual exams?	Less than one month ago Less than six months but more than one month ago Less than one year but more than six months
VAR_X43	Do you consider yourself in good shape?	Yes or No

VAR_X49b	Diet Type Caloric Restriction	Check Box
VAR_X49e	Diet Type Increased Exercise	Check Box

Figure 3. P-Plot of Standardized Residuals

Normal P-Plot of Observed and Expected Cumulative Probability Distributions

Normal P-P Plot of Regression Standardized Residual

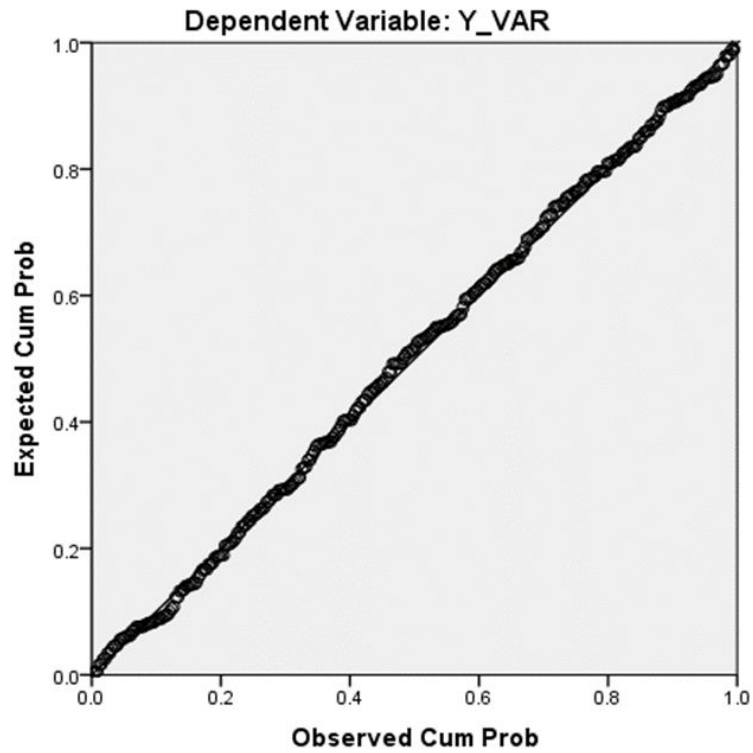


Table 4 Analysis of Variance (ANOVA)

Source	Sum of Square	Degrees of Freedom	Mean Squares	F- Ratio	P Value
Regressio	371.547	9	41.283	11.322	.000
n					

Residual	1086.622	298	3.646		
Total	1458.169	307			

Linearity: Assumption of linearity is confirmed by the F-Test in the Analysis of Variance (ANOVA) table, which assumes that the underlying relationship between dependent variables and a set of independent variables is linear (shown in table 4 below). The result of the F-test indicated that at least one of nine slopes (df=9) was a significant difference ($p < 0.001$) from zero.

Independence: Assumption of independence can be verified by looking at the Durbin Watson statistic to determine if it between 1.5 and 2.5. This study yielded the Durbin Watson value of 1.823, meaning that all residuals are independent from each other implying that all values in the outcome variable are independent among themselves.

Collinearity: Assumption of collinearity shows that in any analyses if the independent variables are more highly correlated with each other. As a result it becomes impossible to determine which variables account for the variance in the

dependent variable, this is called collinearity. There are many statistical indicators for this collinearity problem. The tolerance level is one of many ways to check if collinearity exists. A rule of thumb is to check if collinearity problem exists, which involves the examination of the tolerance values(s) are greater than 0.20. The statistics in this study showed tolerance values ranging from 0.669 to 0.977, concluding that there was no collinearity problem in this study.

Outliers: Checking and removing extreme negative or positive extreme values (of outliers) with a value of more than plus three or less than minus three standard deviations of extreme residuals. With the absence of these outliers shown in the scatterplot (shown in Figure 4), the improvement of the model fitting became attainable in this study.

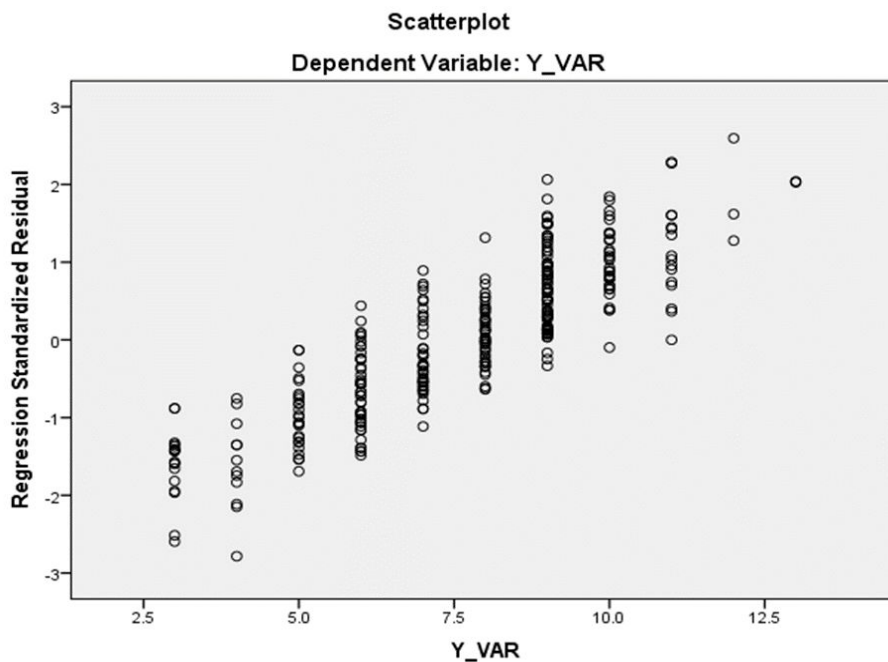


Figure 4. Dependent Variable Scatterplot

Scatterplot of Standardized Residual vs Dependent Variable Conclusions

From the data analysis, it is shown that engagement in physical activity is consistently mentioned and shown through literature, when dealing with risk decrease of obesity as a whole. It is also shown that student's health behaviors seem to continue as they transition into college, and become worse due to the lack of knowledge and surrounding available resources of food accessibility and recreational facilities access, which decreases their peak of overall well-being.

Such barriers can create a burden of student's well-being while enrolled in college, which can trickle and become permanent into adulthood (Racette et al., 2008).

Having such confidence level in appearance drives perceptions of one's initial thought about themselves, which become negative correlations that may drive the student score down becoming detrimental to overall well-being. It can also contribute

to a decrease level of happiness, and drive down overall health. Having such health programs implemented on Tennessee State University's campus, it can allow students to receive needed nutritional value and mental stability resources. It can drive scores and all other measurements associated with overall well-being in a more positive direction, and reduce risk of young adult obesity through healthier behaviors modifications.

DISCUSSION

Public Health Significance

The reason that this topic is such a critical significance to public health is because young adult obesity have very limited literature related to the topic. As stated, there is a gap between child obesity and adult obesity (general obesity), however it is shown that adult obesity occurs (if not already a trouble issue for the individual) between the ages of 18 and 29. With most students in this age range being admitted to a university of their choice, this should be monitored and taken into account so that the individual does not increase their risk of becoming obese with the health behaviors that are adapted during their college years with binge drinking, late night snacking, and so forth.

With African Americans being the at a greater risk that any other ethnic group, and students who heavily attend HBCU's are typically African Americans, this study can help develop or modify health programs and initiatives that are soon to start or are already implemented on the campus, to reduce health risk of the campus and student's obesity and adverse health outcomes, which in turn will raise overall work quality due to health quality.

Strengths

Strengths to this study would involve a number of positive influence on health program initiatives at post-secondary institutions. First, objectives set for this study have been accomplished through validity of statistical analysis and choosing of appropriate outcomes. The regression that was used to conduct analysis for this data

was a good model fit, as it is seen from the Durbin –Watson (collinearity) value, R-squared (variance contributed), and meeting all requirements for model assumptions. Another strength of this study was consistent findings within the literature of various factors that can contribute to young adult obesity and overall well-being of a student.

Also, it was shown that new variables make contribution of this association of increase health behavior risks (i.e., perception of self's best shape). The direction of given coefficients of contributing variables also are logical in the sense of the study, a positive increase where see fit, same as a negative decrease, when measurements are taken. Lastly, this study can be used a tool or outline for health initiative programs to take measure of student's health and offers of the campus.

Limitations

Limitations within this study included recall bias of the student when completing the questionnaire survey which creates burden of analyzing factual information of the student's perception and knowledge of specific questionnaire items. Another limitation would be the validity of the survey instrument. Although there was actual face and concurrent consultation with Vanderbilt University, public health

affiliates, this occurrence was the first time the instrument was used on a school wide basis, limiting and assuming that all questionnaire items are measuring what is needed.

An additional limitation within this study was its inability to make generalization at TSU's campus due to a nature of pilot study which requires significant efforts to receive the survey instrument. Approximately, only twenty-two percent of the freshman class completed the survey, out of 1700 freshman students actively enrolled into TSU. With this response rate being low, generalizations for other students and campuses are hard to compare.

Implications

Application of this study can serve as a skeleton for other university health program development. Using SEM can help map out specific external influences that can hinder and/or enable program development. Knowing such information, this valid data can be used for networking building and engagement of resources that could promote specific program(s). Using the data involved with young adults can show contributors that are consistently significant within the literature. If students are aware and adapt such behaviors at a young age, then established positive health behaviors

would be implemented and become second nature to individuals, which can decrease high numbers in adult or other adverse health outcome.

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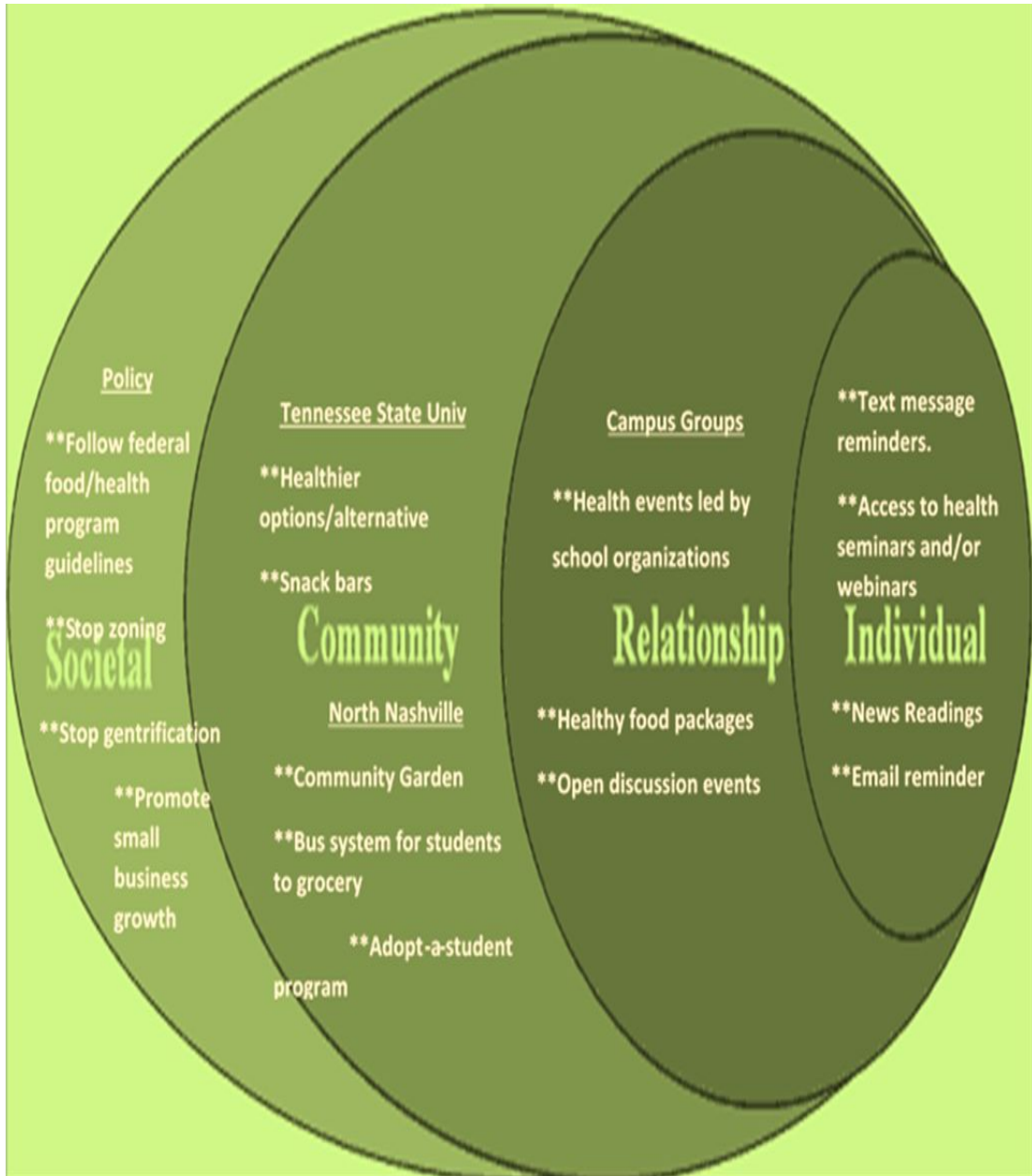
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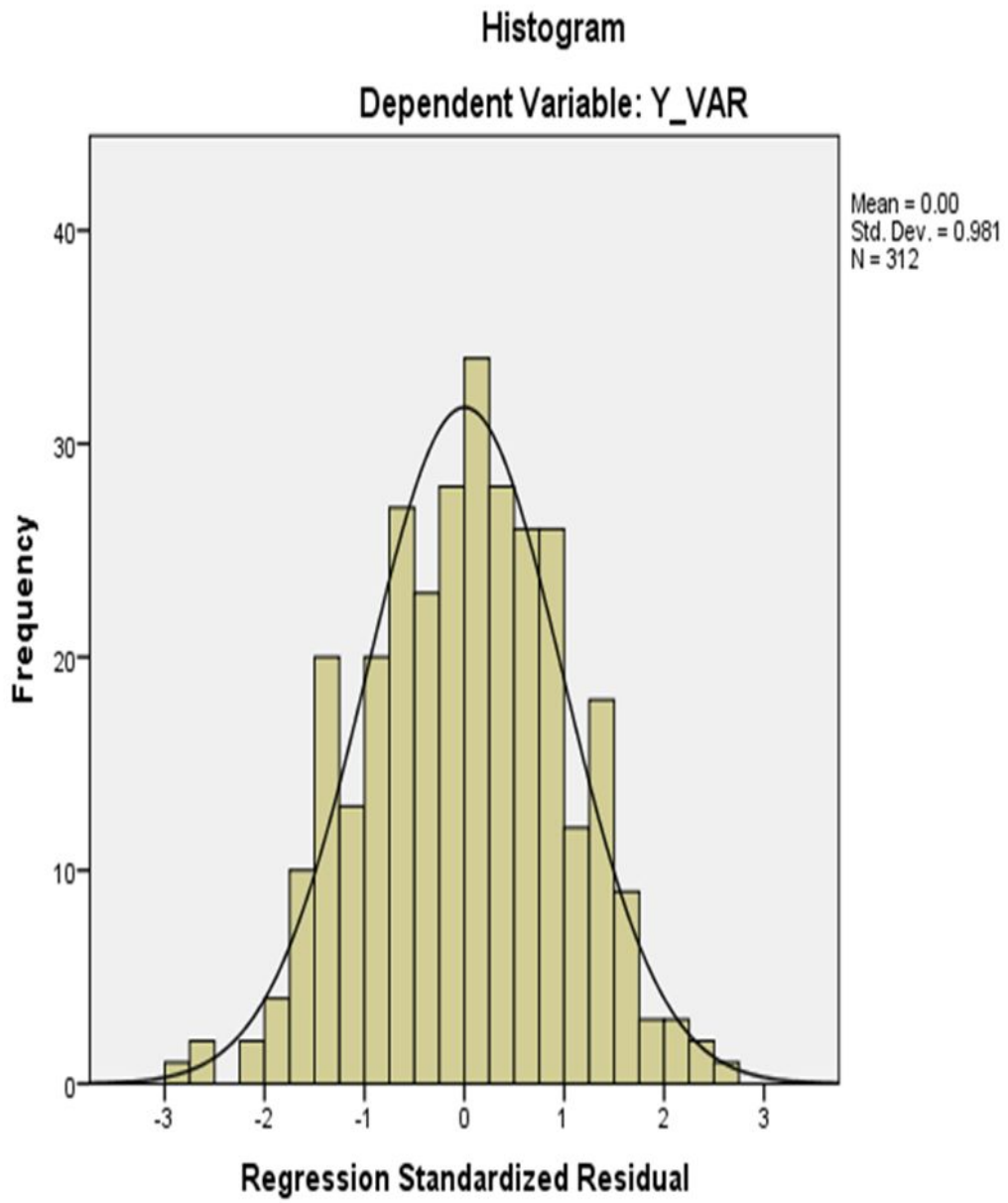
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APPENDIX

Appendix 1. SEM Adoption Model to Study



Appendix 2. Histogram of Standardized Residuals



Appendix 3. TSU Health Initiative Survey

4/13/2015

Qualtrics Survey Software

Personal Health Assessment

Please mark the most appropriate response

	Excellent	Very Good	Good	Fair	Poor
In general , I consider my health to be	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My weekly physical activity routine is	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would describe my physical shape (body composition) as	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider the health of the TSU community to be	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider my level of happiness to be	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider my level of stress to be	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would rate my overall well-being as	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would consider my eating habits to be	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you currently have any kind of health care coverage, including health insurance, HMO's, Medicaid?

- Yes
- No

If Yes, please specify: (select all that apply)

Dental (Delta Dental, etc.)

Vision

Medicaid (Tenn-Care)

Medicare

Private (BC/BS, Cigna, etc.)

Federal (Health-care Exchange Plan)

Other (please specify):

If you have active insurance coverage, what is your relationship to the current cardholder?

- I am the active cardholder (Independent)
- I am the spouse to the cardholder(dependent)
- I am the child of the cardholder (dependent)
- I do not have active insurance

Was there a time in the past 12 months when you needed to see a doctor but could not because of cost, distance, fear, or other reasons?

- yes
- No

If Yes, please specify: (select all that apply):

Cost
Distance
Fear
Lack of transportation
Other (please specify)

Do you have one person you think of as your health-care provider or medical home?

- yes
- No

When was the last time you has a routine appointment with your health care provider?

- Less than 1 month ago
- Less than 6 months but more than 1 month ago
- Less than 1 year but more than 6 months
- More than 1 year ago
- I do not have a health-care provider or medical home

Have you EVER had your blood cholesterol checked?

- Yes
- No

If Yes, what were you told about your blood cholesterol results?

- Normal
- High
- Low
- I don't know

How long ago was your blood cholesterol checked?

- Less than a year ago

- More than a year ago
- I have never had it checked

Have you EVER has your blood pressure checked?

- Yes
- No

If Yes, What were you told about your blood cholesterol results?

- Normal
- High
- Low
- I dont know

How long ago was your blood pressure checked?

- Less than a year ago
- More than a year ago
- I have never had it checked

Have you EVER has a test for high blood sugar or diabetes within the past three years?

- No
- Yes

If Yes, what were the you told about your blood glucose results?

- Normal
- High
- Low
- I dont know

How long ago was your blood sugar or diabetes test ?

- Less than a year ago
- More than a year ago
- I have never been tested for blood sugar or diabetes

Have you EVER been told by a doctor, nurse, or other health professional that you are pre-diabetic or borderline diabetic?

- No
- Yes

If Yes, please specify:

- Type 1-Insulin Dependent
- Type 2- Non- Insulin Dependent

Do you receive annual physical exams?

- Yes
- No

How long ago did you last have a full physical exam by a medical provider?

- Less than a year ago
- More than a year ago, but less than 3 years ago
- More than 3 years ago, but less than 5 years
- More than 5 years ago

Have you EVER been told by a medical provider that you have any of the following chronic illnesses?

- Diabetes
- Human Papilloma Virus (HPV or genital warts)
- Cancer (any kind)
- Asthma
- Mental health illness
- Obesity
- Auto-immune Disease (lupus, MS, Arthritis, etc.) Please Specify: _____
- Other chronic disease Please Specify: _____

Have you EVER been tested for Human Immunosuppressive Virus (HIV)?

- Yes
- No

Are you immunized against the Human Papilloma Virus (HPV) VACCINE

- Yes
- No

153

If Yes, how many shots have you received of the vaccine?

- 1 shot
- 2 shots
- 3 shots
- 4 shots

- Not sure

How long ago did you received the HPV shot?

- Less than year ago
- More than a year ago
- Not sure how long ago
- I have not received the vaccine

Are you taking Any medications prescribed by your healthcare provider on a daily basis?

- Yes
- No

During the past 12 months, have you had an episode of asthma or an asthma attack?

- No
- Yes

Has your doctor ever told you that you have asthma?

- No
- Yes

Do you cough when you have a cold?

- Yes
- No

Do you cough even without a cold?

- Yes
- No

Do you wheeze or hear a whistling sound when you breathe?

- No
- Yes

155

If yes, how often do you hear wheezing sounds?

- Daily
- Weekly
- A couple times a month
- A couple times a year

- I don't wheeze

Do you take medicine for wheezing?

- No
 Yes

If yes, how do you treat your wheezing?

- I use medication when I am having an asthma attack only
 I use medication to prevent attacks only
 I use medication for both treating an attack and prevention of future attacks
 I don't take medicine for wheezing

Do you ever get asthma attacks when you participate in rigorous activities (exercising, sport activities, etc.)?

- Yes
 No
 I do not have asthma

In the past 12 months, have you been seen in a Hospital Emergency Room for any health concern?

- No
 Yes

If you have been seen in the ER in the past 12 months was it because you did not have medical coverage to go to a doctor?

- No
 Yes

How much sleep do you get on average each night

- 3 hours or less
 4-6 hours
 7-9 hours
 10-12 hours
 more than 12 hours each night

Diet and Nutrition

During the past week have you participated at least once in any physical activities such as running, calisthenics, golf, gardening, or walking for exercises?

- No

- Yes

In a usual week, do you participate in moderate activities for at least 10 minutes at a time, when you are not working (i.e., brisk, walking, bicycling, vacuuming, etc.)

- No
 Yes

If Yes, what activity do you engage in regularly?

- Walking
 Running
 Exercise Machines (biking, elliptical, etc.)
 Other (please specify): _____

Would you consider yourself to be in your best possible shape?

- No
 Yes

Have your eating habits changed since you have come to Tennessee State University?

- No
 Yes

If yes, please specify your changed habits

- Eating habits improved
 Eating habits worsened

Do you take vitamins or dietary supplements?

- No
 Yes

If yes, how often do you take them?

- Daily
 Weekly
 Bi-weekly
 Occasionally

How would you describe your eating habits?

- Excellent

- 3-7 times a day
- More than 10 times a day
- I don't smoke cigarettes

Do you **ALWAYS** protect yourself by using contraceptive methods when engaging in sexual activity?

- Yes
- No
- I am not sexually active

If Yes, please specify: (select all that apply):

Male/Female condoms
Birth control: Pill, shots (Depo), Spermicide, Implant(s)-(Nexplanon)
Withdrawal
Diaphragm/Cervical Sponge
Internal Devices such as NuvareRing and Morena
Fertility Awareness such as Calendar and Cycle BEADS
Other: (please specify): _____

Do you smoke Marijuana?

- Yes
- No

On average how often do you smoke Marijuana?

- Less than 3 times a day
- 3-7 times a day
- More than 10 times a day
- I don't smoke Marijuana

Within the **LAST YEAR** would you consider yourself to be depressed, overwhelmed, sad, exhausted, or considered suicide?

- No
- Yes

If Yes, please specify: (select all that apply)

Appendix 4

All Variables Used in Data Analysis¶

<u>Wkly PA--engage-in-physical-activity-weekly--X¶</u>	X1¶
<u>Level stress--(rate)-level-of-stress-----X¶</u>	X2¶
<u>Eat hbts--(rate)-eating-habits...X¶</u>	X3¶
<u>Crnt HIns--do-you-currently-have-health-ins...X¶</u>	X4¶
<u>Dental--dental-coverage¶</u>	X5¶
<u>Vision--vision-coverage¶</u>	X6¶
<u>Medicaid--Medicaid-coverage¶</u>	X7¶
<u>Medicare--Medicare-coverage¶</u>	X8¶
<u>Private Ins--do-you-have-private-ins¶</u>	X9¶
<u>Federal ins--do-you-have-federal-ins¶</u>	X10¶
<u>Other--other-ins-coverage¶</u>	X11¶
<u>Ins CH--insurance-relationship-to-cardholder¶</u>	X12¶
<u>No doc--not-able-to-see-doc¶</u>	X13¶
<u>No doc COST--not-able-to-see-doc--bc-of-cost¶</u>	X14¶
<u>No doc DIST--not-able-to-see-doc--bc-of-distance¶</u>	X15¶
<u>No doc FEAR--not-able-to-see-doc-bc-of-fear¶</u>	X16¶
<u>No Doc LackofTrans--not-able-to-see-doc--bc-of-lack-of-transportation¶</u>	X17¶
<u>No Doc Ot--not-able-to-see-doc--bc-of-other-reasons¶</u>	X18¶
<u>HC Provider--primary-healthcare-provider-(YorN)¶</u>	X19¶
<u>Rou Appt--do-you-get-routine-appts¶</u>	X20¶
<u>Chol chkd--ever-get-your-cholesterol-checked¶</u>	X21¶
<u>Chol res--cholesterol-results¶</u>	X22¶
<u>Chol timeago--last-time-cholesterol-checked¶</u>	X23¶
<u>BP chkd--ever-get-your-blood-pressure-checked¶</u>	X24¶
<u>BP results--blood-pressure-checked¶</u>	X25¶
<u>BP timeago--last-time-blood-pressure-checked¶</u>	X26¶
<u>Dia chkd--diabetic-or-sugar-checked¶</u>	X27¶
<u>Dia results--sugar-results¶</u>	X28¶
<u>Dia timeago--last-time-sugar-was-checked¶</u>	X29¶

Appendix 4. All Variable Used in Data Analysis Part 2

<u>PreDia Borderline--prediabetic-or-borderline-diabetic</u>	X30	α
<u>Type Dia--type-of-diabetes</u>	X31	α
<u>Phys exams--do-you-get-physical-exams</u>	X32	α
<u>Phys exam timeago--last-time-you-received-physical-exams</u>	X33	α
<u>Chronic ill--have-any-chronic-illness</u>	X34	α
<u>HIV--HIV/AIDS-tested</u>	X35	α
<u>HPV--HPV-vaccination-(YorN)</u>	X36	α
<u>Sleep avg--average-sleep-per-night</u>	X37	α
<u>PA pastWk--Physical-activities-in-past-week</u>	X38	α
<u>MA perwk--moderate-activities-per-week</u>	X39	α
<u>MA type--type-of-moderate-activities</u>	X40	α
<u>Des eatHabits--describe-your-eating-habits</u>	X41	α
<u>Fam meals--did-your-family-eat-meals-together</u>	X42	α
<u>Bstshape YorN--consider-yourself-in-best-shape</u>	X43	α
<u>GENDER.....X</u>	X44	α
<u>Social-Economic-Status....X</u>	X45	α
(5-Variables)		α
<u>Adverse-Health-Outcomes-X</u>	X46	α
(3-Variables)		α
<u>Pst30_Mental</u>	X47	α
<u>Nutri class--did-you-take-a-nutrition-class</u>	X48	α
<u>DIET_type--what-type-of-diet-do-you-follow</u>	X49	α



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NOTICE OF APPROVAL FOR HUMAN SUBJECTS RESEARCH

DATE: 01/30/2015
TO: Lauren Dixon, SOGS-MSPH
Chau-Kuang Chen, MD, Office for Research, William Washington, PhD, SOGS-MSPH
FROM: Shannon Roberson, MT, Human Protections Administrator, Exempt
PROTOCOL TITLE: RISK INCREASE OF YOUNG ADULT OBESITY WITH GIS MAPPING OF HIGHER PROBLEMATIC AREAS OF OBESITY USING STUDENT'S RESIDENTIAL ZIP-CODE FOR HEALTH PROGRAM INITIATIVE (PILOT)
FUNDING SOURCE: Funding - Meharry Medical College
PROTOCOL NUMBER: 14-11-314

The Meharry Medical College Institutional Review Board (IRB) has reviewed the protocol entitled: RISK INCREASE OF YOUNG ADULT OBESITY WITH GIS MAPPING OF HIGHER PROBLEMATIC AREAS OF OBESITY USING STUDENT'S RESIDENTIAL ZIP-CODE FOR HEALTH PROGRAM INITIATIVE (PILOT). Your study underwent an on 01/23/2015. Any changes in the protocol, consent form, or other approved documents (for example, number of subjects, dosages, frequency of visits) must be approved by the IRB before being implemented.

1. Please be sure to use only IRB-approved versions of all study documents.

During the course of the study, any local serious adverse events, whether anticipated or unanticipated, must be reported to the IRB within 48 hours. Any serious adverse events that occur at other sites must be reported to the IRB within five working days. In the event that you or the sponsor closes or suspends the study, the IRB must be notified within five working days.

If you have any questions, please call the IRB office at 327-6735.

Sincerely,

S Roberson

Review Type: EXEMPT
IRB Number: FWA00003675
Funding: Meharry Medical College

Attachments

VITA

Lauren A. Dixon was born in Smyrna, Tennessee on the beautiful day of June 14, 1990. She graduated from Jeffersontown High Magnet School in Louisville, Kentucky in May, 2008. After high school graduation, she transitioned into Kentucky State University in Frankfort, Kentucky, which she received her Bachelor of Science degree in Biology with a minor in Chemistry, in 2012. During her undergraduate studies, she interned at the University of Kentucky in Lexington, Kentucky, where she received her first publication in Internal Medicine. After graduation, she completed a Post-baccalaureate at Wright State University in Dayton, Ohio where she studied Renal Transplant Research under Dr. Lucille Wrenshall, through 2014. While at Wright State University, she was able to present her research at the first annual Emory University STEM Symposium in 2014 with paid in full for travel expenses.

After completing her post-baccalaureate, she came to Meharry Medical College to pursue her Master's in Public Health. She has been also granted a number of awards while attending Meharry such as Greenwall Foundation Scholarship, H.G. Hills Scholarship, Meharry National Alumni Scholarship, James and Virginia Merrill Scholarship, United Methodist Church General Board of Higher Education Scholarship.

