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Predictors of Obesity among Young Adults in the State of Maryland

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Abstract

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Abstract

Obesity has become a global wellness concern for young adults. In the past, there were very few studies conducted on predictors of obesity among young adults, even though there have been several studies on the potential predictors of obesity on the general population. The social ecological model was used to guide this quantitative cross-sectional study to identify the possible predictors of obesity among young adults. The Behavioral Risk Factor Surveillance System was used to analyze the potential predictors of obesity among young adults between the ages 18 – 34 years old in Montgomery County, Frederick County, and Princess Georges County, State of Maryland. The independent variables used in this study were physical activity, health care coverage, and excessive alcohol consumption. The cross-sectional study was used to identify the association among variables. Data was analyzed using crosstabs and multiple logistic regression analysis. The results of the study indicated a statistically significant, Chi-sq = 7.24, p = .007, relationship between activity and obesity in the young adult population, ages 18-34. Study results indicated no statistically significant relationship between alcohol consumption and insurance coverage and obesity for the population studied. The study provides evidence and guidance for public health professionals to develop an effective obesity intervention program aimed toward young adults. The implications for positive social change include educating and promoting young adult's wellness through the reduction of obesity rates and the promotion of physical activity.

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Dedication

This dissertation is dedicated to the memory of my beloved father, Mr. Edappally Asokraj. Although he was my inspiration and strength to pursue my doctoral degree, he could not see me complete it successfully.

Thank you to my academic advisers who guided me in this process and the committee who kept me on track.

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Chapter 1: Introduction to the Study

Introduction

The number of obesity cases has significantly increased according to the data spanning the last two decades (Ogden et al., 2016). Today, obesity is considered a chronic illness, which can cause proinflammatory and destructive diseases that are associated with inter and intra physiological along with mental stressors. Obesity has become the most challenging health crisis and metabolic disease that our population faces today (Leahy et al., 2011). This fatal disease affects approximately 78 million adults, which equates to about 37.9% of the United States adult population falling in between the age of 20 and 39 years (Flegal et al., 2016). Obesity exerts a huge impact on the nation's health care system and has not constantly been addressed or managed appropriately by physicians (Centre for Disease Control and Prevention [CDC], 2013). Malignancy diseases such as cancer of the breast, rectum, and colon result due to unmanaged obesity (Trust of America's Health, 2016).

The intentions of this study were to recognize the potential predictors of obesity among young adults in Montgomery County, Frederick County, and Princess Georges County, State of Maryland. In this study, three areas were measured as potential predictors of obesity. They include physical activity, excessive alcohol consumption, and a lack of health care coverage. These variables were selected as predictors that can be easily measured in terms of hours used or consumption units.

In this chapter, the problem statement, purpose of the study, research questions, hypothesis and theoretical framework for this study are discussed. Further, the nature of the

study and the definitions of the terms used throughout this study are detailed. Finally, the scope, assumptions, limitations, delimitations, and significance of the study are explained.

Background

Healthcare costs due to obesity-related health issues are significantly increasing the total national healthcare expenditure, and it has been shown to cause a damaging effect on the worldwide economy (Khan, 2011). The healthcare expenditure associated with the management of obesity and health-related concerns caused by obesity were approximately more than $147 billion in 2010, which has caused a negative impact on the economy and the healthcare system (Finkelstein et al., 2009). In 1990, the obesity-related healthcare costs submitted to Medicare was roughly $107.9 billion, which is 8.8% of the total healthcare expenditure followed by roughly $44 billion on Medicaid, which is about 3.5% of the healthcare expenditure (Queensberry et al., 2013). In 2010, the federal government expenditure was about $800 billion on Medicaid and Medicare, which is 29% percent of the total healthcare expenditure (Andreyeva et al., 2013). Table 1 shows the obesity-related annual health care costs.

Table 1

Obesity Related Annual Health Care Costs

	1990		2010	
	Healthcare Cost Expenditure	% of Total Healthcare	Healthcare Cost Expenditure	% of Total Healthcare
Medicare	$107.9 Billion	8.8	$517.5 Billion	18.9
Medicaid	$43.3 Billion	3.5	$265.4 Billion	9.7

The study in junction with the World Food Center of the University of California-Davis, by the Center for Social Dynamics and Policy in the United States, reported that the health, societal, and material expense of obesity was about $ 92,235 per person, which is higher than over an individual's lifespan than those within a healthy weight range (Pianin, 2015). In another analysis, Scott (2014) showed that the total cost of obesity including nonmedical and direct medical services, incapacity from obesity and decreased productivity, and premature death is almost $305 billion a year in the United States (Pianin, 2015). This figure was calculated based on all direct medical expenses, premature deaths, counseling, bariatric surgeries, cosmetic treatments, and nonmedical causes such as lost productivity costs, disability costs, and foregone tax revenue (Ogden et al., 2016). Using these statistics, if all 12.7 million of the young adults in the U.S. (4% of the total U.S. population) with obesity become adults, the societal cost would exceed $1.1 trillion per year (Ogden et al., 2016). If the government expenditure on programs related to promoting healthy nutrition and lifestyles increased, obesity would be reduced by 5% and could save an expected $611.7 billion on health care costs over the next 20 years (Ogden et al., 2016).

Biro and Wien (2010) identified the potential predictors of obesity among young adults. Some predictors include the imbalance of calories, poor nutritional intake, lack of physical activities, chronic stress, and low socioeconomic factors (Biro & Wein, 2010; Fortuna et al., 2010). According to Apovian (2016), The lack of health coverage and alcohol consumption are other potential predictors of obesity. A better understanding of possible predictors of obesity

among young adults in Montgomery County, Maryland may help to reveal the reasons why the rate of obesity has doubled in this age group from 18–34-year-olds (CDC, 2013).

Biro and Wien (2010) studied the association between obesity and the factors of genes, physical activity, dietary intake, and environmental factors. They found that adolescents with an increased BMI experienced 30% higher rates of mortality as young and middle-aged adults, even though the perseverance of higher BMIs into adulthood accounted for much of the relationship (Biro & Wien, 2010). Similar research on young adults and factors of obesity indicates that as adolescents grow into young adulthood, their lifestyle may change due to growth, development, life stressors, economic status, independent living status, and becoming a parent (O'Neil et al., 2012). All these factors can contribute to the development of poor health habits due to negligence in following a balanced lifestyle (O'Neil et al., 2012).

In another study, Juonala et al. (2011) indicated that being an obese child may significantly increase the chance of continuing to be obese as an adult. This study also suggests the long-term health consequences such as diabetes, hypertension, carotid artery arteriosclerosis, and dyslipidemia that can occur from being obese (Juonala et al., 2011). According to numerous studies, the occurrence of health-related consequences associated with obesity is largely supported (Movahed et al., 2011; Wang & Peng, 2011; Whitmore, 2010).

Peng and Wang (2011) studied the mechanism of low high-density lipoprotein and high low-density lipoprotein among obese patients compared to individuals who were normal weight participants. The results of the study supported the effect of obesity on an individual's cholesterol levels, which is due to a lack of physical activity, poor lifestyle, and poor nutritional

status (Peng & Wang, 2011). The study also concluded that there is a positive correlation between obesity and hyperlipidemia (Peng & Wang, 2011).

Another life-threatening consequence of obesity is hypertension. Mohaved et al. (2011) investigated the impact of obesity and hypertension with left ventricular hypertrophy. The outcome of this study supported that the LVH is more prevalent among obese participants (Mohaved et al., 2011). The study noted that the lack of physical activity may be a significant predictor of LVH in obese individuals (Mohaved et al., 2011). Further, Spees et al. (2012) conducted a study on the difference in levels of physical activity by the various obesity levels in the United States. The researchers found that normal weight participants engage in moderate to vigorous physical activities more than overweight people do, which indicates the potential relationship between lack of physical activity and obesity (Spees et al., 2012).

Another factor that could influence obesity may be low socioeconomic status (SES). Berry et al. (2010) found that there is a significant relationship between body mass index and various demographic, social, and neighborhood characteristics. This study found that participants with low socioeconomic status had high BMI (Berry et al., 2010). The CDC (2013) reported that some of the factors found to be associated with low SES and high BMI categories are a low standard of living and fewer places for safe and affordable physical activities. According to the CDC, a more detailed investigation is required to identify potential predictors of obesity among young individuals in Montgomery County, Maryland. This is especially true due to the secondary data that is available to researchers regarding the U.S. obesity population.

Even though there are studies conducted on potential predictors of obesity in the U.S., there are only a few studies that have been conducted using young adults in Maryland (National Academics, 2016). In Montgomery County, make sure to add the other two counties throughout your manuscript Maryland, research is needed to determine if a correlation exists in factors that may contribute to the dramatic increase between the two adult populations from 9.5% among 18-24-year-olds to 20.9% among 25-34-year-olds (CDC, 2011). Over 54.3% of adults and 4 in 10 children (36.3%) are overweight in Montgomery County, which are alarming statistics (Department of Health and Human Services [DHHS], 2014). Since 2000, the obesity-related hospitalizations increased three-fold among adults and four-fold among children in Montgomery County (CDC, 2011).

According to the United States Census Bureau, in 2015 Montgomery County had a population of 1,040,116, which was a 7% population growth rate. The population is 51.8% females and 48.2% males. The current obesity rate in Montgomery County is 29.6%, and the obesity rate among the men is 26.6% with women around 28.7%. Further, the obesity rates among White individuals is 26.0% with Black individuals around 37.9%, and Latinos 26.0%. The current rate of adult diabetes mellitus (DM) in Montgomery County is 10.1% and hypertension (HTN) is 32.8% (United States Census Bureau, 2016). Tables 2 and 3 below list the race distribution and the obesity rate among age groups, respectively.

Table 2

Race Distribution in Montgomery County, Maryland

Race	Distribution
White	61.3%
Hispanic	19.9%
Black	19.1%
Asian	15.4%
Alaska Native	0.7%
American Indian	0.7%

Table 3

Obesity Rates Among Age Groups

Age	Obesity Rate
18-25	10.3%
26-44	29.4%
45-64	34.4%
65 +	29.4%

According to The State of Maryland Better Policies for a Healthier America released in September (2016), the obesity rate in Maryland has climbed to the 31st highest adult obesity rate in the nation. Currently, Maryland's adult obesity rate is 28.9%, which is up from 19.6% in 2000

and 10.8% in the year of 1990. A most recent data shows, the adult obesity rates now surpass 35% in four states, 30% in 25 states and are above 20% in all states (Trust for America's Health and Robert Wood Johnson Foundation, 2016).

Problem Statement

Obesity in both men and women can cause various consequences such as diabetes, hypertension, cardiovascular diseases, and stroke (Shepherd, 2009). Effective public health strategies aimed to reverse the current trend of obesity and prevention of the associated consequences need to be identified (O' Neil et al., 2012). Studies have reported that the incidence of obesity in the United States is dramatically increasing (Ogden et al., 2016). The increase in the obesity rate may be due to complex interactions between environmental, genetic nutritional, and physical factors (Biro & Wien, 2010). A gap in the literature exists regarding the factors that contribute to obesity among young adults in the age interval of 19-39-years-old (Wand & Peng, 2011). Risk factors such as diet, physical activity, and alcoholism have not been studied in the young adult age group (O' Neil et al., 2012).

According to the most recent data on obesity in the United States, the rate of obesity is increasing (CDC, 2013). These rates now exceed 35% in some of the U.S. Obesity is classified as having a BMI category > 30 kg/ m2 (CDC, 2013). Statistics show that there is a dramatic increase in the obesity rates among the young adult age groups of 18-24-year-olds and 25-34-year-olds (Biro & Wien, 2010; CDC, 2013). Maryland ranks number 3 on a list of cities with obesity rate more than 36% (United States Census Bureau, 2016).

This research study may provide evidence to determine the predictors of obesity in young adults aged 18-24-years-old living in Montgomery County. The evidence from this study may assist public health officials in developing programs to reduce the level of obesity and health-related illnesses, which can decrease the financial burden placed on the United States health care system.

Purpose of the Study

The purpose of this quantitative study is to identify, analyze, and compare the potential predictors of obesity among two young adult age groups that includes 18-24-year-olds and 25-34-year-olds in Montgomery County, Maryland. This study may provide evidence to better understand the potential predictors of obesity between these two age groups. In this study, three areas will be studied as potential predictors of obesity, which include physical activity, excessive alcohol consumption, and lack of healthcare coverage. The results will be disseminated to health professionals, which could help create positive social changes via designing and implementing strategies to reduce the current trend of obesity among young adults.

This study is focused on observing the obesity statistics in Maryland via three constructs, which include physical activity, alcohol consumption, and healthcare coverage. Thus, the impact of each of these variables will be assessed, and the relevancy defined by predicting the extent to which these variables are capable of reflecting obesity outcomes. The Maryland state survey showed that the difference in the rate of obesity is more than double between these two age groups (CDC, 2013). Previous studies showed that factors such as sedentary physical activity, excessive alcohol consumption, and lack of health care coverage largely influence obesity in

young adults (Trust of America's Health, 2016). Evidence has shown that normal weight individuals engaged in moderate to vigorous intensities of physical activities more than obese adults (Spees et al., 2012). Excessive alcohol consumption may also be a significant predictor of young adult obesity as well as many negative health conditions (Kushner, & Ryan, 2014).

When it comes to the available options to prevent obesity, it is known that annual physical examinations, monitoring the BMI categories, conducting screening tests, and other health indicators are beneficial (Finkelstein et al., 2009). Lack of health coverage also affects the individual's ability to receive treatment for obesity-related illnesses (Finkelstein et al., 2009). With the increasing rate of obesity at epidemic proportions, and with such a dramatic increment in obesity rate within the young adult population in Montgomery County, more research is required for a better understanding of these potential predictors of obesity. The choice of variables was made on a preliminary basis as an attempt to seek knowledge on the prevalence of obesity in young adults in Maryland, but greater availability of data and inclusion of other relevant variables can increase the validity of outcomes. There is no comparison of obesity status between the entire U.S. and Maryland; instead, the state health departments are being assessed. With the accomplishment of more data on the predictors of young adult obesity, it may be possible to plan, design, and implement a more effective preventive and interventional program to reduce the rate of obesity in Montgomery County (Cousins et al., 2011).

Research Questions and Hypothesis

RQ1: Is there a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity, as measured by calculating

BMI categories in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland.

$H_0$1: The relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity, as measured by calculating BMI categories in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland is not statistically significant.

Ha1: The relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity, as measured by calculating BMI categories in the young adult age groups living in Montgomery County, Montgomery County, Frederick County, Princess County, in the State of Maryland is statistically significant.

RQ2: Is there a relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI categories in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland?

$H_0$2: The relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI categories in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland is not statistically significant.

Ha2: The relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as

measured by calculating BMI categories in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland is not statistically significant.

RQ3: Is there a relationship between healthcare coverage as measured by the participant's response to the survey on having healthcare coverage and obesity as measured by calculating BMI categories in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland?

$H_0$3: The relationship between healthcare coverage as measured by the participant's response to the survey on having healthcare coverage and obesity as measured by calculating BMI categories in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland is not statistically significant.

Ha3: The relationship between healthcare coverage as measured by the participant's response to the survey on having healthcare coverage and obesity as measured by calculating BMI categories in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland is statistically significant.

RQ4: Which potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) when factoring for gender and race/ethnicity has the strongest association with obesity prevalence between the two young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland?

$H_0$4: It is not expected that the potential predictors (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

Ha4: It is expected that the potential predictors (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

Theoretical Framework

The social ecological model (SEM) was the theoretical framework for the proposed study. Understanding the predictors among a young adult population requires recognizing the impact of social ecological factors on obesity (National Institute of Health [NIH], 2005).

The Social Ecological model categorizes the interrelationships that exist between the health and the behaviors at the social level (Simons et al., 2012). The SEM is a theoretical framework that examines the multifaceted influence of social factors such as individual, community, relationship, and societal factors and their impact on one another at different social levels (CDC, 2013). The SEM hypothesizes the dynamic association between the five levels of influence such as intrapersonal, interpersonal, organizational, community and public policy, which can regulate health status. (Simons-Morten et al.,2012).

The five levels of SEM are organized as follows:

1. Intrapersonal /Individual: This level of the SEM is made up by the individual's various traits and characteristics. These characteristics influence how a person behaves. Some of the attributes for these characteristics linked to an individual's

personality, sexual orientation, educational level, health behaviors, age, and economic status. These factors are linked to Individual basic traits. These factors are significant to consider when implementing public health plans (Simons-Morten et al., 2012).

2. Interpersonal: The social network and the relationships that an individual takes part in also have extreme potential to influence behaviors. The key players in the interpersonal stage of the model are traditions, families and friends. Examples for this level is promoting healthy relationship by using therapy or interventions. Another intervention is strategies to discourage violence among people to promote healthy and peaceful relationships (Simons-Morten et al., 2012).
3. Community: This level of the SEM emphases on the networks among establishments, organizations and societies that make up the healthier community. These relations contain industries and roles of the "built environment," such as gym, parks, library or community centers. These societal structures are frequently vital in shaping and determining how peoples behave and their traditions they uphold. In order to comprehend where the health behaviors originate, it is important to understand what level of community that the individual belongs to (Simons-Morten et al.,2012).
4. Organizational: The organizations often enforce certain behaviors determining restrictions and regulations among the individuals. For example, a school, regulates the dissemination of knowledge. This impact is important once it comes to exchanging information about safe health practices among children in the community (Simons-Morten at al., 2012).

5. Policy Enabling Environment: Policies and laws that are instigated at local, national and global levels make up the widest level of the SEM. These guidelines have the potential to impact large numbers of people. A policy outlining a U.S. malaria aid budget, for example, will have far-reaching global effects for decades (Simons-Morten et al., 2012).

Another study conducted on the comparative influence of aspects of the Social Ecological Model to childhood obesity (Ohri-Vachaspathi et al., 2015). This study examined six key layers of the Social Ecological Model and the result showed that five out of six layers of the SEM at multiple level were found to contribute significantly to predicting the factors influencing the weight status of the obesity among children. A randomized control trial study conducted by Tehrani et al., (2016), applying SEM to improve women's physical activity in preventing obesity.

Harper et al. (2018) studied use of SEM to improve access to health care for adolescent and young adults. Study showed that insurance coverage is extremely important for adolescents and young adults in preventing serious health issues like obesity, diabetes, Hypertension and depression. Spencer et al. (2017) analyzed National Health Interview survey data between 2010 and 2016 examined the medical insurance coverage amongst children, adolescents and young adults found age inclination pattern with incrementally poor coverage and access risks of adolescents and young adults. This study used Social Ecological Model as theoretical framework to analyze how the environmental factors influence the health behavior and its outcome (Spencer et al., 2017).

Nature of the Study

The nature of the study was a quantitative research method. A quantitative research method will be most effective in predicting the potential influencing factors of obesity among young adults from Montgomery County (Tang et al., 2010). The data was collected by secondary analysis of data from the United States health survey on behavioral risk factors called BRFSS in 2017. This data represented all the geographic and demographic area of Montgomery County, Frederick County, Princess County, in the State of Maryland including urban and rural areas. The data was collected by the CDC's BRFSS is comprised of many high-risk behaviors, and usage of preventive health services to address the causes of public health issues that include infectious diseases, chronic health issues, injuries, disabilities and deaths (CDC, 2012).

This study was a cross-sectional research study using data from BRFSS to identify the potential relationships between the key variables of physical activity, lack of health coverage, and excessive alcohol consumption and obesity among young adults in Montgomery County, Frederick County, Princess County, in the State of Maryland. The utilization of the secondary data was ideal and the most effective route for this study because it is reliable, and it allows the research questions to be answered effectively and quickly (Rabinovich & Cheon, 2011). Other data collection methods would be costlier and more time consuming (Castle, 2003). BRFSS is widely used and therefore scores well on the grounds of validity and efficiency for conducting a survey which can reflect the behavioral risk factors (physical activity, alcohol consumption) aiding in obesity for the people of Montgomery County.

The data for this study was used in accordance with the Walden University Institutional Review Board (IRB) guidelines and requirements of the use of human subjects for study. Permission from the CDC was gained before the research began. All the procedures and policies of the CDC and IRB were followed to make the data available for the public. The statistical analysis of this study was done by using the statistical processing and analysis software package (SPSS 25) system recommended by Walden University.

Definitions

Obesity: Obesity is defined as having an excessive quantity of body fat in relation to lean body mass (Apovian & M.D., 2016). The indicator Body Mass Index (BMI) categories are being widely used to express body fat in relation to lean body mass, and BMI categories are expressed as a ratio of individual weight to height.

Physical activity: The physical activity is defining as the essential physical skills or endurance above the basal level required to improve overall health (U. S DHHS, 2008). In this study, physical activity skills refer to at least 150 minutes of reasonable strength aerobic activity like brisk walking every week, and muscle firming activities on 2 or more days in 13-week period that works all main muscle groups. Also, 75 minutes of vigorous-intensity aerobic activity like jogging or running every week, and muscle strengthening activities that work all major muscle groups 2 or more days a week (CDC, 2011).

Health Disparities: Although the term disparity in health care is often understood to mean racial/ethnic disparities (Healthy People 2020, 2015), in this study, health disparities refer to the definition provided by National Institute of Health (NIH, 2015), which states that, “Health

disparities are gaps in the quality of health and health care that mirror differences in SES, racial and ethnic background, and education level" (NIH, 2015, para. 5).

Socioeconomic status: The American Psychological Association (2014) defined socioeconomic status (SES) as the social class that a person or group belong to, often measured by education, occupation and income.

Body mass index" (BMI) Categories: A reliable indicator of body fat calculated from an individual's weight and height (WHO, 2014). According to the CDC (2010), an individual with a BMI category between 25 and 29.9 kg/m2is considered overweight, and an obese individual has a BMI category of 30 or greater.

Excessive alcohol consumption (EAC): In this study, EAC refers to binge drinking, heavy drinking, or any alcohol use by pregnant women or by persons under the legal, minimum drinking age (CDC, 2014a).

Binge drinking: This refers to the consumption of alcohol that brings an individual's blood alcohol concentration (BAC) level to 0.08%. This typically corresponds to five or more drinks within approximately two hours for men or four or more drinks within approximately two hours for women (National Institute on Alcohol Abuse and Alcoholism, 2016.).

Heavy drinking: In this study, heavy drinking refers to 15 or more drinks per week for men and eight or more drinks per week for women (CDC, 2014).

Study Variables

Dependent Variable

The dependent variable used in this study was obesity among young adults between 18-34 years old. Obesity is defined as having an excessive amount of body fat in relation to the lean body mass (Tamers et al., 2011). The effective measure used to find the relationship of body fat to lean body mass is the BMI categories. Body mass Index categories are expressed as the relation of weight to height. In this study, the BMI categories will be measured based on self-reported height and weight, then dividing the "weight in kilograms by the square root of height in meters and expressed in the unit of kg/ m 2" (Tamers et al., 2011). According to CDC recommendation, the normal BMI categories are between 19 to 25. The BMI categories between 25 to 29 are considered overweight, and an individual with a BMI category of 30 and more are considered obese (CDC, 2013).

Independent Variable

The primary independent variables for this study were physical activity, health care coverage, and excessive alcohol intake. According to CDC guidelines, physical activity is 150 minutes of moderate intensity or aerobic activity via walking every week, muscle-strengthening activities 2 or more days in a week, or 75 minutes of vigorous activity like jogging and running, or activities using major muscle strengthening activities in a week (CDC, 2011). For health coverage, the participants were asked to answer questions like whether they have any health insurance and the type of insurance they have. For alcohol consumption, participants were asked about the frequency and amount of alcoholic drinks consumed by them in a week.

Covariates

The groups of gender and ethnicity do not emerge as factors which would have a direct and an apparent impact on obesity; however, they can play an assisting role in providing information with the main independent variables such as physical activity and alcohol consumption. This can occur due to a difference in lifestyles and ethnic backgrounds or genders of the study participants. There are several other factors where socioeconomic status can affect obesity which includes dietary habits, depression, and household size, but the current study is concentrated on stating the prominence of physical activity, alcohol consumption, and healthcare coverage resulting in obesity among young adults (Casagrande et al., 2009).

In this study, the covariates were age groups, gender, and race-ethnicity. For age groups, the participants may be asked what age group they are in, and the responses will be given as numerical form. For gender, participants may be asked "what is your sex?" to get the response of "male or female." For race/ethnicity, participants will be asked "which of the following groups would you say best represents your race (Whites/Blacks, African American, Asian, Native Hawaiian or Pacific Islanders/American Indians or Alaska natives or Hispanics)?" (Kushner & Ryan, 2014).

Assumptions

The assumptions for this study are that the participants who were surveyed for primary data collection provided honest answers for the survey. Other assumptions are that the secondary data will provide accurate information on the demographics, ethnicity, gender, physical activity, amount of alcohol consumption, and health coverage for young adults living in Montgomery

County, Frederick County, Princess County, in the State of Maryland. These assumptions are important because accurate information will provide an accurate interpretation of the results. Public officials may use these assumptions to make informed decisions on prevention of obesity.

Scope and Delimitations

In this study, the inclusion criteria were young adults living in Montgomery County, Frederick County, Princess County, in the State of in the age group of 18-34 years old. The exclusion criteria were children under the age of 18 years old and adults over the age of 34 years old. The participants from states other than Maryland were eliminated.

Limitations

This study had some challenges when it comes to investigating potential predictors of obesity in young adults. Obesity is considered an excessive fat deposition in the body (Kushner, & Ryan, 2014). Obesity is also related to other chronic disease conditions such as cardiovascular diseases, diabetes, cancer, stroke, and more than 60 health issues (Kushner & Ryan, 2014). The challenge of conducting this quantitative study on obesity is similar to investigating any other health issues. The National Cancer Institute (NCI) synthesis report studied the barriers to conducting quantitative research from the patient's viewpoint, and they found over 20 different barriers to participation (Williams S, Emerging Leaders Fellow, 2004). These barriers include; patient uncertainties of being investigated on, expenses, logistical concerns, effort, and quality of life concerns intricated in the informed consent process, predilection for alternative treatments, views about the futility of treatments, and concerns about endurance in care (Williams S, Emerging Leaders Fellow, 2004). Another issue with chronic health issues is that they have

multiple causes often interrelated with each other or acquired earlier in their life and related behavior risk elements (Remington et al., 2010). The major contravention of obesity studies is collecting precise epidemiologic data on causal factors of obesity.

The possible determining factor of obesity where accuracy might be lost includes age, gender, demographic profile, race, and ethnic background. The challenge in collecting accurate data is that many quantitative studies use self-reported questionnaires, which can cause the validity of the study to weaken due to participant bias. The outcome of the study may be influenced by many ways. Self-reported data and questionnaires may have several threats to validity. Some of these threats depend on how the questions are being asked, retrieval of the information, comprehension of the questions, and response generation in the study (McKenzie et al., 2009).

Selection bias may be another threat to validity because the participants may not be characteristics of the population in the study. Due to the self-reported nature of the data, there might be other issues like recall bias. If the data is secondary archived data, which this study is, there is a possibility of its own unknown limitations (McKenzie et al., 2009). Using a high statistical power of 90% and large sample size might help to address some of these anticipated limitations.

Significance

Since the obesity level is rising to an epidemic dimension, it is crucial to have a better understanding about the possible predictors of obesity, especially among the young adult population (O' Neil et al., 2012). Very few researchers have conducted studies on the factors that

are affecting obesity in young adults in Maryland. Understanding predictors of obesity in young adults may help guide the design of intervention studies aimed at prevention of obesity. The interventions can include establishing a link between specific behaviors and obesity and developing methods to accurately measure these behaviors. Understanding predictors of obesity would also help in evaluating the interventions to modify these behaviors (US Department of Health and Human Services, 2005).

Summary

Obesity is becoming the number one public health concern due to the impact it has on chronic and life-threatening issues like diabetes, dyslipidemia, hypertension, cardiovascular diseases, and stroke (CDC, 2013). Roughly one-third of the U.S. adult population is obese, and the numbers continue to increase. It is estimated that the healthcare spending towards obesity is about $147 billion per year (Queensberry et al., 2013). Due to this, there is a pressing need to intensify the obesity prevention strategies in young adults. Studies have shown that despite the public health attempts to reduce adult obesity, the rates are climbing up each year. Previous researchers have shown that some of the risk factors for obesity are lack of physical activity, alcohol consumption, and lack of health coverage in the young adult population.

Several studies reveal the need for obesity prevention programs to reverse the current trend of rising rates of obesity. Understanding the predictors of obesity may be helpful to plan and implement obesity prevention programs by increasing the public awareness. Educating individuals about the possible risk factors of obesity and the negative consequences of obesity causes may improve overall health literacy.

Statistics show that there was a dramatic surge in the incidence of adult obesity between the two age groups of 18-24 and 24-35 years old (CDC, 2013). Even though there are few studies conducted on adult obesity, no studies have been done on these risk factors among young adults in Maryland. It is crucial to consider what the cause of this striking increase in the rate of obesity between the two young adult groups in Maryland is. The outcome of this research study may be helpful to evaluate the previously implemented programs and modify them in order to increase public awareness on the predictors of obesity in young adults and thereby bring a positive social change to the community.

Chapter 2: Literature Review

Introduction

Currently, obesity is an epidemic with devastating health effects and is a proinflammatory and destructive chronic illness (CDC, 2013). Researchers have shown that obesity has major health and economic consequences that are associated with external as well as internal physiological, mental, and social stressors (Ogden et al., 2012). Obesity affects approximately 78 million adults which is about 37.5% of the U.S. population (CDC, 2013). It is anticipated that if the inflation rate of obesity continues in its recent manner, the expected rate of obesity would be about 50% of the adult population and would encompass 18% of the United States healthcare expenses by 2030 (CDC, 2013).

Unmanaged obesity is associated with more than 65 types of comorbidities including diabetes, hypertension, coronary artery illnesses, osteoarthritis, hyperlipidemia, and cancer like preventable illnesses (Bates et al., 2011; Wang & Peng, 2011; Whitmore, 2010). It is anticipated that the current level of obesity might lead to almost half a million cases of cancer related issues, approximately 5 million cases of cardiovascular diseases, and over 6 billion cases of diabetes in the USA, by 2030 (Andreyeva et al., 2013). Consequently, appropriate obesity strategies are required at the local level to prevent such negative effects of obesity on young adults. Many researchers have been conducting studies for many years to identify the possible risk factors of obesity to reverse the current trend in obesity (Bates et al., 2011; Wang & Peng, 2011; Whitmore, 2010).

Purpose of the Study

The purpose of this study was to analyze the possible predictors of obesity among young adults living in Montgomery County, Maryland. Per CDC guidelines, young adults are classified as 18 to 34 years of age (CDC, 2011). The young adults in this study were classified into two groups of 18 to 24 and 25 to 34 years of age. Comparing the characteristics and health behaviors of these two groups may assist in filling a gap in the literature on the significant increase in the prevalence of obesity between these two groups of young adults living in Maryland (Kim & Jeon, 2011).

This chapter provides a summary of the literature review on current obesity trends of adults and a comparison of individual health behaviors that might be contributing to the increase in prevalence of obesity between these young adult groups. The literature reviewed in this chapter provides information on the factors affecting the prevalence of obesity and how those factors are associated with the young adult population in the United States. In this chapter, I provide the details of my search strategy and then address the details of the theoretical framework for this chapter.

Literature Search Strategy

I identified a limited number of studies regarding the obesity trend in young adults in the age group of 18 years to 34 years old (Ogden et al., 2012). Fewer studies have been conducted on the predictors of obesity among young adults, especially in Maryland. I reviewed scholarly literature from 2005 to 2015 using internet searches through the Walden University Library, the Rutgers George F. Smith Library with full text, Medline, and Google Scholar. I also referred to

sources of dissertations, primary and secondary data sources, PubMed, WHO, the CDC and the state government resources. In this literature search, I searched the terms *obesity, young adult obesity, risk factors of obesity, obesity in State of Maryland, predictors of obesity among young adults, risk factors obesity, financial burden of obesity, young adult obesity and excessive alcohol conception, young adult obesity and health coverage, obesity prevention strategies, barriers of obesity* and *age, income, and obesity.* Digital as well as print versions of literature were obtained for review.

Table 4

Strategy Used in Literature Review

# of Results	Boolean phrase	Databases and Journals
Obesity Young adult obesity Young adult's obesity in Maryland Risk factors of obesity Predictors of obesity Social Ecological Model	Obesity and adults young adult and obesity. Risk factors of obesity Obesity in State of MD Maryland predictors of obesity among young adults, risk factors obesity, financial burden of obesity, young adult obesity and excessive alcohol conception, young adult obesity and health coverage, obesity prevention strategies, barriers of obesity and age, income and obesity.	Walden University Library, Rutgers George F. Smith Library Medline Google Scholar. Walden Dissertation PubMed, WHO, the CDC and the state government resources.

Theoretical Foundation

The SEM is the theoretical framework that I used in this study to analyze the predictors of obesity (Simons-Morten et al.,2012). I chose this model because the SEM frequently used to analyze health behaviors in the healthcare field (Simons-Morten et al.,2012). Ulin et al. (2005) stated that the use of the SEM provides guidance to understand how an individual perceives the benefit of personal beliefs on the value of preventing illness, getting well, and their expectations that a specific action to modify their behavior can improve wellness (LaRose et al., 2012). According to Baranowski et al. (2003), the SEM is based on five levels of key factors: Intrapersonal, interpersonal, community, relationship, and societal factors and their impact on one another at different social levels (CDC, 2013). The SEM theorizes the dynamic interaction between the five levels of drives such as Individual, family, community, organizational and policy, which can regulate health status of an individual (Simons-Morten et al.,2012).

In the past, researchers have shown that the use of the SEM is effective in guiding young adults to understand the concerns of obesity and its adverse effects (Simons-Morten et al., 2012). Harper et al. (2018), described the potential factors influencing in gaining weight and obesity, and its potential risks and challenges in prevention, among young college students. Lytle (2009) used the SEM model to identify the phenomenon of obesity. Scott et al. (2017) used SEM to study on adolescent alcohol use and eating behaviors and found that environmental factors influence adolescent alcohol use and associated unhealthy eating behaviors.

Information on Obesity

In the United States, the healthcare expenditure related to the management of obesity and obesity related wellness issues was approximately $147 billion per year in 2010 (Queensberry et al., 2013). Previously, researchers showed that if the U.S. government spent about $10 per person on implementing strategies related to healthy lifestyles and nutrition, the obesity rate could be brought down by 5% (Trust for America's Health, 2008). This would save about $16 billion annually on health care costs over the next 5 years (Trust for America's Health, 2008).

Researchers projected that, in 1990, the obesity related healthcare expenditure by Medicare was about $107.9 billion, which is 8.8% of the total healthcare expenditure and $44 billion on Medicaid, which is about 3.5% of the healthcare expenditure (Queensberry et al., 2013). Another study found that the lifetime public health, social, and material expense of obesity, exclude medical expenses, counseling, and cosmetic treatments is on average $ 92,235 per person, which is almost $305 billion a year in the United States (Ogden et al., 2012). If the government spends on programs related to healthy nutrition and lifestyles and can bring down obesity by 5%, the government could save about $611.7 billion on healthcare expenses over next 20 years (Ogden et al., 2012).

Risk Factors for Obesity

Several factors have been linked to the increasing rate of obesity and the damaging effects on an individual's health (Biro & Wien, 2010). Effective obesity prevention strategies at local as well as national levels are required to reduce the obesity problem in the United States

(Biro & Wien 2010). Therefore, it is crucial to have a better understanding of the associated risk factors of obesity to help initiate obesity prevention programs (Ogden et al., 2012).

Over 54.3% of adults and 4 in 10 children (36.3%) are overweight in Montgomery County, Maryland (DHHS, 2013). Since 2000, obesity related hospitalizations increased three-fold among adults and four-fold among children in Montgomery County (DHHS, 2013). According to the United States Census Bureau, in 2015, Montgomery County, Maryland had a population of 1,040,116 and a 7% population growth rate. The demographic distribution in Montgomery County is 51.8% female, 61.3% White, 19.1% Black/African Americans, 0.7% American Indian, 0.7% Alaska Natives, 15.4% Asian, and 19.9% Hispanics (United States Census Bureau, 2016). The current obesity rate in Montgomery County, Maryland is 29.6%, and the obesity rate among the age group from 18 to 25 years old is 10.3 %, 26 to 44 years old is 29.4%, 45 to 64 years old is about 34.4 %, and 65+ years old is 29.4% (United States Census Bureau, 2016). Further, the obesity rate for men 26.6% with women being 28.7% (United States Census Bureau, 2016). In 2016, the obesity rate among Whites was 26.0%, Blacks was 37.9%, and Latinos were 26.0% (United States Census Bureau, 2016). The difference in the rate of obesity between the age group of 18 to 25 and 26 to 34 is more than double (CDC, 2013).

Recent statistics show that there was a dramatic rise in the rate of obesity among individuals 18-25 and 25-34 year of age in Montgomery County, Maryland as shown in the table 5.

Table 5

The 2016 Obesity Rate Among Age Groups in Montgomery County, Maryland

Age Group	Percentage
18- 25 years	10.3%
26-44 years	29.4%
45-64 years	34.4%
65+ years	29.4%

Note: (United States Census Bureau, 2016). A study conducted on the effect of low-density lipoprotein (LDL) in obese patients using data from the National Health and Nutrition Examination Survey (NHANES) found that a higher lipoprotein level is correlated with obesity more than it is in normal weights individuals (Wand & Peng, 2011). The researchers also concluded that as the obesity rate rises, the cholesterol level also rises (Wand &Peng, 2011). A systematic review by Whitmore (2010) on obesity concluded that there is a definite positive association between type 2 diabetes and obesity.

Jensen et al. (2013) reported serious unwanted outcomes of obesity that included chronic diseases like degenerative arthritis, high blood pressure, hyperglycemia, coronary artery diseases, hyper-lipedema, cancer, stroke, and mental illnesses. According to Pi-Sunyer (2012), obesity is the second leading cause of preventable death in underdeveloped countries. Obesity management

requires holistic lifestyle changes that consist of environmental, cultural, behavioral, and social attributes of a patient's life to bring forth effective and stable changes. Studies showed that if an individual's obesity is untreated, it may lead to an inferior quality of life and an increase in healthcare costs (Jensen et al., 2013).

Studies showed that obese patients have 27% more physician and outpatient visits, 46% higher inpatient costs, and 80% more prescription drug expenditures than normal weight patients (Jensen et al., 2013). Another study reported that keeping the rate of obesity down by one million people could decrease federal health care expenses to $44 billion from $113 million (Brill, 2013). Studies suggest that if providers are prepared with the skills and knowledge of successful obesity management strategies, obesity can efficaciously be managed to ameliorate the quality of patient care and prevent costly comorbidities. Further studies have reported that developments in obesity management strategies in primary care may help decrease the obesity trend and healthcare expenditure (Brill, 2013).

Psychological Factors

Grossniklaus et al. (2010) conducted a descriptive cross-sectional study to investigate the relationship between eating habits and psychological factors. The researchers found evidence that almost 21% of the participants experienced depressive symptoms that are associated with overeating and excessive calorie intake. Other negative psychological factors that impact obesity in young adults are fear and sadness developed during the early stages of life. The negative emotions are triggered from poor childcare and physical and emotional abuse. These factors may

lead to the development of unhealthy lifestyle behaviors such as eating to relax or feel better, sedentary behavior, and increased calorie intake (Vamosi et al., 2010).

Psychological stress and negative emotions affect the hypothalamic-pituitary-adrenal system in the body. Hormones like cortisol and leptin may also contribute to obesity (Farang, 2008). Leptin follows a circadian rhythm, which is regulated by insulin and cortisol levels (Lareg et al. (2007). A review of the existing literature on hypothalamic-pituitary-adrenal (HPA) axis dysregulation and cortisol activity in obesity identified that abdominal fat relates to better responsivity of the HPA axis (Rodriguez et al., 2015). Overall, obesity (BMI) appears to be linked to a hyper-responsive hypothalamic-pituitary-adrenal axis in many but not all studies, such as when acute responsiveness was examined (Rodriguez et al., 2015). There is also indication of a strong association between increased levels of leptin and increased BMI (Lareg, 2007). In obese women, perceived stress and waist circumferences are strongly correlated. It has been reported that people with psychological issues tend to consume more calorie rich food than those who are less stressed (Grossniklaus et al., 2010).

Unhealthy Lifestyles

Unhealthy lifestyle choices are poor dietary habits like excessive intake of calories. Saturated fats and salts with sedentary activity may be one of the most important potential predictors of obesity (Spees et al., 2012). A report by the Institute of Medicine (IOM) called "Bridging the evidence gap in obesity prevention" examines the system science viewpoint and the necessity in obesity research (Skinner & Foster, 2013). Obesity prevention and management is a widespread resource allocation subject involve a full grasp of the whole system for

multilevel intervention (Skinner & Foster, 2013). Obesity is a complex health issue that can lead to other life-threatening issues and can involve genetic, behavioral, and environmental factors.

Obesity is considered a social process that comprises family, peers, environment, economy, geography, knowledge, network, technology, and policies (Skinner & Foster, 2013). People are heterogeneous in their genetic and developmental susceptibility towards obesity. Smith et al. (2010) led a longitudinal observational study on the relationship between skipping meals and the cardio-metabolic factors for obesity. They discovered that the subjects who skipped breakfasts in childhood and adulthood had higher fasting insulin, increased waist circumferences, and high cholesterol levels. A study by Wennberg et al. (2014) noted that poor breakfast habits in adolescence predicted the metabolic syndrome including central obesity and high fasting glucose in adulthood. Evidence showed that more normal weight individuals engaged in moderate to vigorous intensities of physical activities than obese adults (Spees et al. 2012).

Excessive alcohol consumption may also be a significant predictor of young adult obesity as well as many negative health conditions (Kushner, & Ryan, 2014). Breslow (2005) conducted a study on alcohol conception and obesity, found a link between both quantity and frequency of alcohol consumption to BMI. Lack of health care coverage also has a negative impact on weight gain and acts as a significant predictor of obesity as it may affect the individual's ability to preventive services available (Finkelstein, Trogdon, Cohen, & Dietz, 2009). There is an undeniable link between rising rates of obesity and rising medical expenditure (Finkelstein, Trogdon, Cohen, & Dietz, 2009). In addition, Juonala et al. (2011) found that being an obese

child significantly increased the risk of developing obesity as an adult, and developing related health consequences, such as type 2 diabetes, carotid artery atherosclerosis, and hypertension (Movahed, Bates, Strotman, & Sattur, 2011). Spees et al. (2012) studied the characteristics and differences in the types and amounts of physical activity with obesity levels in the US. The researchers found evidence that people with normal Body Mass Index (BMI) categories are engaged at more moderate to vigorous intensities of physical activities than obese adults, indicating a potential relationship between the amount of physical activity and obesity (Spees et al., 2012). A study conducted by Spees et. al. (2012) on the amount and duration of physical activity based on obesity status in the US using a secondary data collected from a sample of 7,695 people from the NHANES 1999-2006, revealed that individuals with normal weights engage in moderate to vigorous intensities of physical activities than obese individuals. The evidence suggests that frequency, intensity, and type of physical activities are important predictors of weight status of an individual. In this study, physical activity and weight status will be further investigated.

Socioeconomic Status

Socioeconomic status (SES) may contribute to obesity status as well. A group of researchers interested in the relationship between the BMI categories and SES among different demographic and neighborhood characteristics studied 500 adults in the age group between 18-90 years and concluded that the adults from lower socio-economic status neighborhoods have higher BMI categories (Berry et al., 2010). Researchers studied other factors influencing obesity associated with low SES such as living in highly populated areas with heavy traffic causing less

space for exercise and other activities. Noise and traffic have been found to be related to endocrine changes and increased levels of cortisol due to stress and noise annoyance. Increased levels of cortisol due to stress and sleep disturbances from increased traffic and noise annoyance can increase the risk for obesity and cardiovascular diseases (Eriksson et al., 2015).

Several studies have been conducted on the contributing socioeconomic factors of obesity among young adults. Studies suggested that childhood diet habits are influenced by early in infancy and childhood practices (Louis, 2014). Exposure to certain factors during childhood, such as low SES at birth and infancy, breastfeeding habits, and overall eating habits among low SES individuals contribute to obesity (Koubaa et al., 2008). In addition to this, young adults living in low SES homes have poorly balanced lifestyles and unhealthy eating habits, like consuming large quantities of low-quality food which may be high in sugar and fat with inadequate nutritious contents (Colapinto, Fitzgerald, Taper, & Veugeles, 2007).

Current Trends in Obesity

Obesity became a major financial burden on the healthcare system because it is not consistently identified and managed appropriately (Center for Medicaid and Medicare Services, 2015). The expected rate of obesity is 50% by 2030, which is almost 18% of healthcare expenditure in the United States. This will cost approximately $861 to $957 billion by 2030 (Center for Medicaid and Medicare Services, 2015). Flegal et al. (2010) analyzed the height and weight of 5,555 participants of NHANES and found that the prevalence of obesity among young males is 32.3% and young women are 35.5%. With the increase in negative psychological,

behavioral, environmental, and economic factors, there has been an increase in the incidents of adult obesity (Wang & Baydoun, 2007).

Age Factor

Age factor seems to be a significant element of obesity. The occurrence of obesity among children under 18 years old is estimated at 17% and over 18 years old is about 35.7% (CDC, 2012). This shows a substantial surge in the prevalence of obesity as age increases. This trend of increased obesity rates in older age groups is also seen among young adults in the age range of 18–34 years in Maryland. Montgomery County is designated as a Tier One County based on the economic wellbeing status in the State of Maryland. Montgomery County has a population of 27,571, with 63, 1% of whites, 19.0% of black persons, 15% of Hispanics and 1.5% of Asians (Montgomery County Health Department, 2014).

The CDC (2013) classified obesity as having a BMI category of $\geq 30 kg/m^2$. In Maryland, obesity rates between the two young adult age groups of 18-25 years of age and 26-34 years of age seem to have the most striking increment. It is estimated that 11.5% of 18-25-year-olds and 29.6% of 25-44-year-olds living in Maryland were obese in the year of 2014 (Trust of America, 2016). The increase in rate is more than double between these two age groups and then even out in all other age groups in Maryland (Trust of America's Health, 2016). In the nearby states, the rate of obesity shows a similar pattern of growth. For instance, obesity rates between 18-24 years of age and 25-34 years of age appeared to have the most dramatic growth (BRFSS, 2011). It is calculated that 9.5% of young adults in the age group of 18-24-year-olds and 20.9% of 25-34-year-olds living in the nearby state of New York are obese (BRFSS, 2011).

Excessive Alcohol Consumption

Excessive consumption of alcohol has several negative impacts on an individual's health conditions (Stahre et al., 2014). Alcohol provides empty calories to the human body, putting an individual at high-risk for weight gain. Many studies revealed that the combined effect of alcoholism and sedentary physical activity is associated with obesity (Kim & Jeon, 2011). More than two drinks of alcohol in men and more than one drink in women is considered heavy drinking according to the CDC (2013). Alcohol ingestion of five or more drinks in a sitting among men and four or more among women is considered binge drinking, which may lead to life-threatening health situations like liver failure, unintentional physical injuries, social problems, and behavioral issues (Stahre et al., 2014).

Per the County Health Rankings in Maryland, Montgomery County ranks first in alcohol consumption (University of Wisconsin Population Health Institute, 2016). A study on the prevalence of alcohol use in Maryland, in 2014, showed that about 87.4% of people age 18 years and older drank alcohol at some point in their life and about 24.7% of people ages 18 years old and older are involved in binge drinking. This study also showed that about 16.3 million young adults older than 18 years old had an Alcohol Use Disorder; this includes 5.7 million women and 10.6 million men (National Institute of Alcohol abuse and alcoholism, 2016). This information is crucial to use to take the initiative in public health efforts by the healthcare administration to reduce excessive alcohol consumption in Maryland. A study conducted by Schroder et al. (2007) reported that excessive alcohol intake is one of the predictors of obesity. In this study, about 19.3% of men and 2.3% of women reported that consumption of alcohol of more than 3 drinks a

day and was directly related to abdominal obesity (Schroder et al., 2007). This may be because excessive alcohol consumption causes a positive calorie imbalance and may lead to unhealthy eating habits and weight gain.

Physical Activity

Physical activity is the major basis of many lifestyle interventions (Wadden et al., 2012). Physical activity in this study is defined as, "any bodily movement produced by skeletal muscles that result in energy expenditure" (Caspersen, Powell, & Christenson, 1985, p. 126). Physical activity is always considered a multifaceted behavior (Biddle & Fuchs, 2009; Caspersen et al., 1985), which is associated with other lifestyle aspects (Cockerham, 2005; Green & Kreuter, 2005; McLeroy et al., 1988). Physical activity is influenced by individual choices, social, and environmental factors (Bauman et al., 2012; Black & Macinko, 2008; Fyhri et al., Toftager et al., 2011; 2011; Kegler et al., 2014; McCormack & Virk, 2014).

There were studies on multiple psychological factors such as self-efficacy and perceived control that influenced the physical activity of individuals (Biddle & Fuchs, 2009). Physical activity can be associated with non-sports and sports activities, such as work-related, household, leisure-time actions, and travel (Plasqui & Westerterp, 2007). The recommendation for physical activity is to complete at least 150 minutes of moderate activity or 75 minutes of energetic physical activity per week or a blend of these (Plasqui & Westerterp, 2007). This should be done two days per week in conjunction with strength training (Hansen, Kolle, and Anderssen, 2014). In addition to this, the sedentary time should be reduced. In a study conducted by Plaqui and Westerterp among the Norwegian adult population, they found that only 31% (34% of women

and 28% of men) accomplished the proposed physical activity per week. In another study conducted by Hansen, Kolle, and Anderssen (2014), they found that being overweight, and obesity was positively related to low levels of physical activity. However, only recently did studies start evaluating the actual physical activity of people in lifestyle interventions using objective measures (Aadland, 2014).

Aerobic exercise is considered one of the most effective forms of exercise to improve health (American College of Sports Medicine [ACSM], 2013)). Aerobic exercise requires the presence of oxygen, and anaerobic exercise occurs in the absence of oxygen (American College of Sports Medicine [ACSM], 2013). Aerobic exercise is also called cardiac exercise because it improves the cardiac muscles. During aerobic exercise, a person uses large muscle groups continuously and rhythmically for more than 2 minutes, when then the body converts Adenosine Triphosphate (ATP) to oxygen for energy to fuel cellular activities in the body (ACSM, 2013). Aerobic exercise increases the heart rate to improve the oxygenation of the body. Some of the moderate intensity aerobic exercises recommended by ACSM (2011) are brisk walking at 3 to 4 mph, mowing the lawn with a push mower, cleaning gutters, sweeping, cleaning and regular household care. Some of the anaerobic exercises are activities for 20 seconds to 2 minutes like a 40-yard dash. Resistance exercises are another type that uses skeletal muscles to improve the muscular strength and endurance (ACSM, 2013). Resistance exercise is useful in improving chronic health conditions by improving the skeletal muscle strength and lean muscle mass (ACSM, 2013) Lean muscle mass burns more calories than that of fat; therefore, it is very

important for obesity management (CDC, 2013). Incorporating multiple types of exercise is the most effective method to achieve the maximum benefits from doing exercises (CDC, 2013).

Sedentary lifestyle has been connected to many chronic, life threatening illnesses and mortality. In general, physical activities and cardio-respiratory fitness is important to prevent premature mortality. Most of the US population does not exercise regularly. A survey conducted by the National Health Interview Survey (NHIS) (2008), showed that 59% of adults do not engage in vigorous activity that causes sweating and an increased heart rate. Many studies confirmed that Americans who engage in physical exercises had lower reports of chronic illness (CDC, 2013). National studies also confirmed that all age groups benefit from regular exercise if the individual engages in at least a 30 minute-brisk walk on most days in a week (CDC (2013)). The CDC (2013) reported that one of the major advantages of exercise is that it reduces the occurrences of obesity, coronary artery disease, hypertension, diabetes mellitus, and colon cancer.

Increased physical activity increases the strength of muscles, fascia, cartilages, tendons, and ligaments from increases in muscle tissues during mechanical stress from resistance exercise (WHO, 2013). Physical activity has an encouraging impact on everyone's health regardless of age and gender. An increased prevalence of obesity occurs with a decreased level of physical activity in all age groups (Wadden et al., 2011). In addition, young adults who follow the recommended exercise guidelines will have a better chance of reducing their weight by 10%, which reduces many obesity related chronic illnesses (Donnelly et al., 2009).

Health Insurance Coverage

Another predictor of obesity in the US is the lack of medical insurance to perform preventive care and management of illnesses (Fortuna, Robbins, Mani, & Halterman, 2010). Before the enactment of Affordable Care Act, a study conducted by Pleis, Ward, and Lucas (2009) found that 17% of adults did not have primary care clinicians due to lack of medical coverage. Park et al. (2006) found that young adults have the lowermost rate of health coverage among all age groups. Young adults are at a higher risk for having a lack of health coverage than any other age group, and they have the lowest rate of health care access when it comes to employee-based insurance (CMS, 2014). After 2010, with the enactment of the Affordable Care Act, the rate of the uninsured youths has gone down, and the young adults between 19 and 26 years have been able to obtain a dependent insurance from their family members (CDC, 2013). The Affordable Care Act services offer several services that encourage preventive care as well as obesity-related facilities and coverage (Blanck & Collins, 2015).

One of the reasons for increasing health care costs is the increase in the number of health disparities. Despite the modern advantages in medical technology, the US is still one of the unhealthiest nations among the developed countries in the world, with increased health disparities such as cancer, high cholesterol, heart disease, stroke, hypertension, and diabetes (Beaglehole et al., 2011). Even though the US is a modernized country, it has poor healthcare coverage with high healthcare costs. Statistics by WHO (2013) show that the US ranks 37th in world healthcare performances when compared to other industrialized countries (Queensberry, Caan, & Jacobson, 2013).

The US healthcare system is a multifactorial healthcare system with overwhelming, expensive healthcare services due to an increased number of chronic health care disparities (Cousins, Langer, Thomas, & Rhew, 2011). Studies have shown that a huge contributing factor for these chronic illnesses are weight gain and obesity (Finkelstein, Trogdon, Cohen, & Dietz, 2009). The cost of the healthcare system in the US has increased to 17.3% of GDP in 2011, which is more than any other country, and it is anticipated that it will increase to 19.5% by 2017. In 2014, the growth rate in healthcare expenditure was almost 5.3% compared to 2.9% in 2013, according to the Center for Medicare and Medicaid Services (CMMS; 2015). Since these figures are alarming, there is an urgent need to initiate strategies to reduce the cost of operating healthcare systems. One of the solutions is to implement clinically proven preventive health care measures, which could save more than 3.7 billion in personal health care expenditures (Maciosek et al., 2010). Therefore, addressing the important predictors of weight gain and obesity among young adults would be an effective solution.

Prevention and Intervention

Since the obesity rate keeps on rising, improved prevention programs are needed to reduce the incidence of chronic illnesses and health care expenses. An abundant number of studies support many obesity prevention intervention programs (CDC, 2013). One study shows that the intervention programs for a 12-month lifestyle modification that focuses on improving physical activity and promoting a healthy diet clinically reduced obesity and cardiovascular risk factors in severely obese African American adults (Goodpaster et al., 2010). Childhood obesity prevention programs are also as important as adult obesity prevention strategies because children

need to learn healthy lifestyle choices early in their lives. Thus, encouraging parental involvement in promoting physical activities for their children is an effective way of promoting behavioral changes (CDC, 2013). Taking early preventive measures is one of the key components in family-based intervention programs. For example, in a 24-month program that included parents and children that was based on nutrition, physical activity, and behavior modification showed a decrease in body fat with positive decreases in total cholesterol, fatty mass, and improved insulin resistance (Savoye et al., 2011).

Furthermore, a six-week study conducted by Wright, Norris, Giger, and Suro (2012) focused on behaviors, physical activity, and nutrition. In this study, the program offered weekly 90-minute education sessions on topics such as healthy lifestyles, the food pyramid, cooking patterns, and healthy alternatives (Wright et al., 2012). The participants were enrolled in the Unified School District in Los Angeles, California. There were five schools included, and they were randomized to 41 either the intervention group (n= 2 schools) or the control group (n= 3 schools; Wright et al., 2012). For this study, recruitment of the participants was conducted by posting fliers on the school campus, presentations to the parents and children, and a letter sent home to their parents. There were 121 children that participated in the intervention group, and 130 for the control group (Wright et al., 2012).

This community was involved with health promotion and school wellness policies and offering community-level activities. The data were collected by pre-and post-interventions via questionnaires 12 months after the intervention program (Wright et al., 2012). The outcome of this study inferred that the intervention group showed a substantial decrease in BMI categories

between baseline and the 12- month follow-up, and there was a significant improvement in dietary habits (Wright et al., 2012). The subjects in this study were children who are obese and overweight; therefore, it is considered an intervention program that promotes healthy behaviors and treatment of obesity. Although this study incorporated lessons about physical activity, this variable was not studied, which is one of the limitations of this study. It would have been beneficial if this study separated obese children from those children who are considered overweight. Overall, this study is a well-designed study which gives insight into interventional programs.

A similar study was conducted by Anderson, Joosse, Stearns, Euclide, and Hartlaub (2008) to determine if their program was effective in the prevention of obesity in overweight children and the treatment of obesity. They offered a 12-week educational program pertaining to the participant's knowledge of healthy behaviors, physical activity, decreased sedentary behaviors, and improvements in self-esteem (Anderson et al., 2008). The outcome of this study showed that 96% of the parents and 81% of the children demonstrated improvement in their knowledge and attitudes about healthy lifestyles (Anderson et al., 2008). The limitations of this study were that a small sample size was used, and there was a lack of follow up to ascertain whether they are continuing the activities (Anderson et al., 2008).

In another study that was conducted by Weems, Kelley, Weaver, Griggs, and Meyer (2014) regarding the type of environment in a community setting involving families and offering educational lessons. In this study, the obese children, as well as non-obese siblings, participated in eight monthly sessions. The results of the study showed that both children and adults in the

family were found to have increased time spent participating in physical activity, improvements in dietary habits, and a significant improvement in their mental health status (Weems et al., 2014). The limitation of this study was that a small sample size was used, the time gap between the classes, and the lack of follow up (Weems et al., 2014).

Another study by Schwartz et al. (2012) on children ages 6-11 with a BMI category above the 85th percentile was recruited from various community residential areas. In this interventional study, there were 59 children and their families who participated in weekly sessions for six months (Schwartz et al., 2012). The post interventional survey that was given after twelve months showed a decrease in consumption of fruit drinks and sodas per day, and an increase in the amount of physical activity and servings of fruit per day (Schwartz et al., 2012). However, this study did not include the behavioral component or separate sessions for children and parents, even though it was announced as a family program (Schwartz et al., 2012). The report says that there was a dropout rate of 29% (Schwartz et al., 2012).

Further, Chomitz et al. (2010) examined the program effects and prevention. The results of the study showed the impact of a three-year intervention program in reducing BMI categories and fitness among children (Chomitz et al., 2010). This study was a threefold program involving the community, school, and families to modify policies to support healthy living, creating food service guidelines, and improving access to physical activity opportunities (Chomitz et al., 2010). 1,858 children participated, and they were categorized based on BMI category measures as being underweight, healthy weight, overweight, or obese (Chomitz et al., 2010). The outcome of this study showed an increasing prevalence in healthy weight individuals and a decrease in the

prevalence of obesity (Chomitz et al., 2010). That is, 40% of the overweight children became a healthy weight, and 24% of the obese children became overweight (Chomitz et al., 2010). The limitation of this study was that there was minimal family involvement. None of these studies involved considering adult obesity; however, these study results can be utilized in establishing new programs in the prevention and treatment of obesity among adults.

Conducting healthy lifestyle seminars on educating young adults about the importance of living a healthy lifestyle including proper nutrition and improved physical activity in their daily lives is important to live healthier. Li et al. (2010) reported that living a healthy lifestyle on a daily basis has been associated with a 40% decrease in obesity. Secondary prevention of obesity is established by means of screening for obesity risk factors and educating young adults about the health risks by measuring height, weight, BMI categories, blood pressure, cholesterol, glucose level, and family history of high-risk cases (Zhang et al., 2010).

Obesity prevention programs that involve social support groups would help to encourage young adults to willingly engage in obesity prevention programs. It is believed that the health care beliefs and obese adult's social contacts can influence their intention to lose weight (Leahey, LaRose, Fava, & Wing, 2011). Support at work sites is another important factor in weight reduction, as the weight loss social support at work sites may influence healthy behaviors like physical activities. Young adults spend the majority of their time at work and therefore work site networks may play an important role in obesity prevention behaviors (Tamers et al., 2011).

The American Medical Association (AMA; 2013) classified obesity as a chronic illness to growth its recognition as a life-threatening condition that demands medical management.

Identifying obesity as a chronic disease also promotes insurance payments for the management of the illness (AMA, 2013). The Centers for Medicare and Medicaid Services (CMS; 2011) reacted by permitting reimbursement for intensive behavior therapy for obesity if a qualified intensive behavior specialist provides the intervention. New provisions of the American Affordable Care Act require insurance companies to meet the expenses in preventative services such as obesity management, at no extra cost to the patient (American Academy of Family Practice [AAFP], 2014).

Understanding predictors of obesity would be helpful in planning the effective management of obesity to advance health care value. Dissemination of the information about the predictors of obesity and the effectuality of the strategies are also beneficial to guide future projects. The CMS (2012) has assigned authority to render incentives designed to bring down healthcare costs and improve patient wellness status (American Association of Colleges of Nursing [AACN], 2006).

Summary

Obesity among young adults are becoming a public health concern as it contributes to chronic and life-threatening issues like dyslipidemia, hypertension, cardiovascular diseases, stroke, and Diabetes (CDC, 2013). According to the CDC, about one third of the US adult population is obese, and the numbers are increasing. The healthcare spending towards obesity is about $147 billion per year (Queensberry, Caan, & Jacobson, 2013). There is a crucial requirement for initiating obesity prevention strategies among young adults. Research have shown that despite the efforts to reduce adult obesity, adult obesity rates are rising each year.

Some of the risk factors for obesity are lack of physical activity, alcohol consumption, and the lack of health coverage, especially in this population. Several studies reveal the need for obesity prevention programs to reverse the current trend of rising rates of obesity. Understanding the predictors of obesity may be helpful to plan and implement obesity prevention programs by increasing public awareness. Educating individuals about the possible predictors, risk factors, and the negative consequences of obesity may improve the health literacy.

Obesity among young adults continues to rise and studies have shown that there is dramatic difference in the prevalence of adult obesity between the two age groups of 18-24 and 24-35 years old (CDC, 2013). There were few studies conducted on adult obesity, but none have studied these risk factors among young adults in Maryland. It is important to investigate what is causing the striking spike in the rate of obesity between the two young adult groups in Maryland. The results of this study may be helpful in improving public awareness of the predictors of obesity among young adults and thereby bring a positive social change in the community. Young adults are classified as 18-34 years of age (CDC, 2011). In this study, young adults are separated into two young adult age groups of 18-24 and 25-34 years of age. For a better understanding of the possible predictors of obesity in young adults living in Montgomery County, Frederick County, and Princess Georges County, State of Maryland

Maryland, the independent variables of physical activity, excessive alcohol consumption, and healthcare coverage will be analyzed to see if these variables have a significant relationship with the dependent variable of obesity. I used the variables of age group, gender, and race/ethnicity as covariate variables to scale down confounding variables.

With the increasing rate of obesity at epidemic proportions, and with such a dramatic increment in obesity rates within the young adult population in Montgomery County, Frederick County, Princess County, in the State of Maryland, additional research using bigger sample sizes are required for better understanding of potential predictors of obesity. With the attainment of more information on the predictors of young adult obesity, it may be possible to plan, design, and implement more effective preventive and intervention programs at the various levels of federal, state, and local levels to invert the drift of obesity in Montgomery County, Frederick County, Princess County, in the State of Maryland and within the United States.

In Chapter 3, this study provides an overview of the research design and study concept planned for the research on predictors of obesity among young adults. The planned method of data collection and data analysis method will be discussed in detail.

Chapter 3: Research Method

Introduction

In this chapter, an overview of the research design and study concept is provided for the study on predictors of obesity among young adults. The method of data collection and data analysis process are discussed in detail. This section allows a detailed understanding of the research perspective in investigating the potential predictors of obesity in young adults living in Maryland. Obesity among young adults is on the rise, and studies showed that there is a dramatic difference in the prevalence of adult obesity between the two age groups of 18 to 24 and 24 to 35 years old (CDC, 2013).

This phenomenon is not limited to Maryland, Frederick County, Princess County, in the State of Maryland and within the United States. In many ways, findings from this study could be helpful in other regions. For example, in nearby states to Maryland, the rate of obesity has shown a similar pattern of growth. For instance, obesity rates between 18 to 24 years of age and 25 to 34 years of age appeared to have the most dramatic growth. It is calculated that 9.5% of young adults in the age group of 18 to 24-years-old and 20.9% of 25 to 34-year-olds living in New York are obese (BRFSS, 2011). While there are many predictors that may contribute to the significant increase in obesity rates between the two age groups of young adults, this chapter will provide information and a rationale on choosing the most appropriate research methods.

Purpose of the Study

The purpose of this study was to examine the potential predictors of obesity among young adults living in Maryland. With obesity levels at epidemic proportions throughout the

country, and with such a dramatic increase in obesity within the young adult population in Maryland, more research was needed to better understand these potential predictors of obesity for this population. By attaining more information on the predictors of young adult obesity, it may be possible to design and implement more effective prevention and intervention programs to reverse the trend of obesity in Maryland and within the United States. A cross-sectional research design was used for this study. The methodology instrumentation and operationalization of constructs using the 2017 BRFSS will be discussed. The BRFSS is one of the largest telephone surveys gathered monthly in all 50 states and U.S. territories including Puerto Rico, U.S. Virgin Islands, and Guam by the CDC (CDC, 2013). The initial permission letter from BRFSS is in Appendix A. Data from the BRFSS was used to answer the research questions and hypotheses. The research questions and hypotheses for this study are discussed in this chapter, along with the data analysis procedures that were used for this study.

Research Design and Approach

Research Design

This study aims to examine potential predictors of obesity that may lead to the increasing prevalence of obesity in young adults in Maryland. The study design was a cross-sectional design. A cross-sectional study is a research design used to capture information based on data gathered for a specific point in time (CMMS, 2015). The data gathered are from a pool of participants with varied characteristics and demographics known as variables. The cross-sectional study was used to identify relationships among the variables. This method is less expensive to perform and does not involve a lot of time (CMMS, 2015). A cross-sectional design

was the most appropriate for this study because it is based on collecting previous data on participants of a similar group.

The study also used secondary data to investigate potential obesity predictors. In the study, participants were young adults living in Montgomery County, Frederick County, Princess County, in the State of, Maryland. The access to reliable data and statistics such as the BRFSS for analysis may provide evidence to answer the research questions in a timely manner (Castle, 2003). For this study, the CDC's 2017 BRFSS data in Maryland was used.

The nature of the study was quantitative. Quantitative methods permit investigators to review large sources of data. Quantitative methods can be valid and reliable if they use prearranged measures. Quantitative methods can also reduce bias in a study since they comprise many cases, which may avoid investigators from using subjects known to them. Quantitative methods allow investigators to identify whether independent and dependent variables correlate in order to regulate causality within a study framework. Quantitative methods also allow researchers to control the data collection environment so that unnecessary variables are not introduced into a study (Tang et al., 2010).

The quantitative study method is the most effective method for investigating the potential predictors of obesity in young adults. This is because prior investigators used quantitative designs to examine the incidence of weight gain in young adults, and this design was found to be the most effective design in helping to answer similar research questions (Tang et al., 2010). Thus, this research study will be aligned with the past literature in this manner by using a quantitative research design due to it being a proven method that works in this research area.

Variables

The independent variables in this study were physical activity levels, alcohol consumption, and health care coverage for young adults living in Maryland. The dependent variable was obesity. The covariates used were age groups, gender, and race/ethnicity.

The Behavioral Risk Factor Surveillance System (BRFSS)

The BRFSS is a large, national health-related telephone database, which gathers state data about U.S. residents concerning their health-related risks, health behaviors, chronic health conditions, availability of preventive services, and its use (CDC, 2013). The BRFSS was established in 1984 in 15 states and is now currently used in all 50 states as well as the District of Columbia and three U.S. territories (CDC, 2013). In this survey system, more than 400,000 adults are interviewed every year, making it the major endlessly conducted health survey system in the world. The data collection method is human to human. The state health departments conduct the survey using in-house interviewers, universities or contracts with telephone call services to manage the BRFSS surveys uninterruptedly through the year using methodological and technical assistance from the CDC. The health department uses a uniform core survey, voluntary elements, and state-added queries. The surveys usually will be done by a technic called random digit dialing (RDD) methods on both cell phones and landlines.

The data that are gathered by the BRFSS is obtained monthly. The crucial uses of the BRFSS are to assist local and state health sections to identify chronic health consequences, monitor health objectives, and construct and evaluate public health programs and policies (CDC, 2013). The BRFSS database may contain important data on the possible predictors of young

adult obesity. This informational data may help explain if there are certain predictors of obesity in young adults living in Maryland.

Methodology

Population

The population of the study was young adults who live in Montgomery County, Maryland. The target population will be the two young adult age groups of 18 to 24 years of age and 25 to 34 years of age who have participated in the survey. According to the United States Census Bureau, in 2015, Montgomery County, Maryland, had a population of 1,040,116 with a 7% population growth rate (United States Census Bureau, 2016). The current obesity rate in Montgomery County, Maryland is 29.6%, and the obesity rate among age group 18 to 25 years old is 10.3%, and 26 to 44 years old is 29.4%. The obesity rate for men, overall, was 26.6% and the rate for women was 28.7% (United States Census Bureau, 2016).

Sampling Procedures

The sampling procedures of the study were from the BRFSS. The BRFSS uses a randomized telephone survey of adults living in the U.S. and U.S. territories. The sample for this study was based on data from participants who live in Maryland. The inclusion criteria for the study were participants who lived in Montgomery County, Frederick County, Princess County, in the State of in 2015 and were between the ages of 18 to 34 years old. The exclusion criteria are BRFSS participants who did not live in Montgomery County, Frederick County, Princess County, in the State of Maryland, were not in the age groups specified, and did not answer all the survey questions.

Power Analysis

For the minimum sample size to achieve an effect size = .02, alpha = .05, and have a statistical power of 90%, at least 341 participants were required for this study (Rosner, 1995). The power is using a test value of 90% to show the expectation of finding a real effect 90% of the time (Rosner, 1995). A power analysis was conducted for each research question, and the minimum number of participants was found to be 341. The data obtained for this study was a total of 1033 participants.

The Data Collection Process

The BRFSS enrolls participants through state health departments conducting randomized telephone interviews based on numbers provided by the CDC in all U.S. States and territories (CDC, 2012). The interview was based on members of a household that were 18 years or older to answer the questions and participate in the survey. BRFSS also advises the participants that they can stop at any time or refuse to answer any questions. At the end of the interview, the data are then inputted in a database where the health departments further check the data to ensure validity.

A complex sample function in SPSS 25 was used to analyze the data. The users are prompted to select the year, state, and variables to be included in the analysis to create custom cross tables (CDC, 2013). Information available at the CDC from the BRFSS on alcohol consumption, physical activity levels, and health care coverage was analyzed through this study. Data to be extracted from this source was originally collected by BRFSS based on human-to-

human interviews and personal surveys administered by the State of Maryland's Department of Health.

The data was extracted electronically from the primary data collection resource through the Internet. In addition, written authorization for data use was obtained (see Appendix A). A sample data collection procedure by BRFSS is included in Appendix B. The collection of data for this study followed the policies and prerequisite for the use of human subjects of the Internal Review Board (IRB) of Walden University and with approval from the CDC. For this study, a reasonably large dataset was selected for the analysis. The cases with missing data of reliable variables were deleted before picking the sample.

Instrumentation and Operationalization of Constructs

BRFSS Instrument

The BRFSS was first developed by CDC in 1984, with 15 states contributing to monthly data collection (CDC, 2013). The BRFSS is known to be one of the largest ongoing telephone health surveys systems that track the health of the U.S population (BRFSS, 2011). The BRFSS has been found to be a valid and dependable instrument in collecting health data (Stein et al., 1993). The researchers assessed the BRFSS in Massachusetts based on a re-interview on a random sample of adults $n = 122$ and a separate sample of Black and Hispanic adults $n = 200$. The results showed no statistically substantial variances in the demographic or risk factor variables, and reliability coefficients for behavioral risk factors were mainly above 0.70 (Stein et al., 1993). Therefore, the BRFSS is an effective system which provides helpful and important

data on obesity rates in young adults living in Maryland as well as many potential predictors of obesity. After the data collection, the data was exported to SPSS 25 for further analysis.

Operationalization

Dependent Variable

The primary dependent variable is obesity. Obesity is classified as having a body mass index (BMI) ≥30kg/m² (Pi-Sunyer, X, F., 2012). BMI groups were calculated based on self-reported height and weight (Pi-Sunyer, X, F., 2012a).

Independent variables. The primary independent variables are physical activity, excessive alcohol consumption, and health care coverage. Healthcare coverage was coded based on the categories and will be given a number, according to the categories.

Physical Activity

According to the CDC (2011a), physical activity is engaging the body's large muscles such that they move in a rhythmic way for a continued period. Some examples of physical activity include swimming, walking, biking, and running. Physical activity was measured in the BRFSS by asking participants to respond to the following questions. Participants were asked the question, “Have you participated in enough aerobic and muscle strengthening exercises to meet guideline?” (CDC, 2011b). Responses were either yes or no. The CDC guidelines for physical activities are “Participating in 150 minutes of moderate intensity aerobic activity like brisk walking every week, and muscle strengthening activities on two or more days a week that work all major muscle groups, or 75 minutes of vigorous intensity aerobic activity like jogging or

running every week, and muscle strengthening activities that work all major muscle groups two or more days a week" (CDC, 2011c).

Alcohol Consumption

Alcoholism is defined by CDC (2011d) as the taking of any drink that comprises 0.6 ounces (14.0 grams or 1.2 tablespoons) of pure alcohol. Usually, this quantity of alcohol is seen in 12-ounces of regular beer or wine. 8-ounces of malt liquor, 5-ounces of wine and a 1.5-ounces of 80-proof distilled spirits or liquor like rum, gin, whiskey, or vodka. The level of alcohol consumption is measured in the survey by asking the survey participants the question "Do you consume five or more drinks on one occasion" if the participant was Male, and "Do you consume four or more drinks on one occasion" if the participant was a female. The responses would be either yes or no (CDC,2011e).

Healthcare Coverage

In this study health coverage is defined as having private medical insurance plans, prepaid plans, or government plans like Medicare. Participants were asked the question "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?". Responses would be either yes or no which will provide an initial idea about the status of health care facilities being availed by people in terms of plans and coverage.

Covariates

The covariates were age groups, gender, and race/ethnicity.

Age Factor

For age, two groups were used in this study to further investigate why the prevalence of obesity doubles within the young adult age groups of 18-24-year-olds to 25-34-year-olds. Participants were asked "What is your age?" (CDC, 2011f). Responses were obtained in numeric forms with coding specified which can be found in the appendix A.

Gender factor

For gender, participants were asked, "What is your sex?" (CDC, 2011g). Responses are either male or female which is a nominal scale.

Race/Ethnicity

The Race/ethnicity information was collected using the questionnaire, "Which one of these groups would you say best represents your race (White/Black or African American/Asian/Native Hawaiian or Pacific Islander/American Indian or Alaska Native/Other?" (CDC, 2011h). Responses were based on racial/ethnic groups. Participants were also asked in a separate question "Are you Hispanic or Latino?" (CDC, 2011i). Responses would be either yes or no.

Data Analysis Plan

For the data analysis, the mean obesity percentage of the two young adult age groups was calculated and compared to examine the differences in behavioral outcomes related to obesity which provided information regarding their lifestyle as well. Secondly, the mean percentage of young adults who engage in physical activity, alcohol consumption, and have health care coverage was calculated and compared. A crosstab analysis was used to show the relationship

between each potential predictor variable to the dependent variable obesity and compared by age group. A logistic regression analysis was conducted on physical activity, alcohol consumption, and health care coverage to determine which potential predictor contributes the most to the increased prevalence of obesity between the two young adult groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland.

The statistical analysis of the study was conducted with the complex sample function in SPSS. SPSS is a statistical processing and analysis software system, which was used for data set formation and statistical analysis. The database was saved on a USB port that will be stored in a locked, fire safe box for five years and rendered upon request.

Research Questions and Hypotheses

The theoretical framework used in this study to analyze the predictors of obesity is the Social Ecological Model. According to the Social Ecological Model, if the individual perceives there is an existence of health concern to certain behaviors and believes that he or she is vulnerable to a life-threatening health risk, the individual must accept the fact that engaging in a recommended health behavior would benefit him in reducing the perceived health risk (McKenzie, Neiger, & Thackeray, 2009).

Research Questions

RQ1: Is there a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity, as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of, Maryland?

$H_0$1: There is no relationship between physical activity as measured by the participant's the response to the survey on the amount of weekly exercise and obesity, as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of, MD.

*H*a1: There is a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of.

RQ2: Is there a relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of MD?

$H_0$2: There is no relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of, MD?

*H*a2: There is a relationship between excessive alcohol consumption as measured by the response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland.

RQ3: Is there a relationship between healthcare coverage as measured by the participant's response to the survey on having health care coverage and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland?

$H_0$3: There is no relationship between healthcare coverage as measured by the participant's response to the survey on having health care coverage and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland?

H_a3: There is a relationship between health care coverage as measured by the response to the survey on having healthcare coverage and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of Maryland, MD?

RQ4: Which potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) when factoring for gender and race/ethnicity has the strongest association with obesity prevalence between the two young adult age groups living in Montgomery County, Frederick County, Princess County, in the State of, MD?

$H_0$4: It is not expected that the potential predictors (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

H_a4: It is expected that the potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

Threats to Validity

The reliability and validity of the data were evaluated by the data source via the CDC in order to be reliable with minimal threats to external and internal validity. The reliability and validity of the BRFSS studies were reviewed and summarized from other similar surveys (BRFSS, 2011). It is reported that the core questions of the BRFSS were reliable and valid. The BRFSS has persistently proved to be a very authoritative and valid resource in public health research (BRFSS, 2011).

Ethical Considerations

All the components of the study were carefully designed to nullify any potential ethical conflicts. Ethical considerations were followed as noted by the Internal Review Board (IRB) of Walden University. In addition, consent from the CDC will be obtained to gain access and use the BRFSS data prior to data collection and analysis. During the study, the confidentiality policies of the CDC will be followed as per the CDC guidelines.

Summary

This chapter explained the research design and methodology of the study. This study was a quantitative cross-sectional study aimed at investigating what predictors may be significantly contributing to the increasing occurrence of obesity among young adults. The independent variables used were excessive alcohol consumption, physical activity, and lack of health care

coverage, and the dependent variable was obesity. Randomized data from the BRFSS was used to respond to the research questions as it contains the independent and dependent variables. The population of the study was conducted between the two young adult age groups of 18-24 years of age, and 25-34 years of age. All the steps and procedures were planned well to prevent conflicts with the IRB of Walden University, the CDC policies, and in gaining permission to use the BRFSS.

Chapter 4: Data Analysis

Introduction

The purpose of this study was to examine the potential predictors of obesity among two young adult age groups between 18 to 24 years and 25 to 34 years old living in Montgomery County, Frederick County and Prince Georges County in the State of Maryland. In this chapter, the details of the data collection, data analysis, results, research questions and hypothesis will be explained. A quantitative analysis was conducted to examine the relationship of potential predictors of obesity among young adults in three counties in the State of Maryland. The potential predictors of obesity that was examined in this study were physical activity, excessive alcohol consumption and health coverage. The data from CDC's 2017 BRFSS was imported using version 25 of SPSS. The data imported into SPSS consisted of 1,393 rows which corresponded to the total number of participants.

Data Collection

The sample population used for this study was from young adult age groups of 18 to 24 and 25- 34 years living in Montgomery County, Frederick County and Prince Georges County in the State of Maryland. The data used for this study was collected from CDC 's 2017 BRFSS and imported to SPSS version 25. The age groups of 18-24 and 25- 34 are selected in the BRFSS dataset, therefore the analysis included only these two age groups and consisted of 1,393 participants. I analyzed 475 participants from the age group of 18-24 years and 918 participants from the age group of 25 to 34 years. All data were coded to present nominal structure for data analysis. The data analysis was performed based on the original plan described in Chapter 3.

The variables for the three potential predictors of obesity used were physical activity, excessive alcohol consumption, and healthcare coverage for this study. The covariates of age group, gender, race and ethnicity were used to help reduce confounding in the study.

Dependent Variable

Obesity

In this study, obesity was used as the dependent variable. Obesity was described and classified based on the body mass index (BMI) ≥ 30 kg/m2 (CDC, 2014 a). BMI was calculated based on self- reported weight and height. Participants were asked to answer the question given by BRFSS questionnaire "How are you without shoes?". Responses were given in pounds. Results showed a higher percentage of the age group 25- 34-year-old were obese in this study compared to the age group of 18 – 24 years old.

Independent Variable Data Collection

Physical Activity

The physical activity was analyzed by asking the question "have you participated in enough aerobic and muscle strengthening exercise to meet guideline?" (CDC, 2014b). According to CDC guidelines the physical activity is "participating in 150 minutes of moderate intensity aerobic activity every week, and muscle strengthening activities on 2 or more days a week that work all major muscle groups, or 75 minutes of vigorous intensity aerobic activity like jogging or running every week, and muscle strengthening activities that work all major muscle groups 2 or more days a week" (CDC, 2014c). Approximately 52.6 % of 18-24 years old and 45.8% of

25- 34-year-old indicated that they had participated in enough physical activity to meet the CDC guidelines.

Excessive Alcohol consumption

The participants were asked to answer the question "Do you consume five or more drinks on one occasion" if the participant was a male, and "Do you consume more than four or more drinks on one occasion, if a female. A higher percentage of participants among the age group of 18 -24-year-old (21.8%) indicated that they drink five or more drinks on one occasion than among the age group of 25 -34 years old (13.1%).

Healthcare Coverage

To analyze the healthcare coverage, the question asked was "Do you have any kind of healthcare coverage, including health insurance, prepaid plans such as HMOs, or Government plans such as Medicare?" (CDC, 2017a). Based on the data analysis in this study, there are no significant relationships found between obesity and healthcare coverage for individuals 18 to 24 years (Chi-sq=.106, p=.745).

Covariate data Collection

Age groups

The question asked to calculate the number of participants in each age group was "What is your age?" (CDC, 2017b). The responses were given in numerical forms. The participants were asked "What is your sex?" for gender (CDC, 2017c). There were higher percentage of male participants in the age group of 18- 24 years old (51,8%) compared to males from 25- 34 years old (45.2%).

Race/ Ethnicity

To evaluate the race and ethnicity, the question asked to the participants was "Which of these groups would you say best represent your race (White/ Black or African American/ Asian/ Native Hawaiian or Pacific Islander/ American Indian or Alaska Native/ Other)?" (CDC, 2017). Among the age group of 18 to 24-year-old,54.3% were White, 22.3%. were Black/African American, 7% were Asian, 1.5% were American Indian/ Alaska Native, and0.6% were Native Hawaiian Pacific Islander. For ethnicity, the participants were asked the question "Are you Hispanic or Latino?" to answer (CDC, 2018). The results showed more Hispanics 10.6% among18 - 24-year-old compared to the age group of 25 – 34-year-old (10.2%).

Data Analysis

First step in the data analysis was to export the data into SPSS. There were several techniques used to analyze the data. Both age group of 18 to 24-year-old and 25-34-year-old were analyzed separately and results compared. A descriptive statistic was used on the demographic of the two young adult group were calculated and compared. Then, the mean percentage of young adults who consume alcohol excessively, engage in adequate physical activity and have health coverage was calculated and compared. A Chi-Square Technique was used to compare the relationship between the depended variable obesity to the potential predictors of obesity. Then, a logistic regression analysis was conducted on the predictors of physical activity, excessive alcohol consumption and having health coverage to determine which potential predictor influences the young adult obesity the most. The details of the data analysis and study results are further discussed in this chapter.

Results

Descriptive Statistics: Demographic Data

The demographics of the two young adult groups were calculated and compared using descriptive statistics, mostly these results are shown to be valid representation of Montgomery County, Prince Georges County and Frederick County in the State of Maryland (U.S. Census, 2010). The majority of the participants identified as White and the remaining identified as African American, Asian and Hispanic which represents the overall sample from State of Maryland (U.S. Census, 2010.) There were a total of 1393 participants in the study with the majority from the 25-34 years old (n = 918), while rest of the participants from the age group of 18-24 years old. The study excluded 14 participants among the sample data due to various reasons.

For gender, 51.8% (n=246) of the 18 – 24 years old age group were males and 48.2% (229) of 18-24 years age group were females. Among the age group of 25-34-year-old there were 45.2% (415) were males and 54.8% (503) were females. For Race, 53.7% of Age group 18–24-year-old were whites, 22.1% were Black, 1.5% were American Indian or Alaskan natives, 6.9 % where Asian, .6% where Native Hawaiian or other Pacific Islander, 10.5% were Hispanics, .4% of Another race non-Hispanic and 3.2 % were multi race non-Hispanic. In the 24–35-year-old age group, 54% were whites, 24.9% were Black, 1.0% were American Indian or Alaskan natives, 4.8% where Asian, .2% Native Hawaiian or other Pacific Islander, 10.0% were Hispanics, 1,1% of Another race non-Hispanic and 2.4 % were multi race non-Hispanic, as displayed in Table 6.

Demographic Information: The reported results for table 6 are unweighted.

Table 6

Unweighted respondents by sex

Age group 18-24 years old

RESPONDENTS SEX

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	246	51.8	51.8	
	Female	229	48.2	48.2	
	Total	475	100.00	100.00	

Table 7

Grouping by race-ethnicity

COMPUTED RACE-ETHNICITY GROUPING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White, non-Hispanic	255	53.7	54.3	54.3
	Black, non-Hispanic	105	22.1	22.3	76.6
	American Indian or Alaskan Native only, Non-Hispanic	7	1.5	1.5	78.1
	Asian only, non-Hispanic	33	6.9	7.0	85.1
	Native Hawaiian or other Pacific Islander only, Non-Hispanic	3	6	6	85.7
	Other race only, non-Hispanic	2	. 4	.4	86.2
	Multi race, non-Hispanic	15	3.2	3.2	89.4
	Hispanic	50	10.5	10.6	100.0
	Total	470	98.9	100.0	

Missing	9		5	1.1	
	Total		475	100.0	

Table 8

Respondent sex by age group

Age group 25-34

RESPONDENTS SEX

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	415	45.2	45.2	45.2
	Female	503	54.8	54.8	100.0
	Total	918	100.0	100.0	

Table 9

Grouping by race-ethnicity

COMPUTED RACE-ETHNICITY GROUPING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White, non-Hispanic	496	54.0	54.9	54.9
	Black, non-Hispanic	229	24.9	25.3	80.2
	American Indian or Alaskan Native only, Non-Hispanic	9	1.0	1.0	81.2
	Asian only, non-Hispanic	44	4.8	4.9	86.1
	Native Hawaiian or other Pacific Islander only, Non-Hispanic	2	.2	.2	86.3
	Other race only, non-Hispanic	10	1.1	1.1	87.4
	Multi race, non-Hispanic	22	2.4	2.4	89.8
	Hispanic	92	10.0	10.2	100.0

Total		904	98.5	100.0
Missing	9	14	1.5	
Total		918	100	

Mean Obesity Prevalence was calculated by Chi-square and compared as displayed in Table 4. The age group 18 to 24 has an obesity prevalence of 18.4% compared to 26.3% for individuals ages 25 to 34 (Chi-square=12.52, p<.001).

(Obesity Prevalence) – the percentages reported correspond to the weighted sample

Table 10

Obesity prevalence comparison by age group

IMPUTED AGE IN SIX GROUPS * Obesity Cross tabulation

		Obesity		Total
Age 18-24		BMI < 30	BMI>=30	
IMPUTED AGE IN SIX GROUPS		419658	94564	514222
% within IMPUTED AGE IN SIX GROUPS		81.6%	18.4%	100.0%
Age 25-34	Count	529377	189224	718601
% within IMPUTED AGE IN SIX GROUPS		73.7%	26.3%	100.0%
Total	Count	949035	283788	1232823
% within IMPUTED AGE IN SIX GROUPS		77.0%	23.0%	100.0%

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count was 102.31.

b. Computed only for a 2x2 table

The age group 18 to 24 has an obesity prevalence of 18.4% compared to 26.3% for individuals ages 25 to 34 (Chi-square=12.52, p<.001), as described in Table 5.

Table 11

Chi-Square Test

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.519a	1	.000		
Continuity Correctionb	12.030	1	.001		
Likelihood Ratio	12.942	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	12.510	1	.000		
N of Valid Cases	1260				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 102.31.
b. Computed only for a 2x2 table

Mean Obesity Prevalence was calculated by Chi-square and compared as displayed in Table 5. The age group 18 to 24 has an obesity prevalence of 18.4% compared to 26.3% for individuals ages 25 to 34. Since the Chi-square test value is 12.52 and the corresponding observed significance level to be less than 0.001 (Chi-square=12.52, $p<.001$), there is a strong association between obesity prevalence and age groups.

Association Between Obesity (DV) and the Study Predictors

The Chi-square test will be used to determine whether there is a statistical association between each of the potential predictors (physical activity, excessive alcohol consumption and having health care coverage) and the dependent variable obesity. Results will be stratified by age group.

Research Question 1 and Hypotheses

RQ1: Is there a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity, as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

H1o: There is no relationship between physical activity as measured by the participant's the response to the survey on the amount of weekly exercise and obesity, as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

H1a: There is a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

Table 12

Physical activity- reported weighted sample percentages.

IMPUTED AGE IN SIX GROUPS * Physical Activity Cross tabulation

			Physical Activity		
			.00	1.00	Total
IMPUTED AGE IN SIX GROUPS	Age 18-24	Count	230988	255833	486821
	% within IMPUTED AGE IN SIX GROUPS		47.4%	52.6%	100.0%
	Age 25-34	Count	385457	325071	710528

	% within IMPUTED AGE IN SIX GROUPS	54.2%	45.8%	100.0%
Total	Count	616445	580904	1197349
	% within IMPUTED AGE IN SIX GROUPS	51.5%	48.5%	100.0%

Table 13

Chi-Square physical activity test by age group.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.238	1	.007		
Continuity Correction	6.915	1	.009		
Likelihood Ratio	7.235	1	.007		
Fisher's Exact Test				.008	.004
Linear-by-Linear Association	7.232	1	.007		
N of Valid Cases	1217				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count was 195.81.
b. Computed only for a 2x2 table

The younger group reports more physical activity (52.6%) compared with the group with ages 25 to 34 (45.8%). This association was found to be statistically significant, since the Chi-square test value is 7.24 and the observed significance level is 0.007 which is much smaller than 0.05. (Chi-sq=7.24, p=.007 < 0.05). Therefore, there is a strong association between physical activity and age groups. Therefore, it is indicated that there is a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity as measured by calculating BMI.

Physical activity and Obesity

<u>Obesity by Physical Activity</u> - reported percentages correspond to the weighted sample for ages 18-24

Table 14

*Obesity * Physical Activity Crosstabulation*

			Physical Activity		Total
			.00	1.00	
Obesity	BMI < 30	Count	163224	205182	368406
	% within Obesity		44.3%	55.7%	100.0%
	BMI>=30	Count	50159	39694	89853
	% within Obesity		55.8%	44.2%	100.0%
Total		Count	213383	244876	458259
% within Obesity			46.6%	53.4%	100.0%

Table 15

Chi-Square test for obesity and non-obesity groups

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.729	1	.099		
Continuity Correction	2.314	1	.128		
Likelihood Ratio	2.724	1	.099		
Fisher's Exact Test				.116	.064
Linear-by-Linear Association	2.722	1	.099		
N of Valid Cases	389				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 33.69.

b. Computed only for a 2x2 table

In individuals 18 to 24, the non-obese group shows a higher percentage of physical activity (55.7%) compared with the obese group (44.2%). However, these differences are not statistically significant that is, there is no significant relationship between obesity and physical activity for individuals between the ages 18 and 24. This is because, that the corresponding Chi-square test value is 2.73 and the observed significance level is 0.099 which is much larger than 0.05. (Chi-sq=2.73, p=.099).

Obesity by Physical Activity - reported percentages correspond to the weighted sample Results for ages 25-34

Table 16

Obesity by physical activity

Obesity * Physical Activity Crosstabulation

			Excess Alcohol		Total
			.00	1.00	
Obesity	BMI < 30	Count	259328	217301	476629
	% within Obesity		54.5%	45.6%	100.0%
	BMI>=30	Count	93338	78348	171686
	% within Obesity		54.4%	45.6%	100.0%
Total		Count	352666	295649	648315
% within Obesity			54.4%	45.6%	100.0%

Table 17

Chi-Square test

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.304	1	.582		
Continuity Correction	.218	1	.640		
Likelihood Ratio	.304	1	.581		
Fisher's Exact Test				.615	.321
Linear-by-Linear Association	.303	1	.582		
N of Valid Cases	741				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 87.29.

b. Computed only for a 2x2 table

Again, since the observed significance level was 0.582 which is much larger than 0.05, we do not find a significant relationship between obesity and physical activity for individuals 25 to 34 years of age. (Chi-sq=.304, p=.582).

The above data analysis showed that there is no significant relationship between obesity and the physical activity on both age groups.

In the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland, there were not significant association between physical activity and obesity therefore the null hypothesis for Research Question #1 cannot be rejected. This study indicated that there was not enough evidence to reject the null hypotheses.

Research Question 2 and Hypotheses

Alcohol Consumption and Obesity

RQ2: Is there a relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

H2o: There is no relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

H2a: There is a relationship between excessive alcohol consumption as measured by the response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

(Excessive Alcoholism) –Reported percentages correspond to the weighted sample 18 to 24 years old and 25 to 34 years old.

Table 18

Excessive alcoholism weighted sample reported percentage correspondent.

IMPUTED AGE IN SIX GROUPS * Excess Alcohol Crosstabulation

			Excess Alcohol		Total
			.00	1.00	
IMPUTED AGE IN SIX GROUPS	Age 18-24	Count	212418	59181	271599
	% within IMPUTED AGE IN SIX GROUPS		78.2%	21.8%	100.0%
	Age 25-34	Count	425398	63847	489245
	% within IMPUTED AGE IN SIX GROUPS		86.9%	13.1%	100.0%
Total		Count	637816	123028	760844

% within IMPUTED AGE IN SIX GROUPS	83.8%	16.2%	100.0%

Table 19

Chi-Square test for excessive alcoholism

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.005	1	.001		
Continuity Correction	11.265	1	.001		
Likelihood Ratio	11.404	1	.001		
Fisher's Exact Test			.001		.001
Linear-by-Linear Association	11.990	1	.001		
N of Valid Cases		805			

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 36.02.
b. Computed only for a 2x2 table

There was a significant association between age group and excessive alcoholism, with 21.8% of individuals 18 to 24 reporting excessive alcohol consumption compared to 13.1% in the older group (24 to 35 years old). This is because the corresponding p-value to test the null hypothesis (Alcohol consumption has no significant association with age groups) versus the alternate (Alcohol consumption has a significant association with age groups), results in a value of 0.001 which is much smaller than 0.05, thereby allowing us to reject the null hypothesis. (Chi-sq=12.01, p=.001).

Relationship between Obesity and Excessive Alcohol Consumption

Obesity by Excessive alcohol consumption- reported percentages correspond to the weighted sample 18 to 24 years old

Table 20

Obesity crosstabulation by excessive alcohol

Obesity * Excess Alcohol Crosstabulation Percentage

			Excess Alcohol		Total
			.00	1.00	
Obesity	BMI < 30	Count	163716	49443	213159
	% within Obesity		76.8%	23.2%	100.0%
BMI>=30		Count	41516	9738	51254
	% within Obesity		81.0%	19.0%	100.0%
Total		Count	205232	59181	264413
% within Obesity			77.6%	22.4%	100.0%

Table 21

Chi-Square test

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.238	1	.007		
Continuity Correction	6.915	1	.009		
Likelihood Ratio	7.235	1	.007		
Fisher's Exact Test				.008	.004
Linear-by-Linear Association	7.232	1	.007		
N of Valid Cases	1217				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 195.81.
b. Computed only for a 2x2 table

Chi-Square Tests

Table 22

Chi-Square test

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.925	1	.165		
Continuity Correctionb	1.403	1	.236		
Likelihood Ratio	2.093	1	.148		
Fisher's Exact Test				.223	.116
Linear-by-Linear Association	1.917	1	.166		
N of Valid Cases		243			

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.42.

b. Computed only for a 2x2 table

Since the p-value for the test was 0.165 which is much larger than the allowed significance level of 0.05, we will not be able to reject the null hypothesis that there is no significant relationship found between obesity and excessive alcohol consumption for individuals 18 to 24 years of age. (Chi-sq=1.93, p=.165).

Obesity by Excessive alcohol consumption- reported percentages for 25 to 34 years old

Table 23

Obesity by excessive alcohol consumption weighted sample

Obesity * ExcessAlcoholCrosstabulation

			ExcessAlcohol		Total
			.00	1.00	
Obesity	BMI < 30	Count	309587	46131	355718
	% within Obesity		87.0%	13.0%	100.0%
	BMI>=30	Count	107132	14313	121445
	% within Obesity		88.2%	11.8%	100.0%

Total	Count	416719	60444	477163
% within Obesity		87.3%	12.7%	100.0%

Chi-Square Tests

Table 24

Chi-Square test

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.667a	1	.414		
Continuity Correctionb	.441	1	.507		
Likelihood Ratio	.648	1	.421		
Fisher's Exact Test				.445	.250
Linear-by-Linear Association	.666	1	.415		
N of Valid Cases	544				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.33.
b. Computed only for a 2x2 table.

Since the p-value or observed significance level was 0.414 which is much larger than 0,05, there is not enough evidence to reject the null hypothesis for the test that there is no significant relationship between obesity and excessive alcohol consumption for individuals 25 to 34 years of age. (Chi-sq=.667, p=.414). By combining both the studies, we fail to reject the null hypothesis for Research Question #2, and hence we conclude that there is no significant association between obesity and excessive alcohol consumption.

Research Question 3 and Hypotheses

Healthcare Coverage

RQ3: Is there a relationship between healthcare coverage as measured by the participant's response to the survey on having health care coverage and obesity as measured by calculating

BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

H3o: There is no relationship between healthcare coverage as measured by the participant's response to the survey on having health care coverage and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

H3a: There is a relationship between health care coverage as measured by the response to the survey on having healthcare coverage and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland.

(Health Coverage)- reported percentages correspond to the weighted sample 18 to 24 years old and 25 to 34 years old.

Table 25

Imputed age group that has any health care coverage

IMPUTED AGE IN SIX GROUPS * HEALTH CARE COVERAGE Crosstabulation

			Yes	No	Total
IMPUTED AGE IN SIX GROUPS	Age 18-24	Count	48471	65162	549872
	% within IMPUTED AGE IN SIX GROUPS		88.1%	11.9%	100.0%
	Age 25-34	Count	687821	127275	815096
% within IMPUTED AGE IN GROUPS			84.4%	15.6%	100.0%
Total		Count	1172531	192437	1364968
% within IMPUTED AGE IN SIX GROUPS			85.9%	14.1%	100.0%

Among the age group 18 to 24 years old, 88.1% has health coverage and among 25 to 34 years old, 84.4 has health coverage.

Table 26

Chi-Square test comparing health care coverage amongst age groups

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.506a	1	.220		
Continuity Correctionb	1.299	1	.254		
Likelihood Ratio	1.535	1	.215		
Fisher's Exact Test				.255	.127
Linear-by-Linear Association	1.505	1	.220		
N of Valid Cases	1384				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 56.01.
b. Computed only for a 2x2 table

Clearly from the above data analysis we can see that there is no significant association between age groups and health coverage, since the p-value is equal to 0.220 > 0.05.(Chi-sq=1.51, p=.220).

Obesity by Healthcare coverage- reported percentages correspond to the weighted sample among 18- 24 years old.

Table 27

Obesity have any health care coverage amongst age group 18-24*

Have any health care coverage crosstabulation

			Yes	No	Total
Obesity	BMI < 30	Count	370665	40952	411617
	% within Obesity		90.1%	9.9%	100.0%
BMI>=30		Count	85296	6279	91575
	% within Obesity		93.1%	6.9%	100.0%

Total	Count	45596	147231	503192
% within Obesity		90.6%	9.4%	100.0%

Table 28

Chi-Square test for age group 18-24

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.106a	1	.745		
Continuity Correctionb	.011	1	.918		
Likelihood Ratio	.109	1	.741		
Fisher's Exact Test				1.000	.475
Linear-by-Linear Association	.106	1	.745		
N of Valid Cases	429				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.73.
b. Computed only for a 2x2 table.

The above table indicated that the p-value to test the null hypothesis showed that there was no significant relationship between obesity and healthcare coverage for individuals 18 to 24 years of age versus the alternative that there is significant relationship, is equal to 0.745 which is much larger than 0.05. Hence, we conclude that the null hypothesis cannot be rejected at 5% level of significance. (Chi-sq=.106, p=.745).

Obesity by Healthcare coverage- reported percentages correspond to the weighted sample among 25 to 34

Table 29

Obesity have any health care coverage amongst age group 25-34*

	Have any health care coverage crosstabulation		
	Yes	No	Total

Obesity	BMI < 30	Count	461020	68093	529113
	% within Obesity		87.1%	12.9%	100.0%
	BMI>=30	Count	157528	31696	189224
	% within Obesity		83.2%	16.8%	100.0%
Total		Count	618548	99789	718337
	% within Obesity		86.1%	13.9%	100.0%

Table 30

Chi-Square test for age group 25-34

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.310a	1	.577		
Continuity Correction	.189	1	.664		
Likelihood Ratio	.306	1	.580		
Fisher's Exact Test			.624	.328	
Linear-by-Linear Association	.310	1	.578		
N of Valid Cases	822				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 25.73.
b. Computed only for a 2x2 table

Since p-value = 0.577 > 0.05, we cannot reject the null hypothesis and so concluded that there is no significant relationship found between obesity and healthcare coverage for individuals 25 to 34 years (Chi-sq=.310, p=.577). Therefore, combining the two facts above, we conclude that the null hypothesis for the Research Question #3 cannot be rejected. Hence, this study showed that there is no significant association between obesity and healthcare coverage.

Research Question 4 and Hypotheses

Obesity (DV) and the strongest study predictor

RQ4: Which potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) when factoring for gender and race/ethnicity has the strongest association with obesity prevalence between the two young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

H4o: It is not expected that the potential predictors (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

H4a: It is expected that the potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

A Chi-square was done to identify the Association between obesity (DV) and the study predictors as indicated above mentioned tables and a logistic Regression Analysis was conducted to address which potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) when factoring for gender and race/ethnicity has the strongest association with obesity prevalence between the two young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland.

Steps in logistic regression analysis

The dependent variable, obesity is binary with values 0 if BMI<30 and 1 if BMI>=30. Therefore, the adequate regression analysis is the logistic regression. Covariates sex and race/ethnicity will be included in a first block and in a second block the potential predictors physical activity, excessive alcohol consumption and healthcare coverage will be included. A

significant Chi-square for the omnibus test of model coefficients for the second block will indicate that at least one of the three predictors are significantly associated with obesity. If the omnibus test for block 2 is significant then we will look at the individual model coefficients to determine which is the predictor(s) of obesity and what is the relationship´s strength and direction. This regression analysis will be conducted separately for subgroups 18-24 years and for 25-34 years.

RESULTS OF LOGISTIC REGRESSION: 18-24 YEARS

The table below show the coding for all variables included in the logistic regression.

Table 31

Basal Metabolic Index Coding

Dependent Variable Encoding

Original Value	Internal Value
BMI < 30	
BMI>=30	1

Table 32

Coding used for gender, ethnicity, the independent variables (health coverage, physical activity and alcoholism)

Categorical Variables Codings

	Frequency	Parameter coding				
	(1)	(2)	(3)	(4)	(5)	
COMPUTED RACE-ETHNICITY GROUPING						
White, non-Hispanic	134	1.000	.000	.000	.000	.000
Black, non-Hispanic	44	.000	1.000	.000	.000	.000

	American Indian or Alaskan Native only, Non-Hispanic		5	.000	.000	1.000	.000	.000
	Asian only, non-Hispanic		15	.000	.000	.000	1.000	.000
	Multi race, non-Hispanic		8	.000	.000	.000	.000	1.000
	Hispanic		16	.000	.000	.000	.000	.000
HAVE ANY HEALTH CARE COVERAGE								
		Yes	206	1.000				
		No	16	.000				
PhyActivity		.00	106	1.000				
		1.00	116	.000				
ExcessAlcohol		.00	173	1.000				
		1.00	49	.000				
RESPONDENTS SEX								
Male		118	1.000					
Female		104	.000					

Table 33

Model coefficients

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	17.976	6	.006
	Block	17.976	6	.006
	Model	17.976	6	.006

Table 34

Model summary

Model Summary estimation			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	194.444a	.078	.126

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Table 35

Classification table

		Observed	Predicted		
		Obesity			Percentage Correct
		BMI < 30	BMI>=30		
Step 1	Obesity	BMI < 30	181	0	100.0
		BMI>=30	41	0	.0
	Overall Percentage				81.5

a. The cut value is .500

Table 36

Variables in the equation

	B	S.E	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Step 1aRESPONDENTS SEX(1)	.305	.379	.647	1	.421	1.356	.646	2.847
COMPUTED RACE-ETHNICITY GROUPING			9.495	5	.091			
COMPUTED RACE-ETHNICITY GROUPING(1).	283	.794	.127	1	.721	1.327	.280	6.289
COMPUTED RACE-ETHNICITY GROUPING(2)	1.485	.830	3.205	1	.073	4.416	.869	22.447
COMPUTED RACE-ETHNICITY GROUPING(3)-	-19.363	17974.843	.000	1	.999	.000	.000	.
COMPUTED RACE-ETHNICITY GROUPING(4)	-19.209	10359.567	.000	1	.999	.000	.000	.
COMPUTED RACE-ETHNICITY GROUPING(5)	.777	1.117	.484	1	.487	2.174	.244	19.402
Constant	-2.144	.799	7.202	1	.007	.117		

a. Variable(s) entered on step 1: RESPONDENTS SEX, COMPUTED RACE-ETHNICITY GROUPING.

INTERPRETATION (Block 1):

The initial model with covariates sex and race/ethnicity has a statistically significant omnibus test (Chi-sq (6) =17.98, p=.006). This indicates that at least one of the covariates significantly predicts obesity.

According to the pseudo-R-squares Cox & Snell and the Nagelkerke, sex and race/ethnicity explain from 7.8% to 12.6% of the variability observed in the dependent variable, which is a pretty low value. Looking at the classification table. although the overall percentage of correctly classified is 81.5%, we can see that the percentage of obese subjects that are classified as such is 0%. In other words, the model is unable to correctly classify any obesity observation.

Finally, looking at the coefficients table "Variables in the Equation", sex is not a significant predictor of obesity (OR=1.356, p=.421). Race/ethnicity is marginally significant with Black non-Hispanic showing greater odds of being obese compared to Hispanic of being (OR=4.41, p=.073).

Table 37

Model Coefficients

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	1.610	3	.657
	Block	1.610	3	.657
	Model	19.586	9	.021

Table 38

Model Summary

Model Summary estimation

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	192.834a	.084	.137

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Table 39

Classification table

	Observed		Predicted		
			Obesity		Percentage Correct
			BMI < 30	BMI>=30	
Step 1	Obesity	BMI < 30	181	0	100.0
		BMI>=30	41	0	.0
	Overall Percentage				81.5

a. The cut value is .500

INTERPRETATION (Block 2)

The initial model with covariates sex and race/ethnicity has a statistically significant omnibus test (Chi-sq (6) =17.98, p=.006). This indicates that at least one of the covariates significantly predicts obesity. According to the pseudo-R-squares Cox & Snell and the Nagelkerke, sex and race/ethnicity explain from 7.8% to 12.6% of the variability observed in the dependent variable, which is a pretty low value. Looking at the classification table. although the overall percentage of correctly classified is 81.5%, we can see that the percentage of obese subjects that are classified as such is 0%. In other words, the model is unable to correctly classify any obesity observation.

Finally, looking at the coefficients table "Variables in the Equation", sex was not a significant predictor of obesity (OR=1.356, p=.421). Race/ethnicity was marginally significant with Black non-Hispanic showing greater odds of being obese compared to Hispanic of being (OR=4.41, p=.073).

Conclusion: In the cross-tabulation analysis, no significant relationship has been found between obesity and any of the three potential predictors. Therefore, the null hypothesis for H4 cannot be rejected in this study for individuals in the age group 18 to 24 years.

RESULTS OF LOGISTIC REGRESSION: 25-34 YEARS

Coding

Dependent Variable Encoding

Original Value	Internal Value
BMI < 30	0
BMI>=30	1

Categorical Variables Coding's

	Frequency	Parameter coding				
		(1)	(2)	(3)	(4)	(5)
COMPUTED RACE-ETHNICITY GROUPING						
White, non-Hispanic	317	1.000	.000	.000	.000	.000
Black, non-Hispanic	120	.000	1.000	.000	.000	.000
American Indian or Alaskan Native only, Non-Hispanic	4	.000	.000	1.000	.000	.000
Other race only, non-Hispanic	5	.000	.000	.000	.000	1.000
Asian only, non-Hispanic	23	.000	.000	.000	1.000	.000
Multi race, non-Hispanic	13	.000	.000	.000	.000	1.000
Hispanic	27	.000	.000	.000	.000	.000
HAVE ANY HEALTH CARE COVERAGE						
Yes	464	1.000				
No	45	.000				
PhyActivity						
No	288	1.000				
Yes	221	.000				
Excess Alcohol						
No	449	1.000				
Yes	60	.000				
RESPONDENTS SEX						
Male	258	1.000				
Female	251	.000				

Table 32. Coding used for gender, ethnicity, the independent variables (health coverage, physical activity and alcoholism)

Block 1: Method = Enter

Table 40

Model Coefficients

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	23.719	7	.001
	Block	23.719	7	.001
	Model	23.719	7	.001

Table 41

Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	548.188[a]	.046	.067

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 42

Classification table

			Predicted		
			Obesity		Percentage
Observed			BMI < 30	BMI>=30	Correct
Step 1	Obesity	BMI < 30	382	0	100.0
		BMI>=30	127	0	.0
	Overall Percentage				75.0

a. The cut value is .500

Table 43

Variables in the equation

	B	S.E	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Step 1aRESPONDENTS SEX(1)	.003	.213	.000	1	.988	.997	.657	1.513
COMPUTED RACE-ETHNICITY GROUPING			22.726	6	.001			
COMPUTED RACE-ETHNICITY GROUPING(1).	.142	.484	.086	1	.770	.868	.336	2.241
COMPUTED RACE-ETHNICITY GROUPING(2)	.812	.501	2.625	1	..105	2,252	.843	6.013
COMPUTED RACE-ETHNICITY GROUPING(3)-	.153	1.246	.015	1	.902	1.165	.101	13.403
COMPUTED RACE-ETHNICITY GROUPING(4)	-1.099	.873	1.584	1	.208	.333	.060	1.845.
COMPUTED RACE-ETHNICITY GROUPING(5)	.848	1.024	.685	1	.408	2.335	.313	17.391
COMPUTED RACE-ETHNICITY GROUPING(6)	.1.098	.724	2.303	1	.129	2.999	.726	12.393
Constant	-1.251	.480	6.797	1	.009	.286		

a. Variable(s) entered on step 1: RESPONDENTS SEX, COMPUTED RACE-ETHNICITY GROUPING.

INTERPRETATION (Block 1):

The initial model with covariates sex and race/ethnicity has a statistically significant omnibus test (Chi-sq (6) =23.72, p=.001), indicating that at least one of the covariates significantly predicts obesity. According to the pseudo-R-squares Cox & Snell and the Nagelkerke, sex and race/ethnicity explain from 4.6% to 6.7% of the variability observed in the dependent variable. Looking at the classification table, despite having an overall percentage of correctly classified of 75%, the percentage of obese subjects that are classified as such is 0%. In other words, the model is unable to correctly classify any obesity observation. Finally, looking at the coefficients table "Variables in the Equation", sex is not a significant predictor of obesity (OR=.997, p=.988). Race/ethnicity is statistically significant (Wald=22.8, p=.001)

Block 2: Method = Enter

Table 44

Model Coefficients

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	2.692	3	.442
	Block	2.692	3	.442
	Model	26,412	10	.003

Table 45

Model summary

Model Summary

Step 1	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	545.498[a]	.051	.075

a. a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 46

Classification table

Observed			Predicted		
			Obesity		Percentage
			BMI < 30	BMI>=30	Correct
Step 1	Obesity	BMI < 30	379	3	99.2
		BMI>=30	123	4	3.1
	Overall Percentage				75.2

a. The cut value is .500

Table 3x0. Variables in the equation

		B	S.E	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1a	RESPONDENTS SEX (1)	-.018	.217	.007	1	.933	.982	.641	1.504
	COMPUTED RACE-ETHNICITY GROUPING			22.724	6	.001			
	COMPUTED RACE-ETHNICITY GROUPING (1)	.	.127	.488	.068	1	.794	.880	.339
2.289									
	COMPUTED RACE-ETHNICITY GROUPING(2)	.842	.505	2.784	1	.095	2.321	.863	6.239
	COMPUTED RACE-ETHNICITY GROUPING(3)-	.061	1.256	.002	1	.961	1.063	.091	12.466
	COMPUTED RACE-ETHNICITY GROUPING(4)	-1.038	.878	1.398	1	.237	.354	.063	1.979
	COMPUTED RACE-ETHNICITY GROUPING(5)	.862	1.035	.694	1	.405	2.367	.312	17.989

COMPUTED RACE-ETHNICITY GROUPING(6)	1.113	.727	2.341	1	.126	3,042	.731	12.653
COMPUTED RACE-PhyActivity(1)	.191	.215	.787	1	.375	1.210	.794	1.846
COMPUTED RACE-Excess Alcohol(1)	-.430	.311	1.906	1	.167	.651	.353	1.198
HAVE ANY HEALTH CARE COVERAGE(1)	.090	.374	.058	1	.809	1.095	.526	2.278
Constant	-1.080	.630	2.935	1	.087	.340		

a. Variable(s) entered on step 1: PhyActivity, ExcessAlcohol, HAVE ANY HEALTH CARE COVERAGE

INTERPRETATION (Block 2):

The omnibus test corresponding to the three potential predictors (block 2) is not statistically significant, which indicates that none of the predictors Physical Activity, Excessive Alcohol Consumption and Having any Health Care Coverage is associated to Obesity (Chi-sq (3) =2.69, p=.442) . Hypothesis 4 is not supported. According to the pseudo-R-squares Cox & Snell and the Nagelkerke, the model explains a very small percentage of the variability observed in the dependent variable, from 5.1% to 7.5%. Results from the classification table very similar than the ones obtained in Block 1, with an overall percentage of correct classification of 75.2%. However, in this model a small percentage of the obese observations are correctly classified (3.1%). Finally, the regression coefficients at "Variables in the Equation" indicate that none of the three potential predictors is significantly associated with obesity, as indicated by their corresponding p-values greater than .05. therefore, it is concluded that we do not have enough evidence to reject the null hypothesis that the potential predictors (physical activity, excessive

alcohol consumption, or healthcare coverage) do not influence obesity. This concludes our analysis for Research Question #4.

Summary

In this quantitative cross-sectional study, the relationship between the three potential predictors of obesity such as physical activity, excessive alcohol consumption and healthcare Coverage among two young adult age groups of 18-24 years old and 25-34 years old, living in Montgomery County, Frederick County and Prince Georges County in the State of Maryland was examined. In this analysis each individual predictor was analyzed collectively as well as each individual age group. The data source analyzed was from the 2017 CDC's BRFSS data. The data from 1,393 participants were imported into SPSS version 25 and coded. Each research question and hypotheses were addressed and examined. The covariates of age group, gender, race and ethnicity were analyzed to reduce confounding in the study. Chi-Square Technique was used to determine the relationship between each potential predictor to obesity rates among each group of young adults. The cross-tabulation analysis was used to determine if the predictors have any significant relationship collectively with obesity in young adult groups. In this study, there was no statistically significant relationship between obesity and potential predictors indicated other than physical activity. Physical activity showed the strongest relationship with obesity. In Chapter 5, the findings will be discussed and interpreted. The conclusion of this study will be drawn based on the study results, the recommendation, and for further actions and research will be discussed.

Chapter 5: Summary, Conclusion and Recommendations

Introduction

This study attempted to identify the potential predictors of obesity among young adults living in Montgomery County, Frederick County and Prince Georges County in the State of Maryland. The probable predictors of obesity among young adults examined were physical activity, excessive alcohol consumption, and having health care coverage. It is of undue concern to better understand which predictors may be causing increased obesity rates to reach economic possibilities throughout the county among this young adult population in the State of Maryland. Considering other negative health disparities of obesity, more studies are needed to be conducted to better understand the predictors of obesity among young adults. It is important to attain more information on the predictors of obesity to design and implement more effective preventive strategies to reverse the current trend in obesity rate in the State of Maryland and United States. This final section of this quantitative cross-sectional study provides the details on the limitations and assumptions of the study as well as the implications for social changes and recommendations for future studies are presented.

Interpretation of the Findings

In this quantitative cross-sectional research, examination was concluded on the link between three potential predictors of obesity and the young adult obesity among young adults living in Montgomery County, Frederick County and Prince Georges County in the State of Maryland. The three potential predictors of obesity that I studied were physical activity, excessive alcohol consumption, and lack of health coverage. There were two young adult group

of 18 to 24 years old and 25 to 34 years of old, examined for this study. The data were collected from 2017 BRFSS and analyzed following the Walden University IRB protocol. The research questions and hypotheses were formulated based on the three potential predictors of obesity among young adult group.

This study demonstrated which potential predictors had a significant relationship with the two young adult groups living in young adults living in Montgomery County, Frederick County and Prince Georges County in the State of Maryland. Descriptive analysis was conducted among a sample size of 1,393 in relation to each potential predictor.

Each predictor in this study was analyzed separately using a Chi-Square Technique to compare the relationship between the depended variable obesity to the potential predictors of obesity. A Logistic Regression Analysis was performed to determine which potential predictor influences the young adult obesity the most. The details of the data analysis and particulars of the study results were also described in this chapter.

Physical Activity

The first potential predictor for obesity evaluated in this study was physical activity. The research question formulated for this independent variable is as below.

RQ1: Is there a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity, as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

H1o: There is no relationship between physical activity as measured by the participant's the response to the survey on the amount of weekly exercise and obesity, as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

H1a: There is a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

This analysis indicated that there is a relationship between physical activity and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland. This study indicated that there is enough evidence to reject the null hypotheses.

The younger group reports more physical activity (52.6%) compared with the group with ages 25 to 34 (45.8%). This association is found to be statistically significant (Chi-sq=7.24, p=.007). Therefore it is indicated that there is a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, This result was consistent with one of the previous study from Wareham (2007), who identified that physical activity had an impact on weight status for all age groups and is a significant factor for healthy weight management. According to Wareham, younger individuals are more involved in physical activities because they are more enthusiastic to discover their

physical strength. Moreover, the more individuals exert effort on physical activities, the more they lose weight. Physical activities such as fitness training allow individuals to burn calories, which would then lower their weight. Thus, obesity is significantly affected by physical activities of individuals (Wareham, 2007). Other investigators have also initiated study on physical activity and found there is a substantial relationship to obesity.

Another study by Spees et al. (2012) investigated the differences in the amount and types of physical activity by obesity status in the U.S. The obesity status is based on the classification of individuals as older adults, young adults, children, and infants. The investigators revealed that more standard weight adults involved in more physical activity at moderate to vigorous intensities than obese adults did, which supports the results from this study that physical activity has a substantial effect on weight status. These two studies determined that younger adults are more engaged in physical activities and that reduces the prevalence of obesity among young adults. A major finding about physical activity is that it benefits reduce the risk of mortality in younger ages in general, and decreased the prevalence of hypertension, coronary heart disease, diabetes mellitus, colon cancer, and obesity (CDC, 2013). Donnelly et al. (2009), found that individuals who met physical activity rules had an improved chance of reducing their weight by 10%, which significantly reduce their risk of associated chronic health conditions. Another study found that the Physical activity can also help increase lean muscle mass that the lean muscle mass burns more calories that fat does, and which is an important function in weight management (ACSM, 2013). With obesity rates increasing in the young adult populations, physical activity seems to be a strong factor in maintaining an individual's body weight. These

data suggest that physical activity may be a significant constituent in developing weight reduction programs for young adults living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland.

Since younger adults are more engaged in physical activities, as shown in the results of this study, weight reduction programs should understand what type of physical activities are suitable for each age group. Similarly, the supporting evidence of this study to the relationship of obesity and physical activities indicated that younger adults have less prevalence of obesity because they engage more in physical activities (Spees et al., 2012). Thus, this also justifies the need to design the strategies to promote physical activities within the state of Maryland to lessen the prevalence of obesity.

Research Question 2 and Hypotheses

Alcohol Consumption

RQ2: Is there a relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

H2o: There is no relationship between excessive alcohol consumption as measured by the participant's response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

H2a: There is a relationship between excessive alcohol consumption as measured by the response to the survey on the amount of alcohol consumption and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, Maryland?

There is a significant association between age group and excessive alcoholism, with 21.8% of individuals in the age group of 18 to 24 years old reporting excessive alcohol consumption compared to 13.1% in the older group (Chi-sq=12.01, p=.001). The analysis of this study indicated that there is insufficient evidence to reject the null hypothesis, which stated that there is no relationship between excessive alcohol consumption and obesity in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland. This was an unexpected result based on the study led by Schroder et al. (2007) on the relationship between abdominal obesity and alcohol consumption among Hispanic men and women in the age group of 25 to 74 years old. Multiple logistic regression analysis was conducted to examine this relationship in this study and result showed that excessive intake of alcohol of more than three drinks a day was directly associated to total energy consumption and abdominal obesity. Thus, it was anticipated in this research that excessive alcohol consumption would be associated with the incidence of obesity. However, the results were annulled because insignificant relationships were identified between the variables. This was an unforeseen result, considering that the 18-24-year-old age group had an obesity prevalence of 18.4%, which was nearly twice that of the 25- 34-year-old age group at 26.3 % (Chi-square=12.52, p<.001).

The findings in the study suggest a much higher rate of excessive alcohol consumption for 18-24-year-old group of 21.8 %, compared to 13.1 % for 25- 34-year-old group. This is also an unexpected finding, as the older age group had the higher obesity rate (26.3 % for younger age group and 18.4 % for older age group). One reason of the insignificance of the relationship of increased alcohol intake and obesity prevalence is based on research from Kim and Jeon (2011) who found that excessive alcohol intake may be correlated with obesity when blended with low physical activity levels. According to the BRFSS about 7 % of the U.S. population drinks heavily and 16 % of the population binge drink (BRFSS, 2017). According to the CDC (2017), 6.9 % of the population drinks heavily which is consistent with the national average. Therefore, this study result indicated that there is insufficient evidence to attribute the obesity prevalence in State of Maryland to excessive alcohol intake of young adult. In its position, this implies that other elements should be considered to address the issue of obesity in State of Maryland. One probable clarification for the varied results on disproportionate alcohol consumption on the obesity rate of young adults living in State of Maryland may be due that the younger age group has a higher metabolism due to increased physical activity levels (Goodpaster et al., 2010). Even though drinking alcohol is common in the U.S. excessive alcohol consumption can increase the risk of many negative health ailments (CDC, 2015). It may also be probable that excessive alcohol intake in the form of heavy drinking or binge drinking may have the disadvantage to an increase of empty calories putting an individual at risk of weight gain with age. Because young adults have the highest rate of excessive alcohol consumption and may lead

to negative health consequences future studies may help better understand the obstacles young adults have in reducing alcohol intake.

Research Question 3 and Hypotheses

HealthCare Coverage

RQ3: Is there a relationship between healthcare coverage as measured by the participant's response to the survey on having health care coverage and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

H3o: There is no relationship between healthcare coverage as measured by the participant's response to the survey on having health care coverage and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

H3a: There is a relationship between health care coverage as measured by the response to the survey on having healthcare coverage and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

The analysis of this study indicated that there is insufficient evidence to reject the null hypothesis, which stated that there is no relationship between healthcare coverage and obesity in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland.

The hypothetical predictor of healthcare coverage was revealed to be irrelevantly related to obesity for both age groups. This study failed to show a significant association between healthcare coverage and obesity between the two age groups.

This study suggest that the older age group had a slightly lower rate of healthcare coverage at 79.1% compared to the younger adult age group at 79.5%. This was an unexpected finding based on prior study on healthcare coverage. Pleis, Ward, and Lucas (2009) indicated that almost 17% of adults do not have a primary care physician, which may lead to undiagnosed health inconsistencies. Innovations need to be made to increase the rate of health insurance coverage to millions of uninsured young adults and prevent U.S. healthcare costs from exceeding trillions of dollars. Beagle hole et al., (2011) revealed that despite the modern development in medical science, the U.S. is still one of the weakest countries in the industrial world, with a growing number of U.S. citizens residing with obesity-related chronic health conditions. A Few of 74 these health disparities tend to be type 2 diabetes, high cholesterol, strokes, hypertension, and heart disease (Beagle hole et al., 2011). The U.S. also has one of the top healthcare costs in the world. It is estimated that the U.S. spends $6,423 per person each year (Sartor, 2005).

With the current rising cost of healthcare coverage, several young adults merely cannot manage to pay for it, and millions of adults go with no healthcare coverage, and do not have the ability to gain access to preventive health care facilities that could help prevent and treat obesity and related conditions (Maciosek et al., 2010). This is particularly important for 25-34-year old's living in State of Maryland, as they have the lowest possible healthcare coverage rate of any age group (CDC, 2011). One supporting factor to the increase in health insurance costs is the

dramatic increase in chronic health disparities associated with overweight and obesity. The national health care costs of obesity alone were estimated to be $147 billion in 2008 (Finkelstein et al., 2009).

In the past, few studies have uncovered that prevention of obesity and chronic disease could reduce healthcare cost and improve quality of life. One of the studies by Maciosek et al. (2010) revealed that clinically recognized preventative health services could save more than 2 million lives annually and save $3.7 billion in personal health care expenditure. This strategy may be helpful in focusing the significant predictors of young adult obesity. Even though the variable healthcare coverage in this study failed to show a substantial relationship with obesity, young adults' healthcare coverage in the future could have a positive impact on reducing young adult obesity, with additional health plans offering and covering obesity prevention and treatment. Thus, the result of this study supported the inexistence of healthcare coverage among younger adults in the past years. Individuals are more likely to get healthcare coverage when they become older adults from government insurance programs. Thus, the understanding of young adults to the prevalence of obesity through healthcare coverage is insufficient to be significantly related to obesity. The result also revealed the lack of enough supportive care for obesity in current healthcare coverage plans. In future, more studies need to be planned to identify the reasons for why young adults having the lowest rate of healthcare coverage than any other age group (Maciosek et al., 2010).

Research Question 4 and Hypotheses

Association between obesity (DV) and the study predictors

RQ4: Which potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) when factoring for gender and race/ethnicity has the strongest association with obesity prevalence between the two young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland?

H4o: It is not expected that the potential predictors (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

H4a: It is expected that the potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

A logistic Regression Analysis was conducted to address research Question 4. The dependent variable, obesity is binary with values 0 if BMI<30 and 1 if BMI>=30. Therefore, the adequate regression analysis is the logistic regression. The covariates sex and race/ethnicity will be included in a first block and in a second block the potential predictors physical activity, excessive alcohol consumption and healthcare coverage will be included. A significant Chi-square for the omnibus test of model coefficients for the second block will indicate that at least one of the three predictors are significantly associated with obesity.

This regression analysis was conducted separately for subgroups 18-24 years and for 25-34 years. This research study rejects the null hypothesis, which stated that it is not expected that the potential predictor (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

Looking at the coefficients table "Variables in the Equation "as described in previous chapter, we can see that none of the three potential predictors is significantly associated with obesity, as indicated by their corresponding p-values greater than .05.

The analysis suggests enough evidence to reject null hypotheses that it is not expected that the potential predictors (physical activity, excessive alcohol consumption, or healthcare coverage) will contribute the most to the increase in obesity prevalence between the two young adult age groups.

At the same time, the younger group reports more physical activity (52.6%) compared with the group with ages 25 to 34 (45.8%). This association is found to be statistically significant (Chi-sq=7.24, p=.007). Therefore, it is indicated that there is a relationship between physical activity as measured by the participant's response to the survey on the amount of weekly exercise and obesity as measured by calculating BMI in the young adult age groups living in Montgomery County, Frederick County and Prince Georges County, Maryland.

This finding supports previous research by on prior research by Wareham (2007) who found that the increased prevalence of obesity occurred simultaneously with the decreased rate of physical activity. The findings in this study are important to help understand obesity rates. Other

researchers like Wang and Beydoun (2007) concluded that obesity rates have increased 32% from 1960 to 2004 and predict that 41% of adults may become obese in the near future if obesity trends do not change. There seems to be many potential influential factors on obesity based on research by Wang and Peng (2011) who state that some factors of obesity may be dyslipidemia, insulin resistance, and lack of physical activity. Even though there are many factors that may affect obesity rates physical activity has been shown in this study to have a strong association with obesity prevalence. Based on the findings in this study and prior scientific research on a decrease in physical activity levels and an increase on obesity rates. One reason for this is that many individuals may not be able to overcome their restrictions in following health recommendation like adequate physical activity (LaRose, Gorin, Clarke, & Wing, 2012). Future studies on young adult obesity using Social Ecological Model may help to better understand the possible problems young adults face in achieving recommended physical activity levels, which may greatly help reduce the prevalence of obesity below 5% which would be a large improvement compared to the current obesity rates which are 9.6% for 18–24-year-old, and 17% for 25–34-year-old.

Analysis of Theoretical Framework

The theoretical framework used in this study was the SEM. According to this theory, understanding the predictors among a young adult population necessitates recognizing the effect of social ecological factors on obesity (National Institute of Health (NIH),2005). The SEM model categorizes the interrelationships that exist between the health and the behaviors at the social level (Simons et al., 2012). The SEM is a theoretical framework that examines the

multifaceted influence of social factors such as individual, community, relationship, and societal factors and their impact on one another at different social levels (CDC, 2013). The SEM hypothesizes the dynamic association between the five levels of influence such as intrapersonal, interpersonal, organizational, community and public policy, which can regulate health status. (Simons-Morten at al.,2012). Obesity Prevention programs should be designed using the following 5 levels, i.e., Intrapersonal, Interpersonal, Community, Organization Level, and Public Policy Level.

Based on the findings of this study, engaging in physical activities lessened the prevalence of obesity. Thus, young adults should be more exposed to physical activities on a day-to-day basis. As per Social Ecological Theory, it is important to identify the effective prevention strategies at different levels which is interrelated with the individuals.

Limitations of the Study

The study on potential predictors of obesity among young adult population has some research limitations. In this study, Research Question 1 examined the relationship between obesity and physical activity among 18 to 24 years and 25 to 34 years old age group and the data analysis showed that there is no significant relationship between the obesity and the physical activity on both age group. The analysis of this study also indicated that there is insufficient evidence to show any relationship excessive alcohol consumption and obesity in the young adult age groups living in Montgomery County, Fredrick County and Prince Georges County, in the State of Maryland. This is in consistent with previous studies. This inconsistency may be due to methodologically differences. In this study, no significant relationship is found between obesity

and healthcare coverage for individuals 25 to 34 years (Chi-sq=.310, p=.577). There were not enough data showing significant associations between obesity and health care coverage for individuals 25 to 34 years therefore the null hypothesis for research question cannot be rejected.

Some of the challenges of this quantitative study are consistent with similar studies conducted with other chronic diseases. Chronic diseases have multiple, interrelated causes unlike other diseases, since Chronic Diseases often develop earlier in life and involve behavioral risk factors (Remington, Brownson, & Wegner, 2010). It is often a big challenge in gathering epidemiological data that is accurate for determinants of obesity. The determinants of obesity possibly are gender, age, race, physical activity level, ethnic background, BMI, and demographic profile. Since this study uses self-reported data there may be participants bias in the study which may weaken the study validity. Self-reported data may affect the outcome in several ways. Major threats to the validity could be understanding of the question being asked, retrieval of information and response generation. Since the young adult age group in this study is not an exact representation of the general population in question, there is a possibility of Selection Bias challenge faced. Another Challenge in this study may be because of the fact that a secondary data analysis was used. This data for the survey was taken from BRFSS (Behavioral Risk Factor Surveillance System). Other limitations with this data could be those questions may have been less objective because of several factors, such as recall bias, misunderstanding of questions, or giving socially desirable responses since this is secondary data that was self-reported.

Recommendation for Action

If the occurrence of obesity is to change within a generation, people who are impacted should be involved directly to make a difference. There should be invested Public policy while educators and the participants who embrace healthy behaviors to reduce the risk of obesity and other health discrepancies should be incentivized. It looks obvious that for younger adults who are obese normative beliefs and social contacts can influence willingness for weight control (Leahey et al., 2011). Currently there is significant evidence that supports programs related to obesity intervention. In the past there were studies conducted via Obesity intervention programs that found lifestyle intervention for a year consisting of healthier diet and physical activity showed significant weight reduction and improved cardio metabolic effects reducing the risk factors (Goodpaster et al., 2010).

It is my argument that future research needs to adopt a much narrower contextual approach in developing and testing models on the predictors of obesity. There are several reasons exists for lack of exercise among young adults such as individuals with disabilities may face physical, psychological, environmental, social, financial and policy barriers to
Several reasons exist for lower rates of physical activity participation among youth with disabilities. Individuals with disabilities face physical, social, environmental, knowledge deficit and policy barriers to physical activity. Future research may include some of these barriers as predictors. The local and state health departments should adopt a wide-ranging obesity prevention program that is based on encouraging physical activity to prevent and treat obesity among young adults. Those areas with existing programs should further enhance their programs

to ensure that public are able to adapt and follow each activity. A complete obesity prevention schedule involves a simple to follow procedure of what individuals should go through daily basis for a healthy lifestyle. Further investigation is recommended to study relationship between obesity and other possible influencing variables such as gender, race, and socio-economic status.

Implications of the study

This study suggests that physical activity is the most significant influencing factor of obesity in the specific population of interest suggest. The study also determines that young adults living in Maryland were impacted by physical activity as the most significant predictor for obesity. Using this information, young adults would benefit significantly by increasing their levels of physical activity in their lifestyle to reduce the risk of obesity. It may be noted that that public health communities both local and statewide may be benefited by this research to form strategies geared towards increasing physical activity as a means of reducing obesity. Social Changes empowering and attracting young adults to adopt healthy lifestyle may result as more obesity intervention programs are introduced or provided. These will in turn lead to better overall life quality in young obese adults trending towards better management of body weight consequently impacting the future generation.

Conclusion

Several research bodies have conducted studies on adult obesity which indicate high occurrence of obesity in young adults, however focus has been more towards general population of adults. Seldom were their focused study to address age groups pertaining to specific adult

groups around explicit or definite locations. This study is specific to Maryland State young adult population and the potential predictors used to determine the impact of obesity were physical activity, consumption of alcohol and having coverage of healthcare. This study disclosed vital data on important features of young adult obesity. For example, this study was able to determine that obesity prevalence is higher in young adult's aged 25-34 years living in State of Maryland. This study also suggests young adults in the age group of 25-34 years of age involved in somewhat less physical activity. This conclusion reinforced prior research on increased obesity rates with this age group and decreased levels of physical activity, which is harmful to the health of young adults. Focusing on improving these levels may help dramatically reduce the prevalence of young adult obesity. Young adults should be educated to live a healthy lifestyle and it's important that they adopt changes to new health behaviors that reduces prevalence of obesity. The adult population is impacted at epidemic proportions of Obesity levels that it is nearly one third of the adult population in State of Maryland. There are multi factors that have contributed to rising proportion of obesity. There are significant negative impacts of obesity on millions of young adults, better prevention strategies to reduce obesity are needed. The Local and State should develop creative initiatives and incentivized strategies to prevent the prevalence of obesity in the coming future generation of young adults.

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Appendix

PREPARATION OF DATASET

First, the age groups 18-24 and 25-34 are selected in the dataset so analysis will only include these two age groups.

Recoding of DV and predictors

Obesity Prevalence

Variable v6 is recoded to create variable Obesity (binary).

Frequencies of v6 (before recoding)

Table A1. Computed body mass index categories

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Underweight (BMI <18.5)	30	2.2	2.4	2.4
	Healthy Weight (BMI 18.5 - 24.9)	542	38.9	43.0	45.4
	Overweight (BMI 25.0-29.9)	393	28.2	31.2	76.6
	Obese (BMI 30.0 and above)	295	21.2	23.4	100.0
	Total	1260	90.5	100.0	
	Missing System	133	9.5		
Total		1393	100.0		
Total		1260	90.5	100.0	

Table A2. Frequencies of obesity

		Obesity			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BMI < 30	965	69.3	76.6	76.6
	BMI>=30	295	21.2	23.4	100.0
	Total	1260	90.5	100.0	
Missing	System	133	9.5		
Total		1393	100.0		

Physical Activity

Variable v9 is recoded to create variable Physical Activity (binary). Values 9 are set as missing.

Frequencies of v9 (before recoding)

Table A3. 150-minute physical activity calculated variable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	150+ min (or vigequiv min) of PA	577	41.4	47.4	47.4
	1-149 min (or vigequiv min) of PA	358	25.7	29.4	76.8
	0 min (or vigequiv min) of PA	282	20.2	23.2	100.0
	Total	1217	87.4	100.0	
Missing	Don't know/Not Sure/ Refused/Missing	176	12.6		
Total		1393	100.0		

Frequencies of Physical Activity

Physical Activity: value 1 indicates 150 or more mins of moderate activity or equivalent mins of vigorous activity and value 0 indicates less than 150 mins or equivalent mins of vigorous activity.

Table A4. PhyActivity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	640	45.9	52.6	52.6
	1.0	577	41.4	47.4	100.0
	Total	1217	87.4	100.0	
Missing	System	176	12.6		
Total		1393	100.0		

Excessive Alcoholism

Excessive Alcoholism is computed from AVEDRNK2 and SEX.
In particular, Excessive Alcoholism (ExcessAlcohol) is a binary variable that equals 1 if male and AVEDRNK2 equal or greater to 5 or if female and AVEDRNK2 equal or greater to 4. It equals 0 if male and AVEDRNK2 less than 5 or if female and AVEDRNK2 less than 4. In cases where AVEDRNK2 was missing (77 or 99) the variable ExcessAlcohol is also missing.

Table A5. ExcessAlcohol

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	689	49.5	85.6	85.6
	1.00	116	8.3	14.4	100.0
	Total	805	57.8	100.0	
Missing	System	588	42.2		
Total		1393	100.0		

Health Coverage

For variable HLTHPLN1, value 9 is set as missing

Table 36. Have any health care coverage

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Yes	1218	87.4	88.0	88.0
	No	166	11.9	12.0	100.0
	Total	1384	99.4	100.0	
Missing	Don't know/Not sure	7	.5		
	Refused	2	.1		
	Total	9	.6		
Total		1393	100.0		

Race-ethinicity

Table A6. Computing race-ethnicity grouping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White, non-Hispanic	751	53.9	53.9	53.9
	Black, non-Hispanic	334	24.0	24.0	77.9
	3	16	1.1	1.1	79.0
	4	77	5.5	5.5	84.6
	5	5	.4	.4	84.9
	6	12	.9	.9	85.8
	Multi race, non-Hispanic	37	2.7	2.7	88.4
	Hispanic	142	10.2	10.2	98.6
	9	19	1.4	1.4	100.0
Total		1393	100.0	100	

The missing labels were added to SPSS.

Table A7. Computed race-ethnicity grouping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White, non-Hispanic	751	53.9	53.9	53.9
	Black, non-Hispanic	334	24.0	24.0	77.9
	American Indian or Alaskan Native only, Non-Hispanic	16	1.1	1.1	79.0
	Asian only, non-Hispanic	77	5.5	5.5	84.6
	Native Hawaiian or other Pacific Islander only, Non-Hispanic	5	4	. 4	84.9
	Other race only, non-Hispanic	12	.9	.9	85.8
	Multi race, non-Hispanic	37	2.7	2.7	88.4
	Hispanic	142	10.2	10.2	98.6
	9	19	1.4	1.4	100.0
	Total	1393	100.0	100.0	

Appendix B

Correspondence with BRFSS coordinator

Good afternoon Kala,

Thank you for your inquiry about Maryland BRFSS data. The Maryland BRFSS program does not release copies of the raw data file; however, I am happy to assist you with analysis.

I would suggest combining data for survey years 2011-2015 instead of 2010-2014. The weighting methodology for the BRFSS survey underwent a methodological change in 2011. Because of this, data from 2010 and earlier should not be directly compared with data from 2011 and later. Data from these two periods should not be combined for analysis, either.

I attached some preliminary information about the prevalence of physical inactivity and lack of health insurance for Montgomery County. Prevalence is provided by age group. (See attachment).

It would be helpful to know how you would like to define "alcoholism" for your analysis. Alcohol use data are collected by a series of questions in the BRFSS. One summary measure calculated by the Centers for Disease Control and Prevention is binge drinking, defined as 5 or ore drinks for men or 4 or more drinks for women on an occasion. The Maryland BRFSS program also calculates chronic drinking, which we define as men having more than 2 drinks and females having more than 1 drink per day.

Please see the attached data, and let me know how you would like to proceed.

Best,
Georgette

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Appendix C

Sample BRFSS Interviewers Script

HELLO, I am calling for the (health department). **My name is** (name) . **We are gathering information about the health of** (state) **residents. This project is conducted by the health department with assistance from the Centers for Disease Control and Prevention. Your telephone number has been chosen randomly, and I would like to ask some questions about health and health practices.**

Is this (phone number)**?**

If "No"

Thank you very much, but I seem to have dialed the wrong number. It's possible that your number may be called at a later time. STOP

Is this a private residence?

READ ONLY IF NECESSARY: "By private residence, we mean someplace like a house or apartment."

Yes [Go to state of residence]
No [Go to college housing] No,

business phone only

If "No, business phone only".

Thank you very much but we are only interviewing persons on residential phones lines at this time.

STOP

College Housing

Do you live in college housing?

READ ONLY IF NECESSARY: “By college housing we mean dormitory, graduate student or visiting faculty housing, or other housing arrangement provided by a college or university.”

If "No”,

Yes No

Thank you very much, but we are only interviewing persons who live in a private residence or college housing at this time. STOP

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State of Residence

Do you reside in (state)?

Yes [Go to Cellular Phone]
No

If "No"

Thank you very much, but we are only interviewing persons who live in the state of at this time**.** STOP

Cellular Phone

Is this a cellular telephone?

Interviewer Note: Telephone service over the internet counts as landline service (includes Vonage, Magic Jack and other home-based phone services).

Read only if necessary: "By cellular (or cell) telephone we mean a telephone that is mobile and usable outside of your neighborhood."

If "Yes"

Thank you very much, but we are only interviewing by land line telephones and for private residences or college housing. STOP

CATI NOTE: IF (College Housing = Yes) continue; otherwise go to Adult
Random Selection Adult

Are you 18 years of age or older?

1	**Yes, respondent is male**	**[Go to Page 6]**
2	**Yes, respondent is female**	**[Go to Page 6]**
3	**No**	

If "No",

Thank you very much, but we are only interviewing persons aged 18 or older at this time.
STOP

Adult Random Selection

I need to randomly select one adult who lives in your household to be interviewed. How many members of your household, including yourself, are 18 years of age or older?

Number of adults

If "1,"
Are you the adult?

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If "yes,"
Then you are the person I need to speak with. Enter 1 man or 1 woman below (Ask gender if necessary). Go to page 6.

If "no,"
Is the adult a man or a woman? Enter 1 man or 1 woman below. May I speak with [fill in (him/her) from previous question]**?** Go to "correct respondent" on the next page.

How many of these adults are men and how many are women?

Number of men

Number of women

The person in your household that I need to speak with is .

If "you," go to page 6

If "yes,"
Then you are the person I need to speak with. Enter 1 man or 1 woman below (Ask gender if necessary). **Go to page 6.**
If "no,"

Is the adult a man or a woman? Enter 1 man or 1 woman below. May I speak with **[fill in (him/her) from previous question]**? **Go to "correct respondent" on the next page.**
How many of these adults are men and how many are women?
__ Number of men
__ Number of women
The person in your household that I need to speak with is .
If "you," go to page 62013

Appendix D

Sample BRFSS Questionnaire from 2013 survey

Core Sections

I will not ask for your last name, address, or other personal information that can identify you. You do not have to answer any question you do not want to, and you can end the interview at any time. Any information you give me will be confidential. If you have any questions about the survey, please call **(give appropriate state telephone number)**.

Section 1: Health Status

Would you say that in general your healthis—

Please read:

Excellent
Verygood
Good
Fair

Or

Poor

Do not read:

7 Don't know / Not sure
9 Refused

Section 2: Healthy Days — Health-Related Quality of Life

(80)

2.1 Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?

Number of days
8 8 None
7 7 Don't know / Not sure
9 9 Refused

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(81–82)

2.2 Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

(83–84)

_ _ Number of days

8 8 None [If Q2.1 and Q2.2 = 88 (None), go to next section]
7 7 Don't know / Not sure
9 9 Refused

2.3 During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?

Number of days
8 8 None
7 7 Don't know / Not sure
9 9 Refused

Section 3: Health Care Access

(85-86)
Section 3: Health Care Access
3.1 Do you have any kind of health care coverage, including health insurance, prepaid plans

such as HMOs, government plans such as Medicare, or Indian Health Service?
(87)

1 Yes **[If PPHF state go to Module 4, Question 1, else continue]**
2 No
7 Don't know / Not sure
9 Refused
3.2 Do you have one person you think of as your personal doctor or health care provider? **If "No," ask: "Is there more than one, or is there no person who you think of as your personal doctor or health care provider?"**
(88)
1 Yes, only one
2 More than one
3 No
7 Don't know / Not sure
9 Refused 2013 BRFSS Questionnaire/Final/12.28.2012 9

3.3 Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?
(89)
1 Yes
2 No
7 Don't know / Not sure
9 Refused
CATI Note: If PPHF State go to Module 4, Question 3, else continue
3.4 About how long has it been since you last visited a doctor for a routine checkup? A routine checkup is a general physical exam, not an exam for a specific injury, illness, or condition.
(90)
1 Within the past year (anytime less than 12 months ago)
2 Within the past 2 years (1 year but less than 2 years ago)
3 Within the past 5 years (2 years but less than 5 years ago)
4 5 or more years ago
7 Don't know / Not sure
8 Never
9 Refused
CATI Note: If PPHF State and Q3.1 = 1 go to Module 4, Question 4a or if PPHF State and Q3.1 = 2, 7, or 9 go to Module 4, Question 4b, or if not a PPHF State go to next section.
Section 4: Inadequate Sleep
I would like to ask you about your sleep pattern.
4.1 On average, how many hours of sleep do you get in a 24-hour period?
INTERVIEWER NOTE: Enter hours of sleep in whole numbers, rounding 30 minutes (1/2 hour) or more up to the next whole hour and dropping 29 or fewer minutes.
(91-92)
_ _ Number of hours [01-24]
7 7 Don't know / Not sure
9 9 Refused2013

BRFSS

6.3 Have you EVER been told by a doctor, nurse or other health professional that your blood cholesterol is high?

(97)

Yes
No
7 Don’t know / Not sure
9Refused

Section 10: Alcohol Consumption
10.1 During the past 30 days, how many days per week or per month did you have at least one drink of any alcoholic beverage such as beer, wine, a malt beverage or liquor? (193-195)
1 _ _ Days per week
2 _ _ Days in past 30 days
8 8 8 No drinks in past 30 days **[Go to next section]**
7 7 7 Don’t know / Not sure **[Go to next section]**
9 9 9 Refused **[Go to next section]**2013 BRFSS Questionnaire/Final/12.28.2012 24

10.2 One drink is equivalent to a 12-ounce beer, a 5-ounce glass of wine, or a drink with one shot of liquor. During the past 30 days, on the days when you drank, about how many drinks did you drink on the average?
(196-197)
NOTE: A 40 ounce beer would count as 3 drinks, or a cocktail drink with 2 shots would count as 2 drinks.
_ _ Number of drinks
7 7 Don't know / Not sure
9 9 Refused
10.3 Considering all types of alcoholic beverages, how many times during the past 30 days did you have **X [CATI X = 5 for men, X = 4 for women]** or more drinks on an occasion?
(198-199)
_ _ Number of times
8 8 None
7 7 Don't know / Not sure
9 9 Refused
10.4 During the past 30 days, what is the largest number of drinks you had on any occasion?
(200-201)
_ _ Number of drinks
7 7 Don't know / Not sure
9 9 Refused
Section 11: Fruits and Vegetables
These next questions are about the fruits and vegetables **you** ate or drank during the past 30 days. Please think about all forms of fruits and vegetables including cooked or raw, fresh, frozen or canned. Please think about all meals, snacks, and food consumed at home and away from home.
I will be asking how often **you** ate or drank each one: for example, once a day, twice a week, three times a month, and so forth.
INTERVIEWER NOTE: If respondent responds less than once per month, put "0" times per month. If respondent gives a number without a time frame, ask: "Was that per day, week, or month?"
11.1 During the past month, how many times per day, week or month did you drink 100% PURE fruit juices? Do not include fruit-flavored drinks with added sugar or fruit juice you
made at home and added sugar to. Only include 100% juice.
(202-204)
1 _ _ Per day
2 _ _ Per week
3 _ _ Per month
5 5 5 Never
7 7 7 Don't know / Not sure

9 9 9 Refused2013 BRFSS Questionnaire/Final/12.28.2012 25

INTERVIEWER NOTE: Do not include fruit drinks with added sugar or other added sweeteners like Kool-aid, Hi-C, lemonade, cranberry cocktail, Tampico, Sunny Delight, Snapple, Fruitopia, Gatorade, Power-Ade, or yogurt drinks.
Do not include fruit juice drinks that provide 100% daily vitamin C but include added sugar.
Do not include vegetable juices such as tomato and V8 if respondent provides but include in "other vegetables" question 11.6.
DO include 100% pure juices including orange, mango, papaya, pineapple, apple, grape (white or red), or grapefruit. Only count cranberry juice if the R perception is that it is 100% juice with no sugar or artificial sweetener added. 100% juice blends such as orange-pineapple, orange-tangerine, cranberry-grape are also acceptable as are fruit-vegetable 100% blends. 100% pure juice from concentrate (i.e., reconstituted) is counted.
11.2 During the past month, not counting juice, how many times per day, week, or month did you eat fruit? Count fresh, frozen, or canned fruit
(205-207)
1 _ _ Per day
2 _ _ Per week
3 _ _ Per month
5 5 5 Never
7 7 7 Don't know / Not sure
9 9 9 Refused
Read only if necessary: "Your best guess is fine. Include apples, bananas, applesauce, oranges, grape fruit, fruit salad, watermelon, cantaloupe or musk melon, papaya, lychees, star fruit, pomegranates, mangos, grapes, and berries such as blueberries and strawberries."
INTERVIEWER NOTE: Do not count fruit jam, jelly, or fruit preserves.
Do not include dried fruit in ready-to-eat cereals.
Do include dried raisins, cran-raisins if respondent tells you - *but due to their small serving size they are not included in the prompt.*
Do include cut up fresh, frozen, or canned fruit added to yogurt, cereal, jello, and other meal items.
Include culturally and geographically appropriate fruits that are not mentioned (e.g. genip, soursop, sugar apple, figs, tamarind, bread fruit, sea grapes, carambola, longans, lychees, akee, rambutan, etc.).
11.3 During the past month, how many times per day, week, or month did you eat cooked or canned beans, such as refried, baked, black, garbanzo beans, beans in soup, soybeans, edamame, tofu or lentils. Do NOT include long green beans.
(208-210)
1 _ _ Per day
2 _ _ Per week
3 _ _ Per month
5 5 5 Never

7 7 7 Don’t know / Not sure
9 9 9 Refused2013 BRFSS Questionnaire/Final/12.28.2012 26

Read only if necessary: "Include round or oval beans or peas such as navy, pinto, split peas, cow peas, hummus, lentils, soy beans and tofu. Do NOT include long green beans such as string beans, broad or winged beans, or pole beans."
INTERVIEWER NOTE: Include soybeans also called edamame, TOFU (BEAN CURD MADE FROM SOYBEANS), kidney, pinto, hummus, lentils, black, black-eyed peas, cow peas, lima beans and white beans.
Include bean burgers including garden burgers and veggie burgers.
Include falafel and tempeh.
11.4 During the past month, how many times per day, week, or month did you eat dark green vegetables for example broccoli or dark leafy greens including romaine, chard, collard greens or spinach?
(211-213)
1 _ _ Per day
2 _ _ Per week
3 _ _ Per month
5 5 5 Never
7 7 7 Don't know / Not sure
9 9 9 Refused
INTERVIEWER NOTE: Each time a vegetable is eaten it counts as one time.
INTERVIEWER NOTE: Include all raw leafy green salads including spinach, mesclun, romaine lettuce, bok choy, dark green leafy lettuce, dandelions, komatsuna, watercress, and arugula.
Do not include iceberg (head) lettuce if specifically told type of lettuce. Include all cooked greens including kale, collard greens, choys, turnip greens, mustard greens.
11.5 During the past month, how many times per day, week, or month did you eat orange-
colored vegetables such as sweet potatoes, pumpkin, winter squash, or carrots?
(214-216)
1 _ _ Per day
2 _ _ Per week
3 _ _ Per month
5 5 5 Never
7 7 7 Don't know / Not sure
9 9 9 Refused
Read only if needed: "Winter squash have hard, thick skins and deep yellow to orange flesh. They include acorn, buttercup, and spaghetti squash."
FOR INTERVIEWER: Include all forms of carrots including long or baby-cut. Include carrot-slaw (e.g. shredded carrots with or without other vegetables or fruit).2013 BRFSS Questionnaire/Final/12.28.2012 27

Include all forms of sweet potatoes including baked, mashed, casserole, pie, or sweet potatoes fries.
Include all hard-winter squash varieties including acorn, autumn cup, banana, butternut, buttercup, delicate, hubbard, kabocha (Also known as an Ebisu, Delica, Hoka, Hokkaido, or Japanese Pumpkin; blue kuri), and spaghetti squash. Include all forms including soup.
Include pumpkin, including pumpkin soup and pie. Do not include pumpkin bars, cake, bread or other grain-based desert-type food containing pumpkin (i.e. similar to banana bars, zucchini bars we do not include).
11.6 Not counting what you just told me about, during the past month, about how many times per day, week, or month did you eat OTHER vegetables? Examples of other vegetables include tomatoes, tomato juice or V-8 juice, corn, eggplant, peas, lettuce, cabbage, and white potatoes that are not fried such as baked or mashed potatoes.
(217-219)
1 _ _ Per day
2 _ _ Per week
3 _ _ Per month
5 5 5 Never
7 7 7 Don't know / Not sure
9 9 9 Refused
Read only if needed: "Do not count vegetables you have already counted and do not include fried potatoes."
INTERVIEWER NOTE: Include corn, peas, tomatoes, okra, beets, cauliflower, bean sprouts, avocado, cucumber, onions, peppers (red, green, yellow, orange); all cabbage including American-style cole-slaw; mushrooms, snow peas, snap peas, broad beans, string, wax-, or pole-beans.
Include any form of the vegetable (raw, cooked, canned, or frozen).
Do include tomato juice if respondent did not count in fruit juice.
Include culturally and geographically appropriate vegetables that are not mentioned (e.g. daikon, jicama, oriental cucumber, etc.).
Do not include rice or other grains.
Do not include products consumed usually as condiments including ketchup, catsup, salsa, chutney, relish.

Section 12: Exercise (Physical Activity)

The next few questions are about exercise, recreation, or physical activities other than your regular job duties.

INTERVIEWER INSTRUCTION: If respondent does not have a "regular job duty" or is retired, they may count the physical activity or exercise they spend the most time doing in a regular month.

12.1 During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?
(220)
1 Yes
2 No **[Go to Q12.8]**
7 Don't know / Not sure **[Go to Q12.8]**
9 Refused **[Go to Q12.8]**

12.2. What type of physical activity or exercise did you spend the most time doing during the past month? (221-222)
_ _ (Specify) **[See Physical Activity Coding List]**
7 7 Don't know / Not Sure **[Go to Q12.8]**
9 9 Refused **[Go to Q12.8]**

INTERVIEWER INSTRUCTION: If the respondent's activity is not included in the Physical Activity Coding List, choose the option listed as "Other ".

12.3 How many times per week or per month did you take part in this activity during the past month?
(223-225)
1_ _ Times per week
2_ _ Times per month
7 7 7 Don't know / Not sure
9 9 9 Refused

12.4 And when you took part in this activity, for how many minutes or hours did you usually keep at it?
(226-228)
_:_ _ Hours and minutes
7 7 7 Don't know / Not sure
9 9 9 Refused

12.5 What other type of physical activity gave you the next most exercise during the past month?
(229-230)2013 BRFSS Questionnaire/Final/12.28.2012 29

_ _ (Specify) **[See Physical Activity Coding List]** 8 8 No other activity **[Go to Q12.8]**
7 7 Don't know / Not Sure **[Go to Q12.8]**
9 9 Refused **[Go to Q12.8]**
INTERVIEWER INSTRUCTION: If the respondent's activity is not included in the Coding Physical Activity List, choose the option listed as "Other".
12.6 How many times per week or per month did you take part in this activity during the past month?
(231-233)
1_ _ Times per week
2_ _ Times per month
7 7 7 Don't know / Not sure
9 9 9 Refused
12.7 And when you took part in this activity, for how many minutes or hours did you usually keep at it?
(234-236)
_:_ _ Hours and minutes
7 7 7 Don't know / Not sure
9 9 9 Refused
12.8 During the past month, how many times per week or per month did you do physical activities or exercises to STRENGTHEN your muscles? Do NOT count aerobic activities like walking, running, or bicycling. Count activities using your own body weight like yoga,
sit-ups or push-ups and those using weight machines, free weights, or elastic bands.
(237-239)
1_ _ Times per week
2_ _ Times per month
8 8 8 Never
7 7 7 Don't know / Not sure
9 9 9 Refused