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African American Women's Body Image Perceptions and the Built Environment

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Walden University
2022

Abstract

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by

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MBA/HCM, University of Phoenix, 2006

BSN, Brenau University, 2003

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

African American (AA) women have a 54.8% overall obesity rate in the United States. This quantitative cross-sectional study's aim was to determine what factors may have an impact on body image perceptions of AA women in Alabama and New Jersey. A gap in research this study addressed is sociodemographic and geographic differences that may impact obesity rates among AA women. The theoretical framework used for this study was the social cognitive theory. Secondary data were obtained from the 2018 Behavioral Risk Factor Surveillance System. Linear regression (LR) analyses results showed that none of the sociodemographic variables (education level, employment status, marital status, and income level) predicted body mass index (BMI) or multiple linear regression (MLR), the omnibus F-test, with F (5, 433) = 2.374, p =.038, and R^2 = .027, revealed sociodemographic factors had no significant relationship with BMI (p >.05). LR results, BMI F (1, 551) = .056, p > .05 and MLR revealed physical activity (PA) did not have a significant effect on BMI based on PA in urban, and rural areas, with t (430) = .497 and p =.620. Findings revealed evidence to not reject both null hypotheses. A significant association was obtained when BMI was analyzed with only PA based on, the omnibus F-test, with F (7, 431) = 2.358, p =.023, and R^2 = .037, this resulted in 3.7% reduction in BMI among age 40–59-year-old AA women in the study population. PA participation in the past 30 days, t (431) = -2.033, p = .043 was the only predictor of BMI. Future studies may explore if age is a predictor of obesity among AA women. Positive social change implications of these findings could be achieved through creating culturally appropriate PA interventions to reduce obesity rates and barriers to PA among AA women.

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Dedication

This doctoral study is dedicated to my remarkable and loving husband, Otis Smith Jr., and all of my remarkable adult children (Cierra, Myles, Connor, Ebony, and Ivory), and their spouses, as well as my grandchildren, and my only brother (Roosevelt Harper). It is also dedicated to my extraordinary and intelligent mother, Mary Harper. She will always be a wonderful role model for our family. Despite all diversities and hardships, she exceeded every goal that she set out to accomplish. I inherited a strength that I am eternally grateful for.

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I would first like to acknowledge God, because without his grace and faithfulness, I would not be here. I would like to thank all of my friends and family members for encouraging me and checking on me, especially those friends and mentors that have preceded me in achieving this extraordinary goal.

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Introduction

Obesity rates have more than doubled in adults since the 1970s; obesity is widespread and continues to be a leading public health epidemic in the U.S. (Flegal et al., 2016; Ogden et al., 2016). Flegal et al. (2016) said more than one-third of all adults in the US are obese due to substantial disparities based on demographics. National data revealed that 57.2% of African-American (AA) women and 46.9% of Hispanic women are obese, compared to 38.2% of Caucasian women (Flegal et al., 2016). Severe obesity continues to be higher among women (9.9%) than men (5.5%), especially among AA women (16.8%) who have approximately double the rates of severe obesity as White (9.7%) and Hispanic (8.7%) women (Flegal et al., 2016).

There is social value in terms of closing the gap involving health inequities, which is the justification for the research. The State of Obesity (2017) said eliminating health inequities could lead to reduced medical expenditures of $61 to $54 billion per year with the recovery of $13 billion annually due to work lost as a result of illness. The US has spent an estimated $35 billion in excess healthcare expenditures, $10 billion in lost in productivity due to illnesses, and nearly $200 billion in premature deaths due to racial health disparities (Ayanian, 2015). Results of the study may provide insight regarding interventions that may be effective in terms of the implementation of public policies needed to combat obesity-related cultural, behavioral, and environmental factors. Besides determining whether local, state, and national level policies may help combat obesity, research may also reveal whether one state has been more effective in terms of combating obesity among AA women.

Currently, no known studies exist that compare the association between sociodemographics, aspects of the built environment, and the body-image perception of AA women across different states, such as Alabama and New Jersey. According to the Center for Disease Control and Prevention (CDC, 2019), the built environment is defined as manmade spaces involving living, working, and playing. This includes homes, parks, sidewalks, building zones, and transportation. Due to the impact that the built environment can have on individual and community health behaviors such as physical activity and healthy eating, the definition of the built environment was expanded in public health to include walkability, bikeability, community gardens, and access to healthy foods (Kaklauskas & Gudauskas, 2016). Features of the built environment can hinder or promote physical activity. Rural and urban obesity disparities exist among adults based on the built environment, due to differences in terms of physical activity participation (Hansen et al., 2015; Lo et al., 2017). A key element of the built environment is walkability. People walk more if they perceive their neighborhood is walkable and walk less if they perceive their neighborhood is less walkable, thereby increasing their chance of being obese (Mohamed, 2018).

Public health care professionals could benefit from studying the impact that the built environment may have on common perceptions and misperceptions of AA women in the southern and northern US regions by studying differences in physical activity levels between urban and rural areas. Results of this study could provide information to help reduce obesity and obesity-related illnesses and reduce morbidity and mortality rates among AA women. Thus, this study helps public health professionals develop culturally-appropriate programs targeting at-risk minorities in Alabama and New Jersey, especially in Alabama, where the rate of obesity in the South is much higher based on racial and ethnic disparities.

Problem Statement

of AA women are considered obese (CDC, 2016). The CDC (2016) defined obesity as having a Body Mass Index (BMI) of 30 or higher. According to the CDC (2016), a person is considered overweight when their BMI is between 25 and 30. Obesity disproportionately affects AA women in the US and cardiovascular morbidity and mortality have been linked to this epidemic (Office of Minority Health, 2017; The State of Obesity, 2018). AA women are disproportionately affected with a 54.8% overall rate of obesity in the US compared to Caucasian (38%), Asian (14.8%), and Hispanic (50.6%) women (National Center for Health Statistics [NCHS], 2017). Hales et al. (2018) said prevalence of obesity was much higher among AA women (55.9%), compared to non-Hispanic White women (38.1%), Hispanic women (48.9%), and Asian women (13.6%).

Seamans et al. (2015) said AA women in the U. S. were more likely to be obese than any other group in the US population. Their study found a gender gap (inequality) between AA women and AA men obesity prevalence. The gender gap was reported as 15.3 percentage points (ppts). The prevalence of obesity among AA women in their study was 38 percent compared to AA men (23%). The prevalence of obesity among AA women was 38% compared to AA men at 23%. Comparatively, the obesity rate among

Caucasian women was 22.2% and 23.7% for Caucasian men. The gender gap between Caucasian women and men was 14.0% (Seamans et al., 2015). According to the CDC (2015), there are many negative health effects due to overweightness and obesity such as clinical depression, anxiety, mental disorders, gall bladder disease, stroke, Type II diabetes, low quality of life, and high blood pressure. The CDC (2020a) said AA women had the highest rates (54.8%) of obesity and severe obesity compared with Caucasian (38%), and Hispanic groups (50.6%). Despite these negative health effects, cultural norms and promoting the acceptance of curvier bodies have contributed to AA women's skewed body image perceptions and lack of motivation to lose weight (Bauer et al., 2017).

Although obesity rates are declining, they are steadily rising among AA women, thus widening the disparity gap (Flegal et al., 2016; Zylk & Bauchner, 2016). Flegal et al. (2016) said more than one-third of the US is obese due to substantial disparities based on demographics. Approximately 57.2% of AA women were obese compared to 46.9% of Hispanic women and 38.2% of White women (Flegal et al., 2016). The obesity epidemic places AA women at risk and decreases their quality of life due to factors such as the built environment, criminalization in neighborhoods, cultural misperceptions, and the complex nature of this public health issue. The built environment and AA women's body image perception are factors that can have an impact on their obesity status. Okop et al. (2016) said AA women believe that AA men desire thicker, curvier women. Thus, skewed body-image perceptions were based on cultural misperceptions, resulting in a lack of motivation to combat obesity (Draper et al., 2016; Lynch & Kane, 2014; Okop et al., 2016). Although prior research has been conducted regarding AA women's skewed body image perceptions, these studies have not compared whether regional differences and factors related to the built environment have had an impact on these perceptions related to obesity.

Since the purpose of this study was to determine associations between the built environment and body image perceptions of AA women in two different states, it was important to compare similar population sizes of AA women from a southern state with a high AA obesity rate to a northern state with a lower AA obesity rate. Alabama was selected because it had a population size of 668,831 AA women, and a 36.3% overall obesity rate, up from 22.6% in the year 2000, and was ranked fifth among 51 US states (The State of Obesity, 2018; US Census Bureau, 2018). New Jersey (NJ) was selected because it had a similar population size of 639,120 AA women, but had an overall lower obesity rate of 27.3%, which was up from 17.0% in 2000; however, NJ was ranked 41 out of 51 states and had the 11th lowest rate of obesity in the nation (The State of Obesity, 2018; US Census Bureau, 2019). Results of this study could be used to address state policies that may help combat the obesity epidemic that disproportionately affects AA women in the south. Obesity risk factors have been known to be geographically specific, and obesity prevalence remains higher in the South compared to the North, as well as between rural and urban areas (Gong et al., 2018; Lee et al., 2019; Xu & Wang, 2015).

It is still uncertain which specific factors related to the built environment can have a positive impact on AA women's body image perceptions to reduce obesity rates and encourage physical activity. Given the large body of research conducted on AA women and obesity, there is a gap in literature comparing geographically-specific obesity factors between a state with a high prevalence of obesity and one with a lower prevalence of obesity, as well as sociodemographics specifically among only AA women. A gap in research this study addressed is sociodemographic and geographic differences that may play a role in rates of obesity among AA women in the North compared to AA women living in the South. Due to cultural misperceptions related to the desire to have curvier bodies, it may be meaningful to use data that shows differences in terms of health behaviors among AA women based on different geographic locations to either accept or reject many cultural misperceptions. This can impact types of weight loss programs, interventions, and policies that should be implemented beyond the individual level for sustainability to reduce obesity trends among AA women.

Purpose of the Study

The purpose of this quantitative cross-sectional study was to investigate differences between 40–59-year-old AA women obesity levels in AL and NJ. The reason the age range was selected was because middle-aged adults between 40 and 59 have the highest obesity prevalence (44.8%) compared to young adults between 20 and 39 (40.0%) and for adults 60 years and older (42.8%; CDC, 2020).

The association between sociodemographics (education, employment status, marital status, and income level), and physical activity in rural and urban counties in terms of BMI was examined. Specific features of the built environment can influence physical activity. A characteristic of the built environment is walkability, which is associated with increased levels of physical activity (Kaklauskas & Gudauskas, 2016).

Physical activity participation within the last 30 days in rural and urban areas, was used as a measure of the built environment's impact on AA women's perceptions based on their BMI (Mama et al., 2015). According to the State of Obesity (2018), Alabama has a high rate of obesity (36.3%) compared to New Jersey (27.3%). By examining AA women's body image perceptions based on their BMI in different geographical areas, results could help determine the most appropriate interventions related to the environment or cultural misperceptions in order to combat this epidemic.

Since obesity rates reveal geographical disparities affecting African American women in southern states, this study fills a gap in research by determining what factors may have an impact on body image perceptions of AA women. BMI has been used in previous research as an indicator of individual body image perceptions and satisfaction. BMI will be the variable used in this quantitative study as an indicator of body image perception among 40–59-year-old AA women in AL and NJ.

Research Questions and Hypotheses

The following research questions were addressed:

RQ1: Is there an association between sociodemographics (education level, employment status, marital status, and income level) and the body image perception (indicated by BMI) among 40–59-year-old AA women in AL and NJ?

$H_0 1$: There is no association between sociodemographics and the BMI among 40–59-year-old AA women in AL and NJ.

$H_a 1$: There is an association between sociodemographic and the BMI among 40–59-year-old AA women in AL and NJ.

RQ2: Does the effect of physical activity on BMI vary based on urban and rural locations for 40–59-year-old AA women, after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural?

$H_0$2: The effect of physical activity on BMI does not vary based on urban and rural locations for 40–59-year-old AA women, after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural.

H_a2: The effect of physical activity on BMI does vary based on urban and rural locations for 40-59-year-old AA women, after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural.

Theoretical Foundation of the Study

The social cognitive theory (SCT) was used to address this multivariate public health issue. The SCT involves how the individual and their environment are interrelated. AA women are impacted by social determinants of health which include the environment, socioeconomic status (SES), culture, and income level. The obesity epidemic among AA women is a multifarious problem that needs solutions involving sustained interventions. Therefore, the SCT framework was optimal for addressing weight reduction strategies among AA women.

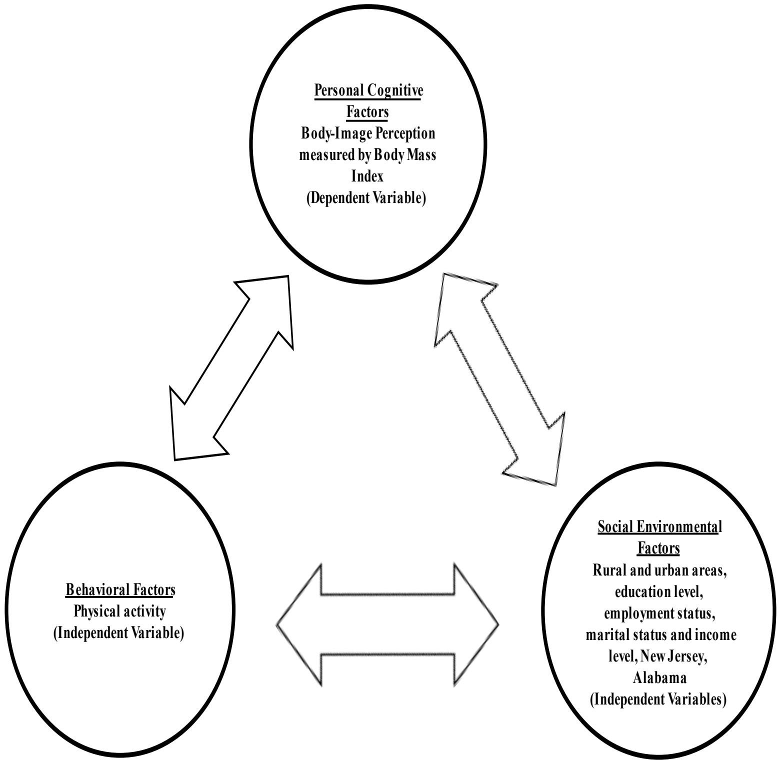
This model's framework involving reciprocal determinism, behavioral capability, observational learning, reinforcements (desire to continue or discontinue a behavior), expectations (benefit or consequence of a behavior), and self-efficacy may prove to be impactful for combating obesity in AA women (Bandura, 1977; LaMorte, 2019). Reciprocal determinism is a central concept of the SCT that refers to the dynamic interaction between the person, their environment, and behavior. Behavioral capability refers to an individual's performance of a behavior based on knowledge and skills. Observational learning is the concept of observing and then "modeling" the observed behavior. Self-efficacy is an important construct of SCT because it refers to the confidence level of the individual and their ability to engage in an activity successfully (Bandura, 1977; LaMorte, 2019). SCT is a useful behavioral theory in physical activity and nutrition promotion. AA women have to be educated about stressors in the environment that increase cortisol levels and make it hard to lose weight, as well as make better health-related diet and exercise choices. Researchers can leverage the framework for developing behavioral strategies to address the obesity crisis among AA women.

SCT can be used to answer research questions for this study in order to understand health-related behaviors and how to change identified behaviors through control and reinforcement actions leading to desired behaviors. Any one or all of the five constructs of the SCT (reciprocal determinism, behavioral capability, observational learning, reinforcements, expectations, and self-efficacy) can be applied to weight loss interventions for AA women. Since studies revealed AA women are more satisfied with being overweight, compared to Caucasian women, this may contribute to a lack of motivation to engage in physical activity (Lynch & Kane, 2014; Mama et al., 2015; Okop et al., 2016; Tennant, 2016). A primary motivational factor of the SCT that can be applied as a weight loss strategy for AA women is outcome expectancies, which is based on individual motivations to modify or change behaviors.

Gothe (2018) said walkability (area for walking), social economic status, crime, and lack of access to recreational facilities were barriers to physical activity for AA women. Self-efficacy is the belief that one possesses skills to engage in activities regardless of environmental, cultural and personal barriers, which may be a predictor of physical activity in AA women. Interventions were based on AA women's need to change their behavior and/or environment to combat obesity. Practitioners can help to identify targeted behaviors that may be controlled through positive reinforcement actions leading to desired and goal-directed behaviors. Key objectives of this study include ensuring therapeutic strategies which incorporate behavioral, cultural, and environmental factors (walkable areas), specific to obesity in AA women.

Figure 1

Link Between SCT Constructs and Study Variables



Nature of the Study

The goal of my study is to collect BMI data for AA women to be used as a measurement of body image perception, as well as collect and analyze the relationship between independent variables which were education level, employment status, marital status, and income level, region by state (NJ and AL), land area (urban/rural), physical activity (yes/no), and interaction term (land area*physical activity).

. Creswell (2009) said data can be collected and analyzed at a single point in time to test relationships between dependent and independent variables; this method was used in my study. Walkability was examined based on AA women's physical activity in rural and urban areas. I used multiple linear regression based on secondary data analyses. IBM SPSS Statistics for Windows, Version 27.0 was used to run inferential, descriptive, and multivariate analysis for all dependent and independent variables for the approved data set.

Literature Search Strategy

I used scholarly and peer-reviewed journals with full text that were published between 2014 and 2019. Library databases included ERIC, MEDLINE, Academic Search Premier, CINAHL Plus, and PubMed. Government organizations such as the CDC, the Office of Minority Health, and National Institute of Health (Office of Women's Health) were used to review articles related to AA women and obesity. Key search terms used in search engines were *AA women*, *obesity*, *body image perception*, *BMI*, *physical activity*, *the built environment*, *racial disparities*, and *obesity rates in southern states*. A secondary data source with datasets related to AA women and obesity was reviewed from the 2018 Behavioral Risk Factor Surveillance System (BRFSS). Google Scholar was used to find recent research and articles related to AA women's obesity, as well as sociodemographics, physical activity, BMI, and the built environment.

Literature Review Related to Key Variables and Concepts

Obesity is a multifactorial disease, and thus there is a complex interplay between factors that contribute to obesity. Lee et al. (2019) said that a higher prevalence of obesity has been linked with lower levels of SES based on race and ethnicity. SES is a composite measure of income, educational attainment, and occupational status. Non-Hispanic blacks have a significantly higher prevalence of obesity compared to non-Hispanic whites (Hales et al., 2018; Lee et al., 2019). SES is considered the main indicator of overall health in the US, yet it is confounded by race and ethnicity. Lee et al. (2019) said that the prevalence of obesity increased in adult women while levels of income and educational attainment decreased.

The prevalence of obesity among non-Hispanic black women, differed by education rather than income. Higher SES is also associated with a healthier lifestyle; conversely, lower SES has been associated with lower levels of physical activity and poorer nutrition, which can also be influenced by the environment based on differences in the infrastructure of geographical regions.

Gurka et al. (2018) said the highest prevalence of obesity in the US is in South and Midwest based on their study of geographical variations in the presence of obesity, diabetes and metabolic syndrome among adults. A contributing factor is the increasing rate of BMI in rural areas which leads to 1.36 higher odds of obesity compared to urban areas (Gurka et al., 2018). According to Wen et al. (2018), educational attainment, neighborhood median household income, and neighborhood-built environment features could reduce odds associated with rural residence by 94%. Rural areas present issues that can decrease participation in healthy behaviors due to long distances to access medical facilities, supermarkets, and gyms or recreational facilities. By examining the built environment, disparities between rural and urban areas can be addressed with effective interventions. This literature review includes obesity-related variables that affect AA women, such as BMI, physical activity in rural and urban areas, and sociodemographics.

Physical Activity in Rural and Urban Areas and BMI

Physical activity is an important intervention in order to prevent obesity and maintain a healthy lifestyle. SES was mostly associated with higher rates of obesity in women, and women with lower SES were more likely to be obese due to lack of engagement in physical activity (Curry, 2020; Lee et al., 2019; Makambi & Adams-Campbell, 2018). Women with higher levels of education engaged more frequently in physical activity (Curry, 2020; Lee et al., 2019; Makambi & Adams-Campbell, 2018; Mokdad et al., 2003). Makambi and Adams-Campbell (2018) said among AA women in their study, vigorous physical activity had a positive indirect effect on obesity based on age, and women with higher levels of SES were more engaged in weight loss practices that resulted in lowering their BMI. The higher the level of education, the more vigorous the physical activity, except for when older age was a factor (Makambi & Adams-Campbell, 2018). Curry (2020) said AA women with associates degrees and some college had higher levels of BMI compared to those with a bachelor's degree or more advanced degrees. Increased stress levels due to having to work multiple jobs and dealing with racism and discrimination decreased the benefits of and time needed to engage in physical activity and healthy dieting. Since low levels of physical activity are reported at a higher rate among AA women, compared to other races, it is important to address geographical and environmental factors that may lead to poor health outcomes among AA women.

Gurka et al. (2018) said in the US, physical activity levels among adults in rural areas were lower compared to urban areas. Obesity and obesity-related illnesses exist at a higher rate among minority and low-income populations in the South when compared to the North (Gurka et al., 2018). Rural populations suffer from obesity-related illnesses at a higher rate than urban or suburban populations (Gurka et al., 2018; Hill et al., 2014; Lee et al., 2019). Participation in physical activity and healthy diets are associated with higher educational attainment and SES levels (Gurka et al., 2018; Hill et al., 2014; Lee et al., 2019). Hill et al. (2014) said AA were disproportionately impacted by higher rates of obesity; however, rural residents had lower BMI levels than urban residents when controlling for sociodemographics (Hill et al., 2014).

Rural communities face many barriers to physical activity such as lack of sidewalks, lack of recreation facilities, threat of loose animals and dogs, and terrain and weather (Frost et al., 2010; Hansen & Hartley, 2015). Hansen and Hartley (2015) said variations in physical activity levels among populations in rural and suburban areas may be the result of geographical differences in the landscape of the area. Environmental barriers to physical activity include lack of physically active role models, neighborhood and community safety concerns, lack of sidewalks, lack of neighborhood/local facilities to engage in physical activity, and weather conditions (Joseph et al., 2015). Additional quantitative research was needed to implement strategies and policies to mitigate risks of environmental-related obesity factors affecting AA women.

Sociodemographics, Body Image Perceptions, and BMI

The obesity epidemic in the United States is due to substantial SES, BMI, and racial and ethnic disparities (Petersen et al., 2019; Krueger & Reither, 2015Blacks who are 20 or older are disproportionately affected by obesity compared to all other ethnic groups in the US (Krueger & Reither, 2015; Ogden et al., 2014). The rate of obesity among Blacks was 47.8% compared to Whites (33.4%), Asians (10.9%), and Hispanics (42%), (Krueger & Reither, 2015; Ogden et al., 2014). Blacks had the highest prevalence of obesity overall at 38.4%, as well as the highest prevalence of obesity of 35% or greater in 31 states compared to Hispanics (32.6%), who had greater than 35%obesity prevalence in only eight states, and White adults (28.6%), who had a greater than 35% obesity prevalence in only one state (Peterson et al., 2019). These disparities are due to social, economic, and environmental factors such as lack of access to healthy foods, inadequate community facilities, lack of sidewalks, low levels of educational attainment, and unemployment (Joseph et al., 2015; Makambi & Adams-Campbell, 2018; Peterson et al., 2019).

AA women have the highest rate of obesity compared to all other groups in the US (Bower et al., 2015; Curry, 2020; Dingfelder, 2013). Curry (2020) said AA women are 57% more likely to be obese compared to Caucasian women (33%), or Hispanic women (44%). Racial and ethnic disparities can also be linked to income and educational attainment, which are factors associated with obesity. Lower levels of educational attainment and income are linked to higher rates of obesity among AA women (Mosli et al., 2020; Rubin, 2018; Wilde et al., 2018). Ogden et al. (2017) said from 2011 to 2014, the age-adjusted prevalence of obesity among women was the lowest in the in the highest income group (29.7%), compared to the middle (42.9%) and lowest income group (45.2%). However, in AA women; there were no differences in terms of prevalence of obesity seen across all income levels. Obesity prevalence was 42.7% among African

American men in the highest income group compared to 33.8% of AA men in the lowest income group (Ogden et al., 2017). The prevalence of obesity decreased among college graduates compared to those with less education across all racial and ethnic groups, with the exception of Asian men and women, Hispanic men, and AA men (Ogden et al., 2017). Further research is needed to show impact of income and education on obesity prevalence based on gender and racial differences.

As of 2014, Mississippi had the second highest rate of obesity prevalence in the nation (Qobadi & Payton, 2017). There was a 37% prevalence of obesity reported among the sample population in their study. Obesity prevalence revealed racial disparities in terms of gender and education. Non-Hispanic White men had an obesity prevalence of 34.7% compared to non-Hispanic Black men (33.7%), non-Hispanic White females (31.3%), and non-Hispanic Black females (52.7%; Qobadi &Payton). Black females had the highest rate of obesity prevalence compared to the other groups consistent with other studies (Bower et al., 2015; Curry, 2020; Dingfelder, 2013; Qobadi & Payton, 2017). There were no significant differences seen in terms of gender among non-Hispanic Whites; however, there were significant differences seen in terms of education among non-Hispanic Whites, but no significant differences among non-Hispanic Blacks in terms of education levels. Marital status was found to be positively associated with male obesity but negatively associated with female obesity (Qobadi & Payton, 2017; Xu & Wang, 2015). Non-Hispanic Blacks had the highest rate of obesity prevalence. Additionally, Black females were more likely to be obese and had a higher rate of obesity prevalence when their income level was less than $25,000 annually, they had less than a high school degree, or were unemployed and physically inactive (Curry, 2020; Lee et al., 2019; Makambi & Adams-Campbell, 2018; Qobadi & Payton, 2017).

One reason for AA women's higher BMI levels may be due to skewed body image perceptions. According to Qobadi and Payton (2017), AA women often have reported higher satisfaction with their body size, despite having higher BMI levels compared to Caucasian women. Furthermore, most obese or overweight AA women do not classify themselves as being obese or overweight and have the belief that AA men prefer their curvier bodies compared to Caucasian women. This is a pervasive perception among AA culture and decreases AA women's desire to engage in weight loss activities (Lynch & Kane, 2014; Mama et al., 2015; Okop et al., 2016; Qobadi & Payton, 2017; Tennant, 2016). More research is needed to determine targeted and culturally appropriate interventions involving disparities that exist among subgroups that have the highest rates of obesity prevalence.

Araujo et al. (2018) conducted a study using multiple logistic regression to determine the association of race and socio-economic status (SES), with obesity among Brazilian adults. Unlike in the US where obesity prevalence has the greatest impact on AA women with lower incomes, in high-income countries obesity impacts both men and women of all ages (Araujo et al., 2018; Kleinert & Horton, 2015). There were 80,702 participants in the study and their race was categorized as White, Black or Brown. Araujo et al. (2018) found that black women had the highest prevalence of obesity (20.6%) compared to white (15.9%) and brown (16.5%) women. Among men, white men had the highest obesity prevalence (14.3%), compared to black (12%) and brown (11.8%) men.

Socioeconomic disparities were highlighted based on race; whites of both genders had higher levels of education and income compared to black and brown men and women (Araujo et al., 2018). Their study revealed for black women, the likelihood of being obese increased (17%) with higher levels of SES and decreased with lower levels of SES; the inverse was reported for white and brown women. There was an increased rate of obesity across all categories for men as the level of SES increased. They noted that obesity prevalence had historically been a health issue for the wealthiest in developing countries (Araujo et al., 2018).

Since factors related to disparities in race tend to be complex, Araujo et al. (2018) suggested that future studies should include effective instrumentations for analyzing the interplay between other variables such as discrimination along with SES, when determining the most effective strategies to decrease the prevalence of obesity in a heterogenous population (Araujo et al., 2018). The current study was instrumental in revealing that targeted strategies aimed at reducing racial and ethnic disparities in SES among AA women, may be ineffective if physiological, psychological and cultural factors are not explored (Araujo et al., 2018).

Definitions

Body mass index (BMI): A standard measure used to determine overweightness or obesity. A person’s BMI is calculated by dividing their weight in kilograms (kg) by their height in meters (CDC, 2020b). Obesity is defined by the CDC (2016) as having a Body

Mass Index (BMI) of 30 or higher and overweight is defined as having a BMI of 25 to 30.

Physical activity: Repetitive and planned exercise engaged on to improve health. One-hundred fifty minutes to 300 minutes of moderate to rigorous exercise throughout the week is recommended for adults aged 18-64 (WHO, 2020).

Sociodemographics: In this study includes marital status, education level, income level, and employment status.

Rural area: Any population or residential area or land outside of any urban area (US Census Bureau, 2020).

Urban area: A densely populated area of 50,000 or more people; this includes developed, residential, commercial, and non-urbanized land use (US Census Bureau, 2020).

Assumptions

Secondary data were collected and analyzed using the 2018 BRFSS Survey. There are two assumptions related to the data. Since the data collected is self-reported and related to health-related risk behaviors and other personal health information, it can be assumed that the collected information contains biased answers. Ward et al. (2016) posits that historically, research has revealed that self-reported body measurements, especially by women, has led to underestimations of BMI. The data is weighted to make it more representative of the populations under study (Iachan et al., 2016). Therefore, it can be assumed that this study can be generalized to similar populations. This assumption was necessary to reveal because BMI is operationalized as the outcome variable in the populations under study.

Scope and Delimitations

All the data used for this study was collected from the 2018 BRFSS. The BRFSS telephone survey, includes both landline and cell phone users in all 50 states, the District of Columbia and any participating US territories, vetted by CDC. The surveys are completed annually, with over 400,000 interviews for the national aggregate (CDC, 2018). The BRFSS data is weighted to account for any nonresponse bias and to ensure there was national representation limited to the adult population. After 2011, a statistical weighting method called raking, was implemented in order to gather more demographic characteristics of populations such as education level, marital status, home ownership and other demographics (CDC, 2018). The randomly selected national aggregate includes the populations of AA women needed for my study. Random sampling removes bias and allows for all individuals of a population to have an equal probability of being selected for a study. Random sampling also allows a researcher to make their study’s findings generalizable to populations (Creswell, 2009).

The BRFSS data set includes the variables marital status, education level, income level, employment status, BMI, physical activity, and both rural and urban areas to be analyzed for my study. My study will include adult females, 40 to 59 years old in New Jersey and Alabama and adults residing in rural and urban areas.

The theory chosen for my study was the SCT, due to the strength of the SCT based on the interconnectedness between the individual, the environment and their behavior. An additional strength is the focus on the maintenance of the achieved behavior (LaMorte, 2019). The HBM framework is useful for determining health behaviors in order to predict change; the individual would then act based on perceived benefits (LaMorte, 2019b). However, the HBM was rejected on the basis that it is more descriptive rather than exploratory and does not address specific interventions for changing health-related actions. It also fails to address environmental and economic factors. Factors related to obesity are multilayered and strategies must be implemented to address the role that the environment has on the individual in order to reduce disparities (Dingfelder, 2013).

A limitation of this quantitative research design hinged on the inability to probe respondents' answers in contrast to qualitative research designs. However, a qualitative study would not have been practical due to time and resource constraints and the unavailability of qualitative databases. Another limitation of this study was the fact that it was conducted during a world-wide pandemic. This may have delayed any updates to the data for the 2018 BRFSS survey, CDC's website, and any relevant literature to my study that may have been conducted but could not be made available for online consumption.

Significance, Summary, and Conclusions

The purpose of this study was to address factors that may contribute to the disproportionate burden of the obesity epidemic on AA women, by revealing a multiplicity of risk factors and the interplay between them, which keeps AA women on a downward quality of life trajectory. AA women have the highest rate of obesity compared to all other groups in the US (Bower et al., 2015; Curry, 2020; Dingfelder, 2013). AA women are 50 percent more likely to be obese compared to Caucasian women (33%). Closing the health disparity gap among AA women can yield long-term benefits towards health equities that can trickle down through generations by decreasing the economic and social cost to individuals and society (WHO, 2015). Flegal et al. (2016) said there remains a lack of effective interventions that address the unique needs and experiences of AA women. There is a confluence of factors that contribute to the energy imbalance among AA women such as, the built environment, cultural norms, a skewed body-image perception and socioeconomic status.

It is important to address factors beyond the individual level to determine other reasons for their poor health status. Therefore, it is vital to examine whether sociodemographic factors and geographic locations play a direct or indirect role in obesity prevention rates in order to reduce racial and ethnic disparities among AA women. This quantitative study offered a comprehensive, comparative look at obesogenic factors to help bridge the gap in the literature. By determining how contextual factors included in the built environment, such as safety issues, terrain, weather, sidewalks, and recreational facilities, and other social determinants of health may impact AA women's BMI level. Public health professionals can gain broader insights on how to better serve and understand the specific needs and behaviors of at-risk populations that continue to result in poor health. Public health care professionals could benefit from studying how upstream determinants influence downstream determinants of AA women in different regions. The results of this study could help reduce obesity and obesity-related illnesses, as well as the morbidity and mortality rate among AA women. Thus, the positive social change implications of this study could help public health professionals develop culturally-appropriate programs targeting at-risk minorities in the South, where the rate of obesity is much higher based on racial/ethnic disparities. AA women can achieve better health through the implementation of policy that can inspire social change among by reducing obesity and implementing interventions that help decrease barriers to physical activity. If a positive correlation is found with the variables under study, health professionals, community service practitioners, and stakeholders can employ interventions on a geographical, local level, and individual level to help reduce the burden of obesity on AA women. A multidirectional approach along with system thinking, and collaboration among stakeholders can promote sustainable positive social change.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative cross-sectional study was to explore the relationship between independent and dependent variables based on regional differences in terms of AA obesity prevalence. Regional differences in obesity levels based on BMI (dependent variable), for 40-59-year-old AA women was explored in NJ and AL to determine associations between education level, employment status, marital status, income level and physical activity, and location in in urban and rural areas. A secondary data set of archived quantitative data for the variables used in this study was retrieved from the 2018 BRFSS to determine if there were associations between the independent and dependent variables. The research design and rationale, methodology, threats to validity, and summary are outlined in this section to explore variables under study related to AA women's obesity prevalence in AL and NJ.

Research Design and Rationale

The BRFSS is a national health-related cross-sectional telephone data collection survey. Across 50 states, over 400,000 adults are interviewed regarding chronic health conditions, services related to prevention, and health-risk behaviors. This is the largest survey in the world that is conducted on an annual basis. This survey collects data at the local level and has proven to be a tool that has played an important role in targeting specific health promotion activities. The CDC coordinates with state departments of each state to conduct monthly landline or cellular phone surveys, using standardized questionnaires, with an objective to collect prevalence data among U.S. adults regarding both risk behaviors and healthy practices they engage in. Variables used in my study were derived from 2018 BRFSS data set. The independent variables used in my study were education level, employment status, marital status, and income level, region by state (AL & NJ), land area (urban/rural), physical activity (yes/no), interaction term (land area*physical activity). AA women's BMI was examined based on the independent variables and the data was collected from 40–59-year-old AA women in AL and NJ.

A quantitative research design was used to test the hypotheses under study by investigating relationships between independent and dependent variables; there were no mediating variables. To determine if hypotheses can be accepted or rejected, statistical analysis was conducted to determine calculated probability levels. There is a lack of information regarding risk behaviors and good health practices of AA women in different regions.

A cross-sectional design was most appropriate to examine the research questions because comparisons can be made at a fixed moment in time between variables, which helped me examine associations that may be able to be applied globally to this population. This research strategy can help advance public knowledge of the epidemic of obesity among AA women by examining factors related to sociodemographics to determine whether there was a relationship between variables of interest. This cross-sectional design was optimal for this study due to the large sample size and its ability to determine prevalence and causation. This cross-sectional design is not bound by time or resource constraints; thus, it was more economical to conduct compared to other research designs.

Methodology

Population

The targeted populations for this study were AA women in AL and NJ between the ages of 40 and 59. National data revealed that 57.2% of AA women were obese (Flegal et al., 2016). The BRFSS was used as the source of data for this study. The total population of the 2018 BRFFS was 437,436 participants. There were 6,606 participants from the state of Alabama and 3,090 participants in New Jersey. Although the CDC collaborates with individual states, they are responsible for preparing, scrubbing and storing data for analysis.

Sampling Procedures

I used secondary data that were available to the public for use without permission, which were archived on the CDC's website. There were no historical or legal documents used as data sources. The 2018 BRFSS is an annual telephone survey system that collects health-related data for noninstitutionalized adults who are 18 or older. Each state has a state official who coordinates with the CDC to determine which questions will be part of the survey.

In the 2018 BRFSS there were 5,514 landline phone numbers and 5,195 cellular phone numbers selected through probability sampling to ensure participants had an equal chance of being selected for the survey. Probability sampling led to high quality results due to unbiased selection of a diverse sample. The total sample size for the BRFSS was 10,709. Selected probability sampling of AA women was derived from a subset of the

6,606 participants in AL and 3,090 participants in New Jersey. All participants were AA women between 40 and 59.

Recruitment, Participation, and Data Collection

All states that participated in the BRFSS telephone survey used a disproportionate stratified sample (DSS) design for their landline samples. This means the population under study in different subgroups, did not have an equal opportunity to be a part of the survey research. However, Guam and Puerto Rico used a simple random-sample design. The landline sample was divided into medium and high-density strata. Both medium and high-density strata contain phone numbers that should correspond with households to increase the probability that samples will come from all households with telephones. The target population for cellular phone users included adults over the age of 18 with a working cell phone and lived either in college housing or a private residence. The 2018 BRFSS involved weighting scales (adjustment for nonresponse and noncoverage) to correct for over or underrepresented data. The variables used in my study were BMI, indicative of body image perception, physical activity in both rural and urban areas, and sociodemographics (race, marital status, education level, income level, and employment status).

Justification for the Effect Size, Alpha, and Power Levels

Prior to conducting a study, it is important to determine the minimum sample size required for the desired level of power. For this study, a priori analysis was not necessary to determine statistical power since secondary data from the 2018 BRFSS had a predetermined sample size. However, G*Power analysis was conducted to ensure the proposed dataset was sufficient for my quantitative study in order to reduce errors. In the context of research, power is the likelihood that a researcher finds an effect between variables among populations being studied (Shreffler & Huecker, 2020). According to Shreffler and Huecker (2020), a power level of 80% is adequate to detect an effect in a study.

The 2018 BRFSS original data set consisted of 437,436 participants throughout the country. There were 238,911 female participants and a total of 36,443 African Americans in the study. There were 6,606 participants from the state of Alabama and 3,090 participants in New Jersey (CDC, 2018). A minimum sample size estimation was determined by using the G*Power 3.1.9.4. Software to compute an a priori power analysis. An F-test for linear regression was used with an effect size 0.15, an alpha level of 0.05, and a corresponding confidence level of 0.80 (80%). An additional 10 percent was added to the calculated sample size after cleaning the dataset (Madley-Dowd, 2019). The minimum sample needed was 109 in order to produce statistically significant results using an alpha level of 0.05 for a desired power of .80 and an effect size of .15.

Instrumentation and Operationalization of Constructs

The 2018 BRFSS study and codebook are available for the public online and no permission is needed for use in my study. According to CDC (2014) scientific research had determined in 1980 that health related behaviors had an impact on premature morbidity and mortality; however, no data was available on a state-specific basis prior to the BRFSS instrument being implemented. Therefore, interventions and resources could not be targeted on a state or local level to reduce unhealthy behaviors that lead to chronic illnesses.   As previously mentioned, the 2018 BRFSS in collaboration with the Centers for Disease Control and Prevention (CDC) and all states located in United States of America, including the District of Columbia, Guam, and Puerto Rico, is an annual telephone survey system that collects health-related data for noninstitutionalized adults that are age 18 years and older (CDC, 2014). This instrument is appropriate for my study because the behavior surveys were developed to collect data on the actual behaviors of individuals rather than on just their knowledge or attitudes. It has been successful in allowing states to implement programs regarding health promotion and disease prevention (CDC, 2014). Since my research questions are related to AA women's behaviors, the results of my study can lead to much needed interventions and social change to help reduce their obesity morbidity and mortality rates.

Although the BRFSS is a national survey instrument, the reliability and validity has been assessed by many published scholarly studies, and by its prevalence estimate compared to other national surveys. The questions used for the BRFSS surveys have come from other national surveys that collect data from physical examinations, face to face interviews, and telephone interviews (Rolle-Lake & Robbins, 2020). These other national surveys include the Current Population Survey (CPS), National Health and Nutrition Interview Survey (NHIS), National Survey of Family Growth (NSFG), National Center for Health Statistics (NHANES), and National Survey on Drug Use and Health (NSUH). The data is submitted to CDC monthly in order to be weighted and calculated to reduce bias and ensure equal representation across all population groups in the study (Rolle-Lake & Robbins, 2020).

Pierannunzi et al., (2013) conducted a literature review of all published scholarly work from 2004 – 2011, that had assessed the validity and reliability of the prevalence estimates taken from the BRFSS. They developed a categorical rubric to assess the quality of each study. The highest rankings were given to authors who conducted reliability tests based on test/retest methods or those authors that used many different samples. Similarly, authors that ranked high for validity tests were those that compared the BRFSS to physical measures, rather than self-reported data (Pierannunzi et al., 2013). The more sophisticated the instruments were that the authors used, the higher they were ranked in the literature review.

The results of the thirty-two studies of reliability and validity resulted in high rankings related to questions regarding self-reported diagnoses of chronic conditions, and all of the test/retest research when administered weekly rather than monthly. The authors found that self-reporting of more sensitive information such as, height, weight, sexual activity, and physical activity was less reliable and valid, unless the individuals were in the vigorous, physical activity category (Pierannunzi et al., 2013). The validity of self-reports was tested when authors had participants who wore accelerometers, maintained a log of their physical activity. They found that the log of physical activity was more consistent with self-reports over the phone rather than the measures taken from the accelerometer (Brown et al., 2004; Pierannunzi et al., 2013). The authors noted that their findings regarding the reliability and validity of the BRFSS revealed a consistent need for its utility just as the previous authors' study found more than a decade ago (Nelson et al., 2001; Pierannunzi et al., 2013).

The variables and questions in the 2018 BRFSS code book have been used broadly across the United States and specifically with AA women who were examined in my study. The context in which the variables have been used in the secondary data base, will allow me to test each hypothesis in my study. The aim of my study was to compare regional differences in obesity levels, based on BMI (dependent variable), for 40-59-year-old AA women in New Jersey compared to Alabama to determine associations between education level, employment status, marital status, and income level. In addition, the physical activity of participants in rural and urban areas will also be examined by the dependent variable (BMI) of AA women.

The 2018 BRFSS code book indicated the dependent variable (DV) BMI, was calculated based on weight in kilograms divided by height in centimeters by 100 to obtain the meters for the height (CDC, 2020). The following two questions on the 2018 BRFSS was used to calculate the BMI: “About how much do you weigh without shoes?” and “About how tall are you without shoes?” The BMI categories were coded as *1* for Underweight BM1<18; *2* for Normal Weight BMI 18 to <25; *3* for Overweight BMI ≥25 to <30; *4* for Obese BMI ≥30 (CDC, 2020). However, for linear regression, BMI15 was used as a continuous variable (1 -999). Two geography-based variables identified as urban versus rural have been included in the 2018 BRFSS from the 2013 National Center for Health Statistics (NCHS) data systems (BRFSS, 2018). Table 1 below depicts a summary of the 2018 questions and study variables for my research questions and hypotheses:

Table 1

Summary of Study Variables

Variable Title	Question	Measure
Income Level	Is your annual household income from all sources?	1 Less than $10,000 2 Less than $15,000 3 Less than $20,000 4 Less than $25,000 5 Less than $35,000 6 Less than $50,000 7 Less than $75,000 8 $75,000 or more 77 Don't know/Not sure 99 Refused Blank Not asked or Missing
Education Level	What is the highest grade or year of school you completed?	1 Never attended school or only attended kindergarten 2 Grades 1 through 8 (Elementary) 3 Grades 9 through 11 (Some high school) 4 Grade 12 or GED (High school graduate) 5 College 1 year to 3 years (Some college or technical school) 6 College 4 years or more (College graduate) 9 Refused
Employment Status	Are you currently…?	1 Employed for wages 2 Self-employed 3 Out of work >1 year or more 4 Out of work < than 1 year 5 A Homemaker 6 A Student 7 Retired 8 Unable to work

		9 Refused
Marital Status	Are You…?	1 Married 2 Divorced 3 Widowed 4 Separated 5 Never married 6 A member of an unmarried couple 9 Refused
Physical Activity	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?	1 Yes 2 No 7 Don't know / Not sure 9 Refused
Urban/Rural	What county do you live in?	1 Urban counties 2 Rural counties
State	What state do you live in?	1 Alabama 34 New Jersey

Source: BRFSS Questionnaire, 2018

Data Analysis Plan

Approval was received from Walden University Institutional Review Board (IRB; 10-11-21-0303956). My data were prepared for analysis using SPSS version 27. Data cleaning included omitting any missing cases and analyzing remaining data. Listwise deletion is frequently used in research and should not introduce any bias in the study if there is a large enough sample, to ensure that the power remains in the study, and the assumption of Missing completely at random (MCAR) is satisfied (Kang, 2013). This study consisted of independent variables that are social demographics (i.e., education level, employment status, marital status, income level, state), land area (urban/rural), physical activity (yes/no), interaction term (land area*physical activity) (see Table 1). Independent variables are categorical/binary in nature and was used as grouping variables. The dependent variable for this study was BMI and was treated as a continuous variable. Descriptive statistics was used to describe the data and multiple linear regression was used to explain the relationship between the dependent variable and the independent variable, which can be ratio-level, nominal, ordinal, or interval (Creswell, 2009 & Statistics Solution, 2021). The following research questions and hypotheses were tested:

RQ1: Is there an association between sociodemographics (education level, employment status, marital status, and income level) and the BMI among 40–59-year-old AA women in AL and NJ?

H_01: There is no association between sociodemographics and the BMI among 40–59-year-old AA women in AL and NJ.

H_a1: There is an association between sociodemographics and the BMI among 40–59-year-old AA women in AL and NJ.

RQ2: Does the effect of physical activity on BMI vary based on urban and rural location for 40–59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural?

$H_0$2: The effect of physical activity on BMI does not vary based on urban and rural location for 40–59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural.

H_a2: The effect of physical activity on BMI does vary based on urban and rural location for 40-59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural.

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For the purpose of this study both linear regression and multiple linear regression was used to determine the predictors of BMI, since the dependent variable (BMI), was used as a continuous variable, rather than a binary or categorical variable. Multiple linear regression and linear regression was used to determine whether the interaction of land area (urban/rural) and physical activity have a significant effect on BMI. The interaction term physical activity*urban/rural, would be testing to see if the difference in BMI values for those who participate in physical activity in urban vs rural is significantly different than the difference between those who do not participate in physical activity in urban vs rural areas.

For the purpose of this study the results of both linear regression and multiple linear regression were interpreted with a confidence interval of (80% CI). An alpha level of 0.05 was selected to determine the level of significance. The p-value is compared to the alpha to determine whether the observed data are statistically significant differences from the null hypothesis. If the p-value is less than or equal to the alpha ($p< 0.05$), we reject the null hypothesis. If the p-value is greater than alpha ($p > 0.05$), then we fail to reject the null hypothesis (Pennsylvania State University, 2021). This approach was used to answer the research questions.

Threats to Validity

Creswell (2013) revealed that quantitative research can be impacted by internal and external threats. Internal validity has to do with the ability to be able to make an inference based on the true effect that the independent variable had on the dependent variable. Threats to internal validity includes maturation, history effects, testing effects, instrumentation, selection bias, diffusion of treatments, and experimental mortality. It's important for researchers to know the threats so that the research design can help prevent them. In this quantitative study, based on secondary data from the 2018 BRFSS, threats to validity were limited by controlling for confounding variables in order to achieve the best outcomes.

External validity has to do with the ability to apply the researcher's findings to similar study participants; this would mean that the study is generalizable (Carlson & Morrison, 2009). Some threats to external validity would be reactivity, also known as the Hawthorne effect, and effects of selection. In this secondary data, the 2018 BRFSS does reflect AA women in different geographical locations. Both landline (5,514) and cellular (5,195) phone numbers were selected through probability sampling to ensure that participants have an equal chance of being selected for the survey (Creswell, 2009, Díaz de Rada & Martinez, 2020). The findings of probability sampling led to higher quality results due to the unbiased selection of a diverse sample (Creswell, 2009, Díaz de Rada & Martinez, 2020).

Statistical conclusion validity is the degree to which correct inferences are made regarding the variables under study. A researcher can try and prevent this error by increasing the statistical power above 0.08 or raising the alpha level to 0.10 or by increasing the effect size (Creswell, 2014; García-Pérez, 2012). In my study, the alpha level was .05, the statistical power was .80 and the effect size was .15, indicating a medium effect (Creswell, 2014).

Ethical Procedures

Although the secondary data that was used for my study is archived on CDC's website and open to the public for use without written consent, there are still ethical considerations related to the use of secondary data. All identifying personal information, must be scrubbed from the data to ensure that participants remain anonymous and their privacy is maintained (Tripathy, 2013). Although the 2018 BRFSS data set is available to the public online, the data has been anonymized so that confidentiality cannot be breached. Walden's IRB approval 10-11-21-0303956 was obtained and only de-identified data sets were analyzed and published; the data was downloaded and password protected and will be destroyed after five years.

Summary

This section includes the research design used to test the research questions in the study. The cross-sectional design was optimal for the study due to time constraints. Multiple linear regression was used to determine the impact of confounding variables on factors. The research design and rationale and operational definitions of independent and dependent variables were described based on secondary data and how they were used in my study. Sampling procedures were described, as well as instrumentation and operationalization of constructs, the data analysis plan, threats to validity, and ethical procedures. G*Power analysis was used to calculate sample size. Section 3 includes a presentation of research findings based on statistical analyses.

Section 3: Presentation of the Results and Findings

Introduction

This study was designed using a quantitative analysis of cross-sectional secondary data set derived from the 2018 BRFSS. This research design was used to determine whether there was a significant relationship between geographic area, sociodemographics, and BMI of 40–59-year-old AA women in AL and NJ. Linear regression and multiple linear regression were used to address the following research questions and hypotheses:

RQ1: Is there an association between sociodemographics (education level, employment status, marital status, and income level) and the BMI among 40–59-year-old AA women in AL and NJ?

$H_0 1$: There is no association between sociodemographics and the BMI among 40–59-year-old AA women in AL and NJ.

$H_a 1$: There is an association between sociodemographics and the BMI among 40–59-year-old AA women in AL and NJ.

RQ2: Does the effect of physical activity on BMI vary based on urban and rural location for 40–59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural?

$H_0 2$: The effect of physical activity on BMI does not vary based on urban and rural location for 40–59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural.

H_a2: The effect of physical activity on BMI does vary based on urban and rural location for 40-59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural.

Section 3 includes the data collection process for secondary data, as well as descriptive statistics of the sample and statistical analysis of findings using multiple linear regression analyses.

Data Collection of Secondary Data Set

The BRFSS telephone survey includes both landline and cell phone users in all 50 states, the District of Columbia, and any participating US territories, and is vetted by the CDC. Surveys are completed annually, with over 400,000 interviews nationally. BRFSS data were weighted to account for any nonresponse bias (unanswered questions in the survey) and ensure there was representation in terms of adults in this population. After 2011, a statistical weighting method called raking (adjusting sample weights in the survey) was implemented in order to gather more demographic characteristics of the population. Random sampling involves removing bias and allows for all individuals in a population to have an equal probability of being selected for a study. Random sampling also allows researchers to make their study's findings generalizable to the population. CDC final weighted data set is available to the public on their website and the 2018 BRFSS. The data set was used for my study and analyzed using SPSS. Files are pretreated and precleaned by the CDC prior to being made available for public consumption. Data were scrubbed for inconsistencies and age variables were recoded to align with the population under study, which allowed for sufficient data.

For this study, AA women between 40 and 59 were the population of interest. The BRFSS is a national representative sample of adults throughout the entire population of the US and was used as the data source for this study. The total population of the 2018 BRFFS was 437,436 participants. There were 6,606 participants from AL and 3,090 participants from NJ (CDC, 2018). All states that participated in the BRFSS telephone survey used a DSS design for their landline samples. The exceptions were Guam and Puerto Rico, who used a simple random-sample design. The landline sample was divided into medium and high-density strata. Both medium and high-density strata contain phone numbers for households to increase the probability that samples came from households with telephones. The target population for cell phone users was adults over the age of 18 with a working cell phone who lived either in college housing or a private residence. There were no major discrepancies found in the 2018 BRFSS data set in Section 2.

Descriptive Analyses

Descriptive and demographic variables of the sample population appear in Table 2, which indicates the total sample size of 594 AA women between the ages of 40 and 59. Ninety-six (16.2%) participants were from New Jersey and a total of 498 (83.8%) participants were from Alabama. Of the total sample of AA women in the study, 494 (83.2%) lived in urban areas, while 100 (16.8%) lived in rural areas. Of this population, 365 (61.4%) participants engaged in physical activity within the past 30 days, while 229 (38.6%) had not. Three-hundred and sixty-seven (72.4%) participants graduated from high school compared to only 63 (10.6%) who did not. Only one164 (27.6%) participants graduated from college. 206 (44.8%) participants’ income level was greater than $21,960 but less than $75,000, compared to 161 (35%), who made less than $21,960. There were 93 (20.2%) participants who made greater than or equal to $75,000. More than half, or 303 (51.9%) participants were employed compared to 281 (48.1%) who were unemployed. 377 (63.8%) participants were not married, compared to 214 (36.2%) who were. Finally, the average BMI for participants was 32.2 (SD =7.6, range 16.4 – 69.4). 52.9% of the sample based on their BMI was considered obese.

Table 2

Frequencies of Variables

Variable	Frequency	Valid Percent
AA women 40-50-years-old		
New Jersey	96	16.2
Alabama	498	83.8
Land region		
Urban	494	83.2
Rural	100	16.8
Physical activity in past 30		
days	229	38.6
No	365	61.4
Yes		
Education	63	10.6
Did not graduate high	367	72.4
school	164	27.6
High school graduate		
College graduate	161	35
Income Level	206	44.8
≤$21,960	93	20.2
>$21,960 thru <$75,000		
≥$75,000	303	51.9
Employment status	281	48.1
Employed		
Unemployed	377	63.8
Marital status	214	36.2
Not married		
Married		

Table 3

Means and Standard Deviation for Measure of BMI of AA Women

Age	*n*	*M*	*SD*
40-59	*544*	*32.2*	*7.6*

Note. The minimum to maximum range was 16.5 – 69.4.

Statistical Assumptions

All assumptions for MLR were assessed. Key assumptions for MLR include linearity, normality, and homogeneity of variance (Mertler & Vannatta, 2013). There was a linear relationship between the dependent and independent variable. Multivariate normality was met by ensuring that all errors were normally distributed. Multicollinearity was tested using Variance Inflation Factor (VIF) to ensure there was not a high degree of correlation between the independent variables (Mertler & Vannatta, 2013). The result of the VIF was below 10, indicating there was not a problem with variance inflations

Regression Analyses

Logistic linear regression and MLR was used to answer both research questions. The data used in the study from the 2018 BRFSS was weighted and calculated to reduce bias and ensure equal representation across all population groups in the study (Rolle-Lake & Robbins, 2020). The minimum sample needed for the study was 109 in order to produce statistically significant results using an alpha level of 0.05 for a desired power of

.80 and an effect size of .15. The actual sample size for the study was 594 AA women between 40-59-years old. Power is the likelihood that a researcher will find an effect between variables in the populations being studied and correctly reject the null hypothesis when it is false and avoid a Type II error (Shreffler & Huecker, 2020). According to Shreffler and Huecker (2020), there is consensus among researchers that a power level of 80% is an adequate level to detect in effect in a study. However, if the null hypothesis is rejected when it is true this is known as a Type I error (Shreffler & Huecker, 2020). The findings were presented based on each research question and the corresponding hypotheses.

Research Questions and Hypotheses

RQ1

RQ1: Is there an association between sociodemographics (education level, employment status, marital status, and income level) and the BMI among 40–59-year-old AA women in AL and NJ?

$H_0 1$: There is no association between sociodemographics and the BMI among 40–59-year-old AA women in AL and NJ.

$H_a 1$: There is an association between sociodemographics and the BMI among 40–59-year-old AA women in AL and NJ.

Education Level and BMI

Before conducting multiple regression analysis to test the hypothesis above, linear regression analyses were also conducted to determine whether each sociodemographic variable is associated with BMI. First, linear regression analysis was performed to determine whether education level predicts BMI. The model summary results (Table 4) showed no correlation between the two variables (*r* = 0.013). This means that education level is not correlated with BMI. Second, the model summary table shows that the r-square is .000. This implies that education level does not explain or predict BMI. Next, the ANOVA table (Table 5) shows that education level does not significantly predict the BMI $F(1, 551) = .090$, $p > .05$. Lastly, the coefficient table (Table 6) shows that the relationship between educational level and BMI is positive but statistically insignificant (*b* = 13.522, *p* = .764).

Table 4

Model Summary Table for Education Level and BMI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.013[a]	.000	-.002	630.990

a. Predictors: (Constant), Education Level

Table 5

ANOVA for Education Level and BMI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35962.627	1	35962.627	.090	.764[b]
	Residual	219379918.689	551	398148.673		

Total	219415881.316	552

a. Dependent Variable: Body Mass Index

b. Predictors: (Constant), Education Level

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Table 6

Coefficients for Education Level and BMI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2836.505	101.093		28.058	.000
	Education Level	13.522	44.991	.013	.301	.764

a. Dependent Variable: Body Mass Index

Employment Status and BMI

Second, linear regression analysis was performed to determine whether employment status predicts BMI. The model summary (Table 7) results showed no correlation between the variables (*r* = 0.004). This means that employment status is not correlated with BMI. Second, the model summary table shows that the r-square is .000.

This implies that employment status does not explain or predict BMI. Next, the ANOVA table (Table 8) shows that employment status does not significantly predict the BMI $F(1, 542) = .008$, $p > .05$. Lastly, the coefficient table (Table 9) shows that the relationship between employment status and BMI is negative but statistically insignificant ($b = -4.703$, $p = .931$).

Table 7

Model Summary for Employment Status and BMI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.004[a]	.000	-.002	632.726

a. Predictors: (Constant), Employment

Table 8

ANOVA for Employment Status and BMI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3004.591	1	3004.591	.008	.931[b]
	Residual	216985651.143	542	400342.530		
	Total	216988655.733	543			

a. Dependent Variable: Body Mass Index

b. Predictors: (Constant), Employment

Table 9

Coefficient Table for Employment Status and BMI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2869.838	84.892		33.806	.000
	Employment	-4.703	54.293	-.004	-.087	.931

a. Dependent Variable: Body Mass Index

Marital Status and BMI

Third, linear regression analysis was performed to determine whether marital status predicts BMI. The model summary results (Table 10) showed no correlation between the two variables (r = 0.020). This means that marital status is not correlated with BMI. Second, the model summary table shows that the r-square is .000. This implies that marital status does not explain or predict BMI. Next, the ANOVA table (Table 11) shows that marital status does not significantly predict the BMI $F(1, 551) = .231$, $p > .05$. Lastly, the coefficient table (Table 12) shows that the relationship between marital status and BMI is negative but statistically insignificant (b = -26.761, p = .631).

Table 10

Model Summary for Marital Status and BMI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.020[a]	.000	-.001	630.910

a. Predictors: (Constant), Marital Status

Table 11

ANOVA Table for Marital Status and BMI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	91818.568	1	91818.568	.231	.631[b]
	Residual	219324062.749	551	398047.301		
	Total	219415881.316	552			

a. Dependent Variable: Body Mass Index

b. Predictors: (Constant), Marital Status

Table 12

Coefficient Table for Marital Status and BMI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2902.333	80.664		35.981	.000
	Marital Status	-26.761	55.719	-.020	-.480	.631

a. Dependent Variable: Body Mass Index

Income Level and BMI

Lastly, linear regression analysis was performed to determine whether income level predicts BMI. The model summary results (Table 13) showed no correlation between the two variables (r = 0.007). This means that income level is not correlated with BMI. Second, the model summary table shows that the r-square is .000. This implies that income level does not explain or predict BMI. Next, the ANOVA table (Table 14) shows that income level does not significantly predict the BMI $F(1, 427) = .023$, $p > .05$. Lastly, the coefficient table (Table 15) shows that the relationship between income level and BMI is negative but statistically insignificant (b = -6.419, p = .880).

Table 13

Model Summary for Income Level and BMI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.007[a]	.000	-.002	641.819

a. Predictors: (Constant), Income_Level

Table 14

ANOVA Table for Income Level and BMI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9383.501	1	9383.501	.023	.880[b]
	Residual	175895076.769	427	411932.264		
	Total	175904460.270	428			

a. Dependent Variable: Body Mass Index

b. Predictors: (Constant), Income_Level

Table 15

Coefficient Table for Income Level and BMI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2886.135	84.685		34.081	.000
	Income_Level	-6.419	42.529	-.007	-.151	.880

a. Dependent Variable: Body Mass Index

After conducting linear regression analysis, MLR was used to determine whether there was a significant relationship between sociodemographics (including education level, employment status, marital status, and income level) and BMI, while accounting for region by state in the United States. Meaning, I sought out to determine if education level, employment status, marital status, or income level was a significant predictor of BMI while adjusting for region (New Jersey and Alabama). There was not a significant relationship between BMI and sociodemographic factors, including education level, employment status, marital status, and income level in 40- to 59-year-old African American women in Alabama and New Jersey. Although there was a significant value for the omnibus F-test, F (5, 433) = 2.374, p =.038, R^2 = .027, there were no significant variable coefficients, meaning no sociodemographic factors had a significant relationship with BMI, p >.05.

Table 16

MLR Model Summary (RQ1)

R	R^2	Adjusted R^2	Standard Error of the Estimate
.163	.027	.015	7.838

Table 17

MLR ANOVA (RQ1)

	Sums of Squares	df	Mean Square	*F*	*p*
Regression	728.98	5	145.80	2.374	.038
Residual	26,597.76	433	61.43		
Total	27,326.75	438			

Table 18

MLR Analysis with BMI as Dependent Variable (RQ1)

	Estimate	*SE*	95% CI		*t*	*p*
			LL	*UL*		
Fixed effects						
Intercept	33.747	0.875	32.028	35.466	38.582	.000
State [a]	-0.023	1.025	-2.039	1.992	-0.023	.982
Education Level [b]	0.089	0.758	-1.401	1.578	0.117	.907
Income [c]	-1.080	0.712	-2.480	0.320	-1.516	.130
Employment Status [d]	-0.341	0.846	-2.004	1.321	-0.403	.687
Married Status [e]	-1.386	0.874	-3.104	0.333	-1.585	.114

Note. [a] 0 = Alabama, 1 = New Jersey; [b] 0 = some high school, 1 = high school graduate, 2 = college graduate; [c] 0 = $\leq$ \$21,960, 1 = > \$21,960, < \$75,000, 2 = > \$75,000; [d] 0 = not employed, 1 = employed; [e] 0 = not married, 1 = married.

RQ2

RQ2: Does the effect of physical activity on BMI vary based on urban and rural location for 40–59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural?

$H_0$2: The effect of physical activity on BMI does not vary based on urban and rural location for 40–59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural.

H_a2: The effect of physical activity on BMI does vary based on urban and rural location for 40-59-year-old AA women after accounting for sociodemographic factors, region by state, land area (urban/rural), and physical activity*urban/rural.

Before conducting multiple regression analysis, linear regression analysis was performed to determine whether physical activity predicts BMI. The model summary results showed no correlation between the two variables (r = 0.010). This means that physical activity is not correlated with BMI. Second, the model summary table shows that the r-square is .000. This implies that physical activity does not explain or predict BMI. Next, the ANOVA table shows that physical activity does not significantly predict the BMI $F(1, 551) = .056$, $p > .05$. Lastly, the coefficient table shows that the relationship between physical activity and BMI is positive but statistically insignificant (*b* = 13.086, p = .812).

Table 19

Model Summary for PA Impact on BMI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.010[a]	.000	-.002	631.010

a. Predictors: (Constant), Physical activity in past 30 days

Table 20

ANOVA for PA Impact on BMI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22463.599	1	22463.599	.056	.812[b]
	Residual	219393417.717	551	398173.172		
	Total	219415881.316	552			

a. Dependent Variable: Body Mass Index

b. Predictors: (Constant), Physical activity in past 30 days

Table 21

Coefficients for PA Impact on BMI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2844.690	92.828		30.645	.000
	Physical activity in past 30 days	13.086	55.092	.010	.238	.812

a. Dependent Variable: Body Mass Index

Next, multiple linear regression was used to determine whether the interaction of land area (urban/rural) and physical activity have a significant effect on BMI. The interaction term physical activity*urban/rural, was tested to see if the difference in BMI values for those who participated in physical activity in urban vs rural was significantly different than the difference between those who did not participate in physical activity in urban vs rural areas. A MLR regression would not have tested the combined effect of physical activity and urban/rural on BMI unless an interaction term was used.

It is common to test interactions using MLR. The predicted BMI values were determined for 4 groups: (1) No, Physical Activity-Urban; (2) Yes, Physical Activity Urban; (3) No, Physical Activity Rural; (4) Yes, Physical Activity Rural. The interaction of land area (urban/rural) and physical activity does not have a significant effect on BMI after adjusting for education level, employment status, marital status, income level, region by state (Alabama/New Jersey), land area (urban/rural), and physical activity (yes/no), t (430) = .497, p =.620. Therefore, the interaction variable was removed, and a multiple linear regression analysis was conducted without the interaction variable.

Table 22

MLR Model Summary (RQ2)

R	R^2	Adjusted R^2	Standard Error of the Estimate
.194	.037	.020	7.821

Table 23

MLR ANOVA Summary (RQ2)

	Sums of Squares	df	Mean Square	*F*	*p*
Regression	1,023.19	8	127.90	2.091	.035
Residual	26,303.56	430	61.17		
Total	27,326.75	438			

Table 24

MLR Analysis with BMI as Dependent Variable (RQ2)

	Estimate	*SE*	95% CI		*t*	*p*
			LL	*UL*		
Fixed effects						
Intercept	34.359	0.989	32.415	36.303	34.741	.000
State [a]	-0.025	1.043	-2.075	2.025	-0.024	.981
Education Level [b]	0.233	0.761	-1.263	1.729	0.306	.760
Income [c]	-0.997	0.716	-2.405	0.410	-1.393	.164
Employment Status [d]	0.020	0.862	-1.674	1.715	0.023	.981
Married Status [e]	-1.382	0.873	-3.097	0.333	-1.584	.114
Land Region [f]	0.043	1.608	-3.117	3.204	0.027	.979
Physical Activity [g]	-1.830	0.891	-3.582	-0.078	-2.054	.041
Land Region*Physical Activity [h]	1.002	2.018	-2.964	4.967	0.497	.620

Note. [a] 0 = Alabama, 1 = New Jersey; [b] 0 = some high school, 1 = high school graduate, 2 = college graduate; [c] 0 = $\leq$ \$21,960, 1 = > \$21,960, < \$75,000, 2 = > \$75,000; [d] 0 = not employed, 1 = employed; [e] 0 = not married, 1 = married; [f] 0 = urban, 1 = rural; [g] 0 = no physical activity, 1 = yes physical activity; [h] interaction term.

Interaction terms are removed from the model if they are not significant because it adds an extra term to the model which causes more complexity, but lacks value. In other words, it lacks parsimony (Glen, 2015; Pennsylvania State University [PSU], 2018). A parsimonious model should only have just enough variables to explain the DV and adjust for known confounders, but not more than that, otherwise the model is not as efficient. Main effects, which are the variables that comprise the interaction term, in this case they are physical activity and urban/rural classification, cannot be interpreted if an interaction is significant because the interpretation of each of the main effects changes based on another variable (PSU, 2018). But since it was not significant, the significant predictor of physical activity was able to be interpreted. This new model was significant, as indicated by the omnibus F-test, F (7, 431) = 2.358, p =.023, R2 = .037. The only significant predictor was physical activity within the past 30 days, t (430) = -2.054, p =.041. Therefore, 3.7% of the variation in BMI was explained by physical activity participation. African American women aged 40 to 59 years old who participated in physical activities within the last month had significantly lower BMI values. Specifically, those who participated in physical activity had on average 1.8 units of BMI lower than those who did not participate in physical activity in the last month p =.041.

Table 25

New MLR Model Summary

R	R^2	Adjusted R^2	Standard Error of the Estimate
.192	.037	.021	7.814

Table 26

New MLR ANOVA

	Sums of Squares	df	Mean Square	*F*	*p*
Regression	1,008.11	7	144.02	2.358	.023
Residual	26,318.64	431	61.06		
Total	27,326.75	438			

Table 27

New MLR Analysis with BMI as Dependent Variable

	Estimate	*SE*	95% CI		*t*	*p*
			LL	*UL*		
Fixed effects						
Intercept	34.243	0.960	32.356	36.130	35.666	.000
State [a]	-0.019	1.042	-2.068	2.029	-0.019	.985
Education Level [b]	0.234	0.760	-1.261	1.728	0.307	.759
Income [c]	-0.980	0.715	-2.385	0.424	-1.372	.171
Employment Status [d]	-0.013	0.859	-1.701	1.674	-0.015	.988
Married Status [e]	-1.384	0.872	-3.098	0.329	-1.588	.113
Land Region [f]	0.666	1.006	-1.310	2.642	0.662	.508
Physical Activity [g]	-1.646	0.809	-3.236	-0.055	-2.033	.043

Note. [a] 0 = Alabama, 1 = New Jersey; [b] 0 = some high school, 1 = high school graduate, 2 = college graduate; [c] 0 = $\leq$ \$21,960, 1 = > \$21,960, < \$75,000, 2 = > \$75,000; [d] 0 = not employed, 1 = employed; [e] 0 = not married, 1 = married; [f] 0 = urban, 1 = rural; [g] 0 = no physical activity, 1 = yes physical activity.

The objective of this quantitative cross-sectional study was to examine if there is an association between sociodemographics and the body image perception (indicated by BMI) among 40–59-year-old AA women in AL and NJ. Additionally, the study sought to determine if the effect of physical activity on BMI vary based on urban and rural locations for 40–59-year-old AA women, after accounting for sociodemographic factors, and land area (urban/rural), and interaction term (land area*physical activity: yes or no).

The population under study was 40-59 y/o AA women in AL & New Jersey. Multiple linear regression was used to answer both research questions. Before conducting multiple regression analysis to test the hypothesis, linear regression analyses were also conducted to determine whether each sociodemographic variable is associated with BMI. The linear regression analyses showed that each of the predictors was not associated with BMI. The results of the MLR revealed there was no association between the sociodemographics (education level, employment status, marital status, income level groups), in 40-59-year-old AA women in Alabama and New Jersey.

There was no significant difference between Alabama and New Jersey on sociodemographic factors and BMI. Therefore, there was evidence not to reject the null hypothesis. The second research question was examined using MLR where BMI was the dependent variable and the independent variables were education level, employment status, marital status, income level, land area (urban/rural), and interaction term (land area*physical activity).

Before conducting multiple regression analysis, linear regression analysis was performed to determine whether physical activity predicts BMI. Linear regression analysis revealed no association between physical activity and BMI.

There was no association between BMI and the independent variables. Thus, there was evidence not to reject the null hypothesis. What is important to note, is that once the interaction term was removed from the statistical analysis, due to the lack of significance, the results indicated that those that had participation in physical activity in the last 30 days, had a significant impact on BMI.

In Section 4, I reiterate the purpose and nature of the study and why it was conducted, summarize key findings, discuss the limitations of the study, make recommendations, discuss the implications for professional practice and social change and discuss conclusions for my study.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The objective of this quantitative cross-sectional study was to examine associations between BMI and education level, employment status, marital status, income level, region by state (AL/NJ), physical activity, and urban and rural location. The population under study was 40–59-year-old AA women in AL and NJ. The reason this age range was selected was because this group had the highest obesity prevalence (44.8%), compared to young adults aged 20 to 39 and adults 60 years and older. AL was selected because it had a population size of 668,831 AA women, and a 36.3% overall obesity rate; it was ranked fifth among 51 US states in terms of obesity rates. NJ was selected because it had a similar population size of 639,120 AA women, but had an overall lower obesity rate of 27.3%, and was ranked 41 out of 51 states.

For RQ1, MLR was used to determine whether there was a significant relationship between sociodemographics and BMI, while accounting for region by state in the US. Results revealed there was not a significant relationship between BMI and sociodemographic factors among 40 to 59-year-old AA women in AL and NJ. Although there was a significant value for the omnibus F-test, with F (5, 433) = 2.374, p =.038, R^2 = .027, there were no significant variable coefficients, meaning no sociodemographic factors had a significant relationship with BMI (p >.05).

For RQ2, before conducting multiple regression analysis, linear regression analysis was performed to determine whether physical activity predicts BMI. Linear regression analysis revealed no association between physical activity and BMI. There was no association between BMI and the independent variables namely education level, employment, marital status, income level, and physical activity in past 30 days. Thus, the null hypothesis had to be accepted. Using MLR, I examined whether the effect of physical activity on BMI varied based on urban or rural location. Analysis was conducted while accounting for sociodemographic factors, land area (urban/rural), and physical activity.

There was no association between physical activity on BMI based on urban and rural location. Thus, the null hypothesis had to be accepted. However, once the interaction term (physical activity*urban/rural) was dropped from the statistical analysis, results of the new analysis indicated that for those who participated in physical activity in the last 30 days, this had a significant impact on BMI.

This new analysis was significant, as indicated by the omnibus F-test, with F (7, 431) = 2.358, p =.023, and $R2$ = .037. The only significant predictor was physical activity within the past 30 days, with t (430) = -2.033 and p =.043. Therefore, 3.7% of variation in BMI was explained by physical activity participation. AA women between 40 and 59 who participated in physical activities within the last month had significantly lower BMI values. Specifically, those who participated in physical activity were on average 1.8 units of BMI lower compared to those who did not participate in physical activity in the last month (p =.041).

Interpretation of the Findings

2018 BRFSS data used in this study revealed that among the 594 AA women between 40 and 59 in AL (498) and NJ (96), there was not a significant relationship between BMI and sociodemographics while accounting for region by state in the US. This particular subset of 40–59-year-old AA women was not previously studied. Ogden et al. (2017) observed no difference in terms of prevalence of obesity across all income levels in AA women. Among non-Hispanic White women, obesity prevalence was lowest in the highest income group. Obesity prevalence among college graduate women was lowest, except there was no difference in terms of prevalence of obesity by education level among non-Hispanic Asians. Although obesity prevalence varies based on education and income levels, patterns may differ between low- and high-income countries. Lower levels of education and income cannot be universally associated with obesity and this varies according to sex and race (Ogden et al., 2017).

I did not find a significant relationship between marital and employment status and BMI of AA women in NJ and AL when compared to previous studies with heterogeneous populations. Qobadi and Payton (2017) said marital status was positively associated with male obesity but negatively associated with female obesity. Non-Hispanic Black adults had the highest rate of obesity prevalence among all explanatory variables, compared to White adults (Qobadi & Payton, 2017). Additionally, Black females were more likely to be obese and had higher rates of obesity prevalence when their income level was less than $25,000 annually, they had less than a high school degree, or were unemployed and physically inactive (Lee et al., 2019; Makambi & Adams-Campbell, 2018; Qobadi & Payton, 2017).

Curry (2020) noted that AA women with some college experience such as an associate’s degree were found to be obese compared to groups with more advanced degrees. The exact reasons were unclear, but Curry (2020) said AA women may have to work multiple jobs, which precludes their ability to engage in physical activity or healthy eating. Overall, 367 (72.4%) of AA women in my study graduated from high school, and 164 (27.6%) were college graduates, 206 (44.8%) of the population's income level was greater than $21,960 but less than $75,000, compared to 161 (35%) who made less than $21,960. Of this population, 51.9% of the sample was employed, and 61.4% of the population engaged in physical activity within the past 30 days.

In a study by Qobadi and Payton (2017), once they controlled for confounders, gender, age, education, and physical activity were associated with increased risk of obesity among Whites only. Their results revealed that gender was the only variable significantly associated with increased risk of obesity among the blacks. They stated that this may be due to the economic disparities that exist between blacks and whites. In other words, middle-class blacks may not be afforded the same resources and opportunities as middle-class whites, and blacks of the same SES are more likely to reside in disadvantaged neighborhoods (Qobadi & Payton, 2017).

Since SES does not always translate into the same opportunities for all races, this may be a plausible reason why there was not a significant relationship in my study between the sociodemographics (including education level, employment status, marital status, and income level) and the BMI among AA women aged 40-59-years old in Alabama and New Jersey, while accounting for region by state in the United States.

Based on descriptive analysis, a majority of the population in my study was employed (51.9%), had a high school education (72.4%), and earned more than a minimum income greater than $21,960, but less than $75,000 (44.8%).

Listwise deletion is the default method in statistical software for handling missing data. This means when there is missing data, cases are dropped from analyses, which can impact statistical power; statistical power is directly tied to sample size. The minimum sample size needed for my study was 109 in order to produce statistically significant results using an alpha level of 0.05 for a desired power of .80 and an effect size of .15. Therefore, I had an adequate sample size after deletion of cases based on missing data.

The purpose of RQ2 was to determine whether the effect of physical activity on BMI varied based on urban and rural area in 40–59-year-old AA women, after accounting for sociodemographic factors, region by state (AL and NJ), and land area (urban/rural. The results based on my research questions were not statistically significant. The effect of physical activity on BMI did not vary based on urban or rural areas in 40–59-year-old AA women.

In the US, physical activity levels among adults in the rural areas were lower compared to urban areas (Hansen & Hartley, 2015; Lundeen et al., 2018 & CDC, 2016). The most robust study by Lundeen et al. (2018) included a sample of 438,479 adults from 50 states, utilizing the BRFSS. The results of my research did not support these findings; however, it is important to note that there were only 100 AA women in the sample from a rural area compared to those AA women living in urban areas (494). Previous studies have found that rural populations suffer from obesity-related illnesses at a higher rate than urban or suburban populations, although some findings were mixed. Howbeit, these studies were conducted among both male and female respondents, as well as multiple ethnic groups and varying age ranges from 18-65 years old(Hill et al., 2014; Gurka et al., 2018; Lundeen et al., 2018 & Lee et al., 2019).

Lee et al. (2019) revealed that rising levels of BMI in rural areas can be related to the 55% of global increases in BMI. In their study they found rural areas to be associated with 1.36 higher odds of obesity compared to urban areas. They found those odds could be reduced by 94% and the relationship could be considered statistically insignificant, if mediated through built environmental features, median household income levels and individual education attainment levels (Lee et al., 2019). Due to the use of secondary data, the sample size of AA women living in a rural area versus an urban area, was not evenly divided. There were only 100 AA women in my study's sample from a rural area, and 494 from an urban area; only 63 (10.6%) of the AA women in the sample did not graduate from high school. One-hundred sixty-four (27.6%) of the sample graduated from college.

The majority (44.8%) of the population's income level was greater than $21,960 but less than $75,000, compared to 161 AA women (35%) who made less than $21,960. There were 93 AA women (20.2%) that made greater than or equal to $75,000. The aforementioned factors may have contributed to the reason that the effect of physical activity on BMI did not vary based on urban or rural areas in 40–59-year-old AA women, after accounting for sociodemographic factors, region by state (AL & NJ), land area (urban/rural), and physical activity*urban/rural (physical activity, yes or no for urban and rural areas). The interaction terms (physical activity*urban/rural) were removed from the model since they were not significant because it added more complexity, but lacked parsimony (Glen, 2015; Pennsylvania State University [PSU], 2018).

After removal of the interaction term from the research question, the results revealed, African American women aged 40 to 59 years old, who participated in physical activities within the last month had significantly lower BMI values. It is important to note that the average body mass index for AA women aged 40-59 years old in my study was 32.2 (SD =7.6, range 16.4 – 69.4). Therefore, the majority of the sample (52.9%), based on their BMI, was considered obese, despite the majority (61.4%) of the population self-reporting they engaged in physical activity within the past 30 days. Although sociodemographic factors and geographic areas were not significant predictors of BMI in my study, participation in physical activity within the last 30 days had a significant effect on BMI levels. This is important since physical activity is an important intervention in the fight against obesity and the desire to maintain a healthy lifestyle, especially among AA women. Previous studies found that socioeconomic status was mostly associated with obesity in women, and specifically, women with a lower SES were more likely to be obese due to a lack of engagement in physical activity and inadequate nutrition (Curry, 2020; Lee et al., 2019; Makambi & Adams-Campbell, 2018). Studies have also revealed that women with higher levels of education engaged more frequently in physical activity (Curry, 2020; Lee et al., 2019; Makambi & Adams-Campbell, 2018; Mokdad et al., 2003). Previous studies indicated the higher the level of education, the more vigorous the physical activity, except for where older age was a factor (Makambi & Adams-Campbell, 2018).

This information may be useful in behavior change programs and counseling of African American women who are obese, who generally have higher body satisfaction than Caucasian women as found in previous studies (Baruth et al., 2015; Draper et al., 2016; Gustat et al., 2017; Lynch & Kane, 2014; Okop et al., 2016), and may benefit from a lower BMI, particularly for the AA women in my study, who are considered middle-age (CDC, 2020b). Potential health benefits of a lower BMI include lowering the risk of heart disease, certain cancers, type 2 diabetes, stroke, mental illnesses such as clinical depression and anxiety, and low quality of life (CDC, 2020b). Participating in some form of physical activity within the past 30 days was a significant predictor of lower BMI in my study, highlighting the need for education regarding obesity in African American women and strategies to combat obesity as an epidemic.

However, education alone does not change behavior. Obesity itself is a multi-layered problem. It's a complex disease where there is an accumulation of body fat that may lead to chronic conditions and health problems (Mayo Clinic, 2021). The contributing factors are just as complex; they can include metabolic, genetic, biological, sociocultural, and psychological factors (Mayo Clinic, 2021). Understanding the complex interplay between genetics and environmental factors, can be a blueprint for creating individualized, multilevel intervention plans. Psychological and social factors can influence health behaviors such as eating patterns and participation in routine physical activity. Addressing this multifaceted disease through behavior modification programs, adds to successful, individualized, weight management goals which may result in sustainability of the achieved weight loss goals (Kelley, Sbrocco, & Sbrocco, 2016).

The Social Cognitive Theoretical study, can be used to explain the results. The SCT offers a comprehensive framework for understanding health-related behaviors and how to change the identified behaviors through control and reinforcement actions leading to the desired behavior (Glanz et al., 2015; LaMorte, 2019). Since AA women have a high satisfaction with a higher body weight, this may contribute to a lack of motivation to engage in physical activity (Lynch & Kane, 2014; Mama et al., 2015; Okop et al., 2016; Tennant, 2016). A primary motivational factor of SCT that can be applied among AA women is outcome expectancies based on an individual's motivation to modify or change behaviors (Glanz et al., 2015; LaMorte, 2019). The social cognitive theory assumes three factors, personal cognitive factors (body mass index), behaviors (physical activity), and environments (education level, employment status, marital status, and income level, and New Jersey and Alabama, urban/rural, physical activity), constantly interact by either influencing or being influenced by each other.

Joseph et al. (2017) posit that AA women in the US are one of the least physically active (PA) groups based on self-reported data from the 2000-2014 National Health Interview Survey (NHIS). The survey revealed that 36 percent of AA women participated in various intensity levels of physical activity (Joseph et al., 2017). The 36 percent of AA women were compared to 50% percent of the US population as whole, and 49 percent of white women who achieved the recommended guidelines. AA women are disproportionately affected by not only obesity-related diseases, but also the burden of

PA-related cardiometabolic disease conditions. Joesph et al. (2017) posits that the SCT's dynamic and reciprocal model regarding the promotion of PA among AA women is relevant due to many PA promotion constructs, such as self-regulation, self-efficacy, and social support. The fact that these constructs can be culturally tailored to fit AA women's distinct ethnic, experimental knowledge and kinship may strengthen the effectiveness of the intervention.

Limitations of the Study

There are several limitations in this study. The study used secondary cross-sectional data which relied on self-reported data. This increases the chance of bias, such as the self-reported BMI. Ward et al. (2016) posit that historically, research has revealed that self-reported body measurements, especially by women, has led to underestimations of BMI. Bias in studies may skew the results of the study (Ng, 2019). Additionally, secondary data fails to determine causation in a study (Gross et al., 2016). The data collected for the population for each state was not evenly distributed among race, gender, or sociodemographic; it contained missing variables. Finally, the data collected was from one southern and one northern state and a specific demographic and age group; therefore, the findings may not be generalizable to the entire US population.

Recommendations for Future Research

Future research may be necessary to determine the amount of physical activity participation that can benefit African American women, specifically in this unique age group of 40-59-year-old women, where obesity can pose a significant health risk (CDC, 2015; CDC 2020b). Researchers should consider longitudinal studies with a more evenly divided sample of AA women based on geographic areas, and a larger sample size, using age as a predictor, to gain insight on the most effective interventions to change perceptions and behaviors for AA women. Quantitative instrumentation should also be considered to measure physical activity and BMI. This may help to reduce bias from the reliance of self-reported data. The PA question used in this study did not ask about weekly frequency or intensity. Respondents were asked, "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?" The CDC (2021a) recommends for adults 18-64 years old, to engage in 150 minutes a week of moderate walking, and at least two days a week of muscle strengthening activities. Future research questions regarding physical activity engagement, should be framed around science-based guidelines to inform the public regarding recommended activity levels. Finally, due to the unique problem facing this population related to their skewed body-image perception, based on cultural misperceptions, a qualitative study may give researchers more insight on specific interventions that reduce barriers to physical activity engagement, since body size and BMI alone is not a motivator for weight loss.

Implications for Professional Practice and Social Change

Although the literature review for this study revealed there were a number of social and environmental factors that influence obesity, there were no significant predictors for overweight/obesity as measured by BMI in this study for AA women aged 40-59 years old. Consistent in the literature review, regardless of any social and environmental obesity level factors, engagement in physical activity was an effective strategy for lowering BMI in AA women. The results of this study may assist public health professionals develop culturally appropriate programs targeting at-risk minorities, by implementing behavior modification programs that specifically are tailored to the needs and stressors that address AA women behavior modification programs can be implemented to assist AA women with tailored interventions related to engagement in physical activity to reduce BMI levels. Multi-level strategies can be developed to reduce health disparities and achieve health equity.

Due to the unique problems facing this population, a more collaborative approach to research is needed where the participants and researchers become partners throughout the whole process. This approach is called community-based participatory research (CBPR). This more holistic approach will allow researchers to gain insight on the values AA women subscribe to which may prove to be more impactful when addressing poor health and chronic diseases (CDC, 2017). CBPR is a collaborative approach that incorporates perspectives, which address the SDOH of the most vulnerable and underrepresented populations. CBPR is an equitable approach that involves all members of the community in the research process to gain strengths and insights into the problem, but also to develop solutions identified by the participants, community and academic leaders, and everyone involved in the research process from its inception (CDC, 2017).

Conclusion

Concerted efforts to address the epidemic of obesity are needed to reduce racial and ethnic disparities in health. Despite all research published on the subject of obesity, and specifically on the AA population, about 4 out of 5 African American women are still overweight or obese. AA women suffer from obesity-related illnesses which decrease their quality of life and increase the morbidity and mortality rate among this population. The direct and indirect costs of obesity negatively impact job growth in the U.S. when private businesses and the federal government have to pay higher costs for disability and unemployment benefits due to a loss of job productivity related to absenteeism.

Physical activity (PA) participation within 30 days was found to have the most significant impact on BMI in this study. PA inactivity is a modifiable risk factor regardless of gender, race, ethnicity, SES or geographic region. AA women's cultural perception may shed light on their satisfaction with having high BMI levels, and lack of engagement in PA. However, the obesity epidemic is a complex issue and all of the aforementioned variables (gender, race, ethnicity, SES, and geographic region) must be addressed in order to reduce health disparities and achieve health equity. The results from this study could be useful in formulating PA programs aimed at reducing barriers to PA engagement among AA women. Positive social change implications of these findings could be achieved through creating culturally appropriate PA interventions to reduce obesity rates among AA women.

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