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The Association Between Race and Obesity After Controlling for Dietary Behaviors Among Adolescents

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Walden University
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Abstract

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Among Adolescents

by

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MA, Trident University, 2015

BS, Medical College of Georgia, 2011

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health/Community Health

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Abstract

Childhood obesity has become a critical global public health concern due to its significant, long-term impact on overall quality of life and physical health. Despite efforts, there is a lack of information that includes all races and ages to combat childhood obesity. This study addressed the association between race and obesity after controlling for dietary behaviors among adolescents in Georgia, using quantitative cross-sectional data from the 2021 Youth Risk Behavior Surveillance System (YRBSS). Guided by the social ecological model, the research investigated how demographic factors and dietary behaviors influence obesity rates. Specifically, the study explored the association between age, race, gender, and dietary behaviors as predictors of obesity. The analysis employed a chi-square test and crosstabs to evaluate these associations. The study revealed that Black or African American adolescents have the highest obesity rates, with an odds ratio of 2.70 compared to White adolescents, indicating that they are approximately 2.70 times more likely to be obese. Hispanic adolescents also had higher obesity rates, with an odds ratio of 2.38 compared to their White peers. No significant difference was observed between adolescents categorized as all other races and White race. These findings emphasize the need for targeted public health interventions addressing socioeconomic and environmental factors, focusing on culturally tailored strategies. By identifying critical predictors of obesity, the study may facilitate meaningful social change and promote healthier lifestyles among adolescents. Addressing these factors could lead to improved health outcomes and contribute to reducing health problems in this population.

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Dedication

I dedicate this dissertation to my daughters, Keria and Ma'Leya. They inspire me to persevere even when faced with challenges. Additionally, I dedicate this dissertation to my late mother, Verna J. Wilcox, whose memory continued to motivate me. I strive to honor her legacy with every accomplishment.

Acknowledgments

I want to express my deepest gratitude to God throughout this journey. I am thankful for the divine grace that has enabled me to pursue and complete this work. This accomplishment would not have been possible without His blessings, support, and unwavering presence. I also extend my heartfelt thanks to Dr. Rohrer for your unwavering support throughout my dissertation journey. Your encouragement has been a constant source of motivation, and your dedication to holding me accountable has significantly contributed to my progress. I sincerely appreciate the time you took to make a phone call and provide guidance, which has been invaluable in navigating the challenges of this process. Your support has made a profound difference, and I am truly grateful for your assistance and commitment.

Table of Contents

List of Tables

Chapter 1: Introduction to the Study

Introduction

In the United States, childhood obesity affects 1 in 5 children and adolescents, creating a severe health problem. Over the years, the prevalence of childhood obesity has increased (Karnik & Kanekar, 2012). Childhood obesity exposes adolescents and children to poor health risks (Centers for Disease Control and Prevention [CDC], 2022a). Childhood obesity is associated with short-term and long-term effects, including respiratory problems, high blood pressure, cardiovascular diseases, and certain types of cancer. (Balasundaram & Krishna, 2023). Childhood obesity is associated with poorer mental health outcomes and reduced quality of life, causing a severe issue (CDC, 2022a).

Many factors influence obesity, such as genetics, social determinants of health, and environmental and behavioral factors (CDC, 2022a). Among these factors, dietary behaviors are critical in developing and managing obesity. Unhealthy dietary habits, such as excessive consumption of high-calorie, low-nutrient foods and sugary beverages; frequent consumption of fast food and processed snacks; and low intake of fruits and vegetables, are significant contributors to obesity prevalence in adolescents. Addressing these unhealthy dietary habits in adolescents requires education for adolescents and families.

Childhood obesity rates vary across different ethnic and racial groups. Certain groups of the population are affected by obesity more than others. In 2017–2018, the obesity prevalence was 21.2% among 12- to 19-year-olds. However, the data revealed noticeable differences when broken down by ethnicity: Obesity prevalence was notably higher in certain racial and ethnic groups. Distinctively, among Hispanic adolescents, the prevalence was 25.6%; among non-Hispanic Black adolescents, it was 24.2%; among non-Hispanic White adolescents, the results were16.1%; and among non-Hispanic Asian adolescents, it was noticeably lower at 8.7% (CDC, 2022c).

For this cross-sectional secondary data study, the social ecological model was used to investigate the association between race and obesity after controlling for dietary behaviors among adolescents in Georgia. The study utilized data from the 2021 Youth Risk Behavior Surveillance System (YRBSS). Every 2 years, the CDC conducts YRBSS surveys, targeting students in ninth through 12^{th} grade (CDC, 2023b). The YRBSS incorporates survey samples from national, state, tribal government, territorial and freely associated state, and local school-based surveys (CDC, 2023c).

Childhood obesity is increasingly affecting all ethnic and racial groups (CDC, 2023c). Over the past three decades, childhood obesity has been prevalent (Sanyaolu et al., 2019). Educating school-aged adolescents regarding childhood obesity is an essential factor in raising awareness of this issue. Implementing targeted interventions and strategies to address the leading cause of childhood obesity within different communities is necessary. Educating adolescents about childhood obesity and emphasizing dietary behavior can aid in understanding and addressing the problem. This study may contribute to positive social change by reversing the trend of childhood obesity.

This chapter encompasses the background, problem statement, purpose of the study, research questions, and hypotheses. Additionally, it incorporates the theoretical framework, nature of the study, definitions, assumptions, scope and delimitations, limitations, and significance.

Background

Obesity is exhibited as a condition when an individual's weight surpasses healthy ranges (CDC, 2022a). Excess weight gain stems from dietary patterns, sleeping routines, and physical activity levels (CDC, 2022a). Additionally, genetics, medications, and social determinants of health play significant roles in contributing to obesity(CDC, 2022a). Efforts to address childhood obesity may include fostering habits such as consuming more fruits and vegetables, ensuring that children get 8 to 10 hours of sleep, and ensuring that children engage in physical activity for at least 60 minutes daily (CDC, 2022a). Communities, initiatives, and public health practitioners are collaborating to dismantle barriers to health and foster a healthier society (CDC, 2022a).

Childhood obesity not only places adolescents and children in jeopardy of poor health outcomes, but also exceedingly affects specific populations (CDC, 2022c). Among children and adolescents aged 2–19, obesity-related conditions include asthma, sleep apnea, joint problems, diabetes, high blood pressure, and high cholesterol (CDC, 2022c). From 2017–2020, the prevalence of obesity was 19.7%, impacting approximately 14.7 million children and adolescents (CDC, 2022c). Obesity prevalence was 22.2% among 12- to 19-year-olds in 2017–2020 (CDC, 2022c).

According to the CDC (2022c), obesity prevalence among children and adolescents in the United States varies by race and ethnicity. Childhood obesity affects children from diverse racial and ethnic backgrounds; specific groups may experience higher prevalence rates of obesity compared to others (Caprio et al., 2008). Research has uncovered notable disparities among different racial and ethnic groups. Racial groups and ethnic minority groups, including African American, Hispanic/Latino, and American/Indian/Alaska Native populations, face significantly elevated rates of obesity in contrast to White and Asian populations (Petersen et al., 2019).

In the United States, a substandard diet ranks among the primary contributors to obesity and numerous chronic diseases (Stowers et al., 2020). The impact of dietary behaviors may help explain some socioeconomic and racial/ethnic inequalities in health (Stowers et al., 2020). The food environment plays a critical role in determining childhood obesity, with the marketing of unhealthy food and beverages to children identified as a crucial factor contributing to poor diet and excess weight gain among youth (Bagnato et al., 2023). Dietary habits, such as portion sizes, food choices, eating patterns, and dietary quality, vary across racial and ethnic groups, and many contribute to differential obesity risk. A national study found that non-Hispanic Blacks had worse diet quality measured by the Healthy Eating Index (HEI) than non-Hispanic Whites (Stowers et al., 2020). Disparities in access to healthy food options, affordability of nutritious foods, and food marketing practices contribute to dietary behaviors and obesity risk among racial and ethnic minority populations (Bagnato et al., 2023).

Although researchers have investigated the issue, limited studies have examined differences in dietary factors between race and obesity and obesity among adolescents. It is essential to understand the causes, consequences, and prevention strategies to combat childhood obesity. This study exhibits dietary behaviors that aid in combating childhood obesity by observing dietary behaviors and patterns in children and identifying which practices are most effective in reducing or preventing obesity. There is a lack of information that includes all races and adolescents on how to combat childhood obesity by observing dietary behavior. The findings from the study display dietary behaviors that aid in combating childhood obesity and race. Targeted promotional outreach efforts can be designed to promote healthier habits by focusing on families that exhibit high-risk behaviors. This information will also promote a healthier future for adolescents.

Problem Statement

This study addressed the research problem of a lack of information that includes all races and ages to combat childhood obesity by observing dietary behavior. Childhood obesity is a global public health crisis, with its prevalence steadily rising over the years (Karnik & Kaneka, 2012). The issue that prompted my literature search was the limited number of studies that investigated differences in dietary behaviors between race and obesity among adolescents. Childhood obesity exposes adolescents and children to significant health risks (CDC, 2022c). Obesity affects certain demographic groups more than others. For instance, in 2017–2018, the prevalence of obesity among 12- to 19-year-olds was 21.2% (CDC, 2022c).

However, the data revealed noticeable differences when broken down by ethnicity: Obesity prevalence was notably higher in certain racial and ethnic groups. Distinctively, among Hispanic adolescents, the prevalence was 25.6%; among non-Hispanic Black adolescents, it was 24.2%; among non-Hispanic White adolescents, the results were16.1%; and among non-Hispanic Asian adolescents, it was noticeably lower at 8.7% (CDC, 2022c). Educating school-aged adolescents and their families about childhood obesity is essential in decreasing its prevalence, and emphasizing dietary behavior can be critical in addressing this issue. Limited studies have investigated the differences in dietary factors between race and obesity among adolescents.

Purpose of the Study

The primary purpose of this quantitative study was to analyze cross-sectional secondary data to examine the differences in dietary behaviors by race and obesity among adolescents living in Georgia. Utilizing the 2021 YRBSS dataset enabled the analysis of adolescents to examine if there was an association between race and obesity within this population. Race served as the independent variable, while obesity was the dependent variable. The study examined how dietary behaviors vary by race and their impact on obesity among adolescents.

Research Questions and Hypotheses

Research Question 1 (RQ1): Is there an association between Black or African American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender?

*H*01: There is no association between Black or African American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

*H*a1: There is an association between Black or African American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

RQ2: Is there an association between Hispanic ethnicity and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender?

*H*02: There is no association between Hispanic ethnicity and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

*H*a2: There is an association between Hispanic ethnicity and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

RQ3: Is there an association between Asian American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender?

*H*03: There is no association between Asian American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

*H*a3: There is an association between Asian American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

RQ4: Is there an association between White American race and obesity in adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender?

*H*04: There is no association between White American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

*H*a4: There is an association between White American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

Theoretical and/or Conceptual Framework for the Study

The analysis was grounded in the social ecological model, a theoretical framework developed by psychologist Urie Bronfenbrenner. The social ecological model is called the ecology of human development (Bronfenbrenner, 1979). According to Bronfenbrenner (1979), the ecology of human development entails the scientific study of the progression and mutual accommodation between an active, growing human being and the changing properties of the immediate settings in which the developing person lives. The social ecological model, as outlined by the CDC (2022a), serves as a preventive framework, emphasizing the importance of understanding the factors influencing childhood obesity. There are four-level social-ecological models. The four levels are individual, relationship, community, and societal (CDC, 2022a).

Utilizing the social-ecological model offered insight into the complex factors contributing to childhood obesity, particularly concerning dietary behaviors. I analyzed the complex relationships among variables by employing a social-ecological model. Through this study, I aimed to highlight the association between age, race, gender, and dietary behaviors as predictors of obesity. Gender, race, age, and dietary behaviors align with the individual constructs of the social-ecological model. According to the CDC (2022), the first level of the model identifies personal and biological history factors that heighten the likelihood of becoming a victim or perpetrator of childhood obesity. Prevention strategies at this level promote beliefs, attitudes, and behaviors conducive to averting childhood obesity, incorporating aspects such as physical activity, sleep patterns, dietary habits, and genetics (CDC, 2022). At the second level of the social-ecological model lies the realm of relationships. The second level encompasses partners, family members, and the individual's closest circle of peers, all of whom influence their behavior (CDC, 2022a).

Prevention strategies at the relationship level encompass family-focused prevention programs, peer programs, and mentorship initiatives. These initiatives aim to enhance parent involvement, foster healthy relationships, nurture problem-solving skills, and promote positive peer norms (CDC, 2022a). At the community level, examination extends to the neighborhoods and schools where social relationships occur and attempts to identify the characteristics of the settings linked to childhood obesity. Whether the community has access to healthy food and whether physical activity opportunities are available are questions at the community level (CDC, 2022b). The fourth level of the social-ecological model is societal. Societal factors shape the environment, inhibiting or encouraging childhood obesity (CDC, 2022a). Societal factors encompass cultural and social norms that either endorse or discourage childhood obesity as a means of problem resolution. Additionally, media messages concerning body image and food, food and agricultural policies, and income inequalities are influential factors at the societal level (CDC, 2022a).

Nature of the Study

This study utilized a cross-sectional research design to examine the impact of dietary behaviors on childhood obesity. Secondary data from the YRBSS were obtained to compare various races while controlling for dietary behavior. Additionally, the study utilized logistic regression analysis as a statistical technique to examine the association between race and obesity when controlling for relevant covariates such as consumption of vegetables, breakfast, 100% fruit juice, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender. This quantitative approach allowed for systemic examination and statistical analysis focused on assessing the relationship between race and obesity when controlling for dietary behaviors among adolescents in Georgia.

Intuitional support, participation, finances, and involvement at home represent limitations, challenges, and barriers that require addressing. Data may lack comprehensive coverage for all variables of interest, challenging understanding the rationale behind data collection methods. Potential bias in outcome assessment warrants consideration, as does the need for policies and training on ethical and cultural concerns. Threats to validity include social interactions, participant dropout, and large sample size. The inability to measure the temporal relation between risk factors and outcomes presents another challenge.

Definitions

Body mass index (BMI): A measure calculated by dividing a person’s body weight in pounds or kilograms by the square of their height in feet or meters (CDC, 2024). High body fatness may indicate a high BMI. The BMI calculator applies only to adults, whereas the BMI percentile chart calculates children's and infants' BMIs. The BMI percentile chart assesses the weight status category and the percentile range.

- *underweight*: Less than the 5th percentile
- *healthy weight*: 5th percentile to less than the 85th percentile

- *overweight*: 85th to less than the 95th percentile
- *obesity*: equal to greater than the 95th percentile (CDC, 2022f)

Obesity: Excessive or abnormal fat accumulation that causes a health risk. Obesity is BMI > 95th percentile (World Health Organization, 2024).

Race: Current classifications are Black or African American, White, Asian, American Indian or Alaska Native, and Native Hawaiian or other Pacific Islander (Bagnato et al., 2023).

Dietary behaviors: Food choices, dietary nutrition or intake, and eating behavior (Stok et al., 2018).

Youth Risk Behavior Surveillance System (YRBSS): Monitors health-related behaviors devoted to the leading cause of disability among youth and adults. This study focused on obesity in adolescents (CDC, 2023b).

100% fruit juice: Fruit juice made from 100% liquid fruit with no preservatives, sugar, or added colorings; the juice comes directly from fruits and vegetables (CDC, 2023a).

Vegetables: Part of plants that humans consume as food (Merriam-Webster, n.d.-b).

Breakfast: First meal of the day; a meal consumed in the morning (Merriam-Webster, n.d.-a).

Age: Age at last birthday; age in completed years (CDC, 2023e).

Gender: The behaviors, activities, cultural roles, and attributes expected of people based on their sex (CDC, 2022g).

Assumptions

I utilized data from the YRBSS to explore the association between race and obesity among adolescents when controlling for dietary behaviors. I assumed the honesty and completeness of participants' responses, assuming that they answered each question to the best of their ability without bias. I also thought this study's findings and information would be accurately reported. The research was believed to have been conducted using ethical principles.

Scope and Delimitations

The scope of this study encompassed the evaluation of various adolescent risk behaviors, with a particular focus on childhood obesity. The study used data from the YRBSS to explore the association between race and obesity after controlling for dietary behaviors. Specifically, the study focused on results from the 2021 YRBSS among adolescents residing in Georgia. The racial groups under examination included Black or African American, White, Asian, and Hispanic populations. It was imperative to research data sets aligned with the study's scope to ensure accurate and relevant findings.

Limitations

The study encountered several limitations during its reliance on secondary data analysis. First, this study heavily relied on self-reported data to evaluate eating behaviors, which can introduce biases. Additionally, the response rates and analyses for nonresponse bias in the YRBSS data revealed significant data limitations. Moreover, the dataset's applicability to youth enrolled in school renders it nonrepresentative of all the individuals in the age group (Underwood et al., 2020). The YRBSS data's limitation concerning ethnicity and race data was notable, as the data categorized race and ethnicity into broad groups such as Hispanic, Black, and White (Underwood et al., 2020).

Determining the overreporting or underreporting of health-related behaviors is impossible, which is a limitation (Underwood et al., 2020). Another limitation is that not all local and state school districts administer YRBSS, and among the schools that do, some may not include all the standard questions on their YRBSS questionnaire (Underwood et al., 2020). Cross-sectional surveys can only indicate association and not causality, representing another limitation (Underwood et al., 2020). Cross-sectional surveys are not designed to explain observed trends, which is another limitation (Underwood et al., 2020).

Significance

The findings from this study display dietary behaviors that contribute to combating childhood obesity, focusing on race. Through this study, I aim to contribute to positive social change by reversing the trend of childhood obesity. This study provides insight into knowledge gaps that encompass all races and ages to address childhood obesity through observation of dietary behavior. Society must focus on dietary behavior across all age groups to combat childhood obesity effectively.

Childhood obesity continues to rise steadily. Addressing childhood obesity could change genetics, physical activity levels, and sleeping routines positively. Transitioning to healthier eating patterns, including consuming more fruits, vegetables, and fat-free or low-fat lean proteins, also represents a positive change. The primary goal of this study was to fill the knowledge gap encompassing all races and ages to combat childhood obesity through observing dietary behavior. The results of this study hold the potential for positive social change by providing information that can reverse the trend of childhood obesity. The study explored dietary behaviors, race, and childhood obesity, offering insights that can contribute to effective practical strategies.

Summary

Chapter 1 examined the relationship between race and obesity in adolescents after controlling for dietary behaviors. The purpose of the study, problem statement, theoretical framework, extensive literature reviews, summary of the findings, and critique methods all reinforce the study's foundation.

Chapter 2 will focus on data collection and research design. It will elaborate on methodology, modeled studies, target population, threats, and validity. Chapter 2 will provide an overview of the literature review for this study, detailing the literature search strategy and the relevant literature found about race and obesity in adolescents.

Chapter 3 will outline the methodology employed in this study, including the selection and operationalization of study variables and covariates. I will outline the statistical analysis plan, describing the specific techniques and procedures used to analyze the data. My aim in this chapter is to offer a clear understanding of how the study was designed to address the research questions and hypotheses, ensuring that the approach was rigorous and appropriate for the data examined.

Chapter 4 will present an in-depth account of the data set preparation and the statistical analysis results. It will include cleaning and organizing the data and the statistical methods used to test the research hypothesis. The findings will be reports supported by figures and tables that illustrate vital results. This chapter is crucial for interpreting the data and understanding how the data addressed the study's research questions.

In Chapter 5, I will discuss the study's findings and implications for social change. I will interpret the results in the context of the existing literature, highlighting how they contribute to the topic. I will explore the impact of these findings. The chapter will highlight the limitations of the research and propose recommendations for future studies to build upon these findings. Through this chapter, I aim to offer valuable insights and directions for research and policy development.

Chapter 2: Literature Review

Introduction

Childhood obesity represents a severe and complex health problem in the United States (CDC, 2023b). Various factors contribute to childhood obesity, including behavioral factors such as medication usage and genetics (CDC, 2023a). Rates of child obesity fluctuate significantly across gender, age, and racial and ethnic groups (State of Childhood Obesity, 2020). Although researchers have investigated the relationship between race and childhood obesity, they have not yet explored this specific approach., which could provide new insights into how racial and ethnic factors influence dietary behaviors and obesity rates among children.

Limited studies have investigated differences in dietary factors between race and obesity among children ages 14–18. There is a lack of information that includes all races and obesity among children ages 14–18 to combat childhood obesity through the observation of dietary behavior. According to the CDC (2022), approximately 1 in 5 American children has obesity. Through this study, I aimed to examine the differences in dietary behaviors based on race and obesity among children.

This study aimed to comprehensively examine the differences in dietary behaviors across various racial groups and their association with obesity among adolescents ages 14–18. Unlike in previous studies focusing on specific racial or ethnic groups, in this study, I sought to include all racial backgrounds. This study focused on adolescents aged 14–18, a critical developmental period during which dietary habits are shaped and can have long-term implications for health outcomes.

This study contributed to the existing literature by comprehensively analyzing dietary behaviors by race and their relationship with obesity among adolescents aged 14–18. This study offers valuable insights that can inform public health interventions and policies to reduce childhood obesity disparities.

In this chapter, I expound on the literature search strategy and examine previous peer-reviewed studies that establish background on the association between race, obesity, and dietary factors. Following this, I discuss the theoretical foundation and justify its selection for the study. Finally, I present a comprehensive literature review concerning the critical variables and concepts pertinent to the study.

Literature Search Strategy

This study utilized Medline, Google Scholar, PubMed, SAGE Knowledge, CDC, World Health Organization, SAGE Journals, Google Chrome and Walden University Library. Key search terms included *childhood obesity, high school children, dietary behaviors, race, pediatric obesity, Asian American, Hispanic ethnicity, African American, White American, quantitative, Youth Risk Behavior Surveillance System, body mass index, gender, nutrition*, and *diet*. The literature search focused on peer-reviewed publications from the past 5 years.

Theoretical Foundation

The framework employed in this study was the social-ecological model, developed by psychologist Urie Bronfenbrenner, also known as the ecology of human development (Bronfenbrenner, 1979). Bronfenbrenner (1979) aimed to advance theory, training, and research in the environments where human beings grow and live.

Researchers have utilized the social-ecological model to understand the causes of childhood obesity and to develop a framework for its prevention (Ohri-Vachaspati et al., 2015). It comprises five levels of influence: interpersonal factors, interpersonal processes, institutional factors, community factors, and public policy. The social-ecological model has been frequently applied in research and efforts to prevent childhood obesity (Ohri-Vachaspati et al., 2015).

Interpersonal factors may create barriers to fostering healthy behavior and interpersonal growth (Rural Health Information Hub, n.d.). The interpersonal level encompasses an individual's relationship with others (Lumencandel, n.d.). At the interpersonal level, friends can engage in personal conversations regarding health screenings. Latkin and Knowlton (2015) stated that social networks provide a powerful approach to health behavior change.

Intrapersonal factors, called *individual-level factors*, include attitudes, beliefs, and knowledge that influence behavior (Rural Health Information Hub, n.d.). Knowing childhood obesity enables individuals to better understand the condition, including its susceptibility, severity, and potential treatment options (Lumencandel, n.d.). While knowledge alone may not always change attitudes, it significantly aids by shaping individuals' crucial attitudes and decisions (Lumencandel, n.d.).

Institutional factors encompass rules, policies, informal structures, and regulations that promote healthy behavior (Rural Health Information Hub, n.d.). The institutional level, called the *organizational level*, enables outreach to diverse community sectors (Lumencandel, n.d.). Schools, churches, and workplaces play vital roles in safeguarding students, members, and employees from public health issues (Lumencandel, n.d.). Organizations can offer counseling and immunization services to their constituents (Lumencandel, n.d.).

At the community level, numerous organizations operate within a given area (Lumencandel, n.d.). Community factors encompass informal or formal social norms among organizations, groups, or individuals, which can impede or facilitate healthy behavior (Rural Health Information Hub, n.d.). These organizations have the potential to combine resources and ideas to enhance the community's overall health (Lumencandel, n.d.). Cultural influences and beliefs are central to the focus at the community level.

Public policy factors are critical in regulating and supporting health actions and practices for disease prevention, including early detection, management, and control (Rural Health Information Hub, n.d.). Public factors encompass local, federal, and state policies (Rural Health Information Hub, n.d.). Regional policymakers research public health and explore more effective approaches to addressing these policies (Lumancandel, n.d.). According to Lumencandel (n.d.), it is the government's responsibility to establish, set and enforce those laws. Organizations can collaborate to organize health events to educate the public with knowledge and resources (Lumencandel, n.d.).

Literature Review Related to Key Variables and/or Concepts

Obesity

Childhood obesity rates in the United States have tripled over the last four decades (Anderson et al., 2019). Efforts to address childhood obesity have included reforming school policies, enhancing nutritional assistance programs, implementing public health initiatives, and allocating resources (Anderson et al., 2019). Anderson et al. (2019) observed recent declines in obesity rates among young children participating in the Women, Infants, and Children Supplemental Nutrition Program (Anderson et al., 2019). This finding suggests that targeted interventions and nutritional support programs reduce obesity rates among vulnerable populations.

In December 2020, researchers utilized papers from the Web of Science Core Collection by Clarivate Analytics, focusing on 2010 to 2019 (Ferrer et al., 2022). The researchers identified the most commonly used keywords, including *nutrition*, *body mass index*, *prevention*, *physical exercise*, and *metabolic syndrome*, from over 300 papers. The study's outcome assists in recognizing numerous variables associated with the global impact of childhood obesity (Ferrer et al., 2022). The papers analyzed originated from 153 countries, with significant scientific production from the United States, Canada, Australia, the United Kingdom, and Switzerland (Ferrer et al., 2022).

Yusuf et al. (2020) and colleagues investigated the influence of selected social determinants of health on overweight and obesity among children aged 0–17 in the United States. Their cross-sectional study explored how certain behavioral, environmental, and socioeconomic factors influence overweight and obesity among U.S. children, utilizing nationally represented data (Yusuf et al., 2020). The researchers sourced the data from the National Survey of Children's Health (NSCH) for 2016–2017, for which 71,811 surveys were completed, with 50,212 surveys collected in 2016 and 21,500 in 2017 (Yusuf et al., 2020).

A limitation of this study was that the data collected by NSCH were cross-sectional, which limited the researcher's ability to establish a temporal relationship between exposures and outcomes (Yusuf et al., 2020). Yusuf et al. (2020) and colleagues conducted a weighted bivariate analysis using the Pearson chi-squared test to determine the association between various exposure variables and overweight or obesity. They utilized binomial logistic regression to adjust for confounders, and the prevalence ratio generated estimates for the association between the exposure and outcome variables (Yusuf et al., 2020). The researchers constructed three models separately: obese only, overweight only, and overweight or obese. All tests of hypotheses were two-tailed, with a type one error fixed at 5% (Yusuf et al., 2020). The covariates included child sex, age, race/ethnicity, language, married, and single-parent status, with the dependent variable being obesity. This study recommended further research to clarify the relationship between overweight/obesity and social determinants of health in children (Yusuf et al., 2020). The findings revealed that 30.6 million children aged 0–17 were surveyed, with 9.5 million of them aged 10–17 years being either overweight or obese. Yusuf et al. classified only 15.19% and 15.77% of the children as overweight only and obese only.

Wilding et al. (2020) and colleagues aimed to examine the relationship between environmental area characteristics at birth and childhood outcomes. The researchers utilized data from the Studying Lifecourse Obesity Predictors (SLOPE) study, employing a cross-sectional design. The sample consisted of 14,084 children ages 4–5 and 5,637 ages 10–11. However, many children were missing outcome data, posing a limitation to the study. Additionally, the study population was limited to children born within a regional hospital. To guide their analysis, the researchers constructed a direct acyclic graph using DAGitty v2.5, based on previous research, illustrating the assumptions made regarding analyzing area effects on childhood weight (Wilding et al., 2020).

Wilding et al. (2020) and colleagues explored the relative risk of children being overweight or obese at ages 4–5 and 10–11, considering covariates such as maternal BMI, age, education, ethnicity, smoking at the start of pregnancy, and parity. The study aimed to investigate the associations between environmental area characteristics measured around the home at birth and overweight/obesity during school age in a population-based cohort in the south of England, UK. The findings revealed that Middle-layer super output areas were positively associated with overweight/obesity, except for children who relocated. Additionally, the study demonstrated that the prevalence of obesity or overweight increased from 23.1% at 4–5 to 34.6% at age 10–11 (Wilding et al., 2020).

Guerrero et al. (2016) aimed to describe growth trajectories in BMI among racial and ethnic groups of U.S. children and identify predictors of these trajectories. The study faced limitations, including missing data in the Early Childhood Longitudinal Study—Birth Cohort (ECLS-B) dataset and variations in weight and height assessments due to the frequency of home visits for data collection (Guerrero et al., 2016). Another limitation was the reliance on parental reports for measures, potentially introducing parental recall bias (Guerrero et al., 2016). Guerrero et al. stated the need for additional studies to deepen understanding of the critical growth periods for racially and ethnically diverse children.

Guerrero et al. (2016) defined the dependent variable as children's BMI, while independent variables encompassed child characteristics, maternal attributes, and home practices. The study included 15,418 children from a nonprobability birth sample by the National Center in 2001. The researchers utilized the Early Childhood Longitudinal Study—Birth Cohort to examine predictors of BMI growth trajectories, including child characteristics, maternal attributes, home practices related to social behaviors and diet, and family sociodemographic factors (Guerrero et al., 2016).

The results indicated that African American and Latino children exhibited higher predicted mean BMI scores in comparison to White children. Researchers identified soda consumption as a significant predictor of BMI growth trajectory among young Black children. Guerrero et al. (2016) suggested that raising awareness among young Black and Latino children about the implications of sweetened beverage consumption and fast food could lead to improvements in their health status, particularly regarding early obesity and BMI growth (Guerrero et al., 2016). Additionally, the study found that Latino children with recently immigrated or immigrant parents displayed a higher mean BMI trajectory during early childhood.

Matsizaki et al. (2021) and colleagues examined the association between California school nutrition policies and population-level trends in childhood overweight/obesity across levels of urbanicity. The researchers utilized secondary data from the Fitnessgram dataset, comprising 3,402,694 child-level records. After excluding the missing data, the analysis focused on 3,272,748 records for White, Latino, Asian, or Black children in seventh grade (Matsizaki et al., 2021). For data analysis, the researchers used multilevel logistic regression. Matsizaki et al. used the dichotomous outcome of child-level overweight/obesity to estimate the impact of school nutrition policies on obesity and to investigate the effect of urbanicity. The study assessed the influence of successive California school nutrition policies on the prevalence of overweight/obesity, stratified by gender and adjusted for school district, school, and student-level characteristics (Matsizaki et al., 2021).

The study's limitations included the absence of a precise comparison group, preventing researchers from accounting for local-level policies to contextualize findings. According to Matsizaki et al. (2021), the prevalence of overweight/obesity was highest among students in urban areas and lowest in suburban areas. The study population consisted of 3,402,694 seventh-grade children from 2002 to 2010. Matsizaki et al. noted that data collected on BMI statistics contained in schools demonstrated high validity and reliability compared to data compiled by trained specialists. Children attending schools in rural areas and boys in suburban and urban regions observed beneficial changes. However, evidence of wholesome policy influences on overweight/obesity was inconsistent across all groups, with exceptions noted for girls in urban areas and boys in second cities (Matsizaki et al., 2021). The researchers concluded that despite some evidence of policy impact, childhood obesity prevalence remains high in urban areas of California (Matsizaki et al., 2021).

Obesity Measurement

Researchers have measured childhood obesity through various indicators, including physical activity, diet, metabolic syndrome, insulin resistance, cardiovascular diseases, and eating behavior (Ferrer et al., 2022). Researchers have also utilized socioeconomic factors such as social status and income to measure childhood obesity. Furthermore, researchers have employed measurements such as waist circumference, skinfold thickness, waist-to-hip ratio, and bioelectric impedance to quantify obesity (Chan, 2020).

BMI is a standard tool for assessing childhood obesity, indicating whether a child falls into the underweight, normal, overweight, or obese categories. BMI boasts several strengths: It is easy to measure, it is inexpensive, and it strongly correlates with body fat levels, as supported by numerous studies showing that a high BMI predicts a heightened risk of chronic and premature death (Chan, 2020). Additionally, BMI accurately indicates body fat levels in children (Chan, 2020).

Waist circumference is the most common method for measuring abdominal obesity (Chan, 2020). It entails measuring the circumference of the abdomen at the natural waist, the umbilicus, or the narrowest part of the midsection. An increase in waist circumference correlates with elevated health risks and predicts the onset of various diseases and mortality (Chan, 2020). Moreover, measuring waist circumference is easy and inexpensive (Chan, 2020).

In the skin fold thickness method, researchers utilize calipers to measure the thickness of skin underlying fat in specific body areas (Chan, 2020). These areas typically include the thighs, the trunk, the front and back of the upper arm, and under the shoulder blade (Chan, 2020). Equations are applied to estimate the body fat percentage using the gathered measurements (Chan, 2020). Although skin fold thickness measurement offers advantages such as safety, affordability, portability, speed, and simplicity, its accuracy may not match that of other methods (Chan, 2020).

In this cross-sectional study, researchers measured childhood obesity using BMI, waist circumference, and body fat (Zhou et al., 2021). Researchers treated BMI as a categorial variable for analysis. The study comprised 1858 participants under the age of 18. The researchers selected studies that met specific criteria and employed various methods, including skinfold measurements, bioelectric impedance, waist circumference, percent body fat, dual X-ray, and height-for-age Z-score (Zhou et al., 2021). The findings revealed a significant association between access to supermarkets and childhood obesity, indicating a positive relationship between the two factors (Zhou et al., 2021).

Children who resided near supermarkets had increased access to healthier food options, resulting in lower BMI levels (Zhou et al., 2021). However, the study faced several limitations. Firstly, all the studies included were conducted in developed countries, limiting the generalizability of the findings to developing countries (Zhou et al., 2021). Additionally, there was a variation in the measures used to assess supermarket accessibility and obesity across different studies, introducing potential inconsistency in the results (Zhou et al., 2021). Lastly, the study's cross-sectional design prevented the researchers from establishing causal inferences between the observed variables (Zhou et al., 2021). Despite these limitations, the study provided valuable insights into the diverse methodologies employed in measuring childhood obesity.

Obesity and Race

Obesity disproportionately impacts minority communities, with African American and Hispanic communities experiencing high rates even after socioeconomic status is taken into account (Eichen et al., 2020). Zgodic (2021) notes that several studies confirm the higher prevalence of obesity among minority racial and ethnic groups. These studies include “A multilevel approach to estimating small area childhood obesity prevalence at the Central block-group level,” “Prevalence of obesity among youths by household income and education,” “Geography of adolescent obesity in the U.S.,” “Rural-urban differences in perceptions of child overweight among children and adolescents, their guardian and healthcare professionals in the United States,” “Differences in obesity prevalence by demographics and urbanization in US children and adolescents,” and “Prevalence of and risk factors for adolescent obesity in Tennessee using the 2010 YRBSS data: an analysis using weighted hierarchical logistic regression.”

The researchers aimed to evaluate whether race/ethnicity affected weight-loss outcomes in a pediatric obesity intervention (Zgodic, 2021). They also examined the association between race/ethnicity and energy intake, program acceptability, attendance, adherence, and exercise participation (Zgodic, 2021).

In a randomized control trial, the researchers evaluated weight loss in family-based behavioral treatment, with or without child participation. The study included 150 parents and children aged 8-12 years, with BMI ranging from 85 to 99.9, encompassing Hispanic, non-Hispanic, non-White, and non-Hispanic White individuals (Zgodic, 2021). On average, researchers observed no statistical difference in weight loss between groups.

The researchers concluded that further research is necessary to determine whether culturally adapted treatments would be more effective for racial/ethnic minorities or if the personalization inherent in family-based behavioral treatment is adequate (Zgodic, 2021).

The researchers conducted statistical analyses using ANOVA and chi-square tests. Covariates included child age, treatment, BMI, income level, and sex. Additionally, the researchers conducted negative binomial regression. The treatment was administered in English, requiring both the parent and child to speak and read English (Zgodic, 2021). However, the study did not explore whether the race/ethnicity of the treatment providers had an impact on outcomes, representing another limitation (Zgodic, 2021).

Anderson et al. (2019) discovered that the prevalence of obesity has diverged by race and gender in recent years. They utilized microdata from reliable sources such as YRBSS, NHANES, and WIC-PC. The researchers pooled the data and applied a linear model to reveal patterns (Anderson et al., 2019). The researchers segmented the results by race, sex, and age. The conclusion drawn was that Blacks and Hispanics are more likely to be obese (Anderson et al.,2019). In this study, the researchers employed BMI as the dependent variable.

The researchers analyzed various datasets that collect information on childhood obesity (Anderson et al., 2019). They utilized data from six nationally representative datasets (Anderson et al., 2019). The researchers analyzed the data comprehensively across birth cohorts, age distribution, and subgroups of interest (Anderson et al., 2019). For assessing older children, they analyzed YRBSS and NHIS, which surveyed more adolescents than the NHANES but only reported weight and height (Anderson et al., 2019). The children studied ranged from 2 to 19 years old. Childhood obesity rates have plateaued recently among school-age children (Anderson et al., 2019). The researchers observed that childhood obesity increases during early childhood and stabilizes by age 10 (Anderson et al., 2019). According to Anderson et al. (2019), five-year-olds in 2010 were two percentage points more likely to be obese compared to those in 1997. Another significant finding was a recent decline in the rate of obesity growth from kindergarten to 3rd grade (Anderson et al., 2019). One limitation of this study was the limited availability of data on racial and ethnic groups. This study also has a limitation regarding data inclusion, as it only incorporates participants from the WIC program, and participation rates vary based on the child's age and race/ethnicity over time (Anderson et al., 2019).

Ogden et al. (2020) and colleagues examined trends between 1999-2000 and 2017-2018, revealing an increase in obesity among adolescents, particularly affecting non-Hispanic Black and Mexican American youth. The study relied on the National Health and Nutrition Examination Survey (NHANES) as a cross-sectional survey, which presented a limitation (Ogden et al., 2020). Due to declining response rates in NHANES, the authors supplemented their analysis with external data (Ogden et al., 2020). The study observed 92,759, revealing an increase in obesity from 16.0% to 20.9% and severe obesity from 5.3% among adolescents aged 12-19 (Ogden et al., 2020).

In this study, Ogden et al. (2020) observed elevated linear and quadratic trends in regression models. The declining responses in NHANES raised concerns about bias in the 2017-2018 data. To address this, the researchers combined NHANES data with external data sources. They explored alternative post-survey adjustments to minimize errors in representation stemming from sample variation and nonresponse, acknowledging these limitations (Ogden et al., 2020). According to the State of Childhood Obesity (2020), obesity rates were higher among non-Hispanic Black girls and Hispanic boys. Conversely, non-Hispanic Asian children exhibited the lowest obesity rates compared to other racial groups (State of Childhood Obesity, 2020).

Yusuf et al. (2020) and colleagues explored the impact of specific social determinants of health on obesity and overweight among children in the United States. They analyzed data from the National Survey of Children's Health 2016-2017 dataset, which surveyed an estimated 30.6 million children, revealing that 9.5 million were either obese or overweight.

Isong et al. (2018) study noted that childhood obesity is prevalent, particularly among racial and ethnic minority children in the United States. Their study aimed to analyze the factors contributing to racial and or ethnic disparities in children’s weight status, including socioeconomic and behavioral risks. The researchers found that Black and Hispanic children exhibited higher rates of obesity compared to White and Asian children (Isong et al., 2018). They utilized nationally representative data from 10,700 children, tracking them from 9 months to kindergarten (Isong et al., 2018).

BMI served as the primary dependent variable in the study. The researchers considered various covariates, including obesity risk factors, maternal risk factors, infancy risk factors, early childhood risk factors, and socioeconomic factors. Researchers conducted regression analyses to analyze the data. According to the authors, few studies have explored the explanation of racial and ethnic differences in early childhood obesity rates (Isong et al., 2018). Moreover, the study underscores the importance of understanding the relative contribution of specific obesity risk factors to racial and ethnic disparities at different life stages (Isong et al., 2018). A key finding of the study is that rapid infant weight gain plays a significant role in contributing to racial and ethnic disparities in obesity during early childhood (Isong et al., 2018).

The study's limitations include the researchers' inability to attribute causality to the obesity risk factors examined within this study, leaving room for the potential for residual confounding or model misspecification (Isong et al., 2018). Measurement errors and misreporting occurred when measuring behavioral risk factors, which relied on parent reports (Isong et al., 2018). The researchers employed a composite variable for the socioeconomic status measure to minimize limitations, incorporating information on parents' occupations, household income, and educational attainment (Isong, et al., 2018).

Obesity and Gender

Understanding the observed differences in childhood obesity prevalence between girls and boys worldwide is critically essential. Recent research indicates that obesity rates are higher among boys than girls during childhood, influenced by factors such as hormonal differences, physical activity levels, dietary patterns, and social and cultural factors (CDC, 2022c). Promoting healthy eating habits, increasing physical activity, and creating supportive environments are critical keys to preventing childhood obesity in both genders (CDC, 2022c).

International data indicated that obesity is more prevalent among boys than girls in the majority of higher and upper-middle-income countries (Shah et al., 2020). Gender-related influences, such as parental feeding practices and societal perceptions of body weight, may contribute to differences in obesity prevalence (Shah et al., 2020); instead of comprehensively exploring gender differences, adjust for sex in multivariable regression models (Shah et al., 2020). Shah et al. (2020) emphasize the necessity for research to delve deeper into understanding the differences in obesity patterns based on sex and gender. Shah et al. (2020) assert that additional research is necessary to enhance understanding disparities in obesity patterns based on sex and gender.

Multiple studies confirm a higher prevalence rate among males (Zgodic et al., 2021). Lucas et al. (2021) colleagues aimed to examine risk factors of childhood obesity according to gender. Researchers identified significant differences in lifestyle habits determining overweight based on sex. Identifying gender disparities in health-related behaviors should be prioritized for the new prevention program (Lucas et al., 2021). Lucas et al. (2021), researchers conducted data analysis using partial least squares structural equation modeling to determine the magnitude of modifiable risk factors promoting the onset of excessive weight.

In the study, 421 students participated, and researchers detected that 40.6% of the participants were overweight based on their BMI (Lucas et al., 2021). The results indicated that boys participated in physical activities more frequently than girls. Notably, the utilization of new technologies that encourage movement instead of sitting was significant only among girls. However, dietary factors and sedentary behavior activities showed no significant differences between genders, as Lucas et al. (2021) reported. The study’s conclusion, drawn by Lucas et al. (2021) and colleagues, suggests that targeting young people's health from a gender perspective holds considerable potential in migrating overweight problems in adulthood. The sample population consisted of first-year high school students, and data were collected using a questionnaire on Health Habits in Adolescents (Lucas et al., 2021).

Researchers conducted a study to examine the prevalence of obesity in adolescents and associated risk factors. The study employed a descriptive approach and utilized a cluster sampling method. It involved 5,578 students from 14 secondary schools. The researchers performed statistical analysis and data processing using SPSS 16.0. The variables examined in the study included age, gender, number of siblings, mothers' education, fathers' education, mother's employment status, father's employment status, self-report family economy, and family history of obesity. The study's findings concluded that sex influences the prevalence of obesity, with a notably higher prevalence among 11-year-old boys, reaching 22.5% (Top et al., 2019).

Anderson et al. (2019) calculated the average prevalence of obesity over time across a wide range of characteristics, including gender. The researchers utilized microdata from the YRBSS, NHANES, and WIC-PC datasets. YRBSS data covered trends for ages 12-18, NHANES for ages 12-19, and WIC-PC for ages 12-17 (Anderson et al., 2019). To calculate obesity prevalence, the authors used national data from 1963-1965 to 1988-1994 based on the 2000 CDC growth chart. The researchers defined obesity as body-mass-index (BMI) at or above the 95th percentile of a fixed gender and age-specific reference population (Anderson et al., 2019). According to Anderson et al. (2010), the results indicated that boys and girls had similar obesity until 2000.

Subsequently, there was an increase in obesity prevalence among boys compared to girls in the early 2000s, although these rates have since converged in recent years.

Obesity and Age

Adolescents frequently experience obesity, often grappling with hormonal changes, social pressures, body image concerns, academic stress, and emotional eating issues during the ages of 12-18 (CDC, 2022c). Individuals with obesity face a reduced life expectancy (Top et al., 2019). The YRBSS monitors categories of critical health-related behaviors among youth, adults, and adolescents (Hu et al., 2021).

The YRBSS monitors six categories encompassing alcohol and drug use, sexual behaviors associated with unintended pregnancy and sexually transmitted infections, unhealthy dietary behaviors, tobacco use, behaviors contributing to unintentional violence and injuries, and physical inactivity (Hu et al., 2021). Conducted by the local and state education and health agencies, The YRBSS is a national school-based Youth Risk Behavior Surveillance Survey administered by the Centers for Disease Control and Prevention (Hu et al., 2021). The data from the 2017 YRBSS was gathered from surveys conducted in 39 states and 21 large urban school districts (Hu et al., 2021). The results revealed that a significant portion of high school students were engaged in health-risk behaviors, with 14.8% classified as obese and 15.6% as overweight (Hu et al., 2021).

The authors utilized a representative sample of 15,624 students who participated in the 2015 Youth Risk Behavior Survey (Hu et al., 2021). The YRBSS, a cross-sectional survey, served as the basis for the study (Hu et al., 2021). Multivariable logic regression was employed to accommodate the complex survey design of the YRBSS. The study aimed to evaluate the association between risk factors and obesity and to calculate population-attributable fractions (Hu et al., 2021). The obesity status of the individual student served as the dependent variable in the analysis (Hu et al., 2021).

The study had limitations, including the fact that population-attributable fractions of modified risk factors of obesity served as association indicators rather than cause and effect. (Hu et al., 2021). Additionally, the researchers focused solely on modifiable risk factors at the respondent level, neglecting other potential risk factors associated with obesity (Hu et al., 2021). Covariates considered in the analysis included the individual respondent's demographic characteristics, such as age, sex, and race/ethnicity. The researchers measured age in years, categorized sex as female or male, and classified race/ethnicity as non-Hispanic Black, non-Hispanic White, Hispanic, and other (Hu et al., 2021). Statistical analysis was performed using the SAS 9.4 version through bivariate analysis (Hu et al., 2021).

Zgodic (2021) employed a model-based Small Area Estimation (SAE) technique to update the prevalence estimates of overweight among children aged 10-17 across the United States. The study revealed that the overweight rate for children aged 10-17 was 30.7 percent in the United States, based on a sample of 24,162 children (Zgodic, 2021). However, the study reported a couple of limitations. Firstly, researchers used parent-reported weight and height to calculate BMI for categorizing overweight individuals without independent verification (Zgodic, 2021). Secondly, different regional divisions exhibited varying overweight rates with wide confidence intervals, notably when the division included countries with a higher prevalence of underrepresented demographic groups (Zgodic, 2021). The researchers sourced the data for the study from the 2016 National Survey of Children's Health. This alarming increase in obesity underscores the limited impact of interventions to date in reversing or halting the obesity trend (Heslehurst et al., 2019).

Anderson et al. (2019) and colleagues calculated the average prevalence of obesity over time across a wide range of characteristics, including age. The authors utilized microdata from the YRBSS, NHANES, and WIC-PC. YRBSS depicted trends for ages 12-18, NHANES for ages 12-19, and WIC-PC for ages 12-17 (Anderson et al., 2019). The researchers determined obesity as an indicator variable using national data from 1963-1965 to 1988-1994 obtained from the 2000 CDC growth chart. They classified a child's body-mass-index (BMI) as equal to or above the 95th percentile of a fixed gender and age-specific range as obese (Anderson et al., 2019).

According to Anderson et al. (2010), the results showed that children aged 6-11 and 12-19 exhibited a higher prevalence of obesity than younger children. The authors highlighted uncertainties regarding whether the rate of increase in obesity has plateaued within the assessed age group, suggesting the need for larger datasets to evaluate the trends (Anderson et al., 2019).

The researchers calculate the average prevalence of obesity over time, analyzing various characteristics such as age, gender, socioeconomic status, geography, race/ethnicity, and their interactions. They utilized a linear trend model for their analysis, collecting data from sources including YRBSS, WIC-PC, and NHANES (Anderson et al., 2019). Childhood obesity served as the dependent variable in their study. According to

Anderson et al. (2019), evidence suggests that the rate of increase in childhood obesity has leveled off among school-age children in recent years.

Obesity and Dietary Behaviors

The relationship between diet, obesity, and cardiovascular disease is closely intertwined (Keung et al., 2019). Obesity is strongly associated with various health issues, including hypertension, type 2 diabetes mellitus, dyslipidemia, respiratory disorders, and coronary artery disease (Keung et al., 2019). Keung et al. (2019) conducted a cross-sectional study among primary and secondary school children in Macao, China, to investigate this further. The study involved 3,635 students for dietary assessment and 1,427 for physical evaluation during 2014-2015 (Keung et al., 2019), with childhood obesity being the dependent variable of interest. The study aimed to shed light on the emerging issues of childhood hyperglycemia and dyslipidemia (Keung et al., 2019).

Various factors contribute to the rise in childhood obesity, including the affordability of high-calorie processed foods with additives, the increasing cost of fruits and vegetables, higher consumption of processed and fast food, and reduced time available for food preparation (Ledezma et al., 2018). Moreover, the prevalence of ultra-processed products, which are not conducive to a healthy diet, poses a significant concern (Martinez & Tur-Vines, 2020). This data underscores the critical necessity for additional research and interventions to address these challenges and promote healthier dietary habits among children.

Keung et al. (2019) and colleagues examined changes in dietary habits and the prevalence of cardiovascular risk factors. They compared the prevalence of obesity, dietary behaviors, and dyslipidemia in their study. The researchers examined healthy and unhealthy dietary habits using the Youth Risk Behavior Survey (YRBSS) items for health surveillance. Descriptive statistics were employed to analyze the results.

Among students aged 12-14, the study revealed lower consumption of vegetables and fruits and a higher prevalence of obesity. Significantly, there was a notable increase in obesity and dyslipidemia rates among students in this age group, raising concerns (Keung et al., 2019).

Martinez and Tur-Vines (2020) conducted a content analysis study focusing on how YouTube content aimed at children addresses obesity and food-related topics. The study added evidence on the strategies utilized in online advertising of food products lacking nutritional value. It highlighted the detrimental impact of online advertisements on childhood obesity prevention policies (Martinez &Tur-Vines, 2020).

The research confirmed that advertising low-nutritional products affects childhood obesity by influencing calorie intake (Martinez &Tur-Vines, 2020). Examining 2,396 videos uploaded to YouTube in 2019, the researchers analyzed 47 hours and 41 minutes of video content. They observed that videos featuring or targeting children often included various food products and specific brands.

Some channels reviewed Spanish food brands intended for or targeting children (Martinez & Tur-Vines, 2020). Study variables encompassed the prevalence of healthy versus ultra-processed food, the presence of food products in YouTuber videos, the number of brands featured, the presence of children and their accompaniment, video settings, content types, communication strategies, explicit food consumption by adults and children, and the presence and type of reference groups.

Fruit juice and milk consumption have been identified as contributing factors to childhood obesity (Sakaki et al., 2020). While fruit juice and milk can provide essential nutrients to children, their consumption was associated with increased BMI in preadolescents and adolescents.

Sakaki et al. (2020) and their colleagues aim to investigate the relationship between fruit juice and milk intakes and changes in BMI among this demographic. Their study revealed that baseline fruit juice consumption was inversely associated with BMI change in boys, even after controlling for age, baseline BMI, race, total energy intake, and physical activity over two years(Sakaki et al., 2020). Interestingly, other types of fruit juice, as well as high-fat and low-fat milk, did exhibit significant associations with BMI change. However, girls were found to have a change in their BMI associated with orange juice consumption.

To assess change in BMI more accurately, the authors employed multiple regression analysis, which provided valuable insights into the relationship between fruit juice, mil consumption, and BMI change among preadolescents and adolescents.

The study collected data from 8,173 participants and analyzed 13,717 2-year internal observations. The participants ranged in age from 9 to 16 years old. According to Sakaki et al. (2020), the gap suggests that orange juice consumption is unlikely to contribute to childhood obesity. However, the study highlights the need for future research to assess intake and BMI over the same period while controlling for additional potential confounders to confirm these findings. One limitation of the study was its focus on only one race, which was non-Hispanic White.

Additionally, the lack of a clear definition for fruit juice increased the likelihood of misclassification bias). Another limitation was the inability to control for socioeconomic variables due to the targeting of young participants in the questionnaires(Sakaki et al., 2020). Lastly, the limitation of the food frequency questionnaire's milk question, which allowed only one type of milk to be selected, restricted participants from specifying the type of milk they consumed (Sakaki et al., 2020).

A wealth of data underscores efforts to combat pediatric obesity (Wood et al., 2020). Focusing on a child's eating habits and mealtime behaviors can be instrumental in preventing pediatric obesity. The researchers emphasize the importance of promoting self-regulating eating behaviors as a preventative measure against childhood obesity (Wood et al., 2020). Additionally, Brunstrom et al. (2020) present recent research highlighting the influence of childhood caregivers on children's ability to regulate their eating.

Hu et al. (2018) examined unhealthy dietary behavior as a modifiable risk factor for obesity. Their study included obese students and found correlations between obesity and factors such as not participating in sports teams, spending three or more hours per day watching television, and tobacco use (Hu et al., 2018). The research revealed that the single modifiable risk factor with the most significant population-attributable fractions was nonparticipating in sports teams (Hu et al., 2018).

In their study, Karki et al. (2019) provided abundant evidence from the literature concerning the relationship between childhood obesity and dietary behaviors. They identified a significant association between high junk food consumption and childhood obesity. Additionally, the authors highlighted various factors affecting children, including sex, age, and ethnicity. The study targets children aged 6 to 13 using a cross-sectional survey, with data analysis conducted using SPSS.

The researchers distributed self-administered questionnaires to 646 students, facilitated by the principal and classroom teacher (Karki et al., 2019). The researchers conducted these cross-sectional surveys between May to October 2017 (Karki et al., 2019). The variables examined included age, sex, birth weight, ethnicity, and education level. The study defined the dependent variable as overweight/obesity, which was determined based on BMI for the age and sex of the children (Karki et al., 2019). Independent variables encompassed sociodemographic factors, dietary behaviors, physical activity, respondents' socioeconomic characteristics, and the children's sedentary behaviors (Karki et al., 2019).

The researchers utilized SPSS V. 21 to conduct their analysis. Karki et al. (2019) examined the prevalence of overweight/obese children and conducted a descriptive analysis of independent variables in proportions. The researchers utilized bivariate and multivariate binary logistic regression analyses to assess associations between variables. The results revealed that out of 575 students, 107 were overweight, and 41 were obese (Karki et al., 2019). Among 328 male children, 62 were overweight, and 35 were obese, while among 247 female children, 45 were overweight, and six were obese (Karki et al., 2019).

One limitation of the study pertains to self-administered questionnaires, which excluded certain items like activity during physical education classes at recess. Missing data might have influenced the PAQ score and consequently impacted the association with BMI (Karki et al., 2019). Additionally, Karki et al. (2019) noted the scarcity of data on dietary and activity-related behaviors associated with childhood overweight and obesity. The study's cross-sectional nature prevented the establishment of a causal relationship (Karki et al., 2019). Therefore, the researchers recommend that further investigations employ objective measurements to elucidate the association between diet and activity-related behaviors and childhood overweight and obesity among Nepali schoolchildren (Karki et al., 2019).

Summary and Conclusions

Evidence indicates that obesity rates were higher among non-Hispanic Black girls and Hispanic boys (State of Childhood Obesity, 2020). Conversely, non-Hispanic Asian adolescents exhibit the lowest obesity rates compared to other racial groups (State of Childhood Obesity, 2020). Recent factors contributing to childhood obesity include insufficient sleep, eating patterns, physical activity patterns, genetics, social determinants of health, illnesses, and medications (CDC, 2022a). Childhood obesity can predispose individuals to health issues in adulthood, with dietary behavior playing a crucial role in its development. Despite the significance of childhood obesity, there is a lack of evidence on effective strategies on effective prevention strategies (CDC, 2015b).

Many studies face limitations such as missing data, limited data availability, validity and reliability concerns, and challenges in establishing causal relationships due to using cross-sectional designs. This study addresses a critical knowledge gap, providing information that includes all races and adolescents to combat childhood obesity by observing dietary behavior. Although the severity of childhood obesity is a public health issue, research on the relationship between race and obesity remains limited (Kirby et al., 2012).

Chapter 3: Research Method

Introduction

Childhood obesity stands as one of the most severe public health issues in the 21st century, with its prevalence reaching epidemic levels in developed countries (Sahoo et al., 2015). The purpose of this quantitative study was to examine the differences in dietary behaviors by race and obesity among adolescents living in Georgia. Employing a cross-sectional study design, I explored the association between race and childhood obesity while controlling for dietary behaviors using data obtained from the 2021 YRBSS. The findings of the data analyses, in conjunction with the quantitative research design outlined in Chapter 2, were utilized to address the research questions and test whether to accept or reject the hypothesis.

The YRBSS collects data from national, state, territorial, tribal government, and local levels to enhance the understanding of student health behaviors (Orange County Public Schools, n.d.). It utilizes study samples of ninth- to 12th-grade students and involves biennial surveys (U.S. Department of Health and Human Services, n.d.). YRBSS data aid the CDC in shaping school health programs and policies, providing insights to stakeholders (Orange County Public Schools, n.d.). The data collected by the CDC play a crucial role in monitoring trends and changes in student health risk over time (U.S. Department of Health and Human Services, n.d.). YRBSS data involve ongoing, systemic collection, analysis, and interpretation. In this chapter, I will discuss the research design and rationale, methodology, data analysis plan, and threats to validity and provide a summary.

Research Design and Rationale

I obtained the YRBSS dataset and used it for the quantitative study. I completed the secondary dataset analysis using SPSS version 29 software. Most researchers have overlooked the investigation of differences between race and obesity among adolescents.

I employed a cross-sectional study design to examine the YRBSS dataset. The design enabled me to control for factors such as age and gender while investigating the association between race and childhood obesity. Cross-sectional studies are advantageous for examining existing data as they allow for observing relationships between variables at a single point in time, providing a snapshot of correlations and associations within a population. However, they have limitations, including the inability to determine causality and challenges in interpreting the identified associations (Wang & Cheng, 2020).

This study considered age, gender, consumption of 100% fruit juice, consumption of vegetables, eating breakfast, diabetes type I, diabetes type II, single-parent household, low-income status, and dietary behaviors as covariates. The selection criteria comprised adolescents. Obesity served as the dependent variable. African American, Asian American, White American, and Mexican were the independent variables. Logistic regression analysis evaluated the association between race and obesity among adolescents. Logistic regression with dummy variables was used to assess the association between the variables race and obesity in adolescents.

Methodology

Population

This study focused on participants in the 2021 YRBSS survey, comprising adolescents residing in Georgia. The target population encompassed students in Grades 9–12 in Georgia. I aimed to assess the association between race and obesity among adolescents, considering White American, Black or African American, and Asian American races and Hispanic ethnicity.

Sampling Procedures

Since 1991, YRBSS has provided national, state, territorial, and local data (CDC, 2023c). It was designed to assess changes in unhealthy behaviors over time, compare different groups of adolescents, and determine the frequency of unhealthy behaviors (CDC, 2023c). Additionally, YRBSS aims to monitor progress toward achieving Healthy People Objectives and other program goals (CDC, 2023c). YRBSS is a set of surveys that track behaviors leading to poor student health.

YRBSS results facilitate monitoring changes in adolescent health behavior over time, identifying emerging issues, and planning program evaluations to support youth health (CDC, 2023c). The sampling frame for the 2021 YRBSS included adolescents who participated in the survey. Inclusion criteria encompass students typically in Grades 9–12 attending parochial, private, public, or charter schools (Mpofu et al., 2023). Exclusion criteria pertain to students in special education schools, alternative or vocational schools, and schools operated by the U.S. Department of Defense or the Bureau of Indian Education (Mpofu et al., 2023).

Data Collection

The YRBSS 2021 dataset underwent a comprehensive process that included sampling, questionnaire development, survey administration, questionnaire administration, data processing, weighing, and data analysis and reporting (CDC, 2023d). The YRBSS comprises a series of surveys conducted by health and education departments at the territorial, local, or state levels targeting public high school students (CDC, 2023b). Additionally, the CDC conducts a national survey, the YRBSS, encompassing high school students from private and public schools across the United States (CDC, 2023b). Since its inception in 1991, the YRBSS has amassed data from over 5 million high school students up to 2021 (CDC, 2023c).

Data from YRBSS have stimulated numerous research topics. YRBSS provides data utilized by lawmakers, doctors, health departments, community organizations, programs, educators, and campaigns, among other endeavors (CDC, 2023c). YRBSS monitors behaviors encompassing youth health and behavior conditions, substance use behaviors, student demographics, and experiences (CDC, 2023b). Additionally, according to the CDC (2023b), data are gathered on sexual orientation and sex.

Sample Size

A power analysis was conducted for a binary logistic regression utilizing race as the primary continuous predictor variable to determine the minimum required sample size. The study revealed that a minimum of 210 cases is required to achieve a minimum power of at least .80. Increasing the power to .95 requires a sample of 341. Therefore, I aimed to obtain 210–341 cases for the study. Considering the number of adolescents included in the dataset and the calculated sample size range, sufficient study participants can achieve an adequate sample size. These results indicate that the study can draw meaningful conclusions regarding the association between race and obesity in adolescents while considering various covariates and ensuring appropriate statistical power.

I utilized G-Power 3.1 software to estimate the sample size for the study. Within the software, I selected *z*-tests for the test family and logistic regression for the statistical test. I chose a priori power analysis to compute the required sample size. For the study, I selected two tails, set the odds ratio to 1.5, and established Pr(Y = 1|X = 1) 0.5 based on the mean odds ratio identified in the literature review. I then calculated and transferred these parameters to the main window, where Pr(Y = 1|X = 1) HO was estimated at 0.5. Additionally, I set the desired power level at 0.8 and then increased it to 0.95. The R2 value was set at 0.01, and a normal distribution was selected. Finally, I set x parm μ to 0 and x parm σ to 1.

Instrumentation

The study utilized comprehensive national school-based survey questions from the YRBSS 2021 as its data collection instrument. The YRBSS questionnaire encompasses inquiries about unhealthy dietary behaviors, along with other vital areas such as alcohol and drug use, tobacco use, physical inactivity, behaviors that contribute to unintentional injuries and violence, and sexual behaviors. The CDC (2023c) designed YRBSS to monitor significant health risk behaviors among youth. The variables of interest for this study included obesity, race, gender, age, and dietary behaviors. Data were gathered from the participants in the survey.

Dietary Measurement

YRBSS actively monitors dietary measurement through a comprehensive survey incorporating various questions on dietary behaviors, as emphasized by the CDC (2023b). As mentioned, this survey encompasses inquiries concerning fruit, vegetables, 100% fruit juice, breakfast consumption, frequency of consumption, snacking habits, and portion size. Administration of the YRBSS survey occurs through paper and pencil, online platforms, or computer-assisted self-interview, adhering to stringent protocols to ensure standardized procedures (CDC, 2023d).

Operationalization of Study Variables

Independent Variable

This study focused on race as the independent variable, specifically examining African Americans, White Americans, Asian Americans, and Hispanic Americans.

Dependent Variable

The dependent variable in this study was obesity, which was categorized as not obese versus obese. It was dummy-coded into a dichotomous variable.

Table 1

Dependent Variables With Level of Measurement

Variable name	Level of measurement
Obesity	Nominal, dichotomous

Covariates

Table 2

Covariates With Level of Measurement

Covariate name	Level of measurement
Age	Nominal, categorical
Race	Nominal, categorical
Gender	Nominal, categorical
100% fruit juice	Nominal, categorical
Vegetables	Nominal, categorical
Breakfast	Nominal, categorical
Dietary behaviors	Nominal, categorical
Diabetes type I	Nominal, categorical
Diabetes type II	Nominal, categorical
Single-parent household	Nominal, categorical
Low-income status	Ordinal, categorical

Age

Controlling for age enhanced this study's internal validity and minimized data variance. It enabled a more thorough examination of the relationship between race and obesity. Additionally, controlling for age facilitated the identification of age-specific effects, thereby facilitating more precise conclusions. Age was coded in the following categories: 12 years old or younger, 13 years old, 14 years old, 15 years old, 16 years old, 17 years old, and 18 years old or older.

Race

Obesity is a complex issue that exhibits significant variation across different racial and ethnic groups. Race and ethnicity were coded in the following categories: White, Black or African American, Hispanic/Latino, and all other races.

Gender

Obesity is a public health issue that varies with gender. Gender is a categorical variable, with 0 indicating male and 1 indicating female. Research suggests that obesity rates during childhood are higher among boys than girls.

100% Fruit Juice

Current meta-analyses and systemic reviews do not support concerns that 100% fruit juice may be associated with childhood obesity (Murray, 2020). Diet quality, including juice consumption, may be paramount in populations with lower socioeconomic status (Murray, 2020). The YRBSS included an item asking participants how often they drank 100% fruit juices such as orange, apple, or grape juice in the past 7 days. The categories were as follows: "I did not drink 100% fruit juice during the past 7 days," "1 to 3 times during the past 7 days," "4 to 6 times during the past 7 days," "1 time per day," "2 times per day," "3 times per day," and "4 or more times per day."

Vegetables

The vegetable variable was categorical, with the categories "I did not eat other vegetables during the past 7 days," "1 to 3 times during the past 7 days," "4 to 6 times during the past 7 days," "1 time per day," "2 times per day," "3 times per day," and "4 or more times per day." Research suggests that consuming vegetables may reduce the risk of colon and rectal cancer, depression, and hip fracture (Folkvord et al., 2022). Encouraging vegetable consumption could change behavior and improve health outcomes (Folkvord et al., 2022).

Breakfast

The YRBSS included an item asking participants how often they ate breakfast in the past 7 days. The categories were "0 days," "1 day," "2 days," "3 days," "4 days," "5 days," "6 days," and "7 days." The breakfast variable is categorical. Skipping breakfast is associated with overweight and obesity (Ma et al., 2020). Numerous studies have consistently associated skipping breakfast with obesity and overweight (Ma et al., 2020). Despite some conflicting findings, skipping breakfast has been shown to increase the risk of being overweight and obese (Ma et al., 2020).

Diabetes Type I

This variable indicated whether the participant had been diagnosed with Type I diabetes. It is a nominal, categorical variable where individuals are categorized as either diabetes type I or no diabetes type I.

Diabetes Type II

This variable indicated whether the participant had been diagnosed with type II diabetes. It is a nominal, categorical variable where individuals are categorized as either diabetes type II or no diabetes type II.

Single-Parent Household

This variable indicated whether the participant lived in a single-parent household. It is a nominal, categorical variable, with categories single-parent household and not single-parent household.

Low-Income Status

This variable indicated the income status of the participant's household, categorized as low income and not low income. It is an ordinal, categorical variable, with low income being lower on the socioeconomic scale than not low income.

Data Analysis Plan

Software

The statistical analysis for this study was performed using IBM SPSS Statistics Version 29.

Data Preparation and Cleaning

I requested and downloaded YRBSS 2021 data from the CDC in ASCII and SPSS format. Specifically, I selected the year 2021 and the state of Georgia. The dataset included crucial variables such as age, gender, obesity, and race. After downloading it, I input the dataset into SPSS. I then cleaned the data by deleting unnecessary variables while retaining all the other variables of interest. Following this cleaning process in SPSS, the dataset was determined to be sufficiently large, containing 210 cases of adolescents, as indicated by the G Power analysis.

Research Questions and Hypotheses

Research Question 1 (RQ1): Is there an association between Black or African American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender?

$H_0$1: There is no association between Black or African American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

H_a1: There is an association between Black or African American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

RQ2: Is there an association between Hispanic ethnicity and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender?

$H_0$2: There is no association between Hispanic ethnicity and obesity among adolescents when controlling for consumption of 100%

fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

*H*a2: There is an association between Hispanic ethnicity and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

RQ3: Is there an association between Asian American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender?

*H*03: There is no association between Asian American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

*H*a3: There is an association between Asian American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

RQ4: Is there an association between White American race and obesity in adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender?

*H*04: There is no association between White American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

*H*a4: There is an association between White American race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

In this study, I employed SPSS version 29 to analyze this secondary data obtained from the 2021 YRBSS data file, which is accessible on the CDC website and available for download upon request. After submitting the request, I downloaded the YRBSS dataset as an SPSS syntax file and imported it into the SPSS software.

Initially, I selected the subset of cases that met the predetermined selection criteria and employed descriptive statistics to identify out-of-range values and missing data. After data cleaning procedures, I performed descriptive statistics once again. I recoded variables as necessary and conducted the two-way test.

For analysis, I utilized multiple logistic regression. The statistical significance level was set at $p<0.05$ to determine whether to accept or reject the null hypothesis. Additionally, I employed the odds ratio to ascertain the strength of the effect.

Multiple Logistic regression analysis was performed to investigate the associations between race and obesity while controlling for the specified covariates.

For RQ1, the predictor variable is the Black race. The covariates included consumption of 100% fruit juice, consumption of vegetables, breakfast consumption, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender, and the outcome variable was obesity.

After conducting the multiple logistic regression analysis, I assessed the significance of the predictor variable Black race by examining its p-value. A p-value less than 0.05 would indicate that the association between being of Black or African American race and obesity is statistically significant. To measure the strength of the association between being of Black or African American race and obesity, I examined the odds ratio (OR) associated with the predictor variable Black or African American race in the logistic regression model. A larger odds ratio indicates a stronger association between being of Black or African American race and obesity, while a smaller odds ratio suggests a weaker association.

For RQ2, the predictor variable is Hispanic ethnicity. The covariates were consumption of 100% fruit juice, consumption of vegetables, breakfast consumption, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender, and the outcome variable was obesity.

After conducting the multiple logistic regression analysis, I assessed the significance of the predictor variable Hispanic ethnicity by examining its p-value. A p-value less than 0.05 would indicate that the association between being of Hispanic ethnicity race and obesity is statistically significant. To measure the strength of the association between being of Hispanic ethnicity and obesity, I examined the odds ratio

(OR) associated with the predictor variable Hispanic in the logistic regression model. A larger odds ratio indicates a stronger association between being of Hispanic ethnicity and obesity, while a smaller odds ratio suggests a weaker association.

For RQ3, the predictor variable is the Asian American race. The covariates were consumption of 100% fruit juice, consumption of vegetables, breakfast consumption, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender, and the outcome variable was obesity.

After conducting the multiple logistic regression analysis, I assessed the significance of the predictor variable Asian American Race by examining its p-value. A p-value less than 0.05 would indicate that the association between being of Asian American race and obesity is statistically significant. To measure the strength of the association between being of Asian American race and obesity, I examined the odds ratio (OR) associated with the predictor variable Asian American race in the logistic regression model. A larger odds ratio indicates a stronger association between being of Asian American race and obesity, while a smaller odds ratio suggests a weaker association.

For RQ4, the predictor variables were the White American race. The covariates were consumption of 100% fruit juice, consumption of vegetables, breakfast consumption, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender, and the outcome variable was obesity.

After conducting the multiple logistic regression analysis, I assessed the significance of the White American race predictor variable by examining its p-value. A p-value less than 0.05 would indicate that the association between being of White American race and obesity is statistically significant. To measure the strength of the association between being of White American race and obesity, I examined the odds ratio (OR) associated with the predictor variable White American race in the logistic regression model. A larger odds ratio indicates a stronger association between White American race and obesity, while a smaller odds ratio suggests a weaker association.

Logistic regression enables examining dichotomous outcomes while considering the influence of multiple predictor variables. By considering both the significance and strength of effects in my study, I gained a comprehensive understanding of the association between race and obesity among adolescents while accounting for potential confounding factors such as consumption of 100% fruit juice, vegetables, breakfast, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender.

Threats to Validity

Utilizing data from the YRBSS helps migrate validity threats. The findings of this study are relevant to adolescents. Cross-sectional studies exhibit low internal validity but high external validity. Cross-sectional study designs measure exposure and disease simultaneously for individual-level variables (Pennsylvania State University, 2023). However, such designs provide weak evidence of a causal association between exposure and outcome (Pennsylvania State University, 2023). Challenges include nonresponse from participants and difficulties in interpreting associations, determining temporal sequence, and addressing biases, all of which can impact validity (Faculty of Public Health, 2023).

The threat to internal validity arises from measuring race and dietary behaviors, including 100% fruit juices, vegetables, and breakfast consumption. Dietary behaviors are associated with self-reports, which may introduce selection bias and compromise internal validity. However, the YRBSS data collection process undergoes validation. According to the CDC (2023d), research indicates that adolescents provide more data than adults. Internal reliability checks are conducted to identify the percentage of students who offer inaccurate responses (CDC, 2023d).

School participation poses a potential threat to external validity. Some schools may decline to participate, impacting the sample size (CDC, 2023d). Additionally, excluding those not enrolled in school from the YRSS data may also affect the generalizability of the findings (CDC, 2023d). Furthermore, changes in health-related policies and media attention on specific health issues may influence students' reporting behaviors, potentially biasing the results (CDC, 2023d).

Ethical Procedures

Using YRBSS to collect data raises several ethical considerations. Parental consent is required since the participants are minors. As a researcher, I am committed to protecting the confidentiality and privacy of the participants. An expedited Institutional Review Board (IRB) review was anticipated due to the CDC's thorough adherence to human research subject protections during the original data collection and study. YRBSS ensures anonymization of the data to safeguard participant identities. Given the sensitivity of the topics discussed, researchers must be mindful of potential risks associated with these topics. Transparency in research methods and findings is essential, and as a researcher, I ensured accountability for the data collected. In preparation for IRB approval, I have completed the Collaborative Institutional Training Initiative (CITI) training and have the certificate on file.

Summary

This study examined the association between race and obesity among adolescents in Georgia, utilizing cross-sectional secondary data from the YRBSS 2021. Descriptive statistics were conducted to analyze all variables, while binary logistic regression was applied to address all research questions. An odds ratio and 95% confidence intervals were reported and interpreted.

All eligible participants meeting the inclusion criteria, comprising adolescents surveyed during the YRBSS 2021, were included in the study. Exclusions were made for participants who did not specify their race, age, or gender since these variables were central to the study's focus. The sampling frame consisted of adolescents from the YRBSS 2021 dataset. The study’s research questions were addressed using data and survey responses from YRBSS 2021. The dependent variable is obesity, categorized as binary(not obese vs obese) based on participants’ BMI values.

Chapter 4: Results

Introduction

I utilized the 2021 YRBSS data set for this quantitative cross-sectional analysis to examine the association between race and obesity among adolescents in Georgia.

Research Question 1 (RQ1): Is there an association between the Black or African American race versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender?

H_01:There is no association between the Black or African American race versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

H_a1: There is an association between the Black or African American race versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

RQ2: Is there an association between Hispanic ethnicity versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender?

H_02: There is no association between Hispanic ethnicity versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

*H*a2:There is an association between Hispanic ethnicity versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

RQ3: Is there an association between all other races versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender?

*H*03:: There is no association between all other races versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

*H*a3:There is an association between all other races versus the White race and obesity among adolescents when controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

This chapter will outline the study's purpose, research questions, and hypotheses. I will then describe the process of preparing the dataset for analysis, including the adjustments to ensure accuracy and suitability. I will also discuss any discrepancies between the planned data collection methods from Chapter 3 and the actual processes used. Next, I will present the descriptive characteristics of the dataset and provide an overview of the analysis plan designed to address the research questions. The results of both bivariate and multivariate analyses will be reported, followed by a summary that provides a cohesive overview of the findings and insights. In this chapter, I aim to provide a thorough and precise account of the data collection process, sample characteristics, and statistical analyses, laying the groundwork for interpreting the study's findings in subsequent chapters.

Data Collection

I obtained IRB approval from Walden University for this study before downloading the data for analysis. The IRB approval number for this study is 05-14-24-0991696. I then downloaded the 2021 YRBSS dataset from the CDC YRBSS Data Page, which included data on age, gender, and dietary behaviors. After importing the dataset into SPSS, I carefully deleted variables that were irrelevant to the study, ensuring that the integrity and reliability of the data were maintained.

The YRBSS is conducted biennially. Initially scheduled for its regular administration from January to June 2021, the 2021 YRBSS was postponed to September to December 2021due to the COVID-19 pandemic, ongoing school closures, and the transition from virtual to hybrid school instructional models (CDC, 2023d).

YRBSS employs a multistage, clustering sample design to recruit participants. The process begins with selecting a representative sample of schools across the United States, encompassing both private and public schools from various geographic regions and demographic backgrounds. Specific classrooms or classes are chosen to participate within these schools, ensuring diverse representation across different grades and demographics. All students in the selected classes are invited to participate voluntarily during a designated class period with trained personnel or researchers present to explain the survey, answer questions, and ensure accurate completion.

The CDC guarantees students' confidentiality and anonymity, emphasizing that individual responses are not shared with schools or other entities. After collection, the data undergo quality checks by the CDC to verify accuracy and reliability. The CDC then analyzes the data to identify patterns, trends, and associations related to youth health behaviors. Recruitment and data collection methods may vary slightly from year to year, but the CDC aims for a high response rate to ensure the data's reliability and validity.

In 2021, YRBSS completed 17,508 questionnaires across 152 schools. Of these, 276 questionnaires did not meet quality control criteria and were subsequently excluded from the analysis, resulting in 17,232 usable questionnaires. The school response rate was 72.7%, and the student response rate was 79.1%, leading to an overall response rate of 57.5%.

The YRBSS 2021 dataset included 584 adolescents. Before conducting the analysis, I refined the dataset using the Select Cases function in SPSS to focus on the population and variables of interest. As a result, I included all 584 adolescents in the study.

Initially, I planned to analyze several vital covariates to provide a comprehensive view of factors influencing adolescent obesity. However, during data collection, I discovered that the 2021 YRBSS dataset lacked information on diabetes type I, diabetes type II, single-parent households, and low-income status. This omission restricted my ability to assess the socioeconomic influences on obesity and limited my evaluation of the role of diabetes in obesity outcomes among surveyed adolescents.

Descriptive Characteristics: Univariate Analysis

I used SPSS to conduct a univariate analysis of all the variables in the study. I also ran descriptive statistics for the independent variables, dependent variables, and covariates. This analysis helped me combine categories within categorical variables based on their percentage and evaluate missing data.

The study participants were adolescents (*n* = 584) from the 2021 YRBSS dataset. Table 3 presents the descriptive statistics for the independent variable and details the racial/ethnic composition of the sample. Specifically, 238 participants (39.4%) identified as White, 217 participants (39.4%) identified as Black or African American, 76 participants (12.6%) identified as Hispanic/Latino, and 53 participants (8.8%) identified as belonging to all other races. Table 3 provides the descriptive statistics for the independent variable, race.

Table 3

Descriptive Statistics: Independent Variable (n = 584)

Variable	*n* (%)
Race	
White	238 (39.4)
Black or African American	217 (35.9)
Hispanic/Latino	76 (12.6)
All other races	53 (8.8)

I examined each categorical covariate to determine which categories needed to be combined for analysis, ensuring that each category had a sufficient sample size. For the age covariate, I merged the original categories of 12 years old or younger, 13 years old, and 14 years old into a single category, 14 years old or younger, due to uneven and low category counts. I also combined 17 years old and 18 years old into a single category: 17

to 18 years old. To address uneven and low category counts in the breakfast covariate, I combined the original categories of "4 days" and "5 days" into a single category, "4–5 days," and merged "6 days" and "7 days" into a single category, "6–7 days." Table 4 provides the descriptive statistics for obesity, age, breakfast, and gender.

Table 4

Descriptive Statistics: Dependent Variables

Variable	*n* (%) (*n* = 549)	*n* (%) (*n* = 604)	*n* (%) (*n* = 575)	*n* (%) (*n* = 599)
Obesity				
Not obese	446 (73.8)			
Obese	103 (17.1)			
Missing	55 (9.1)			
Total	549 (100.0)			
Age				
14 years old or younger		139 (23.0)		
15 years old		189 (31.3)		
16 years old		142 (23.5)		
17–18 years old		134 (22.2)		
Total		604 (100.0)		
Breakfast				
0 days			141 (23.3)	
1 day			58 (9.6)	
2 days			72 (11.9)	
3 days			61 (10.1)	
4–5 days			79 (13.1)	
6–7 days			164 (27.2)	
Missing			29 (4.8)	
Total			575 (100.0)	
Gender				
Female				314 (52.0)
Male				285 (47.2)
Missing				5 (0.8)
Total				599 (100.0)

To address uneven and low category counts, I combined the original categories of "1 time per day," "2 times per day," "3 times per day," and "4 or more times per day" into a single category, "1 or more times per day," for green salad, other vegetables, and

100% fruit juice. Table 5 presents the descriptive statistics for the green salad, other vegetables, and 100% fruit juice covariate.

Table 5

Descriptive Statistics: Dependent Variables

Variable	*n* (%) *N* = 592	*n* (%) *N* = 591	*n* (%) *N* = 592
Green salad			
I did not eat green salad during the past 7 days	313 (51.8)		
1 to 3 times during the past 7 days	208 (34.4)		
4 to 6 times during the past 7 days	31 (5.1)		
1 to more time per day	40 (6.6)		
Missing	12 (2.0)		
Total	592 (100.0)		
Other vegetables			
I did not eat other vegetables during the past 7 days		142 (23.5)	
1 to 3 times during the past 7 days		234 (38.7)	
4 to 6 times during the past 7 days		119 (19.7)	
1 to more time per day		96 (15.9)	
Missing		13 (2.2)	
Total		591 (100.0)	
100% fruit juice			
I did not drink 100% fruit juice during the past 7 days			185 (30.6)
1 to 3 times during the past 7 days			220 (36.4)
4 to 6 times during the past 7 days			90 (14.9)
1 or more time per day			97 (16.1)
Missing			12 (2.0)
Total			592 (100.0)

Bivariate Analysis

I analyzed the dependent variable of obesity and its covariates using crosstabs with chi-square analysis in SPSS Version 29. Before conducting the multivariate analysis, I utilized crosstabs to check for missing data, assess the goodness of fit, and refine categorical variables by combining categories as needed. The analysis revealed that Black or African American adolescents had the highest obesity rates, while White adolescents had the lowest.

Further crosstabs and chi-square analyses uncovered several key patterns: Females had the highest obesity rates, while males had the lowest. Among different age groups, 15-year-olds had the highest obesity rates, whereas 16-year-olds had the lowest. Participants who did not drink 100% fruit juice during the past 7 days showed the highest obesity rates, while those who consumed it one or more times per day had the lowest rates.

In summary, the bivariate analysis indicated that obesity rates are highest among the Black or African American race and lowest among the White race. Additionally, females exhibit higher obesity rates compared to males, and participants who did not drink 100% fruit juice exhibit higher obesity rates compared to those who consumed it regularly (see Table 6).

Table 6

Obesity and Potential Confounding Variables

Variable	*n* (%)
Race/Ethnicity	*p* = .008
White	
Obese	29 (12.7)
Not obese	200 (87.3)
Black or African American	
Obese	49 (25.0)
Not obese	147 (75.0)
Hispanic/Latino	
Obese	16 (23.9)
Not obese	51 (76.1)
All other races	
Obese	7 (16.7)
Not obese	35 (83.3)
Gender	*p* = .677
Female	
Obese	55 (19.4)
Not obese	228 (80.6)
Male	
Obese	48 (18.0)
Not obese	218 (82.0)
Age	*p* = 82.3
14 or younger	
Obese	26 (20.8)
Not obese	99 (79.2)
15 years old	
Obese	30 (17.0)
Not obese	146 (83)
16 years old	
Obese	23 (17.8)
Not obese	106 (82.2)
17 to 18 years old	
Obese	24 (20.2)
Not obese	95 (79.8)
100% fruit juice	*p* = .731
I did not drink 100% fruit juice during the past 7 days	
Obese	36 (21.3)
Not obese	133 (78.7)
1 to 3 times during the past 7 days	
Obese	35 (17.9)
Not obese	161 (82.1)
4 to 6 times during the past 7 days	
Obese	16 (19.0)
Not obese	68 (81.0)
1 or more times per day	
Obese	14 (15.9)
Not obese	74 (84.1)

I conducted crosstabs and chi-square analysis in SPSS Version 29 to analyze the dependent variable of obesity and various covariates, yielding the following results: For the breakfast covariate, the highest rate of obesity was observed among participants who did not eat breakfast at all (0 days), while the lowest rate of obesity was found among those who ate breakfast 3 days a week. Regarding the green salad covariate, participants who did eat green salad during the past 7 days exhibited the highest obesity rates. In contrast, those who ate green salad 4 to 6 times during the week had the lowest obesity rates.

For the other vegetables covariate, the highest obesity rate was found among participants who did not eat other vegetables during the past 7 days. In contrast, those who ate other vegetables one or more times per day had the lowest obesity rates. However, the analysis revealed no statistically significant difference in obesity rates related to the consumption of other vegetables.

The bivariate analysis revealed that participants who skipped breakfast (0 days) had the highest obesity rates. Additionally, those who did not eat green salad during the past 7 days had higher obesity rates, while those who ate green salad 4 to 6 times per week had lower obesity rates. Similarly, participants who did not eat other vegetables during the past 7 days also had higher obesity rates, while those who ate other vegetables one or more times per day had lower obesity rates (see Table 7).

Table 7

Obesity and Potential Confounding Variables

Variable	n(%)
Breakfast	*p* = .840
0 days	
Obese	27 (20.9)
Not obese	102 (79.1)
1 day	
Obese	9 (18.1)
Not obese	41 (82.0)
2 days	
Obese	14 (21.2)
Not obese	52 (78.8)
3 days	
Obese	7 (13.0)
Not obese	47 (87.0)
4 to 5 days	
Obese	14 (19.7)
Not obese	57 (80.3)
6 to 7 days	
Obese	27 (17.5)
Not obese	127 (82.5)
Green salad	*p* = .735
I did not eat green salad during the past 7 days	
Obese	52 (18.1)
Not obese	235 (81.9)
1 to 3 times during the past 7 days	
Obese	35 (18.9)
Not obese	150 (81.1)
4 to 6 times during the past 7 days	
Obese	5 (16.7)
Not obese	25 (83.3)
1 or more times per day	
Obese	9 (25.7)
Not obese	26 (73.2)
Other vegetables	*p* = 3.46
I did not eat other vegetables during the past 7 days	
Obese	48 (18.0)
Not obese	23 (17.6)
1 to 3 times during the past 7 days	
Obese	108 (82.4)
Not obese	39 (18.9)
4 to 6 times during the past 7 days	
Obese	16 (19.0)
Not obese	68 (81.0)
1 or more times per day	
Obese	14 (15.9)
Not obese	41 (84.1)

Multivariate Analysis

To address the study's research questions, I first employed standard multiple logistic regression analysis and then applied complex samples multiple logistic regression analysis in SPSS to evaluate RQ1, RQ2, and RQ3. I developed a complex samples (CS) plan using the sample weights provided in the 2021 YRBSS dataset.

RQ1: To investigate the association between the Black or African American race versus the White race and obesity among adolescents, I used binary logistic regression and complex sample multiple logistic regression analysis, controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

The binary logistic regression analysis revealed that the highest rate of obesity is among the Black or African American race, while the lowest rate of obesity is among the White race ($p < .001$, Table 15). Specifically, Black or African American adolescents are approximately 2.70 times more likely to be obese compared to the White race (reference category) (OR= 2.656, 95 CI [1.527, 4.619, $p < 0.01$, Table 8)].

In the complex logistic regression analysis, the Black or African American race exhibits an odds ratio of 2.075. This indicates that Black or African American participants have approximately 2.08 times higher rates of obesity compared to White participants (see Table 9).

RQ2: To investigate the association between Hispanic ethnicity versus White race and obesity among adolescents, I used binary logistic regression and complex sample multiple logistic regression analysis, controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender.

The binary logistic regression analysis showed that Hispanic ethnicity has a higher rate of obesity compared to White race (p =0.030, Table 15). Specifically, Hispanic ethnicity adolescents are approximately 2.38 times more likely to be obese compared to the White race (reference category) (OR= 2.381, 95 CI [0.351,16.142, p=0.030, Table 8)].

In the complex logistic regression analysis, Hispanic ethnicity exhibited an odds ratio of 2.381 for being obese compared to White race. This indicates that Hispanic ethnicity adolescents are approximately 2.38 times more likely to be obese than their White counterparts (See Table 9).

RQ3: To investigate the association between all other races versus the White race and obesity among adolescents, I used binary logistic regression and complex sample multiple logistic regression analysis, controlling for consumption of 100% fruit juice, vegetables, breakfast, age, and gender. The binary logistic regression analysis showed no statistically significant association between obesity and all other races. (p 0.6671, Table 15). The odds ratio was 1.232 with a 95% confidence interval of (OR= 1.232, 95 CI [0.461,3.293, p 0.667, Table 8)], indicating that the likelihood of obesity among participants of other races compared to White participants was not significantly different.

In the complex logistic regression analysis, all other races were not significant predictors of obesity. Participants of other races had an odds ratio of 1.232 for being obese compared to White participants. While the odds ratio indicated a potential increase in obesity odds for adolescents from other races compared to White adolescents, the results are not statistically significant, and the observed association is not reliable. Further research with a larger sample size may be needed to clarify these findings (See Table 9).

Table 8

Binomial Logistic Regression for Obesity (Dependent Variable) With Predictors Gender, Age, 100% Fruit Juice, Breakfast Green Salad, More Vegetables

Predictors	B	*SE*	Wald	*p* value	Odds ratio	95% CI Lower	for *OR* Upper
Race Ethnicity (reference: White)			13.361	.004			
Black or African American							
Hispanic/Latino	.992	.284	12.203	< .001	2.698	1.546	4.708
All other races	.778	.363	4.720	.030	2.198	1.080	4.474
Gender (reference: female)	.209	.501	.174	.667	1.232	.461	3.293
	0.13	.242	.003	.957	1.013	.630	1.628
Age (reference: 14 or younger)			.672	.880			
15 years old	-.246	.328	.559	.455	.782	.411	1.489
16 years old	-2.36	.351	.451	.502	.790	.397	1.572
17 to 18 years old	-.139	.348	.158	.691	.871	.440	1.723
100% fruit juice (reference: I did not drink fruit juice			4.932	.177			
during the past 7 days)	-.237	.284	.693	.405	.789	.452	1.377
1 to 3 times during the past 7 days	-.230	.359	.408	.523	.795	.393	16.08
4 to 6 times during the past 7 days	-.873	.393	4.928	.026	.418	.193	.903
Breakfast (reference: 0 days)			2.362	.797			
1 day	-.318	.443	.516	.472	728	.306	1.732
2 days	-.112	.399	.079	.779	.894	.409	1.954
3 days	-.701	.478	2.156	.142	.496	.195	1.265
4 to 5 days	-.168	.393	.182	.669	.846	.391	1.826
6 to 7 days	-.181	.322	.316	.574	.834	.443	1.569
Green salad (reference: I did not eat green salad for the past 7 days)			8.73	.832			
1 to 3 times during the past 7 days	.033	.269	.015	.903	1.033	.609	1.752
4 to 6 times during the past 7 days	-.309	.549	.316	.574	.734	.250	2.156
Other vegetables (Reference: I did not eat green salad for the past 7 days)			2.362	.501			
1 to 3 times during the past 7 days	.171	.319	.287	.592	1.186	.634	2.219
4 to 6 times during the past 7 days	-.081	.384	.044	.834	.923	.435	1.958
1 or more times per day	.470	.383	1.510	.219	1.600	.756	3.387

Table 9

Complex Samples Multiple Logistic Regression: Obesity

Predictors	*OR* (95% CI)
Race	
Black or African American vs. White	2.075 (.326, 13.203)
Hispanic/Latino vs. White	2.381 (.351, 16.142)
All other races vs. White	.860 (.534, 1.386)

Summary

Black or African American and Hispanic adolescents show higher rates of obesity compared to White adolescents. However, the analysis did not reveal a significant association between adolescents of all other races and White adolescents. In Chapter 5, I will interpret the findings for each research question and the theoretical framework, discuss the study's limitations, offer recommendations for future research, and explore the implications for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative cross-sectional study was to examine the association between race and obesity among adolescents living in Georgia. The study used a cross-sectional design to investigate how dietary behaviors impact childhood obesity. It employed secondary data from the YRBSS to compare obesity rates across different races while controlling for dietary behavior. Logistic regression analysis assessed the association between race and obesity, controlling for factors such as consumption of vegetables, breakfast, 100% fruit juice, diabetes type I, diabetes type II, single-parent households, low-income status, age, and gender. This quantitative approach simplified a systematic examination and statistical analysis focused on evaluating the relationship between race and obesity when controlling for dietary behaviors in Georgia.

To address RQ1, which pertains to the association between the Black or African American race versus the White race and obesity, the analysis incorporated covariates including 100% fruit juice consumption, vegetable intake, breakfast frequency, age, and gender. These covariates proved statistically significant in the model. The results indicated that Black or African American adolescents had the highest obesity rates, whereas White adolescents had the lowest obesity rates.

For RQ2, which focuses on the association between Hispanic ethnicity and obesity versus White race, the analysis also included the covariates of 100% fruit juice, vegetables, breakfast, age, and gender. These covariates were statistically significant, revealing that Hispanic adolescents had the highest obesity rates when compared to White adolescents.

For RQ3, which addresses the association between all other races versus the White race and obesity, the covariates 100% fruit juice, vegetables, breakfast, age, and gender were included. They were found not to be statistically significant in the model.

In this chapter, I comprehensively interpret the findings and their relationship to the theoretical framework. Additionally, I discuss the study's limitations, propose recommendations for future research, and discuss the implications for social change.

Interpretation of the Findings

African American or Black Race Versus White Race and Obesity

The analysis of obesity rates among adolescents in Georgia reveals that the highest rate of obesity is observed among Black or African American adolescents. In contrast, the lowest rate of obesity is found among White adolescents (p =< .001). The odds ratio of 2.70 indicates that Black or African American adolescents are approximately 2.70 times more likely to be obese compared to White adolescents. This is a public health concern, suggesting that Black or African American adolescents face socioeconomic or environmental factors contributing to higher obesity rates (Ruiz et al., 2020). These findings emphasize the need for targeted interventions and policies that address the specific challenges faced by this demographic group to reduce obesity rates and promote healthier lifestyles. Further research into underlying causes, such as access to healthcare, availability of nutritious foods, levels of physical activity, and broader social determinants of health, can help develop more effective public health strategies and interventions aimed at reducing obesity disparities and improving health outcomes for Black or African American adolescents in Georgia.

The study's findings are consistent with and expand upon existing knowledge regarding the impact of obesity on Black or African American adolescents. Research by Zgodic (2021) and Anderson et al. (2019) has documented the higher prevalence of obesity among minority racial and ethnic groups. The results show the need for tailored public health interventions and confirm the need for targeted strategies to address obesity in high-risk groups. This study provides a comprehensive view of how various minority groups are affected by obesity.

Hispanic Ethnicity Versus White Race and Obesity

Examining the association between Hispanic ethnicity versus White race and obesity among adolescents in Georgia revealed a statistically significant difference (p = 0.030). Hispanic/Latino adolescents were found to be twice as likely to be obese compared to White adolescents, with an odds ratio of 2.381. This disparity suggests that Hispanic/Latino adolescents may face unique challenges that may contribute to higher obesity rates, such as cultural dietary habits, limited access to recreational facilities, and economic constraints. Reducing physical activity and increased calorie consumption exacerbate obesity rates (Ruiz et al., 2020).

The study's findings align with and build upon existing knowledge regarding the impact of obesity among Hispanic adolescents. Previous research by Eichen et al. (2020) and others has established that obesity disproportionately affects minority groups when accounting for socioeconomic status. This study reinforces the notion that Hispanic adolescents experience higher obesity rates when compared to White adolescents due to specific socioeconomic and environmental challenges.

The current results are consistent with trends reported in previous studies, such as those by Ogden et al. (2020) and Yusuf et al. (2020), which highlighted increasing obesity rates among non-Hispanic Black and Mexican American youth. The findings underscore the persistent public health challenge within these communities and affirm the need for targeted interventions to address the elevated obesity rates among Hispanic/Latino adolescents.

All Other Races Versus White Race and Obesity

Examining the association between all other races versus White race and obesity among adolescents in Georgia, I found no statistically significant difference ($p = 0.667$) or any significant impact from the included covariates. The odds ratio was 1.232, indicating that the obesity rates among adolescents of all other races are not significantly different from those of White adolescents. This suggests that not all minority groups experience similar levels of obesity risk. Recognizing this lack of significant difference allows for a more targeted allocation of resources and efforts toward the groups with higher risk, such as African American and Hispanic/Latino adolescents (Ruiz et al., 2020). This outcome suggests that socioeconomic and environmental factors impacting obesity rates may vary across different racial and ethnic groups.

Public health strategies need to be more targeted and nuanced, as Isong et al. (2018) emphasized the importance of understanding the relative contribution of specific obesity risk factors to racial and ethnic disparities at different life stages. The findings suggest that interventions must be culturally sensitive and consider specific socioeconomic and environmental factors unique to each racial or ethnic group. The nuanced understanding could lead to future research and policy-making, ensuring that the resources are allocated efficiently and interventions are designed to meet the needs of the most affected populations (Ruiz et al., 2020).

Theoretical Framework

The analysis of the obesity rate using the social ecological model provides a comprehensive approach to understanding the factors influencing childhood obesity among different racial/ethnic groups. The social ecological model focuses on the importance of health behaviors, considering individual, relationship, community, and societal levels of influence. The social ecological model illustrates how various factors such as socioeconomic status, cultural norms, access to healthy food, and physical activity opportunities interact to affect obesity among adolescents (CDC, 2022c).

At the individual level, the study highlights that race/ethnicity alone may not significantly predict obesity for all the other race categories. This could mean that personal and biological factors and individual behaviors play essential roles. At the relationship level, family and peer influences might differ across ethnic groups, affecting physical activity and dietary habits. Community-level factors such as the availability of recreational facilities and safe neighborhoods for physical activity play a significant role. The societal level factors, like cultural attitudes towards body image and food, further contextualize the findings (CDC, 2022c). This nuanced understanding aligns with the social ecological model's framework, demonstrating the complexity of obesity as a public health issue and underscoring the need for multilevel interventions tailored to the specific needs of different racial and ethnic groups (Bronfenbrenner, 1970).

Limitations of the Study

This study has several limitations. First, the data are self-reported, which can lead to inaccuracies, such as underreporting or overreporting behaviors (Brener et al., 2013). Additionally, the survey primarily includes students from national, state, tribal, territorial, and extensive urban school districts, thus not representing all youths in this age group. Variations in local procedures for obtaining parental consent across different school-based survey sites also pose a limitation. Furthermore, state-level data are only available for some 50 states, and self-reported eating behaviors introduce another layer of potential inaccuracy. The YRBSS focuses solely on behaviors related to the leading causes of morbidity and mortality among youths and adults, limiting its scope (Brener et al., 2013).

Additionally, the dataset does not allow for a specific analysis of the association between Asian American race and obesity among adolescents. The “all other races” category is too broad to isolate the effects for Asian American adolescents. Lastly, the YRBSS dataset does not include variables such as diabetes type I and type II, single-parent households, and low-income status, limiting the study's comprehensiveness.

Recommendations

Future research should focus on more specific racial and ethnic categories to better understand how obesity impacts distinct groups, such as Asian Americans and specific Hispanic subgroups. This approach will help refine interventions to address the unique needs of these populations better (Isong et al., 2018). Additionally, investigating how socioeconomic factors such as income level and education interact with race and ethnicity to influence obesity rates can provide insights into broader socioeconomic determinants and inform targeted policy interventions (Ogden et al., 2020).

Further studies should also evaluate the impact of specific public policies and programs on obesity rates among different racial and ethnic groups. Such research will help policymakers understand which policies are most effective in reducing disparities and improving health outcomes (CDC, 2020). Furthermore, examining the role of psychological and behavioral factors, including mental health, stress, and lifestyle choices, in contributing to obesity among different racial and ethnic groups can offer a more comprehensive understanding of the underlying causes (Stokols, 1992).

By addressing these areas, future research can overcome the limitations of current studies and enhance the understanding of obesity across diverse populations, leading to more effective and tailored public health strategies.

Implications

This study can drive positive social change by improving social conditions, health outcomes, and policy development. Its findings provide crucial guidance for policymakers and public health officials to design targeted interventions and policies that aim at reducing obesity rates among high-risk racial and ethnic groups (CDC, 2022d). By identifying specific factors that contribute to obesity disparities, the study can help shape more effective health programs and community initiatives (Stokols, 1992).

The results of this study highlight the differences in obesity rates among various racial and ethnic groups, indicating where resources and efforts should be concentrated.

This information can lead to developing programs that address the specific needs of different communities, such as culturally relevant nutrition education or community-based weight management programs (Bronfenbrenner, 1979). Community organizations can use these insights to develop targeted programs that align with the needs of their populations.

Additionally, by shedding light on the socioeconomic and environmental factors influencing obesity, this study raises awareness about the challenges faced by different racial and ethnic groups. The increased awareness can mobilize community support and drive collective actions toward addressing these issues (Ogden et al., 2020). The findings can be used to educate healthcare providers, educators, and community leaders about the challenges experienced by various groups.

Translating the study's insights into actionable strategies and interventions will foster positive social change. The aim is to improve public health, reduce disparities, and enhance the overall well-being of different communities (Isong et al., 2018).

Conclusion

This quantitative cross-sectional study aimed to investigate the association between race and obesity among adolescents in Georgia, utilizing secondary data from the YRBSS. By employing a cross-sectional research design and logistic regression analysis, the study assessed how dietary behaviors and other covariates influence obesity rates across different racial and ethnic groups.

The findings reveal that Black or African American adolescents exhibit the highest obesity rates, with an odds ratio of 2.70 compared to their White peers, indicating that they are approximately 2.70 times more likely to be obese. This significant disparity emphasizes the need for targeted public health interventions that address socioeconomic and environmental factors contributing to higher obesity rates among Black or African American adolescents. These results align with existing literature highlighting the prevalence of obesity in minority groups and emphasize the necessity for tailored strategies to combat these disparities.

The study found that individuals of Hispanic ethnicity are approximately twice as likely to be obese compared to their White peers, with an odds ratio of 2.38. This suggests that Hispanic adolescents face unique challenges, such as cultural dietary habits and limited access to recreational facilities, which contribute to their higher obesity rates (Eichen et al., 2020). These findings are consistent with previous research documenting obesity disparities among Hispanic youth and highlight the need for culturally sensitive public health strategies.

In contrast, the study did not find a statistically significant difference in the obesity rates between adolescents categorized as all other races and White race. The odds ratio of 1.23 indicates no significant impact from the covariates in the model. This suggests that not all minority groups experience the same level of obesity risk, allowing for more focused resource allocation towards groups with higher risk (Ogden et al., 2020).

The social ecological model's theoretical framework provides a comprehensive view of how various individual, relationship, community, and societal factors influence obesity. This highlights the complexity of obesity as a public health issue and supports the need for multilevel, culturally tailored interventions (Bronfenbrenner, 1979).

The study's limitations include the reliance on self-reported data, which can introduce inaccuracies, and the exclusion of variables such as diabetes and socioeconomic status due to limitations in the YRBSS dataset. Additionally, the study's focus on school-based data means that it does not represent all adolescents in the age group, and the broad category of all other races limits the ability to analyze specific racial groups, such as Asian Americans.

Overall, this study contributes valuable insights into the relationship between race and obesity among adolescents in Georgia, highlighting how different racial factors influence obesity rates. The findings reveal specific disparities and patterns related to race that contribute to varying obesity rates among adolescents. This detailed understanding underscores the need for further research to explore these racial factors more deeply. It emphasizes the need for targeted research and interventions to address these disparities effectively.

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