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Relating Overweight/Obesity and Psychosocial Outcomes Among Racial/Ethnic and Sexual Minority Adolescents

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Walden University
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Abstract

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by

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MPH, American Military University, 2014

BS, Troy University, 2010

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Adolescents being overweight/obese is a public health crisis that threatens the health and welfare of adolescents going into adulthood and places a significant strain on society. It has been described as one of the most severe public health challenges of the 21st century by the World Health Organization. The pervasiveness of obesity in adolescents rose by 47.1% over the last three decades, and it disproportionally affects racial/ethnic minority lesbian, gay, and bisexual (LGB) persons. Guided by distal and proximal health behaviors, the minority stress model, and intersectionality, the purpose of this study was to examine whether being overweight or obese influences the psychosocial outcomes of depression, suicidality, and substance use in racial/ethnic and sexual minority adolescents who participated in the 2017 Youth Risk Behavior Survey and the 2017 National Survey on Drug Use and Health. Descriptive statistics and multivariable logistic regression tests were used to analyze the data. Results indicated no significant associations between being overweight or obese and the psychosocial outcomes of depression and suicidality among this population. However, there was a significant association between being overweight/obese and substance (marijuana) use in this population (*OR* = 2.26, 95% CI = 1.11, 4.59), showing that overweight/obesity and substance (marijuana) use co-occur within this racial/ethnic and sexual minority. Understanding the extent to which overweight/obesity and marijuana use coexist in this population could add to the incomplete understanding of the epidemiology, mechanisms, and treatment of these conditions to develop new programs that help improve the quality of life for minority LGB individuals, which can also lead to positive social change for their families and communities.

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Dedication

This dissertation is dedicated to my children, Isaac, Teiyana, and Dante for their amazing support throughout my doctorate program. I also dedicate this to my sister and friend, Felica who taught me to believe in the power of education.

Acknowledgments

First and foremost, I must give all honor and Glory to God who is the head of my life, for giving me the strength and perseverance to complete this journey. “For I know the plans I have for you,” declare the Lord, “plans to prosper you and not to harm you, plans to give you hope and a future.” ~Jeremiah 29:11.

The path toward this dissertation was long and very challenging and its completion is thanks in huge part to the educated and phenomenal people who challenged, supported, and refuse to allow me to give up. I would like to express my sincere gratitude to my chair Dr. Peter Anderson for his unwavering support, invaluable feedback, motivation, and enthusiasm. His knowledge, guidance, and encouragement helped me to stay focus on the goal post and to ultimately reach this milestone. My deepest appreciation goes to my dissertation committee member, Dr. Aaron Mendelsohn, for his extraordinary assistance and willingness to go the extra mile to ensure I achieve success. Without his assistance, thought-provoking questions, and enduring support, the dissertation process would have been much more challenging to accomplish. To my URR member, Dr. Robin Carlson, thank you for your insightful comments, intricate level of detail, and invaluable support. I could not have imagined a better team to assist me in completing this journey. I would also like to thank Dr. Candace Bright, Dr. Tom Granoff, and Dr. Andrea Curry for their assistance which was pivotal in this dissertation.

Last and certainly not least, I would like to thank my family for their unwavering support through this entire process. I am indebted to you and truly appreciate your prayers and encouragement. I will forever be grateful.

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Part 1: Overview

Introduction

Over the past few decades, the prevalence of adolescent obesity within the United States has more than tripled (Ogden et al., 2014; Webster et al., 2018). It was estimated that 30% of youth and adolescents in the United States are overweight or obese (Tyson & Frank, 2018). Data from 2015–2016 demonstrated that almost 1 out of every 5 school-age youth and adolescents in the United States (6 to 19 years) were obese or overweight (Centers for Disease Control and Prevention, [CDC], 2019a). Within the United States, 340 million adolescents between the age of 5 and 19 years old are considered to be overweight or obese (Kumanyika, 2019). The rate of obesity presents many health and social implications and impacts the general well-being of adolescents (Mereish & Poteat, 2015). Obesity in adolescents has negative connotations of morbidity and mortality during adulthood, and it is challenging to reverse (Ajman et al., 2019).

Racial and ethnic minorities are disproportionally affected by obesity (Melius et al., 2019). Roughly 21% of Latino children and adolescents and 24% of African American children and adolescents are overweight/obese compared to 14% of White children and adolescents (Guerrero & Chung, 2016). Data obtained from the National Center for Health Statistics also showed that 22% of African American youth are classified as obese compared to 14% of non-Latino White youth (Allport et al., 2019). African American adolescents currently have the second highest rates of obesity (20%), particularly those in low socioeconomic status, compared to 14.2% of their White counterparts (Jackson et al., 2019). Despite research pointing to the overall rates of

obesity stabilizing, the prevalence of severe obesity in the United States is increasing with racial/ethnic minorities at most significant risk (D'Agostino et al., 2018). Obesity is a major challenge for public health in the United States, with minority youth at a particularly increased risk (Schulte et al., 2018). Though overweight/obesity has been shown to occur at higher levels among racial/ethnic minority adolescents, only a few researchers have explored racial/ethnic differences in the increased risk of overweight/obesity in adolescents (Rodgers et al., 2017a).

Previous researchers have argued that lesbian, gay and bisexual (LGB) youth and adolescents are also disproportionately affected by weight-related disparities (Azagba et al., 2019; Hall et al., 2019). However, limited population-based state-level data on LGB communities and body weight continue to act as a barrier to understanding LGB differences in the United States (Azagba et al., 2019; Jennings et al., 2019). Similarly, obesity, diet, habits of physical activity, unhealthy behaviors in weight control, and body image are fields of prospective disparities among LGB populations that lack significant research evidence (Laska et al., 2015). Because LGB adolescents have a higher incidence of being overweight and obese, they are five times more probable to become obese adults. This places them at advanced risk for negative health outcomes in both the short and the long term, such as low self-esteem, psychological problems, substance use, and depression, which leads to long-term morbidity and premature death (CDC, 2018). There is a need for information about the specificity of the LGB community for professionals dealing with eating disorders (Kołodziej et al., 2018), and synchronized efforts are needed to meet needs and improve the health and well-being of minority adolescents and

LGB adolescents (Laska et al., 2015). Action is needed to protect the health and well-being of minority adolescents and LGB adolescents (CDC, 2016).

Further, LGB adolescents who are also racial/ethnic minorities could be at a higher risk of adverse health consequences due to experiences of minority stress as a result of being a member of multiple minority groups (Katz-Wise et al., 2014). LGB adolescents may cope with minority stress by taking part in unhealthy weight-related behaviors (Katz-Wise et al., 2014). Ethnic minority adolescents are at an increased risk of disordered eating, especially targeted weight loss behaviors compared to their White counterparts, which may be attributed to increased level of stress due to minority status (Rodgers et al., 2017b). Similarly, because they are members of multiple minority groups, these adolescents may face stigma at various levels that can have a profound effect on their identities, their perceptions, and life trajectories (Chulani, 2018). In addition to race/ethnicity, adolescents who possess other social identities, such as being overweight/obese or a sexual minority, may often endure maltreatment and marginalization (Benner et al., 2018). Therefore, a continued focus is needed on reducing the stigma associated with being overweight and having unhealthy habits in this vulnerable population (Rodgers et al., 2017b).

In this study, I examined the relationship between being overweight/obese and the psychosocial outcome of depression, suicidality, and substance use among racial and ethnic minority LGB adolescents utilizing intersectional and minority stress framework. The knowledge gained from this study has the potential to assist public health officials in recognizing overweight/obese as a risk factor that contributes to racial and ethnic

minority LGB adolescents' depression, suicidality/suicide ideation, and substance use. The results of this study could yield results to help bridge the gap in overweight/obesity-related mental health services and possibly aid public health officials, community leaders, and policymakers in implementing new programs aimed at bringing about social change throughout communities. The results could also help to increase the focus on adolescents who hold multiple collective identities. The knowledge from this study may enable the development of more effective prevention and intervention methods that are relevant for all sexual orientations and races/ethnicities.

Background

Many adolescents face the enhanced likelihood of diabetes, heart disease, and high blood pressure due to the preventative condition of obesity (Hahn et al., 2018). Additionally, there are many individuals struggling with depression, which is among the most treatable mental health disorders, according to the American Psychiatric Association (Fox et al., 2016). Depression causes more suicide idealization, death, and disease than any other mental health disorder (Lu, 2019). As depression in adolescents is a growing public health issue, there is a rising interest in the intersectional evaluation of population inequalities in depression (Evans & Erickson, 2019).

The rate of obesity in the adolescent population continues to increase (CDC, 2017). According to the CDC (2019a), the pervasiveness of obesity in 2017 was 18.5% and impacted about 13.7 million young people, which puts them at a health risk. More recently, 20% of American children were overweight or obese, and there are three times as many as there were in the 1970s, which leads to health, economic, and social

disadvantages (Brownell et al., 2019). Adolescence is marked by many dramatic physical and psychological changes, and obesity during this period often leads to low self-esteem and subsequent depression, suicidality, dietary disorder, and substance misuse (Pirgon et al., 2015); however, there is little literature concerning the association between obesity and the psychosocial consequences in adolescents.

Across different nations, the contributing factors to adolescent obesity change, but the prevalence continues to increase (Nirmala et al., 2018). Adolescent obesity may be driven by sedentary behaviors (Chen et al., 2018). Adolescent addiction to drugs and obesity also share a common fundamental similarity relating to the way their brain responds to rewards and irrational consumption behaviors (Chen et al., 2018). Further research on psychosocial factors and additional studies to examine drug use and obesity concomitantly is needed to gain a superior comprehension about their associated fundamental origins (Chen et al., 2018). Table 1 provides causal and protective factors outlined in the literature that possibly interact or may be linked to health outcomes such as being overweight/obese among adolescents.

Table 1

Causal and Protective Factors of Health Outcomes in Adolescents

Causal factors	Literature citations
Built environment	The built environment in which adolescents live can contribute to their perceived stress and hence their health and quality of life (Feda et al., 2015). According to Jones (2015), it is possible that neighborhoods shape caloric intake and energy expenditure based on the amenities that are present. Environmental characteristics and the level of accessibility of those contextually-based amenities are related to health outcomes (Jones, 2015).
Sedimentary behaviors	Adolescents may become more independent, with increased autonomy contributing to high levels of sedentary activities and caloric intake (Carter et al., 2015). Obesity is associated with decreased physical activity and increases in sedentary activities (Haidar et al., 2019).
Urbanization	Ogden et al. (2018) reported that differences in obesity prevalence have also been reported by level of urbanization. Measured weight and height from 1999-2006 showed that rural children aged 2 to 19 years had consistently higher odds of overweight and obesity even after adjustment for sociodemographic, health, diet, and exercise (Ogden et al., 2018).
Depression	Depression may act as a risk factor for the development and persistence of obesity, specifically in adolescents (Sagar & Gupta, 2018).
Stress	According to Carter et al. (2015) a common risk factor for both depressive symptoms and weigh gain is stress, but how the protective factors impact each form of outcome is complex. Depressive symptoms and weight gain can co-occur among adolescents due to common risk factors such as stressors, poverty, gender, and ethnic minority status (Carter et al., 2015). Stress has been also seen as an important psychosocial contributor to obesity and stressed children are more prone to indulge in emotional overeating (Sagar & Gupta, 2018).

(table continues)

Causal factors	Literature citations
Self-esteem	According to Carter et al. (2015) research suggests that self-esteem could serve as a protective factor for both depressive symptoms and weight gain in adolescence. Self-esteem scores decline throughout adolescence in those who are obese (Carter et al., 2015). Obese children express more weight concern and more dissatisfaction with their body image and low self-esteem than normal weight children (Sagar & Gupta, 2018). Previous studies have shown associations between childhood obesity and some forms of psychopathology such as depressive symptoms and low self-esteem (Sagar & Gupta, 2018).
Social support	Family functioning, including family cohesion as well as supportive and warm family interactions, are key factors in promoting health behavior in children (Dallacker et al., 2019). Adolescents who received more parental and peer support for physical activity were more physically active than adolescents who received less support (Haidar et al., 2019). Lack of social support and encouragement from family and friends hinder weight maintenance in adolescence (Sagar & Gupta, 2018).
Physical activity	The activity level of adolescents is a significant comportment to consider when researching protective factors against depression and obesity (Carter et al., 2015). According to Rodriguez-Ayllon et al. (2019), increased levels of physical activity and reduced sedentary behavior may benefit adolescents by meeting their basic psychological needs (e.g., social interaction, self-acceptance, and purpose in life), and thus improve overall mental health in adolescents.
Family meals	Family eating habits and family history of obesity especially in the mother can be a big hurdle (Sagar & Gupta, 2018). A greater frequency of family meals is associated with better diet quality and lower body mass index (BMI) in children (Dallacker et al., 2019).

LGB adolescents are disproportionately affected by obesity throughout the United States (Azagba et al., 2019). Research shows that rates of eating disorders, body discontent, and obesity are higher among them than their heterosexual counterparts (Gonzales & Henning-Smith, 2017; National Lesbian, Gay, Bisexual, and Transgender [LGBT] Health Education Center, 2018). LGB adolescents are also at an increased risk for substance abuse, cardiovascular diseases, intimidation, isolation, dismissal, anxiety, depression, and suicide (Hafeez et al., 2017; Wood et al., 2017). The stigma faced by LGB people in their daily lives is a far more significant factor in poor health than the higher than average rates of obesity in the population (Massey, 2015). The daily experience of stigma leads to depression and impacts both behavioral and physical health (National LGBT Health Education Center, 2018). Additionally, many LGB adolescents are faced with rejection from both family and friends (Russell & Fish, 2016), which often leads to higher levels of psychiatric disorders, substance use, physical abuse, and suicide (Shiver, 2019). Further, LGB adolescents who are overweight/obese can suffer excessive harassment and mental distress (Johns et al., 2017). Therefore, it is important to improve inclusivity in education in addition to addressing the public health community, psychological wellness services, the juvenile justice system, and even the foster care system to help to improve the health and well-being of LGB adolescents (Fisher & Huchting, 2019).

Racial and ethnic minority LGB adolescents are faced with countless social and systemic difficulties that may hinder their progressive growth and transition into adulthood (Greif-Hackett & Gallagher, 2018). Obesity compounds the difficulties that

racial and ethnic minority LGB adolescents are faced with and places them at an increased risk for psychiatric disorders, substance abuse, and suicide ("Lesbian, Gay, Bisexual, and Transgender Health," 2019). However, little is known about the intersection of race/ethnicity and sexual orientation and its effect on adolescent weight status (Katz-Wise et al., 2014). The Institute of Medicine and the National Institutes of Health pointed out the need for improved quality studies to better understand the health of sexual minority populations (Azagba et al., 2019). Scholars have emphasized the need to build a theoretical structure that incorporates the various factors involved in shaping health inequalities (Gkiouleka et al., 2018). There is an increasing interest in the use of intersectional methods in research on health inequalities (Evans & Erickson, 2019; Green et al., 2017). This is because intersectionality affords researchers the ability to analyze several points of intersection between marginalization axes more easily (Evans & Erickson, 2019).

Although it has been documented that LGB adolescents have a higher prevalence of depression, suicide/suicidal ideation, and substance abuse than their heterosexual counterparts (Cyrus, 2017), research is lacking on the experiences of racial and ethnic LGB minorities (Boyas et al., 2019). The experience of stigma and discrimination marginalizes racial and ethnic minority LGB adolescents, which causes them a range of psychosocial stressors as well as poor health outcomes such as substance use and depression (Swann et al., 2019). Addressing issues at the intersection of LGB and racial/ethnic minority status is important to reduce health inequalities and improve health interventions (Chin et al., 2016; Green et al., 2017). Thus, I investigated if a relationship

exists between being overweight/obese and psychosocial outcomes of depression, suicide/suicidal ideation, and substance use among racial and ethnic minority LGB adolescents.

Overweight/Obesity and Adolescence

Adolescent obesity is a major threat to the present and long-term health of American adolescents (Kramer et al., 2016). Adolescent obesity continues to pose a serious threat and burden to the overall public health system, making it a public health crisis (Kramer et al., 2016; Lynch et al., 2016). For children and adolescents of the same age and sex, being overweight is defined as having a body mass index (BMI) between the 85th and 95th percentiles, whereas obesity is defined as having a BMI at or above the 95th percentile (CDC, 2018). The incidence of obesity in adolescents is greater than in preschool kids and slightly greater in boys than girls, with an estimated 19% and 15%, respectively (Muturi et al., 2017).

Overweight and obese adolescents are more likely to remain obese in adulthood and to develop non-communicable diseases such as diabetes and cardiovascular disease (World Health Organization, 2018). Obesity is also associated with many physical psychological and neurocognitive defects that impair the health and quality of life of adolescents (Yanovski, 2015). There is a correlation between adolescent obesity and a greater incidence of cardiometabolic risk factors; impeded social and emotional development; enhanced risk of being morbidly obese in adulthood; adult co-morbidities including diabetes, hypertension, asthma, mobility constraints, and sleep apnea; and reduced education and revenue status as adults (Kramer et al., 2016). As a result of the

decreased quality of life and the persistence of adolescent obesity into adulthood, the probability for increased long-term morbidity and mortality exists (Yanovski, 2015). Additionally, obesity in adolescents leads to psychosocial problems, such as poor self-image, social isolation, social exclusion, and depression (Jackson et al., 2019). Adolescent obesity is one of the issues of public health that contributes significantly to health disparities in the United States (Muturi et al., 2017).

Researchers have examined the issue of adolescent obesity to discover ways to address and reduce the rates of obesity. Campbell et al. (2019) evaluated literature from 2007-2017 on adolescent obesity, food choices, and genetics in the United States and found that a holistic approach would be needed to reduce and sustain adolescent obesity. However, other researchers have stated that in order to reduce and sustain adolescent obesity, healthy weight-related behavior and weight perceptions are key, as adolescents who perceived themselves as underweight or a normal weight were more likely to partake in healthy behaviors like physical activity and eating vegetables (Hahn et al., 2018). Similarly, White et al. (2017) examined the effect of adverse coping behaviors on the development of high blood pressure and the growth of obesity in adolescents in a Mississippi school district, suggesting that when adolescents do not see the association between negative behavior and poor well-being, it may contribute to the continuing increase in the predominance of obesity and cardiovascular disease. Even with the existence of clinical risk variables for hypertension and obesity like gender, most students did not feel at risk for developing cardiovascular disease, which indicated a need for programs to encourage healthy behaviors (White et al., 2017).

Researchers have also argued that the relationship between socioeconomic status and obesity differs by race/ethnicity; however, socioeconomic status does not completely explain the ethnic/racial differences in obesity (Cuevas et al., 2019). The intersectionality of race, gender, and social status cannot be separated from each other. In fact, not only are race and socioeconomic status closely related, but the perception of one may affect the perception of the other (Barlow & Lahey, 2018). Thus, it is imperative to explore the multiple determinants of health and obesity among racial and ethnic minority adolescents that cause significant disparities in health (Guerrero et al., 2017). Further, based on a study of 12,511 adolescents from middle schools in Massachusetts, overweight/obese racial and ethnic minority adolescents were at greater risk of dieting and disordered weight control habits such as self-induced vomiting and the use of dietary supplements (Rodgers et al., 2017a).

In addition to socioeconomic status and ethnicity, researchers have presented multiple reasons for adolescent overweight/obesity; however, the reasons are diverse, and there is no general consensus. Further, determining the exact cause of obesity in any person is a daunting task, and initiatives aimed at quantifying the contribution of modifiable risk factors to childhood and adolescent obesity will help refine approaches for prevention and treatment strategies to reduce such obesity (Hu et al., 2018). There are prevalent factors that underscore the need for obviously defined policies and processes that can help in the many attempts of adolescent obesity prevention and intervention (Emmett & Chandra, 2015).

Adolescents being overweight/obese within the United States is nearing epidemic proportions, which will likely decline their life expectancy (Kelley, 2019). Research on racial and ethnic prejudice on health and obesity is needed (Kumanyika, 2019) as well as the health status of sexual minority youth (Keenan et al., 2018); hence, this research study was focused on racial and ethnic minority LGB adolescents in the United States who are overweight/obese. The relationship with psychosocial outcomes of depression, substance use, and suicidality also needs to be explored. The health outcomes of obesity are too significant to ignore (Durbin et al., 2018). In the LGB adolescent population, this is especially true because they encounter numerous barriers in health care services, such as lack of quality care, mistreatment by providers, and discriminatory health care environments that lead to health care inequalities (Stepleman et al., 2019).

LGB (Sexual Minority) Adolescents

According to the CDC (2019b), sexual minority adolescents are those who identify as LGB or those who have sexual contact with persons of the same or both sexes. Sexual minority adolescents reside in every community and are from all walks of life (CDC, 2019b). There are an estimated 1.3 million LGB adolescents in the United States who represent a great diversity of different races, ethnicities, and socioeconomic statuses (Scannapieco et al., 2018).

LGB adolescents face severe health risks such as increased suicide, feeling sad or hopeless, and increased substance use (CDC, 2016). When compared to their heterosexual peers, LGB adolescents are up to 3 times more likely to report being bullied at school, which has driven efforts to find ways in which to improve the well-being and

health of LGB adolescents (CDC, 2016). Research has supported the association between victimization and depressive symptoms among LGBT or questioning (LGBTQ) high school students, which had a negative transactional association with school belonging (Hatchel et al., 2018). LGB adolescents in homophobic environments face related victimization, and when compared to non-LGB youths, the likelihood of adverse psychological results may be higher (Hackimer & Proctor, 2015). Adolescents who identify as LGB have reported enhanced rates of depression, suicidal ideation, substance use, skipping school, and impaired academic performance (Hackimer & Proctor, 2015). Further, females tend to demonstrate more anxiety and somatization symptoms, while males reported greater depression rates and suicidal ideation (Hackimer & Proctor, 2015). For LGB adolescents to thrive not just in schools but also in their communities, they need to feel secure and protected socially, emotionally, and physically (Zaza et al., 2016). The need to improve the health and welfare of LGB adolescents drives the effort to develop programs in schools that may prevent the compounding risk of victimization and mental distress, leading to depression and suicidality (Scherr & Mayer, 2019).

Overweight/Obesity and LGB (Sexual Minority) Adolescents

Adolescents who identify themselves as LGB face significant health disparities when compared to their heterosexual counterparts (Luk et al., 2018; Snapp et al., 2015). Population-based and observational work has shown variations in obesity between sexual minorities and their heterosexual counterparts (Mereish & Poteat, 2015). Similarly, LGB adolescents are especially vulnerable to eating disorders and unhappiness with their bodies (McClain & Peebles, 2016). Sexual minority youth have significantly higher odds

of misperceiving their weight status and taking part in conceivably unsafe weight control practices such as fasting, utilizing diet items, and cleansing, which can leave to impacts on development (Hadland et al., 2014). Additionally, sexual minority adolescents might be less inclined to be physically energetic or involved with group activities due to potential minority stressors that they regularly encounter at school, specifically bias and elevated discrimination experienced with regard to sports in their communities (Mereish & Poteat, 2015). Researchers have noted that it is critical to pay close attention to minority stress during adolescence because stigmatizing experiences during this period because low developmental performance can lead to poor outcomes later in life (Goldbach & Gibbs, 2017). However, evidence sexual orientation differences in eating patterns, physical movement, and weight-related paradigms as well as the factors that affect disparities in weight status is relatively limited (Austin et al., 2009; Luk et al., 2018). As such, there remains a need for more studies to document, comprehend, and solve environmental factors contributing to LGBT community health disparities ("Lesbian, Gay, Bisexual, and Transgender Health," 2019). Within the LGB adolescent population, this is of great importance because previous studies suggested that their health is affected by the way communities and institutions recognize their presence and specifically promote their well-being (Gower et al., 2019).

Depression and Overweight/Obesity

Depression and being overweight/obese in the adolescent population have become more widespread and can lead to severe health consequences. Depression has been perceived as a negative result of obesity (Freira et al., 2017). Researchers have shown

that the odds of being obese were three-and-a-half times higher for adolescent patients who were struggling with depression than those who were not depressed (Fox et al., 2016). Within the adolescent population, roughly 20% have depressive symptoms, which may hinder the improvement of their intellectual, social, and psychological skills that support adjustment to adult life (Freira et al., 2017). The American Psychiatric Association has reported that women are more likely than men to develop depression, with up to one-third having a major depressive episode in their lifetime (Parekh, 2017). Body image can also link major depression and body weight among adolescents (Roberts & Duong, 2015).

Although there is some reported association between depression and obesity in LGB adolescents (Byrne et al., 2015; Freira et al., 2017; Hammerton et al., 2014), it still remains unclear whether LGB adolescents are depressed and eating abnormally along with being less physically active which causes them to become overweight/obese or if their being overweight/obese led them into depression. More research is warranted to investigate the relationship between depression and obesity in LGB adolescents using a variety of different measures (Hammerton et al., 2014). This is of utmost importance since previous research studies have consistently found that LGB people are more likely than their heterosexual counterparts to experience poor physical and mental health outcomes and behavioral habits (Gonzales & Henning-Smith, 2017).

Racial and Ethnic Minority LGB Adolescents

Individuals who identify as racial and/or ethnic monitories or as a sexual orientation minority group face many unique challenges and stressors due to their

multiple identities (Santos & VanDaalen, 2016). For example, for LGB racial and ethnic minority adolescents/young adults, parental social support is a key protective factor against the development of psychological distress in LGB adolescents, but many experience discrimination and a lack of social support (Wise et al., 2019).

Though intersectionality has gained widespread recognition, a major gap exists regarding the effect of intersectionality on identity creation for people navigating multiple minority statuses, especially among racial/ethnic and sexual minorities (Cerezo et al., 2020). For these groups, health and well-being problems are inseparable from major social issues such as racism and xenophobia/homophobia (Collins et al., 2014). However, little attention has been given to the prevalence and health-related implications of microaggression for sexual and gender minorities, especially those with intersecting marginalized identities based on race, ethnicity, and ability (Sterzing et al., 2017). Further, limited research has been conducted to investigate the mental health outcomes of LGB minority individuals and ways to enhance these outcomes (Macapagal et al., 2019; Ramirez & Paz Galupo, 2019). A significant gap remains in prevention and intervention approaches targeted for LGB adolescents (Toomey et al., 2018). But racial and ethnic gaps in health are complex due to various factors related to the individuals, communities, society, and the environment (CDC, 2020). This is a crucial intersection of identity and health that demands innovative research to examine the emerging health challenges (Collins et al., 2014).

LGB Adolescents and Suicidality

Adolescents who identify as LGB are a vulnerable population at a high risk of suicide (Bojarski & Qayyum, 2018). In 2015, 8.6% of high school students reported an attempted suicide (CDC, 2018), and LGB adolescents are 4 times more likely than their heterosexual counterparts to attempt suicide (Kann et al., 2016; Rhoades et al., 2018). Although completed suicide is more prevalent in the elderly LGB population, suicide attempts among LGB adolescents are more likely to happen than among their heterosexual peers (Rivers et al., 2018). LGB adolescents are often marginalized and face distinctive difficulties in self-acceptance and recognition with peers, family, and communities, increasing the risk of social isolation, which in turn increases vulnerability to anxiety, depression, substance use, and suicide (Bojarski & Qayyum, 2018).

The high incidence of suicidality and the differences in severity among LGB adolescents is of great concern (Scannapieco et al., 2018). However, knowledge about how LGB adolescents develop their enhanced danger of suicide remains restricted (Plöderl et al., 2014). Adequate information is not known about the health-related behaviors that contribute to adverse health outcomes among LGB adolescents and how the pervasiveness of these health-related behaviors compares to their heterosexual colleagues (Kann et al., 2016). The continued high rates of adolescent suicide indicate a failure to identify at-risk youth and develop effective strategies for prevention (Rew et al., 2016). There is a need to conduct suicidality research, which explores the intersection of race/ethnicity and sexual orientation how this intersection influences suicidality among LGB adolescents who hold multiple identities (Boyas et al., 2019).

Racial/Ethnic Minority and Substance (Marijuana) Use

Adolescents from all various backgrounds struggle with substance use/abuse (Steinka-Fry et al., 2017). However, adolescents of diverse racial and ethnic backgrounds differ in risk factors, habits, rates, and effects of substance use/abuse (Steinka-Fry et al., 2017). Decades of cross-sectional studies have pointed to higher self-reported substance use among sexual minority adolescents, particularly those who self-identify as sexual minorities and/or experience same-sex attraction and/or sexual activity compared to their heterosexual peers (Dermody et al., 2020). Similarly, researchers have also found that sexual minority girls are at a higher risk of substance (marijuana) use than their heterosexual peers (Dermody et al., 2020). Enacted stigma is a significant predictor of mental health outcomes; therefore, race/ethnicity, as well as sexual minority status, contribute uniquely to poorer health (Swann et al., 2019). One of the priorities of the U.S. Department of Health and Human Services requires recognizing adolescents at risk for health drug use, such as sexual minorities, to notify targeted prevention and intervention strategies (Dermody et al., 2020). This is because little research has been conducted to examined the perspectives of those who live at the intersection of both identities and who are vulnerable to adverse perspectives on the basis of both their racial/ethnic identification and their sexual minority identification (Swann et al., 2019).

LGB Adolescents and Substance (Marijuana) Use

A known public health concern is the high frequency of marijuana use especially beginning in the adolescent stage of life (Terry-McElrath et al., 2020). More adolescents in the United States are now reporting an increased use of marijuana than alcohol or

tobacco (Terry-McElrath et al., 2020). Though substance use is an important public health challenge in the general population, within the LGB population, substance use is disproportionately high compared to heterosexuals (Flentje et al., 2015). LGB adolescents have poorer health outcomes when compared to their heterosexual peers, including disproportionate levels of illicit use of substances like nonprescribed prescription drugs (Demant et al., 2018; Mereish et al., 2017). Similarly, substance abuse is one and one-half to three times higher in LGB compared to their heterosexual counterparts (Schuler et al., 2018). Based on a study of the 2015 National Youth Risk Behavior Survey (YRBS), which included questions for 19 different substance use outcomes, LGBQ adolescents were 1.2 times more likely to have used any substance in their lifetime, and they were also more likely to report using two substances or more during their lifetime (Caputi et al., 2018). Substance abuse has been documented as a risk factor for sexual minority adolescents (Bowers et al., 2015). Growing research suggests that substance use disparities are increasing for LGB adolescents due to academic, physical, and social issues (Watson et al., 2020). Additionally, adolescents with a background marked by weight-based prodding from relatives have been linked to increased substance use and less fortunate self-evaluated well-being (Puhl et al., 2019). Understanding how these behaviors affect the health of LGB adolescents is paramount to improving their health (Pérez Ambriz, 2015).

Substance abuse prevention efforts for LGB adolescents in the United States are compromised by the absence of strict clinical trial evidence to support a specific regimen of options and approaches to prevention, which requires medical practitioners to

extrapolate from research in older adults (Fisher & Mustanski, 2014). Current research indicates significant disparities in use among sexual minority youth across various demographics, including earlier use and higher alcohol consumption rates among sexual minority female youth compared to their heterosexual female counterparts (Watson et al., 2018). But literature on the fundamental causes for the disparities in substance use between LGB adolescents and their heterosexual counterparts is scarce (Demant et al., 2018). The current public health system is inadequate at providing LGB adolescents with healthy and positive support (McCormick et al., 2017). It is important to recognize that public health officials and clinicians still need specific tools to reduce the risk factors facing LGB adolescents (Pérez Ambriz, 2015).

Substance (Marijuana) Use and Overweight/Obesity

Obesity and substance abuse in the United States are significant medical and public health issues (Dodor et al., 2018). Considerable attention has been focused on the relationship between substance abuse and obesity, both of which are major public health concerns not just among the adult population but among adolescents as well. Evidence shows that both disorders are widespread diseases that are associated with social stigma and discrimination, which could relate to racial/ethnic and LGB minority adolescents. For example, in a study of 516 and 992 African American adolescents during their transition from adolescent to adulthood, almost two-thirds displayed progressively unhealthy lifestyles, either in the form of substance use or weight gain (Chen et al., 2018). Research has also shown that parental expectations for physical activity and exercise with a same-sex peer may moderate sexual orientation disparities in adolescent physical activity and

BMI. Additionally, being overweight/obese weight status, perception of being overweight/ obese, and the overestimation of weight among sexual minorities were all more prevalent than among heterosexual females (Luk et al., 2018).

There is a link between obesity and substance abuse, but these results are not precise (Amiri & Behnezhad, 2018). Though research has indicated that obese adolescents are at increased risk for substance abuse and preventable deaths in the United States (Gearhardt et al., 2018; Lanza et al., 2015), little is understood concerning the relationship between being overweight/obese in LGB adolescents and future danger of problematic substance use (Flentje et al., 2015). For this reason, I focused on the relationship between being overweight/obese and substance use among racial and ethnic minority LGB adolescents in the United States. This study may offer added knowledge to providers and public health officials by drawing their attention to the link between being overweight/obese and substance (marijuana) use in LGB adolescents, which could be used to establish policies aimed at reducing both substance use and obesity-related health problems and mortality. Knowledge about the associations between LGB adolescents' substance use and other behaviors has the potential to provide insight into how best to design and implement targeted interventions (Bowers et al., 2015).

Additionally, this study may contribute to filling the gap in research regarding being overweight/obese and the psychosocial outcomes of depression, suicidality, and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States. The results of this study may also educate and address the changing needs of policymakers and researchers regarding the possible link between being

overweight/obese and suicidality in racial and ethnic minority LGB adolescents in the United States.

Theoretical Framework for the Study

I based the theoretical foundation for this study on Crenshaw's (1989) theory of intersectionality, distal and proximal factors of health behavior (Crenshaw, 1989), and Meyer's (1995, 2003) minority stress model. I used these theoretical constructs to guide this study's design and approach. Although these theories are independent of one another, there are some overlapping concepts that have been used for improving the understanding of various distal (suicidality) and proximal factors (stress, depression, and substance use) in the LGB population (Kamenov et al., 2016). Distal and proximal factors are influential in predicting and explaining a wide range of health behaviors and outcomes for an individual, which include substance abuse, depression, obesity, suicidal ideation, and suicide, among others (Black, 2017). Health risks do not occur in isolation, and the chain of occurrences that lead to adverse health outcomes involves causes that are both proximal and distal. In order to recognize and possibly prevent behaviors that are deemed unsafe, both the distal and proximal factors of those behaviors must be taken into consideration (Lämmle et al., 2013).

Intersectionality

Crenshaw's (1989) theory of intersectionality was initially framed as a concept animated by the importance of social change. Black political theorists and feminists originally developed intersectionality as a means of conceptualizing the multiple disadvantages faced by Black women as an unequal reality that could not be grasped by

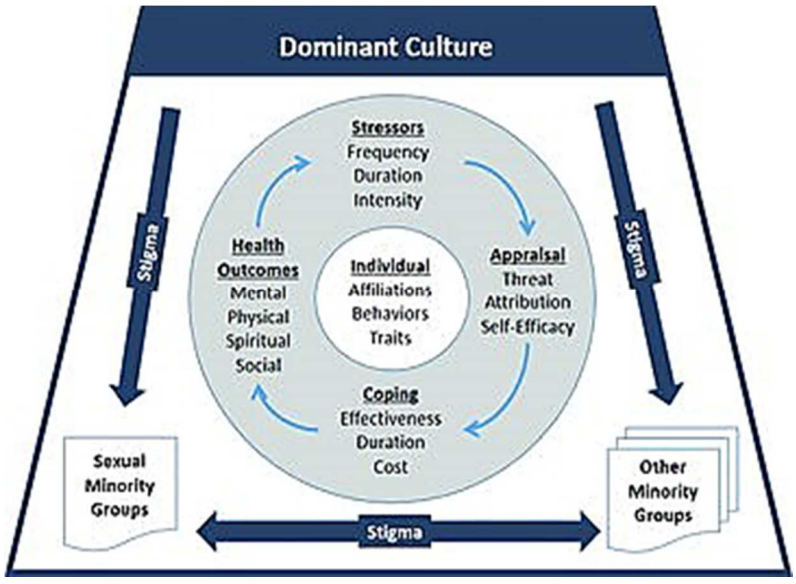
strategies that viewed race and gender as separate entities (Gkiouleka et al., 2018). Crenshaw created and used this theory to argue for the need to concentrate on processes and conflicting wealth, privilege, and injustice structures. However, elements of this work have been extended to question the reliance on a single-axis paradigm that is more common in psychological research and, more specifically, identity research (Santos & VanDaalen, 2016).

The theory of intersectionality, since its origin, has influenced scholarship in several fields and has evolved in new ways from its revolutionary roots (Gkiouleka et al., 2018). Rather than only looking through the prism of sexual identity or race and ethnicity as if they were mutually exclusive, the application of intersectionality helps researchers to understand that LGB racial and ethnic minorities have unique experiences as members of several disadvantaged groups and that these experiences have implications for their mental well-being (Santos & VanDaalen, 2016). The use of the theory of intersectionality does not point out any particular social construct but recognizes that when researching racial and ethnic minority LGB adolescents, there are a variety of social determinants of health (Gkiouleka et al., 2018). Crenshaw's (1989) intersectionality theory helps to formulate research questions about the situation of particular social groups and to analyze the structural factors responsible for their increased vulnerability (Gkiouleka et al., 2018). Similarly, Crenshaw's intersectionality theory helps researchers to go beyond the conventional emphasis on race and gender intersections and consider new intersections with other dimensions of systemic inequalities (Evans & Erickson, 2019).

I chose the theory of intersectionality to guide this study because it can contribute to the current population health approaches in health inequalities and disparities. The theory of intersectionality provided a useful framework in which to analyze and interpret the findings relating to being overweight/obese and the psychosocial outcomes among racial and ethnic minority LGB adolescents in the United States while being used to account for both between and within-group differences. Intersectionality is a valuable method for analyzing demographic differences via regression models with a wide variety of associations implicitly ignoring the heterogeneity of risk that exists within such identities (Green et al., 2017). Figure 1 presents the intersectional ecology model of sexual minority health.

Figure 1

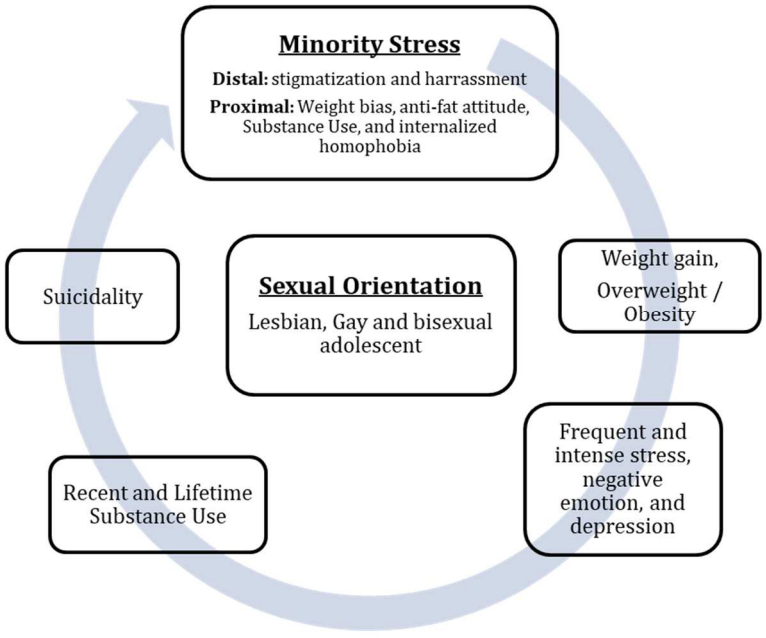
Intersectional Ecology Model of Sexual Minority (LGB) Health



Additionally, the distal and proximal factors of health behaviors depend on the notion that people act according to the importance that things hold for them, which implies that social links emerge that have direct effects on health. According to research, adolescent obesity is affected by both the proximal and distal environment's physical and social characteristics (Nesbit et al., 2014). The model combines various variables to explain developmental changes across the life span. Figure 2 portrays distal (stigmatization, victimization, and health disparities) and proximal (substance use, obesity, and suicidality) factors.

Figure 2

Distal and Proximal Factors of Health Behaviors Among LGB Individuals



Finally, Meyer's (1995, 2003) minority stress model is the most relevant and well-established framework for addressing the many disparities and negative psychological outcomes that are faced by LGB adolescent when compared to their

heterosexual counterparts (Cramer et al., 2017; Hall, 2018). Meyer's minority stress model is based on two assumptions: (a) stress is social and appears as a consequence of society's heterosexism and create a hostile social environment and (b) the presence of these conditions leads to poorer mental health outcomes. LGB adolescents experience higher levels of depression, anxiety, self-harm, and the use of drugs due to stressors they experience such as discrimination, rejection, and stigma (Frost & LeBlanc, 2014; Goldbach & Gibbs, 2017) Thus, established models of suicide intersect with the Meyer 2003 minority stress model (Plöderl et al., 2014). The minority stress model addresses both risks and protective factors in general and those unique to the experiences of LGB adolescents (Cramer et al., 2017). This model tends to the issues faced by sexual minorities that are not captured by other theories (Cramer et al., 2017), which makes it the most suitable model to use for this study. Further, the model is a useful framework that is effective in addressing not only stress among sexual minority adolescents but also marijuana use (Goldbach et al., 2015).

Rationale for Choosing Intersectionality, Distal and Proximal Factors of Health Behavior, and Minority Stress Model

I chose the theory of intersectionality to guide this study because it permits researchers to examine the relationship among layers of marginalization, discrimination, and health inequities (Crenshaw, 1989). The theory underlines the need to tackle the ongoing health crisis aimed at harm and marginalization against and within LGB populations (Chan & Henesy, 2018). Intersectionality extends diversity to critically explore multiple dimensions of social identity (e.g., race, ethnicity, gender identity,

height, orientation, social class) to promote linkages across identities (Chan & Henesy, 2018). This framework allows researchers to see how social problems impact all the members of a targeted group so that they do not fall through the cracks and are left to suffer in virtual isolation. The use of the intersectional framework for research removes the privilege of one identity-based risk factor over another, which may lead to a more precise detection of subpopulations at higher risk for developing diseases while also informing successful prevention and treatment strategies (Patil et al., 2018). Intersectionality helps to bring attention to situations, circumstances, and life experiences of racial/ethnic minority adolescents, addressing disparities and health inequalities (Syed et al., 2018).

The distal and proximal factors of health behavior integrate constructs from all previous theories, which made it suitable for this research study. The theory emphasizes that distal and proximal factors work together to influence health-related behaviors such as overeating, suicidality, and substance use. Overweight/obese LGB adolescents are faced with many distal stressors such as elevated rates of discrimination and victimization, which often lead to psychological distress and unhealthy behaviors (Boza & Nicholson Perry, 2014; Puhl et al., 2019). The distal and proximal factors of health behavior best explain the psychosocial outcomes of depression, suicidality, and substance use among LGB adolescents (Meyer, 2003). The independent variable (overweight/obesity) can create negative health outcomes in the lives of racial/ethnic minority LGB adolescents in the United States. This can lead to psychosocial outcomes (the dependent or outcome variables) of depression, suicidality and substance use. By

utilizing the distal and proximal factors of the health behavior model, I was able to examine the distal factors (weight-based victimization and discrimination) and the proximal factors (stressful life events and feelings of hopelessness) that may be associated with being overweight/obese among LGB adolescents and their relationships with the psychosocial outcomes of depression, suicidality, and substance use. The distal and proximal factors of the health behavior model can be used to help with the promotion of adolescents' health by identifying the interplay between distal and proximal health-related behavioral factors such as healthy eating habits, social support (peers and family) and their impact on objective health in a comprehensive approach. Both distal and proximal determinants of behaviors should be regarded in order to improve the capacity to predict and possibly deter health risks (Lämmle et al., 2013).

Meyer (2003) provided a theoretical framework for the definition of minority stress as it relates to individuals' mental health consequences in stigmatized minority groups, specifically LGB adolescents. This framework is used to help explain the impact of stigma on LGB individuals and indicates that stigma, prejudice, and discrimination are different, persistent, and psychosocial stressors that may lead to negative health outcomes (Meyer, 2003). Researchers have pointed toward the trend of multiple minority stress in which traditionally disadvantaged groups experience elevated stress rates as a result of facing marginalization in two or more identities (Chan & Henesy, 2018). Meyer (2003) also contended that LGB individuals are at risk of higher rates of substance abuse as well as depression and anxiety due to distal and proximal stress (Ramirez & Paz Galupo, 2019), leading to poor mental health results. Therefore, Meyer's minority stress theory

framework explains the mechanisms by which many racial, ethnic, and sexual minorities encounter adverse health outcomes (Swann et al., 2019). As such, in applying Meyer's minority stress model as a framework, my aim was to test whether a relationship exists between being overweight/obese and the psychosocial outcomes of depression, substance use, and suicidality among racial and ethnic minority LGB adolescents living in the United States.

By conducting this research study, I hoped to offer more representative and quality information about the relationship between being overweight/obese and depression among racial and ethnic minority LGB adolescents in the United States, the relationship between being overweight/obese and suicidality among racial and ethnic minority LGB adolescents in the United States, and the relationship between overweight/obesity and substance use among racial and ethnic minority LGB adolescents in the United States. I also wanted to help guide future health interventions directed at enhancing the health of racial and ethnic minority LGB adolescents in order to bridge the gap in overweight/obesity-related mental health services and positively influencing the course of treatment and providing the LGB adolescents community with more extensive, scientific, and humane care (Hafeez et al., 2017). By conducting this study, I also hoped to bridge the current gap in the literature by determining who among racial and ethnic minority LGB populations is more susceptible to poor health outcomes and provide additional information in the context of the impact of being overweight/obese on racial and ethnic minority LGB population psychosocial outcome.

Supporting Methodologies

Secondary Data

Secondary data were useful for this study because they provided access to high quality larger dataset collected by the CDC and Substance Abuse and Mental Health Services Administration (SAMHSA) and contained significant breadth and flexibility. Access to secondary data also equalizes opportunities for all researchers and builds capacity for empirical research (Johnston, 2017). The analysis of secondary data enables researchers to analyze the original dataset to examine new research questions and develop new knowledge (Johnston, 2017). Previous researchers have used secondary data to examine racial and ethnic disparities in reported dietary practices among California's largest minority groups of children (Guerrero & Chung, 2016) and individual trajectories of substance use among young sexual minorities and heterosexual females (Dermody et al., 2020). This type of study was useful for this research project because it made it possible to address the questions in the study with data that already exist. Further, secondary data are cost effective and easy to conduct; they were used to support rapid data collection and allow data gaps to be quickly identified.

Instrumentation

In this study, I used the YRBS dataset to examine being overweight/obese and psychosocial outcomes among racial/ethnic and sexual minority adolescents in the United States. The survey instrument consisted of 89 multiple choice questions divided into six parts: (a) behaviors leading to intentional and accidental injuries and violence, (b) tobacco use, (c) alcohol and other drug use, (d) sexual behaviors, (e) unhealthy dietary

behaviors, and (f) inadequate physical activity. The national YRBS is administered every 2 years by the CDC Division of Adolescent and School Health. The CDC performed two reliability tests for the YRBS items, one in 1992 and another in 2002.

Previous researchers have also used the survey to study suicide ideation in adolescents (Arat, 2015; Gonzales & Blashill, 2018; Mueller et al., 2015; Toscos et al., 2018). Mueller et al. (2015) utilized a single question (During the past 12 months, did you ever seriously consider attempting suicide?) from the 2009 and 2011 YRBS to assess suicide ideation to examine how race/ethnicity, gender, and sexual orientation shape the likelihood of being bullied and adolescent's vulnerability to suicide ideation. Similarly, Arat (2015) used this question to examine risks and protective factors such as dietary patterns, bullying, cyberbullying, television intake, and physical activity for psychosocial distress among Asian adolescents ages 12- to 18-years old compared Caucasian and African American adolescents. Thus, there is a precedent for using data from this question as a measure for suicidality, and this question has been demonstrated to be a valid measure of adolescents' recent and lifetime suicidal thoughts and behaviors (May & Klonsky, 2011). This YRBS survey item measures multiple indicators of a major depressive episode including prolonged sadness, prolonged hopelessness, and disruption in daily activities. Previous researchers (Divin & Zullig, 2014; Dworkin et al., 2017; Kim et al., 2015; Lee et al., 2017; Reisman, 2017; Winsler et al., 2015) similarly operationally defined depression (Boyd et al., 2018; Chukwuere et al., 2020; Spielman et al., 2014; Verkuil et al., 2015). Measuring depression in this manner is well-established in the literature (Divin & Zullig, 2014; Dworkin et al., 2017; Lee et al., 2017; Reisman, 2017;

Winsler et al., 2015) and has been shown to have strong reliability (Dworkin, et al., 2017).

Overview of the Manuscripts

Adolescent obesity continues to be a major threat to the present and long-term health of adolescents in the United States (Kramer et al., 2016). Similarly, adolescent depression presents a major public health concern because it places adolescents at an increased risk for conditions such as anxiety, and behavioral disorders (Weller et al., 2018). Suicidality among adolescents represents another significant challenge to public health. Particularly, suicidality among LGB adolescents who represent a significant and vulnerable United States minority group (Hall, 2018). LGB adolescents are about 3 times more likely to think of suicide and make a suicide plan and nearly 5 times more likely to attempt suicide than their heterosexual counterparts (Kann et al., 2016). Therefore, it is necessary to address being overweight/obese among LGB adolescents and how it influences the psychosocial outcome of depression, suicidality, and substance (marijuana) use. This study focused on racial and ethnic minority LGB adolescents in the United States.

The motivation behind this quantitative research study was to examine the relationship between being overweight/obese and the psychosocial outcomes of depression, suicidality, and substance use among racial and ethnic minority LGB adolescents in Grades 9 through 12 living in the United States. I divided the study into three manuscripts and included a methodology that explored the influence of being overweight/obese on the three-health outcomes of depression, suicidality, and substance

(marijuana) use among racial and ethnic minority LGB adolescents in the United States. The methodology examined the following: (a) the link between being overweight/obese and depression among racial and ethnic minority LGB adolescents in the United States; (b) the examination of being overweight/obese and the risk of suicidality among racial and ethnic minority LGB population; and (c) the examination whether being overweight/obese is linked to substance (marijuana) use among racial and ethnic minority LGB adolescents after controlling for age and sex in an effort to assist in future prevention and intervention strategies to reduce the amount of depression, number of suicidality, and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States.

Manuscript 1

Specific Problem

Adolescent overweight/obesity and depression are becoming progressively common and are recognized globally as significant public health issues (Mannan et al., 2016). In the United States, childhood obesity has more than doubled in children 6 to 11 years of age from 7% in 1980 to almost 18% in 2012, and it has more than quadrupled in adolescents 12–19 years of age from 5% to almost 21% in the same period (Fan et al., 2014). Depression affects between 11 to 20% of adolescents, and the risk increases with age, especially in boys (Mihalopoulos & Spigarelli, 2015). LGB adolescents are disproportionately affected by both obesity and depression (Perrino et al., 2015). Additionally, race/ ethnicity has been linked with weight status and mental health issues, such as depression, in adolescents (Lim et al., 2016). Many adolescent subgroups display

disparities in depression, depressive symptoms and/or access to mental health services, such as socioeconomically marginalized, sexual minorities (i.e., LGB), and racial and ethnic minority adolescence (Perrino et al., 2015). Given its significant public health consequences, adolescent depression is under-researched overall in the United States, including its complexity, risk factors and disparities in the utilization of mental health services (Lu, 2019).

Additionally, among adolescents, being overweight/obese is one of the most common causes of weight-based victimization, and the levels increase due to sexual orientation (Puhl et al., 2019). Researchers have indicated that long-lasting negative health outcomes and poor psychological health are associated with these experiences among adolescents (Puhl et al., 2019). The CDC documented disproportionately high levels of poor behavior in mental health and health danger, commonly considered an activity that undermines LGB youth in coping with stress (Mallory et al., 2017). LGB individuals who are also racial and ethnic minorities are at a greater risk of adverse health outcomes, and many faces more difficult challenges than their White counterparts (Chin et al., 2016). In view of the health inequalities in adolescent obesity and cultural disparities in eating and physical activity habits, body image/size and expression of challenging emotions, the analysis of depressive symptoms and ethnic identity is justified in order to inform the development of tailored, culturally aware and responsive interventions to help enhance psychosocial functioning in overweight/obese adolescents (Lim et al., 2016).

Research Question and Hypotheses

Research question: Is there a relationship between overweight/obesity and depression among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex?

H_0: There is no relationship between overweight/obesity and depression among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex.

H_a: There is a relationship between overweight/obesity and depression among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex.

Nature of Study and Design

Analysis of data in this research study was based on the quantitative research design, utilizing archival data from the 2017 YRBSS, an epidemiological surveillance system developed by the CDC to monitor the pervasiveness of youth behaviors that will most likely influence their health. Variables that were used in this research study included overweight/obesity, sex, and age. Those variables were previously found to influence depression; however, other conducted studies were on heterosexual adolescents. I focused this research study on racial and ethnic minority LGB adolescents in Grades 9 through 12 in the United States. The overall research question addressed by this study was whether being overweight/obese is related to depression among racial and ethnic minority LGB adolescents in the United States. The independent variable, overweight/obesity, was measured by adolescents' BMI percentile, and the dependent variable was depression.

I entered the data into the Statistical Package for the Social Sciences (SPSS) version 27 and used logistic regression for data analysis to examine the association between being overweight/obese and depression while controlling for age and sex. A further discussion on the advantage of a quantitative approach for this research study will be addressed in the manuscript in Part 2.

Source of Data

In this research study, I utilized secondary cross-sectional data obtained from the 2017 YRBSS. The YRBSS tracks priority health-risk activities that significantly contribute to the leading causes of youth mortality, injury, and social issues that contribute to adult trends.

Manuscript 2

Specific Problem

The pervasiveness of obesity among adolescents not only affects their physical health but may have negative consequences on their mental health as well (Van Vuuren et al., 2019). However, there are limited studies available that link being overweight/obese to adolescents' psychosocial problems such as suicidality. Of particular concern is suicidality among LGB adolescents because multiple scientific studies have shown that LGB adolescents are more prevalent to suicidality compared to their heterosexual counterparts (Kann et al., 2016; Rimes et al., 2019; Scannapieco et al., 2018). Sexual and gender minority adolescents are more than twice as likely to be suicidal (McKay et al., 2019). LGB adolescents who had a past suicide attempt were two and one-half times more likely to harm themselves after experiencing LGB specific minority stress

(Scannapieco et al., 2018). Additionally, the estimated differences between sexual minority and non-sexual minority youth are usually much higher for the more extreme suicidal outcomes (e.g., suicide attempts and suicide attempts resulting in injury or needing medical attention) than for outcomes such as suicidal ideation or planning (McKay et al., 2019). Closer examination of the risk factors, particularly LGB-specific risk factors, is needed to address these suicide disparities (Rimes et al., 2019). However, research examining obesity with potential suicide risk in LGB adolescents is limited (Rimes et al., 2019). Additionally, regarding race and ethnicity, attempted suicide and death rates are highest among Native American youth. Hispanic adolescents have higher rates of suicidal ideation and attempted suicide than non-Hispanic adolescents, and suicide rates for African American adolescents have risen in recent years (Nestor et al., 2016).

Research Question and Hypotheses

Research question: Is there a relationship between overweight/obesity and suicidality among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex?

H_0: There is no relationship between overweight/obesity and suicidality among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex.

H_a: There is a relationship between overweight/obesity and suicidality among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex.

Nature of Study and Design

The basis of this analysis was quantitative research, which is consistent with evaluating whether there is a relationship between being overweight/obese and the psychosocial outcome of suicidality among racial and ethnic minority LGB adolescents in Grades 9 to 12 in the United States. I conducted this quantitative research study by utilizing secondary data from the 2017 YRBSS, an epidemiological surveillance system established by the CDC to monitor the prevalence of youth behaviors that most influence health. I measured the predictor variable, overweight/obesity, using student's BMI percentile. I measured the outcome variable of interest suicidality based on adolescents having serious thoughts of suicide. The covariates of this study were age and sex. I analyzed the data using multivariable analytic techniques. I used logistic regression to assess the relationship between being overweight/obese and psychosocial outcomes among racial and ethnic minority LGB adolescents in the United States. I performed statistical analysis using SPSS software version 27 at the .05 significance level.

Source of Data

Quantitative research models are significant for assessing individual differences in cognitive competencies (Filoteo et al., 2017). In this quantitative research study, I conducted an analysis of secondary data to explore the relationship between adolescents being overweight/obese and the risk of suicidality in adolescents. I utilized secondary data obtained from the 2017 YRBSS to examine the relationship between being overweight/obese and suicidality among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex.

Manuscript 3

Specific Problem

The number of adolescents who are affected by substance use/abuse has become a global problem. Substance use, which encompasses alcohol consumption, alcohol dependency, substance usage, and opioid dependency, has a significant effect on Americans in terms of mortality, disease, and economic impact (Hearld et al., 2017). Similarly, substance use/abuse has a significant effect on people, families, and communities, as its cumulative impacts contribute to expensive social, physical, and mental health issues (Das et al., 2016). Addressing the effects of drug use alone is expected to cost Americans more than $600 billion dollars a year (Hearld et al., 2017). Epidemiological studies have pointed to varying prevalence and patterns of substance use among different racial and ethnic adolescents' groups (Unger, 2015). However, there is minimal understanding of the intersection of LGB and racial/ethnic minority statuses that influence substance (marijuana) use. To explain the nature of the development of substance use disparities, it is important to explore the prevalence of substance-using habits at even younger ages (Dermody et al., 2020).

When compared to their heterosexual counterparts, LGB adolescents have an increased risk of using both experimental and heavy substances (Huebner et al., 2015). Relative to their heterosexual counterparts, LGB adolescents have almost 4 times the likelihood of lifetime smoking and 2.5 times the likelihood of marijuana use (Schuler et al., 2019). LGB adolescents also have an increased risk of substance abuse, including lifetime use of alcohol [OR=2.23] and cannabis [OR=2.58], early initiation of alcohol

consumption, and a higher prevalence of binge drinking (Shlosberg et al., 2014). Distal factors such as discrimination and weight-based victimization have been shown to lead to psychological distress and substance use in the LGB adolescent population (Livingston et al., 2015).

Additionally, many researchers in epidemiology and etiology of drug use are aware that adolescents of various racial, ethnic, and cultural groups, loosely described, vary in their pervasiveness and habits of substance use, misuse, and non-use (Unger, 2015). Racial and ethnic minorities in the general population are at higher risk of binge drinking and the deleterious effects of alcohol abuse compared to non-Hispanic Whites (Spadola et al., 2018). Hispanic adolescents in the United States have a higher incidence of cigarette, alcohol, and other substance use relative to their peers in other racial and ethnic groups (Unger, 2015). The social disadvantage-related features, such as racial and ethnic minority status, are associated with increased psychological distress and, consequently, increased substance use (Hearld et al., 2017). In general, minority groups that are underprivileged, undervalued, or marginalized by the majority of society have a higher prevalence of adolescent substance use relative to groups with more social influence, which may or may not be numerical majorities but typically maintain their control due to socioeconomic and sociopolitical factors (Unger, 2015).

Although the relationship between minority stress of LGB adolescents and the use of substances is well documented, less is currently known about the daily stress of LGB adolescents and the risk processes of substance use (Livingston, 2017). Additionally, studies on substance use by sexual minorities lack racial and ethnic diversity (Mereish et

al., 2017). The racial and ethnic disparities discussed in the literature call for further intragroup studies to define personal factors that can predict outcomes for substance abuse (Burlew & Sanchez, 2017). Further research is necessary to explore racial, ethnic, sexual orientation, and gender identity gaps in stress (Goldbach & Gibbs, 2015). Evidence shows that racial and ethnic minority adolescents are less likely to seek clinical mental health care compared to White youth (Fisher et al., 2018). Because of this high unmet mental health need, this study aimed to determine whether being overweight/obese is a predictor of substance (marijuana) use among racial and ethnic minority LGB adolescents.

Research Question and Hypotheses

Research question: Is there a relationship between overweight/obesity and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States after controlling for family income and sex?

H_0: There is no relationship between overweight/obesity and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States after controlling for family income and sex.

H_a: There is a relationship between overweight/obesity and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States after controlling for family income and sex.

Nature of Study and Design

This research study was quantitative and cross-sectional utilizing secondary data used to determine whether there is a relationship between being overweight/obese and

substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States after controlling for family income and sex. I performed data analysis by using SPSS version 27 and a logistic regression.

Sources of Data

The study utilized secondary data obtained from the 2017 National Survey on Drug Use and Health (NSDUH), the primary source of statistical information on the prevalence, patterns, use or abuse of illicit drugs, and mental health among United States households ages 12 and older (SAMHSA, 2018). I used the 2017 NSDUH dataset collected by SAMHSA in this study for secondary data analysis. SAMHSA/NSDUH 2017 consists of free, open, and public-use data files.

Significance

This study assessed the relationship between being overweight/obese and the psychosocial outcomes of depression, suicidality, and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States. The identification of a relationship between adolescents being overweight/obese and psychosocial outcomes among racial and ethnic minority LGB adolescents in the United States could lead to the development of appropriate interventions. Adolescent obesity may stimulate moods such as guilt and degradation, negative stigma, low self-regard, or being unhappy with body image, all of which can cause adolescents to be in a depressed mood with thoughts of suicide (Byrne et al., 2015). Adolescent depression is a problem that if left undiagnosed and untreated in time can substantially decrease the quality of life for adolescents and in serious instances can cause them to develop suicidal thoughts or commit suicide, which is

recognized as the second principal cause of mortality among adolescents (Kassis et al., 2017).

The results of this study contribute to the broadening of the fundamental knowledge regarding the parallel between adolescents being overweight/obese and psychosocial outcomes of depression, suicidality, and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States. Studies on adolescent depression and psychosocial outcomes factors are inconsistent in signaling that there are predictors at play other than obesity, which affects psychosocial factors such as depression in adolescents (Zachurzok et al., 2018). The knowledge gained from this study may be used to help partners in developing projects that may assist teenagers battling with depression, particularly lesbian/gay or sexual minority young people.

This study could additionally help to advance the well-being and health of racial and ethnic minority LGB adolescents in the United States by providing health care providers and community leaders with much-needed information to incorporate systematic changes that would aid in promoting better mental, physical health, and educational outcomes. Depression in adolescents is a consequential psychological health problem, and the recognition of the various causal factors among LGB adolescents is important to develop effective treatments and intervention methods (Byrne et al., 2015). Even though society is technologically advanced, there is scarce information on what can be done to improve the lives of LGB adolescents or strategies to aid in making both the health and education system more supportive and inclusive of LGB adolescents (Fisher & Huchting, 2019). Therefore, identifying the relationship between being overweight/obese

and psychosocial outcomes of depression, suicidality, and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States could lead to social change by implementing recommended interventions that could lead to a reduction in the incidents of being overweight/obese and suicidality among the target population.

Summary

This chapter presented an overview of the epidemiology of being overweight/obese among LGB adolescents, including psychosocial problems such as depression, social isolation, suicidality, and substance (marijuana) use, which all are public health challenges that demand attention to improve the quality of life for this population. Obesity-associated comorbid conditions present a major threat to LGB adolescents because they are more prevalent to obesity, substance use, and suicide than their heterosexual colleagues (Bowers et al., 2015; Kann et al., 2016). Overweight/obese LGB adolescents experience a distinctive set of social stressors and are often the victims of weight base victimization, which leads to various coping strategies such as depression, substance use, and suicidality. Because the pervasiveness of depression and suicide among adolescents is so high, and the consequences are so great, more is needed to be done (Nierengarten, 2018). To enable early therapy and prevent pain, suffering, and possible death, it is critical to acknowledge symptoms of depression (Kroning & Kroning, 2016).

In this chapter, I further addressed the problems associated with being overweight/obese among racial and ethnic minority LGB adolescent population, the purpose of the study, the research questions and hypotheses, the theoretical framework on

which the study was based, and the nature of the study. Racial and ethnic minority LGB adolescents face many health disparities, and the pervasiveness of being overweight/obese among this vulnerable population creates a burden not only to the public health system but also to the economic system. The health disparities that exist among racial and ethnic minority LGB adolescents have been demonstrated through the literature (Goldbach & Gibbs, 2015; Keenan et al., 2018; Valentine & Shipherd, 2018); however, adolescents who identify as sexual minorities need special attention in the field of research (Goldbach & Gibbs, 2015). Although quantitative intersectionality approaches of epidemiology have widely accepted that variables such as race and sex are proxies to racism and sexism, an essential next step is to investigate how these social determinants of health inequality work at multiple levels simultaneously (Green et al., 2017). There is a gap in determining who among the racial and ethnic minority LGB population may be more at risk for poor health outcomes (Fish & Pasley, 2015). Researchers have shown that the obesity epidemic within the adolescent population is continually evolving, yet limited research exists that demonstrates the impact of social factors on the health of adolescents, including victimization due to weight (Keenan et al., 2018).

This study utilized a nonexperimental design by evaluating cross-sectional data obtained from the 2017 YRBSS collected to screen priority health-risk behaviors that significantly contribute to the leading causes of youth death, disability, and social issues that lends to adult patterns (YRBSS, 2017) and the (SAMHSA/NSDUH 2017) collected to assess substance abuse danger and protective factors in relation to the incidence of

substance abuse among youth/adolescents (NSDUH, 2017). The focus of this study was to assess the relationship between being overweight/obese and the psychosocial outcomes of depression, suicidality, and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States. A more in-depth discussion relevant to overweight/obesity and the psychosocial outcomes of depression, suicidality, and substance (marijuana) use among racial and ethnic minority LGB adolescents is provided in Part 2.

Part 2: Manuscripts

Manuscript 1: Relating Overweight/Obesity and Depression Among Racial/Ethnic and Sexual Minority Adolescents

Cadene T. Douglas

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February 2021

APA 6

Outlet for Manuscript

The target journal for this first article is the *Journal of Homosexuality* (https://www.tandfonline.com/toc/wjhm20/current). All manuscripts submitted to the *Journal of Homosexuality* must follow the guidelines of *the Publication Manual of the American Psychological Association*, 6th edition. The main goal of the journal is to publish thought-provoking scholarship by writers, community leaders, and educators who use a variety of research methodologies and provide a variety of perspectives to continue influencing knowledge development in lesbian, gay, bisexual, transgender and queer studies contexts. Manuscripts published in this journal cannot exceed 10,000 words including the references.

Abstract

In the United States, depression is the third most common mental health disorder, affecting almost 14% of adolescents between the ages of 13 to 18. The intersectionality of race/ethnicity and sexual orientation in minority lesbian, gay, and bisexual (LGB) adolescents create high rates of depression due to minority stress and an even higher risk of poor health outcomes. But researchers have not yet examined the relationship between the external factor of obesity and depression in racial and ethnic minority LGB adolescents. Guided by distal and proximal factors of health behaviors, minority stress model, and intersectionality, the purpose of this study was to determine whether being overweight/obese among racial/ethnic minority LGB adolescents influences the outcome of depression (feeling sad or hopeless in the past year) among students who participated in the 2017 Youth Risk Behavior Survey. A cross-sectional quantitative design was used to analyze secondary survey data from 984 adolescents. Descriptive statistics and multivariable logistic regression tests were used to analyze the data. The results showed that 41.9% of adolescents were overweight/obese and 56.4% were depressed. However, there were no significant associations between overweight/obesity and depression among adolescents (*OR* = 1.05, 95% CI = 0.81, 1.35), controlling for age and sex. Thus, there are other distal and proximal factors influencing the psychosocial outcome of depression among racial/ethnic and sexual minority adolescents. More research aimed at reducing health disparities among racial/ethnic and sexual minority adolescents is needed to begin the development of targeted intervention and prevention programs aimed at improving the health outcomes of this population.

Introduction

Depression in adolescents is a primary concern for public health officials in the United States and is associated with several adverse outcomes (Waldron, Howard, & Reinecke, 2019). Globally, among 10–19-year olds depression is the leading cause of disability-adjusted years of life lost (Lu, 2019). The consequences of depression are not only undesirable and often detrimental to health, but they are also on a broader scale expensive and damaging (Byrne, O'Brien-Simpson, Mitchell, & Allen, 2015). At any given time, it is estimated that around 10 to 15 % of adolescents and youths are depressed (Moreh & O'Lawrence, 2016). Adolescents who struggle with depression are at an increased risk of experiencing depression later in life and are more prone to substance use and life-altering comorbidities (Rinke et al., 2019).

Further, depression disproportionately affects lesbian, gay, and bisexual (LGB) adolescents (Hall, Rosado, & Chapman, 2019). In a culture that often marginalizes LGB adolescents, unique challenges emerge that create stress and can have adverse effects on their mental health (Gillig, Miller, & Cox, 2019). Exposure to stressors increases depression in LGB adolescents (Sutter & Perrin, 2016), which is often linked to abnormal weight and may be a risk factor for obesity later in life (Byrne et al., 2015).

The pervasiveness of adolescent depression also differs by gender, age, race, and ethnicity (Patil, Porche, Shippen, Dallenbach, & Fortuna, 2018). Hispanic and White adolescents may have a higher prevalence of depression at 12% and 13%, respectively, compared to 9% of Black and Asian adolescents; biracial adolescents may have the highest prevalence at 15.6% (Patil et al., 2018). Not only does the pervasiveness of

depression vary by gender, girls are at least twice as likely to experience depression after age 15 as boys, but risk factors also differ by gender (Scott, Wallander, & Cameron, 2015). Obesity and depression frequently co-occur; however, it is still unclear whether race by gender groups vary in the relationship between obesity and psychosocial distress (Carter & Assari, 2017). There is a significant research gap on the role of ethnic identity as a possible moderator of the relationship between depression and obesity among adolescents (Conklin, Tam, Guo, & Richardson, 2019), and research on health inequality should continue to consider race and ethnicity (Perreira, Wassink, & Harris, 2019). Thus, a growing body of evidence indicates that psychosocial associations of obesity may depend on race, gender, and their intersection (Carter & Assari, 2017).

Building understanding of the factors affecting the progression of depression during the crucial adolescent era will promote successful prevention and treatment efforts (Scott et al., 2015). The purpose of this research was to explore the influence of being overweight/obese on depression among racial and ethnic minority LGB adolescents in the United States in Grades 9 through 12. Given its serious public health consequences, adolescent depression is under-investigated within the United States, including its scope, risk factors, and mental health service utilization differences (Lu, 2019). An awareness of the risks and protective mechanisms among the LGB adolescent population is required to inform the development of culturally sensitive, developmentally, appropriate, and successful depression therapies (Hall, 2018).

Significance/Importance

Adolescents that are overweight/obese and depression are now being recognized as a common occurrence during the adolescent stages of life. According to Mannan, Mamun, Doi, and Clavarino (2016), there are several possible mechanisms, including behavioral and lifestyle variables and biological and genetic factors, that link depression and obesity. However, given the significance of obesity in public health, particularly in kids and adolescents, the connections between obesity and depression have been of significant concern (Hammerton, Thapar, & Thapar, 2014). Both obesity and depression present a challenge to public health and have become more rampant in recent years. According to Nemiary, Shim, Mattox, and Holden (2012), during adolescent years, both obesity and depression are common and are associated with various complications in health, including hypertension, heart disease, and a greater prevalence of mortality later in life.

Due to the high prevalence and burden of depression and obesity, they are both reflected in high societal costs (Bodden, Stikkelbroek, & Dirksen, 2018). Both obesity and depression place a severe economic burden on the public health system and are devasting to the health of adolescents (Topçu, Orhon, Tayfun, Uçaktürk, & Demirel, 2016). Depression in adolescents is a significant mental health problem, and it is essential to identify risk factors for this form of depression in order to develop treatments and procedures to aid adolescents (Byrne et al., 2015). Depression is one of the most studied mental health phenomena (Bygstad-Landro & Giske, 2018), and an increasing number of LGB adolescents are struggling with it. The minority stress theory indicates that these

issues emerge in LGB adolescents as a reaction to interpersonal stress and victimization (Meyer, 2003).

Grant et al. (2014) found that LGB adolescents are more prone to health-related disorders such as obesity and depression compared to their heterosexual counterparts. Stepleman et al. (2019) provided various examples of physical health disparities among LGB adolescents, such as obesity and asthma. However, it is not clear what factors explain these disparities and how they develop over time (La Roi, Kretschmer, Dijkstra, Veenstra, & Oldehinkel, 2016). Perrino et al. (2015) suggested that preventing depression can have indirect and beneficial effects on other health problems because of the association between depression and conditions such as diabetes, drug use, and obesity. In this research study, I aimed to contribute by filling gaps in the literature by assessing the ability of being overweight/obese to predict depression in racial and ethnic minority LGB adolescents in the United States, while controlling for age and sex. The result of this study may change the climate around racial and ethnic minority LGB adolescent's depression and encourage help-seeking behaviors.

In the present study, I explored the relationship between being overweight/obese and depression among racial/ethnic and sexual minority adolescents living in the United States. To test this relationship, I combined three theoretical frameworks into a developmentally appropriate model that examined minority stress, intersectionality, and aspects of both distal (i.e., LGB group membership and racial/ethnic minority group) and proximal (differences between races, psychosocial factors) factors of overweigh/obesity, that interacts to influence depression in racial/ethnic and sexual minority adolescents.

Distal and proximal factors of health behaviors posit that distal factors (i.e., stigmatization, victimization, health disparities, anti-LGB experiences) along with proximal factors (overweigh/obesity, relationship with peers, sexual orientation concealment and stressful life events) may lead to increase in minority stressors and psychological distress leading to depression. This model parallels Crenshaw's (1989) intersectionality and Meyers (1995, 2003) minority stress model, which state that sexual minorities experience distal and proximal stressors relating to their marginalized identity and compromise their health. Research on minority stress model supports this conceptualization of intersectionality, distal and proximal stressors as a mediator between behavioral health risk (i.e., overweight/obesity) and depression (Jabson, Farmer, & Bowen, 2014).

Relevant Scholarship

Researchers in several evidence-based studies (Kebbe et al., 2018; Nemiary et al., 2012; Van Vuuren et al., 2019) found that obese adolescents have a higher frequency of mental health problems, such as depression, anxiety, and low and/or poor self-esteem than nonobese adolescents. According to Ciubara, Burlea, Anton-Paduraru, Burlea, and Untu (2014), both obesity and depression in LGB adolescents led to a substantial decline in their quality of life and comprehensive functioning. The emergence of LGB sexual orientation is related to an increased risk of depressive symptoms, as LGB adolescents are faced with sexual shame, and discrimination, resulting in minority stress (La Roi et al., 2016). Similarly, the unique patterns of intersecting minority adolescents' social identities can define the symptoms of depression that can affect adolescents differently by

gender, race, and ethnicity (Patil et al., 2018). Negative perceptions of different social groups, combined with gender-based and discriminatory interactions, can contribute to poor mental health outcomes (Patil et al., 2018). Also, conflicts in allegiances between identities or perceived incompatibility between one's ethnic/racial and LGB identities can be a stressor that exacerbates the perceptions of marginalization between LGB racial and ethnic minorities and is correlated with psychological distress (Santos & VanDaalen, 2016).

Herrman et al. (2019) found that globally, depression is the leading cause of diseases related to mental health, yet for various reasons, there has been a failure to discuss the global burden of this disease. Rathnayake, Roopasingam, and Wickramasighe (2014) found that while researchers have identified the adverse effects of obesity, research is limited in the adolescent age group to identify specific risk factors associated with obesity. Perrino et al. (2015) contended that studies that increase the availability of science and accost the effectiveness of preventive interventions among vulnerable groups such as LGB adolescents could play a role in eliminating disparities and inequalities in health. Similarly, Patil et al. (2018) contended that although social determinants of depression are conceptualized through numerous ethnic and racial minority groups in the United States, mechanisms, course, and severity are less understood.

Research Question and Design

RQ: Is there a relationship between overweight/obesity and depression among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex?

H_0: There is no relationship between overweight/obesity and depression among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex.

H_a: There is a relationship between overweight/obesity and depression among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex.

This research study was an analysis of secondary quantitative data collected through a cross-sectional survey design. I utilized the 2017 Youth Risk Behavior Survey (YRBS) dataset collected by the Centers for Disease Control and Prevention (CDC) for public health actions to improve the health outcomes of adolescents and is consistent with the research design option and data collection method for the research study. To test the hypothesis and to address the research questions on the relationship between being overweight/obese and the psychosocial outcome of depression among racial and ethnic minority LGB adolescents in the United States, I adopted a quantitative research approach with a cross-sectional research design. I used logistic regression analysis to test the hypotheses and answer the research questions.

Cross-sectional studies help researchers to explain the burden of the outcome of interest and its interaction with several other variables (potential risk factors) at a given point in time, in a well-defined population (Bangdiwala, 2019). There are many advantages to using the cross-sectional study design, such as the capability to analyze multiple outcomes and exposures from one sample, easily reproduced in other studies, and the usefulness to study common outcomes and then generate assumptions

(Bangdiwala, 2019). For this reason, and also because it can estimate the prevalence of an outcome of interest, I utilized the cross-sectional study design for this study. The YRBS System (YRBSS) is one of the few LGB youth information sources used in grades nine to 12.

Statistical Assumptions

I employed a quantitative research design to explore the relationship between being overweight/obese and depression among racial and ethnic minority LGB adolescents in the United States. I used logistic regression in this study since it is a statistical technique that is suitable in testing the relationship between various (categorical or continuous) predictor variables and a binary outcome variable. The model has been used to perform similar analyses conducted by other researchers (Breton et al., 2015; Chodzen, Hidalgo, Chen, & Garofalo, 2019). It was best suited for this quantitative research as it facilitated the evaluation of the relationship between being overweight/obese and depression among racial and ethnic minority LGB adolescents in the United States. I executed this study after considering and testing the following assumptions for logistic regression: (a) binary or ordinal dependent variable; (b) independent observations; (c) little or no multicollinearity among independent variables; (d) independent variables are linearly related to the log odds; and e) dataset has a large sample size (Aksu & Keceoglu, 2019).

Logistic regression makes no assumptions about the distribution of scores for the predictor variables; however, it is sensitive to high correlations between the predictor variables (multicollinearity). Multicollinearity occurs when two or more independent

(predictor) variables are highly correlated in the regression model (Daoud, 2017). In this study, I tested the assumption of multicollinearity among the predictor variables by examining the tolerance for each prior to running the regression model. I performed the Hosmer-Lemeshow goodness-of-fit test to see whether there was evidence of lack of model fit.

Methods

Participants

The population of interest for this study was overweight/obese racial and ethnic minority adolescents who self-identify as LGB in Grades 9 through 12 residing in the United States. The rationale for choosing this population was because the pervasiveness of obesity among youth and adolescents in the United States remains higher than the Healthy People 2020 goals of 14.5% (Hales, Carroll, Fryar, & Ogden, 2017), which is a problem that needed attention. Being overweight/obese in adolescents often continues into adulthood and creates many other health-related problems like increased risk of morbidity and mortality. Though there is growing evidence of weight-based victimization among youth, little attention has been paid to this problem in racial and ethnic minority LGB adolescents despite their high prevalence of being overweight and obese and increased danger of victimization (Puhl, Himmelstein, & Watson, 2019).

In this research, I utilized the 2017 YRBS dataset, which is a nationally representative sample of adolescents in Grades 9 to 12 living in the United States. This sample included adolescents who self-identified as American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, and White.

Roughly 43% of the population from the YRBS self-identified as White, 19.2% Black/African American, 25.4% Hispanic, 1.7% American Indian/Native Hawaiian/Pacific Islander, and 10% self-identified as other race/ethnicity (Baiden, LaBrenz, Asiedua-Baiden, & Muehlenkamp, 2020). As reported by the National Center for Education Statistics (2015), ethnic minority students currently account for 35% of the student population in the United States and are predicted to reach 50% by 2050 (Simon & Azzarito, 2019). The sample dataset also included the sexual identity of adolescents as being either heterosexual (straight), gay or lesbian, bisexual or not sure. Approximately 1,390 adolescents who partook in the 2017 YRBS self-identified as LGB (Baiden et al., 2020). With the data provided in the literature, if a third (460 participants) of the 1,390 adolescents who self-identified as LGB is a racial or ethnic minority, then there was a sufficient sample to conduct the analysis (see Table 2).

Racial/Ethnic Minority

In the present analysis, racial/ethnic minority classification was a composite variable that is computed from two questions from the 2017 YRBS: "Are you Hispanic or Latino?" with the response choices being binary as "yes" or "no" and "What is your race?" with the response choices being (a) American Indian or Alaska Native, (b) Asian, (c) Black or African American, (d) Native Hawaiian or Other Pacific Islander, and (e) White (CDC, 2017). This question allows students to check all that applies (CDC, 2017). These two questions were combined to create a binary race/ethnicity variable to identify if respondents identify as a minority (i.e., non-Whites, Hispanic-Whites).

Sexual Minority Status

In the present analysis, sexual minority classification was a composite variable focused on two YRBS questions measuring sexual identity and orientation to minimize the use of single-item variables and overcome the shortcomings of prior studies. Specifically, sexual minority adolescents include those who identified as LGB as well as those who were unsure about their sexual identity based on the question "Which of the following best describe you?" with the response choices being (a) heterosexual (straight), (b) gay or lesbian, (c) bisexual, and (d) not sure and "During your life, with whom have you had sexual contact?" with the response choices being (a) I have never had sexual contact, (b) females, (c) males, or (d) females and males (CDC, 2017). For the purpose of this analysis, inclusion in the sample-based sexual minority status was dichotomized (*yes* or *no*). If someone reported that their sexual identity was anything other than heterosexual and/or if someone indicated that they had sexual interaction with the same or both sexes, they were coded as being a sexual minority.

Sample and Power

Power analysis is one of the many key components of the research process (Pek & Park, 2019). Statistical power refers to the likelihood of a study in producing a statistically significant result when the null hypothesis is in fact false (Perugini, Gallucci, & Costantini, 2018). The conventional power of 0.80 is adequate in finding an effect if it exists (Perugini et al., 2018).

In this research study, I examined overweight/obese racial and ethnic minority LGB adolescents in grades nine to 12 in the United States. I used G*Power 3.1.9.4 to

conduct a logistic regression power analysis and sample size estimation. The calculations included the following parameters:

1. A priori analysis
2. Two-tailed test
3. x distribution equal to 'binomial'
4. I set the value for Pr(Y=1|X=1) H1 at .2 - The probability of the outcome (depression) being a "1" in the LR model when the predictor (overweight/obesity) is a "1".
5. Alpha level was .05. - 5% chance of a Type 1 error occurring.
6. Power level set at .80. - The probability that a true relationship exists between the study variables is 80%.
7. R^2 set at .16. – Correlation between the predictor is accounted for by the covariates (Hsieh, 1989).
8. X-parm π is set at .5 – Probability that the predictor will be a "1".

Utilizing the parameters listed above and assuming various odds ratios (*ORs*), I produced Table 2. Based upon the literature (Chen, Cohen, & Chen, 2010), an OR of approximately 2 – 2.5, I expected a medium effect size. The expected sample size was between 229 through 413 persons for this analysis for these ORs. I based my assumption on the published literature from the YRBS dataset (Baiden et al., 2020), as mentioned in the section entitled 'participants', was that I should have about 460 participants in my study. Therefore, I should be able to detect an adjusted OR as low as 2 for the predictor

variable of interest, obesity/overweight, and the outcome of depression, given this sample size and the other parameters noted above.

Table 2

*G*Power Sample Size Calculations*

Adjusted *OR*	Sample Size (*N*)
1.5	1278
1.75	650
2	413
2.25	297
2.5	229
2.75	186
3	156

Variables/Sources of Data

In this research study, I utilized cross-sectional data obtained from the 2017 YRBSS, to explore the relationship between overweight/obese adolescents and depression among racial and ethnic minority LGB adolescents. The design of YRBSS was to track priority health-risk activities that significantly contribute to the leading causes of youth mortality, injury, and social issues that contribute to adult trends (Kann et al., 2018). YRBS data are probability weighted by the CDC in accounting for non-response between schools and students and reflecting the demographic distribution of adolescents across the United States.

Instrumentation or Measures

I utilized the 2017 YRBSS data, collected through a self-administered, anonymous, 99-item questionnaire. Table 3 identifies the variables of interest operational definition and the scales of measurement specific to the present study. The survey

included questions regarding height, weight, race and ethnicity, age, sex, and questions concerning the following six risk groups of health behaviors: (a) behaviors that contribute to unintentional injuries and violence; (b) sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection; (c) drug use; (d) tobacco use; (e) unhealthy dietary behaviors; and (f) inadequate physical activity (CDC, 2018b). The response to this questionnaire was recorded on a computer-scannable booklet or answer sheet.

Independent Variable Construction

Body Mass Index (BMI). BMI is the most commonly used metric for the diagnosis of obesity (Batsis et al., 2016). I calculated BMI, an obesity indicator and an indicator of overweight, from the self-reported height and weight by utilizing the following formula:

BMI = kg/m2 = Weight (in kg)/ [Height (in m)2]

Overweight/Obesity. I constructed the independent variable, overweight/obesity, from adolescents reported data on the YRBSS questionnaire regarding height and weight. The CDC utilized height, weight, and age of adolescents to obtain body mass index (BMI). BMI is classified into four categories: underweight (BMI < 5th percentile), normal weight (BMI < 85th percentile and ≥ 5th percentile), overweight (BMI ≥ 85th percentile and < 95th percentile), and obese (BMI ≥ 95th percentile) (Kann et al., 2018). For the purposes of this research, I coded the four categories as one dichotomized variable that captured adolescents BMI percentiles as either underweight/normal weight (< 85th percentile) or overweight/obese (≥ 85th percentile) to form a new variable,

overweight/obesity (OV-OB). I recorded this variable as a "0" for < 85th percentile or a "1" for ≥ 85th percentile.

Depression. I measured depression based on adolescents' responses to the following question from the 2017 YRBSS. "During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities? The variable is reported as (a) = yes or (b) = no in the YRBSS. I coded the variable on a binary response scale (0 = No, 1 = Yes).

Control Variables

Age. Measured based on the response to the question: "How old are you?" (in years).

Sex. I measured sex with the item: "What is your sex?" I coded the variables as 1 = female and 2 = male. I coded this categorical variable as 0 = female and 1 = male. The variables of interest and the scales of measurement are presented in Table 3.

Table 3

Variable of Interest Operational Definition and Scales of Measurement

Variable	Description	Variable Type	Scale of Measurement
Overweight/ Obesity	Dichotomized based on BMI percentile	Independent Variable	Categorical (Nominal)
Depression	Feeling sad or hopeless	Dependent Variable	Nominal
Age	Measured in Years at time of survey	Control Variable	Interval
Sex	Sex at birth	Control Variable	Nominal

Two covariates were used for this analysis. These were confounders as according to various research studies, age and adolescents' sex are associated with depression (Bluth,

Campo, Futch, & Gaylord, 2017; McLaughlin & King, 2015; Salk, Petersen, Abramson, & Hyde, 2016).

Validity and Reliability

State, local, and national agencies have used the YRBSS since 2001 to determine which youth-related activities contribute to the leading causes of mortality and morbidity among youth and to determine how these risk behaviors change over time. I conducted validity and reliability tests and retests for the YRBSS to ensure that the data were acceptable. In 2003, the CDC also reviewed existing empirical literature to examine cognitive and behavioral factors that could influence the validity of adolescents' self-reporting of YRBS- measured behaviors (CDC, 2013). The CDC concluded that while self-reporting of these types of behaviors is influenced by both cognitive and situational factors, these factors do not threaten the validity of self-reporting of each type of behavior (CDC, 2013).

Analytical Strategies

I used descriptive statistics, including frequencies and percentages for categorical data and measures of central tendency and spread for continuous variables to describe the data elements of interest. I assessed multicollinearity with the variance inflation factor (VIF). The VIF is a measurement for calculating and quantifying how much of the variance is inflated (Daoud, 2017). I calculated VIF by using SPSS as part of the regression analysis.

I used multivariable techniques, namely multiple logistic regression to examine the association between overweight/obesity (predictor variable of interest) and depression

(outcome variable) among racial and ethnic minority LGB adolescents while controlling for the effects of age and sex (independent variables). The logistic regression model was as follows, where "β0" is the constant or the Y-intercept and "e" is the random error.

$$\text{Predicted Depression} = \beta 0 + \beta 1(\text{OV-OB}) + \beta 2(\text{age}) + \beta 3(\text{sex}) + e$$

I tested the assumptions for logistic regression noted above and performed the Hosmer-Lemeshow goodness of fit statistic to assess whether there was any evidence of lack of fit. I conducted all statistical analyses and corresponding assumption testing on weighted data using (SPSS) version 27.

Results and Analyses

The purpose of this research was to use the 2017 YRBSS cross-sectional dataset collected by the CDC for secondary data analysis to examine the relationship between being overweight/obese and the psychosocial outcome of depression among racial/ethnic minority LGB adolescents in the United States. This section presents the results of the regression analyses conducted to address the research question. It also includes descriptive demographics of the sample, diagnostics tests/tests of assumption, the measurement model with goodness of fit results, and hypothesis testing.

Execution

In this quantitative study, I utilized logistic regression analyses to examine the relationship between being overweight/obese and depression in racial/ethnic minority LGB adolescents. In exploring this relationship, I controlled for confounding factors that have been shown to be associated with depression (i.e., age and sex). I excluded missing or incomplete data from the analysis. I downloaded data from the 2017 YRBSS database

in ASCII data format and then converted into SPSS. I exported the dataset into SPSS-27 for statistical analysis. I adjusted the 2017 YRBS dataset and the corresponding codebook used for statistical data analysis in this study to accurately represent the variables of interest for my research question.

In the 2017 YRBS data set, a total population of 14,765 students provided responses to the survey conducted by the CDC to monitor health-related behaviors that contribute to the leading causes of youth death and disability. For the six key variables utilized in this research study (BMI, depression, race/ethnicity, sexual identity, age, and sex), 12,297 individuals (83.3%) had no missing answers and were thus retained for the study. Based on the inclusion criteria for this research study (racial and ethnic minority LGB adolescents in the United States), the final sample was $N = 984$.

Descriptive Demographics of the Sample

The frequency counts and percentages for the selected variables from the 2017 YRBS dataset are presented in Table 4. Nine hundred and eighty-four participants met the inclusion criteria for this study (racial and ethnic minority LGB adolescents in the United States). Forty-two percent ($N = 412$) of the adolescents in the study had a BMI score of the 85th percentile or higher. Regarding race/ethnicity, the most common racial ethnic groups were Black/African-American (36.9%; $N = 363$) and multiple race Hispanic (26.5%; $N = 261$). The most common sexual identity was bisexual (56.6%; $N = 557$). The demographic representation by age of participants in this study ranged from 12 to 18 years or older with the median age of 16 years old. For sex at birth, 73.7% ($N= 725$)

were female and 26.3% ($N = 259$) were male. Fifty-six percent of the sample met the criteria for depression.

Table 4

Frequency Counts for Selected Variables in the Dataset (N=984)

Variable	Category	n	%
BMI Category			
	Underweight/Normal Weight	572	58.1
	Overweight/Obese	412	41.9
Race/Ethnicity			
	Am Indian/Alaska Native	13	1.3
	Asian	64	6.5
	Black or African American	363	36.9
	Native Hawaiian/Other PI	14	1.4
	Hispanic / Latino	152	15.4
	Multiple - Hispanic	261	26.5
	Multiple - Non-Hispanic	117	11.9
Sexual identity			
	Gay or lesbian	169	17.2
	Bisexual	557	56.6
	Not sure	258	26.2
Age (mdn=16 years)			
	12 years old	3	0.3
	13 years old	3	0.3
	14 years old	128	13.0
	15 years old	231	23.5
	16 years old	244	24.8
	17 years old	252	25.6
	18 years old or older	123	12.5
Sex at Birth			
	Female	725	73.7
	Male	259	26.3
Depression			
	No	429	43.6
	Yes	555	56.4

Diagnostics Tests/Tests of Assumptions

I analyzed the research question using multiple logistic regression. Five assumptions based on the logistic regression methodology by Aksu and Keceoglu (2019) included: (a) the dependent variable being binary or ordinal; (b) there is an independent observation; (c) there is little or no multicollinearity among independent variables; (d) independent variables are linearly related to the log odds; and (e) the dataset must have a sufficiently large sample size. Based on the assumptions of logistic regression, the design of the study met all these rules for this analysis. The assumption of little or no multicollinearity was met based on intercorrelations among the predictor variables. The assumption of no outliers, high leverage points or influential points was met based on analysis of the casewise list option in SPSS and no studentized residuals were found to be greater than ± three residual standard deviations.

Results

Results derived from the 2017 YRBS data specified that during the past year, almost one in three adolescents (31.5%) persistently felt sad or hopeless (CDC, 2018a). Among Hispanic adolescents, 33.7% experienced recurrent feeling or sad or hopelessness compared to 29.2% of Black adolescents (CDC, 2018a). Among LGB adolescents who were not sure of their sexual orientation, 46.4% persistently felt sad or hopeless compared to 27.5% of their heterosexual peers (CDC, 2018a).

I conducted a multivariable logistic regression to determine if being overweight/obese predicts depression in racial/ethnic and sexual minority adolescents. The results are presented in Table 5. The overall model was significant, χ^2 (3, N = 984) =

16.94, $p = .001$. The amount of variance explained by the model was between 1.7% and 2.3% based on the Cox and Snell R^2 and Nagelkerke R^2 statistics, respectively. The base classification rate was 56.4% and the final classification rate was 58.7%. This indicated that the model predicts 58.7% of the responses correctly. Inspection of the odds ratios found depression to be significantly lower in males than females ($OR = 0.55$, 95% CI (0.42, 0.74), $p = .001$). However, depression was not related to being an overweight/obese adolescent (see Table 5). Thus, I failed to reject the null hypothesis. The results of Table 5 indicated that overweight/obesity does not predict depression among racial/ethnic and sexual minority adolescents, while controlling for age and sex.

Table 5

Summary of Logistic Regression Analysis for Variables Predicting Depression Among Racial/Ethnic Minority Lesbian, Gay, and Bisexual Adolescents (N = 984)

					95th CI	
Variable	*B*	*SE*	*p*	*OR*	Lower	Upper
Constant	1.08	.32	.001	2.94		
Age (years)	-.02	.05	.74	.98	.89	1.09
Males	-.59	.15	.001	.55	.42	.74
Overweight/Obese	.04	.13	.74	1.05	.81	1.35
χ^2	16.94					
df	3					
%Depression *	58.7%					

Note. OR = Odds Ratio. CI = Confidence Interval. *Depression was defined as "Feeling sad or hopeless in the past year."

Hosmer and Lemeshow Test: $p = .48$.

Cox and Snell $R^2 = .017$. Nagelkerke $R^2 = .023$.

Discussion

Interpretation of the Findings

The adverse psychological and physical health effects of adolescent weight-based victimization is well documented in the literature. However, there has been a lack of attention placed on this issue in minority adolescents. In this study, I focused on racial/ethnic and sexual minority adolescents who are overweight/obese. My study was designed to examine whether any relationship existed between being overweight/obese and the psychosocial outcome of depression among LGB adolescents in Grades 9 through 12 living in the United States. I utilized the CDC 2017 YRBS dataset in this study to determine whether there is a relationship between being overweight/obese and depression (defined as feeling sad or hopeless) among racial/ethnic and sexual minority adolescents in the United States after controlling for age and sex. The results of the research question indicated that there is no significant association between being overweight/obese and the psychosocial outcome of depression among this group of overweight/obese LGB adolescents in the United States.

The result of this study was consistent with previous research showing no significance between depression and weight. For example, Hammerton et al. (2014) found that there were no significant differences in the percentage of children with depressive disorder between the weight categories (i.e., underweight, normal, overweight, and obese) based on BMI, and individuals who were underweight had higher rates of depression. Similarly, based on a study involving 18-year-old Greek students, individuals with lower BMI scores had greater depressive symptoms (Byrne et al., 2015).

Additionally, Assari and Caldwell (2015) found no relationship between obesity and higher rate of depression among African American male or females or Caribbean Black males. In fact, most of the studies that found no significant association between being overweight/obese and depression occurred outside of the United States; this suggests that different nations may have different cultural values or attitudes concerning overweight/obesity, which may mediate this relationship. But the findings of my study indicate that the relationship between being overweight/obese and depression identified in the literature inside the United States (Hackimer & Proctor, 2015; Hafeez, Zeshan, Tahir, Jahan, & Naveed, 2017; Pirgon, Sandal, Gökçen, Bilgin, & Dündar, 2015) are not significant among racial/ethnic and sexual minority adolescents.

The results of this study also showed that adolescent females reported more depression than adolescent males (B = -0.59), which is consistent with previous research. Scott et al. (2015) found that not only does the pervasiveness of depression vary by sex, but girls are at least twice as likely to experience depression after age 15 as boys. Similarly, La Roi et al. (2016) reported that studies have consistently shown that women experience higher levels of depression compared to men and girls have an increased susceptibility to depressive symptoms compared to boys starting in early adolescence.

In keeping with the intersectionality model, this study examined the relationship between being overweight/obese and the psychosocial outcome of depression among intersecting social categories of adolescents (i.e., racial/ethnic and sexual minority). In this study, being overweight/obese was not significantly associated with depression among racial/ethnic and sexual minority adolescents, indicating that the ways in which

these social identities intersect at the individual level with macro-level systems (i.e., overweight/obesity) may not produce a significantly different outcome of reports of depression as their heterosexual counterparts. The theory of intersectionality offers a critical perspective in grasping the various marginalization and their relationship to health outcomes, as social disparities converge in the lives of individuals (Syed, Santos, Yoo, & Juang, 2018). Adolescents who are in multiple-minority groups, such as LGB people of color, are more likely to be subjected to stigmatization, discrimination, and fear of rejection (Cyrus, 2017). Overweight/obese adolescents who are at the intersection of race/ethnicity and gender face weight-based victimization, which could lead to adverse psychological consequences (Puhl et al., 2019). However, the findings of this study indicate that depression among racial/ethnic and sexual minority adolescents may not be related to being overweight/obese.

The findings of this study also align with the concepts associated with the minority stress model in that while racial/ethnic and sexual minority adolescents are member of various stigmatized groups, the distal stress they face along a continuum of objective experiences to proximal stressors, which are subjective experiences that may be mediated by various factors. Thus, the findings of this study that found no significant association between being overweight/obese and depression may indicate that other distal and proximal factors are playing a role and any relationship may be indirect rather than direct.

On an individual level, LGB adolescents are exposed to both distal stressors (discrimination, hate crimes, prejudice, harassment) and proximal stressors (rejection,

weight bias, internalized homophobia, identity concealment), which contribute to the unique stressors that they face, which in turn puts them at risk for a variety of adverse physical and mental health outcomes. Thus, more research to identify both distal and proximal factors contributing to being overweight/obese and depression is vital because health risks do not occur in isolation. A greater understanding of the distal and proximal factors of being overweight/obese and the prevalence of depression may guide policy makers and public health practitioners in identifying the mental health needs of racial/ethnic and sexual minority adolescents.

The findings of the present study partly contradict the literature that posits that being overweight/obese is associated with depression in LGB adolescents (Hackimer & Proctor, 2015; Hafeez et al., 2017; Pirgon et al., 2015). According to Pirgon et al. (2015), several evidence-based researchers indicated that overweight/obese adolescents are at a higher risk of mental health outcomes such as depression compared to their non-overweight/obese counterparts. Accordingly, Byrne et al. (2015) indicated that some longitudinal research found evidence that depression may be a risk factor for the development of obesity in adolescence later in life. However, these findings alone do not show a causal relationship between depression and obesity. Therefore, further research is recommended to explicate the reason for this discrepancy in the results and to unravel the potential link between being overweight/obese and depression.

However, in this study, I found that depression was not related to being overweight/obese. This indicates that among the sample population for this study, being an overweight/obese adolescent did not significantly correlate with the outcome of

depression differently than among the general population. Although this inconsistency does not alter the interpretation of the findings, when applying the results to broader LGB population it should be taken into consideration, in that the sample used in the current study may not have been an accurate representation of the racial/ethnic and sexual minority population who are overweight/obese.

Another possible explanation for the discrepancy in the findings may be due to the present study defining depression as feeling sad or hopeless, rather than defining it according to the Child and Adolescent Psychiatric Assessment, the Children Depression Inventory, Patient Health Questionnaire-9 or the Beck Depression Inventory as other researchers (Fox, Gross, Rudser, Foy, & Kelly, 2016; Freira et al., 2017; Hammerton et al., 2014) did. The various measures used to define depression among adolescents may be a factor in the inconsistency of the results. Fox et al. (2016) found that studies examining the prevalence of depression, for example, in youth with obesity are inconsistent.

Another possible explanation for the inconsistency is the way in which being overweight/obese is defined; the current study defined overweight/obese as having a BMI percentile equal or greater than the 85th percentile, while other studies measured weight both dimensionally, using BMI as a continuous variable and categorically such as underweight, average weight, and obese groups (Hammerton et al., 2014). Byrne et al. (2015) defined being overweight as a BMI score above 25 kg/m^2 and obesity as BMI score above 30 kg/m^2. Differences in outcome can occur when various relative weight concepts are used (Hammerton et al., 2014). The minority stress model points to stigma and minority stress as determinants of disparities in LGB adolescents' health (Meyer,

2003). The model has been described as a theory that helps researchers explain health disparities among racial/ethnic and sexual minorities (Cyrus, 2017). The model posits that stigma and stress caused by being a sexual minority may be contributing to depression (Meyer, 2003). Obesity has traditionally been a stigmatized disorder, with studies recording social isolation, discrimination, and prejudice linked to negative attitudes (Roberts & Duong, 2015). From the literature, the evidence is clear that discrimination and prejudice adversely affects both the physical and mental health of minority groups (Cyrus, 2017).

Assari and Caldwell (2015) came to a similar conclusion. They suggested the risk of depression among adolescents who are overweight/obese is increased by high stigma and exposure to bullying. Similarly, Puhl et al. (2019) contended that distal and proximal stressors such as elevated rates of discrimination and victimization faced by overweight/obese LGB adolescents often lead to psychological distress and unhealthy behaviors. A study conducted by Scherr and Mayer (2019) revealed that rejection, alienation, and other forms of marginalization by peers have been linked to issues of longer-term psychosocial problems such as depression. It is important for us to understand that the disparities faced by racial/ethnic and sexual minority adolescents can be a by-product of the numerous adverse factors and difficulties that they face.

Despite the findings of the present study indicating that there is no significant relationship between being overweight/obese and depression in racial/ethnic and sexual minority adolescents in this study, LGB adolescents are still disproportionately affected by both obesity and depression (Perrino et al., 2015). Despite the finding of the present

study which indicated no significant association between being overweight/obese and depression in minority adolescents (*OR* = 1.05, 95% CI (0.81, 1.35), *p* = 0.74), LGB individuals who are also racial and ethnic minorities are at a greater risk of adverse health outcomes, and many faces more difficult challenges than their White counterparts (Chin, Lopez, Nathan, & Cook, 2016). Some studies (Byrne et al., 2015; Sahoo et al., 2015; Trambacz-Oleszak, Krzyżaniak, Szafrańska-Komarowska, & Kaczmarek, 2018) indicated that a U-shaped relationship exists between being overweight/obese, depression, and others (Hammerton et al., 2014; Sutaria, Devakumar, Yasuda, Das, & Saxena, 2019) indicated that no relationship exists. The results of this study which found depression to be higher among racial/ethnic and sexual minority females (*OR* = 0.55, 95% CI (0.42, 0.74), *p* = .001), indicate that other factors need to be explored which are contributing to depression among this vulnerable population because our understanding of the potential mechanisms may not be accurate. Given the seriousness of obesity and depression to public health, especially among children and adolescents, the results of the present study also indicate that more research is necessary to confirm potential causative roles in order to develop and implement effective multifaceted intervention measures. Revealing the risk and protective factors of these multifactorial disease is of great importance.

Limitations of the Study

This research study has several limitations. One of such potential limitation is the self-reported height and weight used to calculate BMI. While respondents received assurance that their answers would remain anonymous, there is a likelihood that they

underreported their weight, consequently, the pervasiveness of being overweight and obese may have been underestimated (Underwood et al., 2020); however, there is no evidence that there was any impact to the findings of this study by underreported weight. The extent to which health-behaviors are underreported or overreported cannot be determined, although the literature considered in this study showed that the information is of acceptable quality (CDC, 2013). A second limitation of this study is the absence of contextual variables in the YRBS dataset, which limits the ability to account for socio-economic status, built environment, urbanization, social support and other potential confounders known to be a risk factor for being overweight/obese (Byrd, Toth, & Stanford, 2018; Sahoo et al., 2015). Third, although the National YRBS dataset is representative of the general adolescent population, it may not be generalizable to the nation. This is because the data collected were only from adolescents who were present in school on the day of the survey's administration; therefore, some degree of selection bias may have been present. Racial/ethnic and sexual minority adolescents might account for a disproportionate proportion of dropouts from high school and other adolescents who are present or not present in school (CDC, 2013). Finally, because many issues sampled extremely sensitive issues, despite assurances of anonymity, the outcomes may have been impacted by social desirability bias.

Implications for Professional Practice

The results of this study may help advance the Healthy People 2030 goals of gathering data on LGB individuals which will aid researchers, policy makers, health care providers, and advocates identify and address health inequalities impacting the LGB

adolescent population. By conducting this research study, it is now known that among racial/ethnic and sexual minority adolescents in the United States, there was no significant relationship between being overweight/obese and psychosocial outcome of depression. Hammerton et al. (2014) recommended that more research is conducted within the adolescent population to explore the relationship between depression and obesity utilizing a variety of different measures due to conflicting findings. To my knowledge, this is the first research to combine the three theoretical frameworks used in this study to determine if being overweight/obese predicts depression in racial/ethnic and sexual minority adolescents. The results of this study yielded a non-significant association between overweight/obesity and the psychosocial outcome of depression among adolescents in the United States, but help to highlight the need for more research to better understand risk and prevalence of depression in adolescents who are overweight/obese.

Both being overweight/obese and depression in adolescents have serious consequences. Adolescents who are overweight/obese face a variety of psychosocial problems that seriously affect their quality of life and well-being. Results of this study on racial/ethnic and sexual minority adolescents indicate that no significant relationship exists between being overweight/obese and the psychosocial outcome of depression; however, these conditions do not occur in isolation and they coexist in adolescents. The findings suggest that a critical need exists for stakeholders to conduct comprehensive research aimed at understanding what is contributing to these conditions and ways in which they can broaden their assessment to determine the psychosocial factors of being

overweight/obese in an effort to collaborate and provide counseling and education in regard to weight loss, diet, or physical activity. Considering the developmental vulnerabilities of adolescents at the intersection of multiple social identity and the social stigma associated with being overweight/obese, the coexistence of these conditions is likely to dramatically influence treatment and help-seeking behaviors. Therefore, knowing that being overweight/obese is not significantly associated to depression in racial/ethnic and sexual minority adolescents provide concrete areas that must be screened individually and be included in treatment and prevention programs. This may also help stakeholders to develop different techniques which target being overweight/obese and depression separately in order to prevent and treat them effectively. Doing so may change the climate around racial/ethnic minority LGB adolescents' being overweight/obese and depression and may encourage help-seeking behaviors. The implications of not supporting the goal of helping to improve the lives of LGB adolescents are too great to ignore.

Implications for Positive Social Change

This study may lead to positive social change by enhancing adolescents' lives by increasing the focus on adolescents who hold multiple collective identities and the difficulties that they face compounded by being overweight/obese. The results of this study which shows no significant association between being overweight/obese and depression in racial/ethnic and sexual minority adolescents may also bring about positive social change by igniting a dialogue that recognizes that being an overweight/obese adolescent is not related to being depressed. However, despite the lack of relationship,

overweight/obesity and depression are still important problems separately and should be address. In doing so, it could make public health officials and policymakers conscious of the external factors of being overweight/obese and depression in racial and ethnic minority LGB adolescents. It may also increase their level of awareness concerning the intersection of race/ethnicity and sexual orientation in minority LGB adolescents which creates high rates of depression due to minority stress and high risk of poor health outcomes.

Recommendations

The results of this study which indicated that no significant relationship existed between overweight/obese and depression highlight the need for further research on the topic to examine other factors which may influence these conditions in racial/ethnic and sexual minority adolescents. Further research should employ a different data collection method such as primary data that provides more detail information concerning depression in racial/ethnic and sexual minority LGB adolescents. The variables should be operationalized in a different manner to aid in this process. Researchers may also consider a different research design approach such as a longitudinal study design which can offer a unique insight which might not be otherwise possible. It may also help to see if the health of racial/ethnic and sexual minority LGB adolescents improves or declines over time based on various factors. Researchers may consider a mixed methods approach for a future study, as mixed methods add value by increasing the validity of the results while helping to establish knowledge. Mixed methods use the strengths of both quantitative and qualitative methodologies and in turn achieve a deeper and broader

understanding of perspective on the overall issue (McKim, 2017). Evidence from the literature concerning the relationship between being overweight/obese and depression in adolescents is mixed based on the type of research methodology used (Mannan et al., 2016). A mixed method approach in a future study would help not only to analyze the quantitative data for a general understanding of the factors influencing depression among this vulnerable population but also to identify inconsistencies or additional constructs which may influence the trajectories of depression. Mixed methods also offer researchers opportunities for combining a number of theoretical perspectives in which to examine racial/ethnic and sexual minority LGB adolescents.

Additionally, I recommend that further research in this area address the limitations of the study by examining other covariate variables to determine their influence. Additional research should also be conducted to examine environmental factors that contribute to health disparities among racial/ethnic and sexual minority LGB adolescents. A theoretical framework that could be employed to study the population of interest and to better interpret the findings of the study is the health equity promotion model. This framework is oriented toward LBG individuals achieving their maximum mental and physical health potential and it considers both positive and adverse health-related conditions. The model is extremely useful in highlighting LGB group complexity and intersectionality as well as structural and environmental impacts.

Conclusion

In this study, I utilized data from 984 participants in the 2017 YRBS dataset to determine if being overweight/obese predicts depression among racial/ethnic and sexual

minority adolescents in the United States. The results of this study indicated that being overweight/obese does not predict depression among racial/ethnic and sexual minority adolescents in the United States while controlling for age and sex. The results of the study did find depression to be higher among females than males but not for overweight/obese adolescents. The findings of this research study showed that there are many other factors which contribute to being overweight/obese and depression among the population of interest. Thus, to deal with the challenges faced by the LGB adolescent population, all stakeholders in the community need to establish a comprehensive strategy to reduce LGB specific health disparities to improve their mental health and wellbeing. In order to mitigate the disparities faced by LGB adolescents, parents, teachers, medical professionals, and society as a whole can play a significant role (Hafeez et al., 2017). As we are faced with a global pandemic and given the knowledge that minority populations are most affected (Hooper, Nápoles, & Pérez-Stable, 2020), communities and institutions must ensure that LGB adolescents' presence are recognized and that they specifically promote their well-being.

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Manuscript 2: Relating Overweight/Obesity and Suicidality Among Racial/Ethnic and Sexual Minority Adolescents

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Outlet for Manuscript

The target journal for this research study is the *Journal of Adolescent Health* located at https://www.jahonline.org/. All manuscripts submitted to the *Journal of Adolescent Health* are to be done electronically. Grammar, punctuation, and the scientific writing of all manuscripts submitted to this journal for publishing will follow the 10th edition of the AMA writing style manual. This journal aims to publish research study that focuses on adolescent medicine and health, and much like this manuscript this journal is concerned with improving the health and well-being of adolescents. Manuscripts published in this journal cannot exceed 3,500 words with 250-word structured abstract, five tables/figures, and 40 references. This manuscript will be abridged to meet the word limit.

Abstract

Obesity and suicidality are two significant public health challenges. According to recent studies, lesbian, gay, and bisexual (LGB) adolescents are at the most risk for suicidal ideation and attempted suicide compared to their heterosexual counterparts, being two to seven times more likely to attempt suicide. Racial/ethnic minority LGB adolescents are at a compounded disadvantage with the intersection of their sexual orientation and racial/ethnic identity. Guided by distal and proximal health behaviors, minority stress, and intersectionality, the aim of this study was to determine whether being overweight/obese among racial/ethnic minority LGB adolescents influences the outcome of suicidality (seriously considered attempting suicide in the past year) among students who participated in the 2017 Youth Risk Behavior Survey. A cross-sectional quantitative design was used to analyze secondary survey data from 984 adolescents. Descriptive statistics and multivariable logistics regression tests were used to analyze the data. The results indicated that 41.9 % of adolescents were overweight/obese and 37.5% reported suicidality. There were no significant associations between being overweight/obese and suicidality among adolescents (*OR* = 1.06, 95% CI = 0.82, 1.38), controlling for age and sex. The findings indicate a need for careful monitoring of adolescents' mental health to uncover triggers and temporal predictors of suicidal behaviors. Awareness and treatment of each of these issues could improve the lives of minority LGB individuals and society as a whole.

Introduction

Adolescent suicide continues to increase in the United States and is a burden to the public health system. Suicide was the second leading cause of death in the United States among adolescents age 12 to 17 in 1999 and 2015, representing a concern for public health (DeCou & Lynch, 2018). Additionally, between 2007 and 2016 the suicide rate of adolescents aged 10 to 19 in the United States rose by 56%, making it the second leading cause of death in this age group (Xiao & Lu, 2019). In particular, lesbian, gay, and bisexual LGB adolescents exhibit high rates of suicidal thoughts and behaviors in relation to their straight counterparts beyond other known risk factors (DeCou & Lynch, 2018). Data from the National Youth Risk Behavior Survey (YRBS) indicated that compared to their heterosexual counterparts, LGB adolescents were at least three times more likely to have seriously considered suicide in the previous year. Similarly, in the last two decades, racial and ethnic minority adolescents, particularly Latinos, have shown growing levels of suicidal ideation and suicide attempts (Ortin et al., 2018). Research has shown that people of color are at great risk of depression and suicide relative to White individuals (Sutter & Perrin, 2016).

The high reported number of adolescents who considered suicide is largely attributed to minority stress resulting from bullying and discrimination (Ahuja, 2016). Further, the stress of dealing with the stigma of being a sexual minority in a society where heterosexuality is normative is often an explanation regarding why LGB adolescents are at an increased risk of suicide (Mueller et al., 2015). The cultural model of suicide indicates that racial and ethnic minority individuals encounter particular

cultural factors that influence their response to stressors, which can contribute to suicide differently relative to White individuals (Sutter & Perrin, 2016). Everyday stressors associated with social inequality cause these disparities in suicide attempts (Sutter & Perrin, 2016). The literature also provides strong evidence that bullying of LGB adolescents is widespread, and LGB adolescents are more likely than their heterosexual counterparts to be depressed (Ahuja, 2016). This combination has resulted in rates of LGB adolescents' suicide being at four to five times higher than their heterosexual peers (Ahuja, 2016). This study expands on the current literature concerning suicidality among racial and ethnic LGB adolescents by addressing gaps in the research concerning the influence of being overweight/obese on suicidality among racial and ethnic minority LGB adolescents in Grades 9 to 12 in the United States.

Significance/Importance

The Centers for Disease Control and Prevention (CDC) recorded a 30% rise in suicides between 2000 and 2016 in the United States, with rates rising in all age groups; however, of significant concern is the rise in suicide among adolescents (Miron et al., 2019). One particular group of adolescents who are at an increased risk of suicidal thoughts and suicide is LGB adolescents (O'Brien et al., 2016). The rates of suicidality or ideation is four times higher in LGB adolescents than their heterosexual counterparts (Rhoades et al., 2018). Racial and ethnic minority LGB individuals may be at an even greater risk of reduced mental health and increased suicidality (Sutter & Perrin, 2016).

The minority stress theory suggests that high suicide rates among LGB adolescents are due to the impact of stigma and discrimination faced by these individuals;

however, little is known about the various risk factors (Rimes et al., 2019). Reducing the threat to LGB adolescents' mental health and well-being across developmental stages is key in the prevention of suicidality (Fish & Pasley, 2015). The literature indicates substantial gender, racial, and ethnic differences in suicide risk factors and highlights the need for further research on suicidal behavior in minority adolescents as well as the need for culturally responsive prevention measures (Lee & Wong, 2020). The intersectional identities of the sexual/gender minority and minority race/ethnicity have been related to increased vulnerability to the psychological effects of discrimination (Sutter & Perrin, 2016). However, no research to date has specifically examined the possible reciprocal impact of both LGB and race/ethnic discrimination on mental health and suicidality among a diverse community of LGB people of color (Sutter & Perrin, 2016). Future intersectional research should aim to incorporate and explain the diverse ways in which membership in these social categories, both individually and in combination, forms variation in the implementation of behavioral and inequality outcomes (Steffensmeier et al., 2017). More research is needed to study the occurrences of suicide/suicidality among adolescents to determine the prevalence (Miron et al., 2019).

Additionally, adolescents who are overweight/obese are more likely to be subjected to weight-based victimization (Himmelstein & Puhl, 2019). Adolescents who are overweight or obese are viewed negatively, which causes them to develop poor self-image and increases their risk of being victimized by their peers (Keenan et al., 2018; Van Vuuren et al., 2019). This leaves them vulnerable to adverse effects on psychological well-being, social functioning, and physical health (Himmelstein & Puhl, 2019). Weight-

based victimization is also associated with a higher risk of psychological distress such as depression, anxiety, poor body image, and suicidality (Himmelstein & Puhl, 2019). Exploring the relationship between being overweight/obese and suicidality among racial and ethnic minority LGB adolescents in the United States is important because it constitutes a gap in the literature that needs to be researched in order to design effective interventions to promote wholesome mental health development in LGB adolescents (Van Vuuren et al., 2019).

This research study effects positive social change by highlighting the relationship between being overweight/obese and suicidality among racial and ethnic minority LGB adolescents within the United States. By drawing attention to the relationship between being overweight/obese and suicidality among LGB adolescents, stakeholders have the ability to establish targeted LGB adolescents' suicide prevention along with societal-level anti-stigma interventions aimed at reducing LGB adolescent victimization in order for them to live healthier and more productive lives.

The aim of this study was to examine the relationship between being overweight/obese and suicidality among racial/ethnic and sexual minority adolescents living in the United States. To examine this relationship, I combined three theoretical frameworks into a developmentally appropriate model to provide a quantitative application that examined variables such as race/ethnicity and sexual minority. These frameworks combined helped to explore how health inequalities (i.e., being overweight/obese) and distal and proximal factors (i.e., minority group membership) impact the health outcomes of racial/ethnic and sexual minority adolescents.

Crenshaw's (1989) theory of intersectionality states that differences on various dimensions such as gender, race, and sexual orientation combine to create systems of disparities. These disparities are most commonly understood through the lens of minority stress and distal and proximal factors of health behaviors theories. These theories posit that health disparities (i.e., being overweight/obese) are the results of distal and proximal stressors that minority groups overwhelmingly face which causes them to be at an elevated risk of suicide (Livingston et al., 2015).

Relevant Scholarship

According to Pineda-Roa (2019), there are greater suicide ideation rates in the homosexual population and attempted suicide relative to their heterosexual counterparts. However, the developmental timing of suicide-related disparities between heterosexuals and sexual minorities such as LGB adolescents is an under-studied field with important prevention implications (Fish et al., 2018). Mereish et al. (2018) contended that despite sexual orientation disparities in suicide, there is insufficient research to explore factors associated with the risk of suicide among sexual minorities when recognizing subgroup variations within this group. The body of literature, while increasing, is less common concerning LGB individuals from racial/ethnic backgrounds and the particular challenges they face due to the intersection of gender, sexual orientation, and race/ethnicity (Cyrus, 2017).

Suicide continues to have disproportionate effects on many racial and ethnic minority groups (Oh et al., 2019). Therefore, it is becoming increasingly vital to understand the social factors that contribute to suicidal thoughts and behaviors among

people of color (Oh et al., 2019). According to Chiang et al. (2017), it is estimated that sexual and gender minority adolescents have at least 1.5 times the rates of depression, suicidality, and high levels of other mental health problems when compared to their heterosexual or non-transgender peers. Similarly, Baiden et al. (2019) found that sexual minority adolescents were 2.2 times more likely to have made a suicide plan and 3.18 times more likely to have attempted suicide. Racial and ethnic minority adolescents, as well as LGB adolescents, are more likely to report suicidal thoughts, plans, and attempts (Mueller et al., 2015). Adolescent suicide is a public health challenge within the United States, and it contributes to a high rate of morbidity and mortality. The rate of suicide in the United States is twice the homicide rate. Public health efforts should focus on preventing the onset of suicidal ideation in adolescents (Baiden et al., 2019).

Van Vuuren et al. (2019) contended that the risk of suicidal death in LGB youth and adolescents has continued to increase. Similarly, a significant body of evidence indicates that sexual and gender minority adolescents are at a high risk of suicide ideation and attempts across numerous identity groups (McKay et al., 2019). Sexual minorities are more likely to report suicidal ideations and attempts across racial and ethnic groups than their peers (McKay et al., 2019). However, it is not well understood what is contributing to this increase. Results of previous research studies that have examined racial and ethnic differences in the prevalence of suicidality have been inconsistent and conflicting, which may suggest that there are critical differences in suicidality at the intersections of race and ethnicity and sexual minority status (Bostwick et al., 2014). Therefore, this research study examined the association of being overweight/obese and suicidality in racial and

ethnic minority LGB adolescents living in the United States. The results of this study provide policymakers and public health professionals with information about this relationship, which may aid in instituting programs that promote a healthy lifestyle and improve social inclusion and overall quality of life for racial and ethnic minority LGB adolescents.

Research Question and Design

RQ: Is there a relationship between overweight/obesity and suicidality among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex?

H_0: There is no relationship between overweight/obesity and suicidality among racial and ethnic minority LGB adolescents in the United States after controlling for age and sex.

H_a: There is a relationship between overweight/obesity and suicidality among racial and ethnic minority LGB adolescents after controlling for age and sex.

Park and Park (2016) stated that quantitative research designs are aimed at identifying and isolating particular variables within the study framework (searching for correlation, relationships, and causality). In this research study, I defined the relationships between being overweight/obese and suicidality among racial and ethnic minority LGB adolescents, which can be addressed by utilizing the quantitative research design. This research study utilized youth risk behavior survey (YRBS) data, which contained survey questions, to yield numerical values that could be used to substantiate or reject the hypotheses. The administration of surveys given to adolescents in grades nine through 12

nationally collected data for this research study. In this research study, I sought to outline the relationship between the independent and the dependent variable utilizing quantitative data collected through the YRBS System (YRBSS), which made a quantitative research design more appropriate.

A quantitative research design was preferred for this research study due to the levels of measurement of the variables, the desire to examine the relationship and degree, and the unique variability between the variables. Quantitative methods were the best way to explore the associations between the variables and to test the theoretical model in this research study. By using data from the 2017 YRBS, I had access to comprehensive data. By using the quantitative research method, I was able to test my theory or hypotheses, collect descriptive data, and explore any relationship between variables.

Statistical Assumptions

This research study employed a quantitative research design to explore the relationship between being overweight/obese and suicidality among racial and ethnic minority LGB adolescents in the United States. I analyzed the research question using logistic regression since it is a statistical technique that is suitable in testing the relationship between various (categorical or continuous) predictor variables and a binary outcome variable (Ranganathan et al., 2017). This study considered five assumptions of logistic regression analysis which included: (a) binary or ordinal dependent variable; (b) independent observations; (c) little or no multicollinearity among independent variables; (d) independent variables are linearly related to the log odds; and (e) dataset has a large sample size (Aksu & Keceoglu, 2019).

Logistic regression makes no assumptions about the distribution of scores for the predictor variables; however, it is sensitive to high correlations between the predictor variables (multicollinearity). Multicollinearity occurs when two or more independent (predictor) variables are highly correlated in the regression model (Daoud, 2017). In this study, I tested the assumption of multicollinearity among the predictor variables by examining the tolerance for each prior to running the regression model (Daoud, 2017). I performed the Hosmer-Lemeshow goodness of fit test to see whether there was evidence of lack of model fit.

Methods

Participants

The population of interest for this research study was overweight/obese racial and ethnic minority adolescents who self-identify as LGB in Grades 9 through 12 residing in the United States. The rationale for choosing this population is because the pervasiveness of being overweight/obese among youth and adolescents in the United States remains higher than the Healthy People 2020 target of 14.5% (Hales et al., 2017), which is a problem that needs attention. Being an overweight/obese adolescent often continues into adulthood and creates many other health-related problems and increases the risk of morbidity and mortality. Although there is growing evidence of weight-based victimization in youth, little attention has been paid to this problem in racial and ethnic minority LGB adolescents despite their elevated pervasiveness of being overweight and obese and increased danger of victimization (Puhl et al., 2019).

This study used the 2017 YRBS dataset, which is a nationally representative sample of adolescents in Grades 9 to 12 living in the United States. This sample includes adolescents who self-identified as American Indian/Alaska Native, Asian, Black or African American, Native Hawaiian/Other Pacific Islander, White, Hispanic/Latino, multiple-Hispanic, and multiple-non-Hispanic. Roughly 43% of the population from the YRBS self-identified as White, 19.2% Black/African American, 25.4% Hispanic, 1.7% American Indian/Native Hawaiian/Pacific Islander, and 10% self-identified as other race/ethnicity (Baiden et al., 2020). As reported by the 2015 National Center for Education Statistics, ethnic minority students currently account for 35% of the student population in the United States and are predicted to reach 50% by 2050 (Simon & Azzarito, 2019). The sample dataset also includes the sexual identity of adolescents who took part in the study. With the data provided in the literature, if a third (460 participants), of the 1,390 adolescents who self-identified as LGB is a racial or ethnic minority, then there was a sufficient sample to conduct the analysis (see Table 6).

Racial/Ethnic Minority

In the present analysis, racial/ethnic minority classification was a composite variable that is computed from two questions from the 2017 YRBS: “Are you Hispanic or Latino?” with the response choices being binary as “yes” or “no” and “What is your race?” with the response choices being (a) American Indian or Alaska Native, (b) Asian, (c) Black or African American, (d) Native Hawaiian or Other Pacific Islander, and (e) White (CDC, 2017). This question allows students to check all that applies (CDC, 2017).

These two questions are combined to create a binary race/ethnicity variable to identify if respondents identify as a minority (i.e., non-Whites, Hispanic-Whites).

Sexual Minority Status

In the present analysis, sexual minority classification is a composite variable focused on two YRBS questions measuring sexual identity and orientation to minimize the use of single-item variables and overcome the shortcomings of prior studies. Specifically, sexual minority adolescents include those who identified as LGB as well as those who are unsure about their sexual identity (i.e., "Which of the following best describe you? With the response choices being: (a) Heterosexual (straight), (b) Gay or lesbian, (c) Bisexual, and (d) not sure) or had sexual contact with individuals of the same sex or both sexes (i.e., "During your life, with whom have you had sexual contact? With the response choices being: (a) I have never had sexual contact, (b) females, (c) males, (d) females, and males (CDC, 2017). For the purpose of this analysis, I dichotomized inclusion in the sample-based sexual minority status as yes or no. If someone reported that their sexual identity was anything other than heterosexual and/or if someone indicated that they had sexual interaction with the same or both sexes, I coded them as being a sexual minority.

Sample and Power

The power of the statistical test represents the probability of being able to reject the null hypothesis if it is indeed false (Meyvis & Van Osselaer, 2018). A power analysis is used to determine the probability of making a Type II error, that is, the probability of failing to reject a null hypothesis when it is false. Type II error usually occurs when the

sample size is too small. The conventional power of 0.80 is adequate in finding an effect if it exists (Perugini et al., 2018).

In this research study, I examined overweight/obese racial and ethnic minority LGB adolescents in grades nine to 12 in the United States. G*Power 3.1.9.4 was used to conduct a logistic regression power analysis and sample size estimation. The calculations included the following parameters:

1. A priori analysis
2. Two-tailed test
3. x distribution equal to 'binomial'
4. The value for Pr(Y=1|X=1) H1 set at .2 - The probability of the outcome (suicidality) being a "1" in the LR model when the predictor (overweight/obesity) is a "1".
5. Alpha level was .05. - 5% chance of a Type 1 error occurring.
6. Power level was set at .80. - The probability that a true relationship exists between the study variables is 80%.
7. R^2 is set at .16. – Correlation between the predictor that is accounted for by the covariates (Hsieh, 1989).
8. X-parm π was set at .5 – Probability that the predictor will be a "1".

Using the parameters listed above and assuming various odds ratios (*OR's)*, I produced Table 6. Based upon the literature (Chen et al., 2010), an OR of approximately 2 – 2.5, corresponding to a medium effect size is expected. Thus, a sample size of 229 to 413 persons would be required for this analysis for these ORs. My assumption based on

the published literature from the YRBS dataset, as mentioned in the section entitled 'participants', is that I should have about 460 participants in my study. Therefore, I should be able to detect an adjusted OR as low as 2 for the predictor variable of interest, obesity/overweight, and the outcome of suicidality, given this sample size and the other parameters noted above.

Table 6

*G*Power Sample Size Calculation*

Adjusted Odds Ratio (OR)	Sample Size (N)
1.5	1278
1.75	650
2	413
2.25	297
2.5	229
2.75	186
3	156

Variables/Sources of Data

The research study utilized secondary data obtained from the 2017 YRBSS, to explore the parallel between being overweight/obese and suicidality among racial and ethnic minority LGB adolescents in the United States. The design of the YRBSS was to track priority health-risk activities that significantly contribute to the leading causes of youth mortality, injury, and social issues that contribute to adult trends (Kann et al., 2018). YRBSS data are probability weighted by the CDC to account for non-response between schools and students and reflecting the demographic distribution of adolescents across the United States.

Instrumentation or Measures

In this study, I utilized the 2017 YRBSS data, collected through a self-administered, anonymous, 99-item questionnaire. Table 7 identifies the variables of interest operational definition and the scales of measurement specific to the present study. The survey included questions regarding height, weight, race and ethnicity, age, sex, and questions concerning the following six risk groups of health behaviors: (a) behaviors that contribute to unintentional injuries and violence; (b) sexual behaviors that contribute to unintended pregnancy and sexually transmitted diseases, including HIV infection; (c) drug use; (d) tobacco use; (e) unhealthy dietary behaviors; and (f) inadequate physical activity (CDC, 2018). The response to this questionnaire was recorded on a computer-scannable booklet or answer sheet.

Table 7

Variable of Interest Operational Definition and Scales of Measurement

Variable	Description	Variable Type	Scale of Measurement
Overweight/ obesity	Dichotomized based on BMI percentile	Independent variable	Categorical (Nominal)
Suicidality	Considering suicide	Dependent variable	Nominal
Age	Measured in years at time of survey	Control variable	Interval
Sex	Sex at birth	Control variable	Nominal

Independent Variable Construction

Body Mass Index (BMI). Body mass index (BMI) is the most commonly used metric for the diagnosis of obesity (Batsis et al., 2016). BMI, an obesity indicator and an indicator of overweight, is calculated from the self-reported height and weight (CDC, 2017). It is calculated utilizing the following formula:

BMI = kg/m2 = Weight (in kg)/ [Height (in m)2]

Overweight/Obesity. I constructed the independent variable, overweight/obesity, from adolescents reported data on the YRBSS questionnaire regarding height and weight. The CDC utilized height, weight, and age of adolescents to obtain BMI. BMI is classified into four categories: (a) underweight (BMI < 5th percentile), (b) normal weight (BMI < 85th percentile and ≥ 5th percentile), (c) overweight (BMI ≥ 85th percentile and < 95th percentile), and (d) obese (BMI ≥ 95th percentile) (Kann et al., 2018). For the purposes of this research, I coded the four categories as one dichotomized variable that captures adolescents BMI percentiles as either underweight/normal weight (< 85th percentile) or overweight/obese (≥ 85th percentile) to form a new variable, overweight/obesity (OV-OB). I recoded this variable as a "0" for < 85th percentile or a "1" for ≥ 85th percentile.

Suicidality. In this study, I utilized data from the 2017 YRBSS, which is a self-reported questionnaire, in which suicidality is measured based on adolescents having serious thoughts of suicide. I assessed the dependent variable, suicidality, based on the responses to the following question: 26. "During the past 12 months, did you ever seriously consider attempting suicide?" (a) yes, (b) no. For this question, a "Yes" response was coded 1 and a "No" response was coded 0.

Control Variables

Age. Measured based on the response to the question: "How old are you?" (in years).

Sex. I measured sex by the item: "What is your sex?" The variables were coded 1 = female and 2 = male. I coded this categorical variable as 0 = female and 1 = male. The variables of interest and the scales of measurement are presented in Table 7.

These variables were confounders as the literature reported that age and sex are related with suicide rates (Recker & Moore, 2016; Vijayakumar, 2015). As such, they could have skewed the relationship between being overweight/obese and suicidality.

Validity and Reliability

Many state, local, and national agencies used the YRBSS since 2001 to determine which youth-related activities contribute to the leading causes of mortality and morbidity among youth and to determine how these risk behaviors change over time. The CDC conducted validity and reliability tests and retests for the YRBSS to ensure that the data were acceptable. In 2003, they also reviewed existing empirical literature to examine cognitive and behavioral factors that could influence the validity of adolescents' self-reporting of YRBS-measured behaviors (CDC, 2013).

Analytical Strategies

I used descriptive statistics, including frequencies and percentages for categorical data and measures of central tendency and spread for continuous variables to describe the data elements of interest. I assessed multicollinearity with the variance inflation factor (VIF). The VIF is a measurement for calculating and quantifying how much of the variance is inflated (Daoud, 2017). I calculated VIF via Statistical Package for the Social Science (SPSS) as part of the regression analysis.

I used multivariable techniques, namely multiple logistic regression to examine the association between overweight/obesity (predictor variable of interest) and depression (outcome variable) among racial and ethnic minority LGB adolescents while controlling

for the effects of age and sex (independent variables). The logistic regression model was as follows, where "β0" is the constant or the Y-intercept and "e" is the random error.

$$\text{Predicted Suicidality} = \beta 0 + \beta 1(\text{OV-OB}) + \beta 2(\text{age}) + \beta 3(\text{sex}) + e.$$

I tested the assumptions for logistic regression and performed the Hosmer-Lemeshow goodness of fit statistic to assess whether there is any evidence of lack of fit. All statistical analyses and corresponding assumption testing were conducted on weighted data using SPSS version 27.

Results and Analyses

The purpose of this research was to use the 2017 YRBS cross-sectional dataset collected by the CDC for secondary data analysis to examine the relationship between being overweight/obese and the psychosocial outcome of suicidality among racial and ethnic minority LGB adolescents in the United States. This section presents the results of the regression analyses conducted to address the research question. It also includes a descriptive demographics of the sample, diagnostics tests/tests of assumption, the measurement model with goodness of fit results, and hypothesis testing.

Execution

In this quantitative study, I utilized logistic regression analyses to examine the relationship between being overweight/obese and suicidality in racial/ethnic minority LGB adolescents. In exploring this relationship, I controlled confounding factors that have been shown to be associated with suicidality (i.e., age and sex). I excluded missing data or incomplete cases from the analysis. I downloaded data from the 2017 YRBSS database into ASCII data format and then converted into SPSS. I exported the dataset into

SPSS-27 for statistical analysis. I adjusted the 2017 YRBS dataset and the corresponding codebook used for statistical data analysis in this study to accurately represent the variables of interest for my research question.

In the 2017 YRBS dataset, a total population of 14,765 students provided responses to the survey conducted by the CDC to monitor health-related behaviors which contribute to the leading causes of youth death and disability. For the six key variables utilized in this research study (BMI, suicidality, race/ethnicity, sexual identity, age, and sex), 12,297 individuals (83.3%) had no missing answers and were thus retained for the study. Based on the inclusion criteria for this research study (racial and ethnic minority LGB adolescents in the United States), the final sample was $N = 984$.

Descriptive Demographics of the Sample

The frequency counts and percentages for the selected variables from the 2017 YRBS dataset are presented in Table 8. Nine hundred and eighty-four participants met the inclusion criteria for this study (racial and ethnic minority LGB adolescents in the United States). Forty-two percent ($N = 412$) of the adolescents in the study had a BMI score of the 85th percentile or higher. Regarding race/ethnicity, the most common racial ethnic groups were Black/African-American (36.9%; $N = 363$) and multiple race Hispanic (26.5%; $N = 261$). The most common sexual identity was bisexual (56.6%; $N = 557$) followed by not sure (26.2%; $N = 258$). The demographic representation by age of participants in this study ranged from 12 to 18 years or older with the median age of 16 years old. For sex at birth, 73.7% ($N = 725$) were female and 26.3% ($N = 259$) were male. Thirty-seven and a half percent of the sample met the criteria for suicidality.

Table 8

Frequency Counts for Selected Variables in the Dataset (N=984)

Variable	Category	*N*	%
BMI category	Underweight/Normal Weight	572	58.1
	Overweight/Obese	412	41.9
Race/Ethnicity			
	Am Indian/Alaska Native	13	1.3
	Asian	64	6.5
	Black or African American	363	36.9
	Native Hawaiian/Other PI	14	1.4
	Hispanic / Latino	152	15.4
	Multiple - Hispanic	261	26.5
	Multiple - Non-Hispanic	117	11.9
Sexual identity			
	Gay or lesbian	169	17.2
	Bisexual	557	56.6
	Not sure	258	26.2
Age (mdn=16 years)			
	12 years old	3	0.3
	13 years old	3	0.3
	14 years old	128	13.0
	15 years old	231	23.5
	16 years old	244	24.8
	17 years old	252	25.6
	18 years old or older	123	12.5
Sex at Birth			
	Female	725	73.7
	Male	259	26.3
Suicidality			
	No	615	62.5
	Yes	369	37.5

Diagnostics Tests/Tests of Assumptions

I analyzed the research question using multiple logistic regression. Five assumptions based on the logistic regression methodology by Aksu and Keceoglu (2019) included: (a) the dependent variable being binary or ordinal; (b) there is an independent observation; (c) there is little or no multicollinearity among independent variables; (d) independent variables are linearly related to the log odds; and (e) the dataset must have a sufficiently large sample size. Based on the assumptions of logistic regression, all these rules for this analysis were met by the design of the study. The assumption of little or no multicollinearity was met based on intercorrelations among the predictor variables. The assumption of no outliers, high leverage points or influential points was met based on analysis of the casewise list option in SPSS and no studentized residuals were found to be greater than ± three residual standard deviations.

Results

Results derived from the 2017 YRBS data specified that during the past year, 17.2% of adolescents seriously considered attempting suicide (CDC, 2018). Among racial/ethnic groups, 16.4% of Hispanic adolescents seriously considered attempting suicide and 14.7% of Blacks adolescents seriously considered attempting suicide (CDC, 2018). Forty-seven-point seven percent of LGB adolescents seriously considered attempting suicide and 31.8% of adolescents who were not sure of their sexual orientation compared to 13.3% of their heterosexual peers (CDC, 2018).

I conducted a multivariable logistic regression to determine if being overweight/obese predicts suicidality in racial/ethnic and sexual minority adolescents.

The results are presented in Table 9. The overall model was significant, χ^2 (3, N = 984) = 8.61, p = .04. The amount of variance explained by the model was between .9% and 1.2% based on the Cox and Snell R^2 and Nagelkerke R^2 statistics, respectively. The base classification rate was 62.5%, and the final classification rate remained the same. This indicates that the model predicts 62.5% of the responses correctly. Inspection of the odds ratios found suicidality to be significantly lower in males than females (*OR* = .64, 95% CI (.47, .87), p = .005). However, suicidality was not related to being an overweight or obese adolescent (See Table 9). Thus, I failed to reject the null hypothesis. The results of Table 9 indicated that being overweight/obese does not predict suicidality among racial/ethnic and sexual minority adolescents, while controlling for age and sex. This indicates that for the population of interest, there is no relationship between being overweight/obese and suicidality.

Table 9

Summary of Logistic Regression Analysis for Variables Predicting Suicidality Among Racial/Ethnic Minority Lesbian, Gay, and Bisexual Adolescents (N=984)

					95th CI	
Variable	*B*	*SE*	*p*	*OR*	Lower	Upper
Constant	.07	.33	.83	1.07		
Age (years)	-.01	.05		.83	.99	.89
Males	-.44	.16		.005	.64	.47
Overweight/Obese	.06	.13		.64	1.06	.82
χ^2	8.61					
df	3					
%Depression *	62.5%					

Note. OR = odds ratio. CI = confidence interval. *Suicidality was defined as "Seriously consider attempting suicide in the past year."

Hosmer and Lemeshow Test: p = .24.

Cox and Snell R^2 = .009. Nagelkerke R^2 = .012.

Discussion

Interpretation of the Findings

The CDC 2017 YRBS dataset utilized in this study helped to determine whether there is a relationship between being overweight/obese and suicidality (defined as seriously consider attempting suicide) among racial/ethnic and sexual minority adolescents in the United States after controlling for age and sex. I conducted logistic regression analysis to determine whether a relationship exists. Being overweight/obese did not predict suicidality among racial/ethnic and sexual minority adolescents, after controlling for age and sex. This indicates that for the population of interest, the study found no relationship between being overweight/obese and suicidality while controlling for age and sex. These results are consistent with previous research showing no significant relationship between BMI and suicidality as well as a reduced risk of suicide for overweight/obese individuals (Perera et al., 2016).

Though the present study found no significant relationship between being overweight/obese and suicidality in racial/ethnic and sexual minority adolescents, with studies pointing to an elevated risk and continued increase of suicide in sexual minority adolescents (McKay et al., 2019; Van Vuuren et al., 2019), there may be other distal and proximal variables that contribute to suicidality among this population. In addition, there is empirical evidence pointing to childhood adversity variables such as lack of social support, sexual assault, domestic violence, and maternal depression as a factor for suicidality among adolescents (Strandheim et al., 2014). Therefore, despite this study's findings, further research is needed.

The results of this study also showed that adolescent females reported more suicidality than adolescent males (B = -.44), which is consistent with previous research. Baams et al. (2015) found that LGB adolescent females have higher levels of suicidality compared to LGB adolescent males. Though females exhibit lower levels of stress associated with their coming out, these stressful experiences are correlated with feelings of not belonging and a strain on family and friends and in turn suicidality (Baams et al., 2015). Similarly, Johns et al. (2017) found that on average, sexual minority females have higher BMI than their heterosexual counterparts and both sexual minorities and overweight/obese individuals are targets of societal stigma, contributing to increased harassment and related mental distress. Aligning with the theory of intersectionality, a trend of double jeopardy emerged among sexual minority females as demonstrated in the results of the present study which showed that LGB females reported more suicidality than LGB males. Sexual minority females who considered themselves to be overweight/obese reported more sadness and suicidality among all the mental distress than their heterosexual counterparts (Johns et al., 2017).

The minority stress model posits that the high risk of suicidality among sexual minorities is correlated with their encounter with unique distal (e.g., victimization, stigma, and discrimination) stressors and correlated proximal (e.g., concealment, internalized heterosexism) stress mechanisms referred to as minority stress (Meyer, 2003). Similarly, gender and sexual orientation are significant predicators of differences in LGB adolescent's mental health and health behaviors (Baams et al., 2015). Thus, the findings of the present study that showed that LGB adolescent females reported more

suicidality compared to LGB adolescent males align with the concepts associated with the distal and proximal factors and minority stress in that racial/ethnic and sexual minority adolescents are at the intersection of multiple social categorizations which are interconnected and creates a complicated position within society (Cyrus, 2017). As a result of these intersectional minority identities, they are faced with excess social stress stemming from both distal and proximal factors which leaves them particularly vulnerable to negative health outcomes (McConnell et al., 2018). In the last two decades, researchers linked minority stress with suicidality among sexual minority individuals (Baams et al., 2015). By mediating general risk factors, sexual identity-specific stressors may be distal predictors of depression and suicidality (Baams et al., 2015).

McKay et al. (2019), found that sexual minorities are more likely to report suicidal ideations and attempts across racial and ethnic groups than their peers even though it is not well understood what is contributing to this increase. In my study, the findings indicated that being overweight/obese was not significantly related to suicidality in racial/ethnic and sexual minority adolescents. Factors presented in the literature attempted to explain the disparities as it relates to being overweight/obese and suicidality among LGB adolescents. According to Hafeez et al. (2017), early victimization and emotional distress represented about 50% of the disparities in emotional distress between LGB and heterosexual adolescents in both boys and girls. However, Baams et al. (2015) found that victimization and stigmatization due to sexual orientation negatively affects the levels of suicide ideation. The findings correspond to Meyer's (2003) minority stress model which contends that minority groups such as LGB adolescents are at a higher risk

of mental health problems due to stress induced by social stigmatization. Perera et al. (2016) pointed to cross-sectional studies which indicate that factors such as body weight perception, depression, and medical comorbidity serve as confounders to the relationship between being overweight/obese and suicidality. This suggests the need for further research to examine the contributing factors to the disproportionate rates being overweight/obese and suicidality in racial/ethnic and sexual minority adolescents.

One possible explanation for the difference between my study results and some of the literature is the way in which the outcome was defined. The present study defined suicidality as seriously consider attempting suicide in the past year, while other researchers (McKay et al., 2019; Rew et al., 2016; Van Vuuren et al., 2019) assessed suicidality using various questions and responses. It is possible that the various measures used to assess suicidality among adolescents may be a factor in the inconsistency of the results. Strandheim et al. (2014) found that the results of studies on weight problems among adolescents who are underweight or overweight and suicidality are contradictory.

Another possible explanation for my study results is that public opinion of the LGB population is changing (Goldbach & Gibbs, 2017), and with these changes, it is possible that many LGB adolescents are now maturing in social settings in which being a sexual minority is not viewed negatively. In addition, while LGB adolescents may still face minority stressors, they may be able to access new coping mechanisms more easily than previous generations (Goldbach & Gibbs, 2017). Thus, to understand the underlying mechanisms which contribute to the elevated risk of suicide among racial/ethnic and sexual minority adolescents, further research is needed.

Limitations of the Study

This research study has several limitations. One of such potential limitation is the self-reported height and weight used to calculate BMI. While respondents received assurance that their answers would remain anonymous, there is a likelihood that they underreported their weight, consequently, the pervasiveness of being overweight and obese may have been underestimated (Underwood et al., 2020); however, there is no evidence that underreported weight impacted the findings of this study. The extent to which health-behaviors are underreported or overreported cannot be determined, although the literature considered in this study showed that the information is of acceptable quality (CDC, 2013). A second limitation of this study is the absence of contextual variables in the YRBS dataset, which limits the ability to account for socio-economic status, built environment, urbanization, social support and other potential confounders known to be a risk factor for being overweight/obese (Byrd et al., 2018; Sahoo et al., 2015). Third, although the YRBS dataset is representative of the general adolescent population, it may not be generalizable to the nation. This is because the data collected were only from adolescents who were present in school on the day of the surveys' administration, therefore, some degree of selection bias may have been present. Finally, because many issues sampled extremely delicate data, despite assurances of anonymity, the outcomes may have been impacted by social desirability bias.

Implications for Professional Practice

The prevalence of being overweight/obese among adolescents in the United States remains higher than the Healthy People 2020 target of 14.5% (Hales et al., 2017).

Overweight/obesity is a complex and multifactorial disease with various psychosocial outcomes (Puhl et al., 2019). However, the results of this study found no significant association between being overweight/obese and psychosocial outcome of suicidality. Being overweight/obese and suicidality can co-occur in racial/ethnic and sexual minority adolescents and consideration should be given to the use of intersectionality, minority stress model, and distal and proximal behavior model to explore factors which contribute to these diseases as well as to broaden our knowledge of the mental health conditions of adolescents with both conditions. Both being overweight/obese and suicidality compound minority stress faced by adolescents at the intersection of race/ethnicity, gender, and sexual identity negatively affects their health and wellbeing. With the results of this study showing no association between being overweight/obese and suicidality, new strategies should be implemented to advance the identification and intervention of factors contributing these diseases hereby lessening the gaps in health disparities.

The finding of this study also points to the potential importance of revising policies and practices to alter the beliefs that being overweight/obese and suicidality are significantly correlated. Such revisions to policies and practices may not only help reduce health disparities but in the long run, it may create a healthier and more environmentally friendly society for adolescents with multiple social identities. This change may also help advance Healthy People 2020 goal of eliminating health disparities, achieving health equity within various segment of the population and improving LGB individual health, safety, and well-being (Goldbach et al., 2014). Environmental and policy interventions

must be at the forefront of attempts to reverse the increase prevalence in both overweight/obesity and suicidality among racial/ethnic and sexual minority adolescents.

Implications for Positive Social Change

The results of this study add to the current body of knowledge on being overweight/obese and the psychosocial outcome of suicidality among racial/ethnic and sexual minority adolescents in the United States. I found no associations between being overweight/obese and suicidality indicating that there are other factors that contribute to these health disparities faced by this population. To bring about change in any community, public health practitioners and other stakeholders must conduct relevant research studies to determine the factors in the macrosystem that affect the prevalence of being overweight/obese and suicidality among racial/ethnic and sexual minority adolescents. The results of this study also contribute the positive social change by increasing the depth of literature available on the health care needs of this population.

Recommendations

The results of this study may help to fill a critical gap in research by adding to the body of literature concerning minority adolescents and indicating that there is no significant association between being overweight/obese and suicidality in this population but give rise to additional questions. The finding highlights the need for further research on the topic to identify key factors and determinants of the rise in trends for these conditions in racial/ethnic and sexual minority adolescents to pursue viable and effective policies to reverse these trends. Further research should employ a different data collection method such as primary data that provides more detail information concerning being

overweight/obese and suicidality in racial/ethnic and sexual minority adolescents. The variables should be operationalized in a different manner to aid in this process. Researchers may also consider a different research design approach such as a longitudinal study design which can offer a unique insight which might not be otherwise possible. It may also help to see if the health of racial/ethnic and sexual minority LGB adolescents improves or declines over time based on various factors.

I also recommend that future research employ mixed methodology as it adds value to research studies by increasing the validity of the results while helping to establish knowledge. Mixed methods use the strengths of both quantitative and qualitative methodologies and in turn achieve a deeper and broader understanding of perspective on the overall issue (McKim, 2017). Evidence from the literature pointing to a relationship between being overweight/obese and suicidality varied based on the design of the study (Perera et al., 2016). Examining the complexities among racial/ethnic and sexual minority adolescents would probably take more nuanced approaches to data collection. Thus, employing a mixed method approach may be suitable and it may help to improve the efficiency and effectiveness of the study.

Additionally, I recommend that further research in this area address the limitations of the present study. In this study, I analyzed the YRBS dataset which did not contain any contextual variables, so it is not known if socio-economic status, built environment, urbanization, social support and other potential confounders are risk factors for being overweight/obese in the population of interest. Additional research should examine other covariate variables to determine their influence. Further research should

also be conducted to examine environmental factors that contribute to health disparities among racial/ethnic and sexual minority adolescents. Secondly, although the YRBS dataset is representative of the general adolescent population, it may not be generalizable to the nation, and it may be subject to sampling bias. Therefore, a more proactive sampling strategy such as the experience sampling method (ESM) could help provide a higher response rate while ensuring a larger spread of the findings over time and space. This could ultimately enhance the ecological validity of the results of the analysis.

Conclusion

This study utilized data from 984 participants in the 2017 YRBS dataset to determine if being overweight/obese predicts suicidality among racial/ethnic and sexual minority adolescents in the United States. The results of this study indicated that being overweight/obese does not predict suicidality among racial/ethnic and sexual minority adolescents in the United States after controlling for age and sex. The results of the study did find suicidality to be higher among females than males; however, suicidality was not related to being an overweight/obese adolescent. The findings provide a more complete picture of being overweight/obese and suicidality as it relates to racial/ethnic and sexual minority adolescents. It highlights that suicidality is independent of being overweight/obese. Treatments and intervention plans must be revised and tailored to the need of racial/ethnic and sexual minority adolescents. It also highlights that no single treatment modality is adequate to tackle these multifactorial diseases because they are not significant related and due to their complexity.

Data from the 2017 YRBS indicated that 17.2% of adolescents seriously contemplated committing suicide in the past year. The data also indicate that the pervasiveness of seriously contemplating suicide was higher among females (22.1%) than among males (11.9%). Nationwide, in 2017, the YRBS data indicated that the rate of obesity was greater among Black (18.2%) and Hispanic (18.2%) adolescents than among their White counterparts (12.5%), and higher among Black and Hispanic females (16.7% and 14%) respectively than White females (10.3%). While the pervasiveness of these two conditions is considered to be leading factors for poor health outcomes, they are also damaging behaviors that could in and of themselves impose high societal costs. The finding from this study highlight that being overweight/obese is not significantly associated with suicidality in racial/ethnic and sexual minority adolescents. However, these conditions do co-occur in adolescents and underscores the importance of all stakeholders collaborating to ensure that education, healthcare, and effective treatment options are available to adolescents who are at the intersection of multiply collective identities. To deal with the challenges faced by the LGB adolescent population, all stakeholders in the community need to establish a comprehensive strategy. In order to mitigate the disparities faced by LGB adolescents, parents, teachers, medical professional, and society as a whole can play a significant role (Hafeez et al., 2017). As we are faced with a global pandemic and given the knowledge that minority populations are most affected (Hooper et al., 2020), communities and institutions must ensure that they specifically promote the well-being of minority adolescents with multiple collective identity.

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Manuscript 3: Relating Overweight/Obesity and Substance (Marijuana) Use Among Racial/Ethnic and Sexual Minority Adolescents

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Outlet for Manuscript

The target journal for this research study is the *Journal of Drug and Alcohol Dependence* located at https://www.journals.elsevier.com/drug-and-alcohol-dependence. All manuscripts submitted to this journal must follow the AMA Manual of Style, 10th edition. The aim and scope of the journal is to promote mutual understanding of the many facets of drug abuse for the benefit of all researchers involved in drug and alcohol research and facilitate the transfer of scientific findings to successful practices in treatment and prevention. Much like the aim of this research study, the journal's mission is to offer scholars, clinicians, and policymakers' access to information from all viewpoints and to do so in a single journal in a format that is comprehensible. Manuscripts published in this journal should not exceed 4,000 words (for the introduction, methods, results, and discussion). This manuscript will be abridged to meet the word limit.

Abstract

Substance use among adolescents is a global public health crisis. Multiple researchers have identified different risks and protective factors for substance use among adolescents. Racial and ethnic minorities, when taking various risk factors into account, are more susceptible to substance use-related problems. Similarly, lesbian, gay, and bisexual (LGB) adolescents experience higher levels of minority stress and associated substance use compared to their heterosexual peers. Although researchers have well documented the association between adolescents and substance use due to minority stress, less is known about being overweight/obese and its effect on substance use in this population. Guided by distal and proximal factors of health behaviors, minority stress model, and intersectionality, the purpose of this study was to determine whether being overweight/obese among racial/ethnic minority LGB adolescents influences the outcome of substance (marijuana) use among adolescents who participated in the 2017 National Survey on Drug Use and Health. I used a cross-sectional quantitative design to analyze secondary survey data from 186 adolescents. Descriptive statistics and logistic regression tests analyzed the data. The result found that 53.2 % of adolescents were overweight/obese and 25.3% had substance (marijuana) use. There were significant associations between overweight/obesity and substance (marijuana) use in adolescents (*OR* = 2.26, 95% CI = 1.11, 4.59). This study contributes to positive social change by advancing both the literature and Healthy People 2020 goals of addressing health inequalities impacting LGB individuals.

Introduction

Lesbian, gay, and bisexual (LGB) adolescents face many disparities in mental health-related outcomes when compared to their heterosexual counterparts (Scannapieco et al., 2018). Compounding mental health disparities are the increased likelihood that LGB adolescents will be more susceptible to substance abuse (Scannapieco et al., 2018). LGB adolescents have 190% higher odds of substance use/abuse compared to their heterosexual peers. Among females, these disparities are higher than for males and for younger than older adolescents (Coulter et al., 2018). To guide comprehensive public health and policy strategies, contemporary data providing a holistic perspective of LGB substance use risk are needed (Caputi et al., 2018).

Similarly, according to the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA), there are substantial racial and ethnic disparities in the prevalence of drug use and involvement in the treatment of substance abuse (Burlew & Sanchez, 2017). Though racial and ethnic minority groups account for 40% of admissions to publicly funded substance addiction treatment facilities, these populations tend to be at elevated risk of poor treatment outcomes (Burlew & Sanchez, 2017). In regard to alcohol, racial and ethnic minorities are more likely to suffer adverse effects, such as prosecution and incarceration for drinking, possibly due to perceived racial prejudice and racial/ethnic stigma (Camplain et al., 2020).

When members of stigmatized groups such as racial/ethnic minorities face stigma and prejudice, their overall capacity to self-regulate is compromised (Stettler & Katz, 2017). Despite the growing literature that links discrimination to health outcomes, little is

known about the mechanisms that link the unique forms of discrimination that occur within a particular setting to subsequent health disparities (Huebner et al., 2015). Additionally, minimal literature exists concerning other factors such as obesity and how it influences substance use by adolescents (Coulter et al., 2018). In this study, I sought to expand on the current literature concerning substance use among racial and ethnic minority LGB adolescents by addressing gaps in the research concerning the influence of being overweight/obese on substance use among racial and ethnic minority LGB adolescents in the United States.

Significance/Importance

Substance use affects millions of adolescents in the United States. On an average day, 881,684 adolescents smoke cigarettes, 646,702 use marijuana, and 457,672 drink alcohol (Inman et al., 2020). Substance use remains a public health concern for adolescents and young adults, and the transitions between these developmental phases are a critical period for substance use and misuse (Mason et al., 2015).

Of particular concern is the prevalence of substance use among racial and ethnic minority LGB adolescents. In comparison to their heterosexual counterparts, LGB adolescents are at increased risk of substance abuse (Huebner et al., 2015), being 190% more likely than their heterosexual peers to report a history of substance use (Mereish et al., 2017). Studies conducted by the Centers for Disease Control and Prevention (CDC) found that LGB adolescents are at higher risk compared to their heterosexual peers for 11 out of the 13 markers of tobacco use and 18 out of the 19 markers of alcohol and other substance use behaviors (Mereish et al., 2017). The disparities in substance use are

significant primarily because this behavior at an early age is associated with an increased probability of later lifetime addiction (Coulter et al., 2018).

Substance use among adolescents is a public health concern because by the time adolescents reach grade 12, almost 70% of them have tried alcohol, and nearly 50% have used marijuana (Zapolski et al., 2017). This is of significant concern because the SAMHSA found that those who first started using/abusing alcohol at a younger age became more alcohol dependent later in life (Song et al., 2018). Race and ethnicity are said to be related to adolescent substance use, with racial variations more pronounced in higher grades (Hill & Mrug, 2015). With regard to marijuana use, recent national statistics show a rise in the prevalence of usage among racial and ethnic minority adolescents, so that current levels of use are equal to or higher than those seen among their White peers (Zapolski et al., 2017). Native American adolescents have higher rates of alcohol and drug use than adolescents in other minority groups and are found to have levels comparable to or higher than White adolescents (Zapolski et al., 2017). However, regardless of group membership, studies indicate that minority adolescents experience more drug-related problems than their White counterparts (Zapolski et al., 2017).

Various existing literature reported that a relationship exists between socioeconomic status and substance use prevalence and patterns (Andrabi et al., 2017; Lewis et al., 2018). Lower socioeconomic status is correlated with greater intake of alcohol, tobacco and cocaine among adolescents and increased risk of early adulthood use disorders (Lewis et al., 2018). According to Andrabi et al. (2017), a critical problem when evaluating adolescent substance use is the significant inequality in the risk of use

across different segments of society. It is important to broaden lines of inquiry to identify modifiable mechanisms underpinning the relationship between socioeconomic status and adolescent use of substances (Andrabi et al., 2017).

Despite many prevention efforts aimed at reducing adolescents' substance use, trends have shown little to no decrease. This may suggest that there are other predictors of adolescent substance use. The results of this research study help to identify a contributing factor of substance use in racial and ethnic minority LGB adolescents as well as provided a framework for future research aimed at improving the lives of racial and ethnic minority LGB adolescents.

This research study examined the relationship between being overweight/obese and substance (marijuana) use among racial/ethnic and sexual minority adolescents living in the United States. To explore this relationship, I combined three theoretical frameworks in an effort to expand on the current literature and to provide a more in-depth understanding of how the intersection of race/ethnicity and sexual orientation creates unique stress (i.e., unhealthy eating, depression), along with distal and proximal factors (i.e., substance use) that affect the health outcome of racial/ethnic and sexual minority adolescents.

Relevant Scholarship

According to Caputi et al. (2018), previous researchers have suggested that adolescents who self-identify as LGB have a higher likelihood of using tobacco, alcohol, and marijuana with many attributing these risk differences to minority stressors, such as stigma. LGB adolescents are more prevalent to a variety of mental health disorders such

as the rate of depression, anxiety, and substance use disorders (Grant et al., 2014). The reason for these disparities in mental health is not entirely evident, but it may be linked to the social stigma, discrimination, and negative childhood experiences of LGB people (Grant et al., 2014). However, there are simply not enough high fidelity evidence-based interventions to address the need to prevent adolescents and young adults from substance abuse (Mason et al., 2015).

Eitle et al. (2017) contended that even though many racial and ethnic minorities live overwhelmingly in economically deprived neighborhoods, empirical data shows that most racial and ethnic minority adolescents in America use drugs less often than (non-Hispanic and Hispanic) Whites. Both the insulation and subjective culture hypothesis indicate that the reality of being an ethnic and/or racial minority in a predominantly White student body causes negative effects for minority students (Eitle et al., 2017). These disparities are of great concern since the National Center on Addiction and Substance Abuse indicated that early substance use is more likely to develop later on into problematic substance use (Song et al., 2018). The United States census projected that by the year 2060, 64% of those under the age of 18 with substance use/abuse problems, would belong to a racial and ethnic minority group, compared to 56% for the general population which draws attention to attempts to identify racial and/or ethnic disparities in substance use (Song et al., 2018). It is clear from the literature that the risk factors for substance use/abuse differ by race and ethnicity (Eitle et al., 2017). Therefore, more research was necessary to explore racial and ethnic differences in substance use among LGB minority adolescents.

Meta-analysis indicated that racial and ethnic minority LGB adolescents record almost three times more substance use when compared to their heterosexual peers, including marijuana use (Dermody et al., 2016). Meyer's minority stress theory indicates these inequalities are the product of the disadvantaged status of LGB individuals within society (Toomey et al., 2018). However, the relationship between being overweight/obese and substance use is rarely examined. This gap in the literature needed to be explored in an effort to provide public health professionals with the information necessary to reduce racial and ethnic minority LGB adolescents' substance use and help improve the mental health disparities (Fish & Pasley, 2015).

The minority stress theory emphasizes that LGB adolescents face a range of social and psychological stressors leading to substance use (Goldbach et al., 2014). However, very little is known concerning the exact stressor. In this research study, I examined the relationship between being overweight/obese and substance (marijuana) use among racial and ethnic minority LGB adolescents living in the United States. By drawing attention to this relationship, this research study may help to inform the establishment of effective targeted LGB adolescents' prevention and intervention in an effort to reduce their health disparities. The results of this research study help to provide stakeholders and public health professionals with information they can use to assist in their attempt to achieve Healthy People 2020 goals of disposing of LGB well-being inconsistencies and upgrading endeavors to improve LGB wellbeing (Goldbach et al., 2014).

Research Question and Design

RQ: Is there a relationship between overweight/obesity and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States after controlling for family income and sex?

H_0: There is no relationship between overweight/obesity and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States after controlling for family income and sex.

H_a: There is a relationship between overweight/obesity and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States after controlling for family income and sex.

This research study was an analysis of secondary quantitative data, collected through a cross-sectional survey design from the 2017 National Survey on Drug Use and Health (NSDUH) from the SAMHA. According to Connelly (2016), benefits of cross-sectional studies is that they are versatile and can cover many distinct fields of human conduct and circumstances. Since the aim of this research study was to determine if the independent variable (overweight/obesity) predicted the dependent variable (marijuana use), the appropriate design to answer this question was quantitative.

Statistical Assumptions

This research study employed a quantitative research design to explore the relationship between being overweight/obese and substance (marijuana) use among racial and ethnic minority LGB adolescents in the United States. I analyzed the data for this research question by using logistic regression since it is a statistical technique that is

suitable in testing the relationship between various (categorical or continuous) predictor variables and a binary outcome variable (Ranganathan et al., 2017). In this study, I considered the following assumptions of logistic regression analysis: (a) the dependent variable being binary or ordinal, (b) there is an independent observation, (c) there is little or no multicollinearity among independent variables, (d) independent variables are linearly related to the log odds, and (e) the dataset must have a sufficiently large sample size (Aksu & Keceoglu, 2019).

Logistic regression makes no assumptions about the distribution of scores for the predictor variables; however, it is sensitive to high correlations between the predictor variables (multicollinearity). Multicollinearity occurs when two or more independent (predictor) variables are highly correlated in the regression model (Daoud, 2017). In this study, I tested the assumption of multicollinearity among the predictor variables by examining the tolerance for each prior to running the regression model (Daoud, 2017). I performed the Hosmer and Lemeshow goodness-of-fit test to see whether there was evidence of lack of model fit.

Methods

Participants

The population of interest in this research study was racial/ethnic minority LGB adolescents aged 12 to 19 residing in the United States. The rationale for choosing this population was that health risk behaviors are commonly thought to co-exist in adolescence but gaps in the literature remain (Vidot et al., 2016). In the United States, adolescent rates of being overweight/obese and substance use are high (Vidot et al.,

2016). Substance use and abuse pose a significant public health challenge in the United States, particularly among adolescents, which represents a risk for substance use disorder (Reisner et al., 2015).

This research study used the 2017 NSDUH dataset collected by SAMHSA. The NSDUH dataset is SAMHSA's primary source of statistical information on illicit drug use (SAMHSA, 2018a). As a result of a stratified multistage area probability sample, adolescents who responded to the 2017 NSDUH represent each of the 50 states and the District of Columbia. The 2017 NSDUH survey includes data on race/ethnicity, sexual orientation, and weight status based on self-reported responses. Of the adolescents that participated in the 2017 NSDUH survey, between 2,500 and 3,500 self-identified as racial/ethnic minority (Carmona et al., 2020; Center for Behavioral Health Statistics and Quality, 2018; SAMHSA, 2018b).

Racial/Ethnic Minority

In the present analysis, racial/ethnic minority classification was a composite variable that is computed from two questions from the 2017 NSDUH: "Are you of Hispanic, Latino, or Spanish origin or descent?" with the response choice being binary as "yes" or "no" and "Which of these groups describe you?" with the response choices being (a) White, (b) Black or African American, (c) American Indian or Alaska Native (American Indian includes north American, Central American, and South American Indians), (d) Native Hawaiian, (e) Guamanian or Chamorro, (f) Samoan, (g) Other Pacific Islander, (h) Asian (including: Asian Indian, Chinese, Filipino, Japanese, Korean, and Vietnamese), and (i) Other (Specify; SAMHSA, 2018b). The question allows respondents

to select all that applies (SAMHSA, 2018a). I combined these two questions to create a binary race/ethnicity variable to identify if respondents identify as a minority (i.e., non-Whites, Hispanic-Whites).

Sexual Minority Status

The present analysis included adolescents 12-19 years of age who self-identified as LGB based on a response to the questions "Which one of the following do you consider yourself to be?" with response choices being: (a) heterosexual, that is, straight, (b) lesbian or gay, and (c) bisexual or had sexual contact with individuals of the same sex or both sexes and "Which statement best describes your feelings" with the response choices being (a) I am only attracted to females, (b) I am mostly attracted to females, (c) I am equally attracted to females and males, (d) I am mostly attracted to males, (e) I am only attracted to males, and (f) I am not sure. For the purpose of this analysis, I dichotomized the inclusion in the sample-based sexual minority status as (*yes* or *no*). If someone reported that their sexual identity was anything other than heterosexual and/or if someone indicated that they had sexual interaction with the same or both sexes, I coded them as a sexual minority.

Sample and Power

Power analysis is one of the many key components of the research process (Pek & Park, 2019). Statistical power refers to the likelihood of a study in producing a statistically significant result when the null hypothesis is in fact false (Perugini et al., 2018). The conventional power of .80 is adequate in finding an effect if it exists (Perugini et al., 2018).

In this research study, I examined overweight/obese racial and ethnic minority LGB adolescents ages 12 to 19 years old in the United States. G*Power 3.1.9.4 was used to conduct a logistic regression analysis and sample size estimation. The calculations included the following parameters:

1. A priori analysis
2. Two-tailed
3. x distribution equal to 'binomial'
4. The value for Pr(Y=1|X=1) H1 was .2 - The probability of the outcome (marijuana use) being a "1" in the LR model when the predictor (overweight/obesity) is a "1".
5. Alpha level was .05. – 5% chance of a Type 1 error occurring.
6. Power level was .80. – The probability that a true relationship exists between the study variables is 80%.
7. R^2 was .16. – Correlation between the predictor that is accounted for by the covariates (Hsieh, 1989).
8. X-parm π was .5. – Probability that the predictor will be a "1".

Using the aforementioned parameters and assuming various odds ratios (*ORs)*, I produced Table 10. Based on the literature (Chen et al., 2010), an OR of approximately 2.0 – 2.75, corresponding to a medium to large effect size is expected. Thus, the required sample size was between 186 to 413 persons for the analysis of these ORs. I based my assumption on the published literature from the NSDUH dataset, as mentioned in the section entitled 'participants', was that I should have about 500 participants in my study.

Therefore, I should be able to detect an adjusted OR as low as 2 for the predictor variable of interest, obesity/overweight, and the outcome of substance (marijuana) use, given this sample size and the other parameters.

Table 10

*G*Power Sample Size Calculations*

Adjusted Odds Ratio (OR)	Sample Size (N)
1.5	1278
1.75	650
2	413
2.25	297
2.5	229
2.75	186
3	156

Source of Data

In this research study, I utilized secondary data obtained from the 2017 NSDUH. NSDUH is the primary source of information used by SAMHSA for surveys and the collection of data at regional, state, and sub-state levels. The data cover particular concerns related to the prevalence, behaviors, and effects of alcohol, illegal drug use, and mental illness among sexual minority adolescents in the United States. For this analysis, I used the 2017 NSDUH dataset, which exists in the public domain for secondary data analysis. The NSDUH 2017 dataset may be replicated or copied and does not require permission to access the data.

Measures

This study utilized the 2017 NSDUH data, collected through face-to-face household interviews in two phases by NSDUH. Table 11 identifies the variables of

interest operational description and the scales of measurement specific to the present study. Respondents read or listen to questions on their headphones, and then type their responses directly on the NSDUH laptop. The 2017 NSDUH annual target sample size of 68,032 interviews were divided across three age ranges, with 25% assigned to adolescents aged 12 to 17 years and 25% assigned to those between the age of 18 to 25 years of age. The 2017 NSDUH was subject to five response validation tests. The first two removed students whose drug use and other antisocial behavior seemed to be exaggerated. Students who reported using fictitious drugs were removed during the third test. Student surveys that repeatedly reported logically inconsistent drug use patterns were removed during the fourth test. The fifth test removed students who responded to less than 25% of the survey questions. The weighted interview response rate for adolescents was 75.1%.

Table 11

Variables of Interest Operational Description and Scales of Measurement

Variable	Description	Variable Type	Scale of Measurement
Overweight/ obesity	Dichotomized based on standardized cut-off for BMI	Independent variable	Categorical (Nominal)
Substance (marijuana) use	Individual substance use categories	Dependent variable	Nominal
Family income	Total family income	Control variable	Ordinal
Sex	Sex at birth	Control variable	Nominal

Independent Variable Construction

Body Mass Index (BMI). Body mass index (BMI) is the most commonly used metric for diagnosis of obesity (Batsis et al., 2016). It is defined as the weight in

kilograms divided by the square of the height in meters (CDC, 2020). BMI was calculated utilizing the following formula:

BMI = kg/m2 = Weight (in kg)/ [Height (in m)2]

Overweight/Obesity. I constructed the independent variable, overweight/obesity, from adolescents' reported data on the NSDUH questionnaire regarding height and weight. The NSDUH converted the responses concerning weight into pound and height into inches (NSDUH, 2017). These variables were then recoded into a BMI variable (NSDUH, 2017). For individual between the age of 5 to 19 years, a standardized cut-off for overweight (BMI $\geq$ 25 and < 30 kg/m^2), and obesity (BMI $\geq$ 30 kg/m^2; World Health Organization, 2019). For the purposes of this research, I coded the categories as one dichotomized variable that captures adolescents BMI as either underweight/normal weight (< 25 kg/m^2) or overweight/obese ($\geq$ 25kg/m^2) to form a new variable, overweight/obesity (OV-OB). I recorded this variable as a "0" for < 25kg/m^2 or a "1" for $\geq$ 25kg/m^2.

Substance Use. The measurement of substance use (i.e., marijuana or hashish, cocaine, heroin, methamphetamines, and inhalants) occurred based on adolescents' responses to the following questions from the 2017 NSDUH:

- During the past 30 days, on how many days did you use marijuana or hashish?
- During the past 30 days, on how many days did you use cocaine?
- During the past 30 days, on how many days did you use heroin?
- During the past 30 days, on how many days did you use methamphetamine?

- During the past 30 days, on how many days did you use any inhalants for kicks or to get high?"

These variables are reported as total number of days [Range: 1 – 30], 91 = never used, and 93 = did not use in the past 30 days. I dichotomized adolescents reports of substance use with substance use in any day or any number of times in the past 30 days coded as "1" and no substance use at all in the past 30 days coded as "0."

Control Variables

Family Income. I measured family income based on self-reported total family income in the 2017 NSDUH. I constructed the variable as follows: 1 = Less than $20,000 dollars, 2 = $20,000 - $49,000 dollars, 3 = $50,000 - $74,000 dollars and 4 = $75,000 dollars or More.

Sex. I measured sex with the item: "What is your sex?" I coded the variables as 1 = male and 2 = female. I coded this categorical variable as 0 = male and 1 = female. The variables of interest and the scales of measurement are presented in Table 11.

I used two covariates for this analysis. These variables were confounders as literature has reported that adolescents' sex is associated with substance (marijuana) use (Benner & Wang, 2015). Similarly, the literature reports a relationship between adolescents' socioeconomic status and substance (marijuana) use (Andrabi et al., 2017; Lewis et al., 2018). As such they could have distorted the relationship between being overweight/obese and substance (marijuana) use.

Validity and Reliability

SAMHSA and the National Institute on Drug Abuse cosponsored a special study in which they explored the validity of NSDUH self-reported data on drug use among individuals aged 12 to 25 years old. The results of the study showed that most adolescents and young adults accurately reported their recent drug use in self-reported studies (SAMHSA, 2018b). A similar study was conducted to assess the reliability of the NSDUH questionnaire responses. This was accomplished by comparing the answers from the first interviews with re-interview answers and checking for consistency, which was found (SAMHSA, 2018b). The capacity of a survey to provide reliable data and consequent population projections can be tested by evaluating the accuracy of respondents' responses at two different time points from separate survey administrations (SAMHSA, 2018b). Deliberate measures are implemented to ensure the validity and integrity of the data (SAMHSA, 2018b). These measures include employing random sampling in the identification and selection of the sample. The outcome is a representative sample that best reflects the state of the country with respect to the variables the data are collected for (SAMHSA, 2018b).

Analytical Strategies

I used descriptive statistics, including frequencies and percentages for categorical data and measures of central tendency and spread for continuous variables to describe the data elements of interest. I assessed multicollinearity with the variance inflation factor (VIF). The VIF is a measurement for calculating and quantifying how much of the

variance is inflated (Daoud, 2017). I calculated VIF via Statistical Package for the Social Science (SPSS) as part of the regression analysis.

I used multivariable techniques, namely multiple logistic regression was used to examine the association between being overweight/obese (predictor variable of interest) and substance (marijuana) use (outcome variable) among racial and ethnic minority LGB adolescents after controlling for the effects of family income and sex (independent variables). The logistic regression model was as follows, where "β0" is the constant or the Y-intercept and "e" is the random error:

$$\text{Predicted Substance (marijuana) Use} = \beta 0 + \beta_1(\text{OV-OB}) + \beta_2(\text{family income}) + \beta_3(\text{sex}) + e.$$

I tested the assumptions for logistic regression noted above, and performed the Hosmer-Lemeshow goodness of fit statistic to assess whether there is any evidence of lack of fit. All statistical analyses and corresponding assumption testing were conducted on weighted data using SPSS version 27.

Results and Analyses

The purpose of this research was to use the 2017 NSDUH cross-sectional dataset collected by SAMHSA for secondary data analysis to examine the relationship between being overweight/obese and marijuana use among racial/ethnic minority LGB adolescents in the United States. This section presents the results of the regression analyses conducted to address the research question. It also includes a descriptive demographics of the sample, diagnostics tests/tests of assumption, the measurement model with goodness of fit results, and hypothesis testing.

Execution

In this quantitative study, I utilized regression analyses to examine the relationship between being overweight/obese and marijuana use in racial/ethnic minority LGB adolescents. In exploring this relationship, I controlled confounding factors that have been shown to be associated with marijuana use (i.e., family income and sex). I excluded missing or incomplete data from the analysis. I exported data from the 2017 NSDUH database into SPSS for statistical analysis. I adjusted the 2017 NSDUH dataset and the corresponding codebook used for statistical data analysis in this study to accurately represent the variables of interest for my research question.

In the full NSDUH dataset, responses from 56,276 individuals were available. For the 10 key variables in the study (BMI, race/ethnicity, sexual identity, sex at birth, total family income, and the five drug usage variables), 52,816 individuals (93.9%) had no missing answers and were thus retained for the study. Based on the selection criteria for the study (racial and ethnic minority LGB adolescents in the United States), the final sample was $N = 186$. Analysis of why there was such a dramatic decrease in the sample size ($N = 52{,}816$ to $N = 186$) was due to the fact only adolescents who were 18 or 19 years of age were asked the questions pertaining to sexual identity (SAMHSA, 2018a).

Descriptive Demographics of the Sample

The frequency counts and percentages for the selected variables from the 2017 NSDUH dataset are presented in Table 12. Fifty-three percent ($N = 99$) of the sample were overweight/obese. The most common racial/ethnic groups were Hispanic (46.2%; $N = 86$) and non-Hispanic Black/African-Americans (25.8%; 48). Sixty-nine percent of the

sample self-identified as bisexual. In this research study, 55.4% (*N* = 103) were 18 years old and 44.6% (*N* = 83) were 19 years old. Concerning sex at birth, 67.7% (*N* = 126) were female and 32.3% (*N* = 60) were male. Total family income ranged from less than $20,000 dollars per year (36.6%) to $75,000 dollars or more (18.8%) with the median family income of *mdn* = $35,000 dollars (see Table 12).

Table 12

Frequency Counts for Selected Variables in the Dataset (N=186)

Variable	Category	n	%
BMI Groups			
	Underweight/Normal Weight	87	46.8
	Overweight/Obese	99	53.2
Race/ethnicity			
	Non-Hispanic Black/Afr Am	48	25.8
	Non-Hispanic Native Am/AK Native	5	2.7
	Non-Hispanic Native HI/Other Pac Islander	2	1.1
	Non-Hispanic Asian	11	5.9
	Non-Hispanic more than one race	34	18.3
	Hispanic	86	46.2
Sexual identity			
	Lesbian or Gay	46	24.7
	Bisexual	129	69.4
	Do not know	11	5.9
Age			
	18 years old	103	55.4
	19 years old	83	44.6
Sex at birth			
	Male	60	32.3
	Female	126	67.7
Total family income (mdn = $35,000)			
	Less than $20,000	68	36.6
	$20,000 - $49,000	57	30.6
	$50,000 – $74,999	26	14.0
	$75,000 or More	35	18.8

The counts for drug usage in the past 30 days sorted by frequency are presented in Table 13. Twenty-five percent of the sample reported using marijuana at least once in the past 30 days. Two people (1.1%) reported using inhalants and/or cocaine in the past 30 days. No one in the sample reported using either heroin or methamphetamines (see Table 13). Given the low reported drug usage in the past 30 days, I made a decision to only create a logistic regression model for marijuana use.

Table 13

Frequency Counts for Drug Usage in the Past 30 Days (N=186)

Drug	*N*	%
Marijuana	47	25.3
Inhalants	2	1.1
Cocaine	2	1.1
Heroin	0	0
Methamphetamines	0	0

Note. Respondent could endorse more than one drug.

Diagnostics Tests/Tests of Assumptions

I analyzed the research question in this study using logistic regression by racial/ethnic and sexual minority adolescents. Aksu and Keceoglu, (2019) described several statistical assumptions needed for a binomial logistic regression. These assumptions included: (a) the dependent variable being binary or ordinal, (b) there is an independent observation, (c) there is little or no multicollinearity among independent variables, (d) independent variables are linearly related to the log odds, and (e) the dataset must have a sufficiently large sample size. All of the assumptions were met.

Results

Results derived from the 2017 NSDUH data specified that during the past 30 days 19.6% of 18 years old and 23.6% of 19 years old used illicit drugs, however, in 2017 marijuana was the most commonly used illicit drug (McCance-Katz, 2019). The results also specified that in 2017, there was a significant increase in the percentage of young adults 18 to 25 who use marijuana, with the most significant being among young adult women (McCance-Katz, 2019). The results also point to a correlation between frequent marijuana use and opioid abuse, heavy alcohol usage, and depression in adolescents and young adults (McCance-Katz, 2019).

I conducted logistic regression to determine if being overweight/obese predicts marijuana use in racial/ethnic and sexual minority adolescents. The results are presented in Table 14. The overall model was significant, χ^2 (3, N = 186) = 11.23, p = .01. The amount of variance explained by the model was between 5.9% and 8.7% based on the Cox and Snell R^2 and Nagelkerke R^2 statistics. The base classification rate was 74.7% and the final classification rate remained the same. Inspection of the odds ratios found the BMI category (OR = 2.26, 95% CI (1.11, 4.59), p = .02) to be statistically significant. Therefore, I rejected the null hypothesis. The results indicated that overweight/obesity does predict marijuana use among racial/ethnic and sexual minority adolescents, while controlling for family income and sex. This indicates that for the population of interest, there is a significant relationship between overweight/obesity and marijuana use.

Table 14

Summary of Logistic Regression Analysis for Variables Predicting Marijuana Use Among Racial/Ethnic Minority Lesbian, Gay, and Bisexual Adolescents (N = 186)

					95th *CI*	
Variable	*B*	*SE*	*p*	*OR*	Lower	Upper
Constant	-2.18	.86	.01	.11		
Female	.65	.41	.11	1.92	.86	4.26
Family Income	-.24	.17	.15	.79	.57	1.09
Overweight/Obese	.82	.36	.02	2.26	1.11	4.59
χ^2	11.23					
df	3					
%Marijuana Use	25.3%					

Note. OR=Odds Ratio. CI =Confidence Interval.

Hosmer and Lemeshow Test: $p = .60$.

Cox and Snell $R^2 = .060$. Nagelkerke $R^2 = .088$.

Table 15 displays the chi-square comparison based on adolescent's marijuana usage and overweight/obesity. The test was significant, χ^2 (1, $N = 186$) = 5.58, $p = .02$; Cramer's $V = .17$. Inspection of the table found that 68.1% of adolescents who used marijuana within the last 30 days had a BMI score greater or equal to 25 compared to 48.2% of those adolescents who did not use marijuana in the last 30 days. However, it should be noted that the Cramer's ($V = .17$, $V^2 = .029$) accounted for only 2.9% of the variance (See Table 15).

Table 15

Chi-Square Comparison of Marijuana Usage and Overweight/Obesity (N=186)

	Underweight/normal weight		Overweight/obese	
Usage	*N*	%	*N*	%
No	72	51.8	67	48.2
Yes	15	31.9	32	68.1

Note. χ^2 (1, $N = 186$) = 5.58, $p = .02$; Cramer's $V = .17$.

Discussion

Interpretation of the Findings

This section compares the results of the research to what was found in the literature to either confirm, disconfirm, or broaden information in the discipline. Intersectionality, distal and proximal behaviors, and minority stress model guided the study by explaining that adolescents at the intersection of multiple collective identities are faced with psychosocial stress (both distal and proximal) due to prejudice and inequality in their communities, and they internalize these stresses. Analysis of the 2017 NSDUH dataset collected by SAMHSA occurred to determine whether there is a relationship between being overweight/obese and marijuana use among racial/ethnic minority LGB adolescents in the United States after controlling for family income and sex. The results indicated that being overweight/obese does predict marijuana use among racial/ethnic and sexual minority adolescents, after controlling for family income and sex. This indicates that for the population of interest, there is a significant relationship between being overweight/obese and marijuana use.

Despite significant findings, the results showed that gender was not a significant predictor of substance (marijuana) use; however, I found that although LGB females made up 67.7% of the sample, they accounted for 78.7% of those that used marijuana. This finding indicates that gender differences exist in marijuana use and is consistent with previous research that found that substance use disparities were higher among females than males (Coulter et al., 2018). Similarly, Baams et al. (2015) found that

gender and sexual orientation are important causes of variation in LGB adolescents health behaviors.

These findings align with growing research that suggest that substance use disparities are increasing for LGB adolescents (Watson et al., 2020). They also align with an increasing body of research that has shown that overweight/obese adolescents are at risk of problematic substance use; however, mixed results illustrate the complexity of this relationship (Lanza et al., 2015). Being overweight/obese is a complex issue that continues to increase among racial/ethnic and sexual minority adolescents. Overweight/obesity rates remain high, and substance use is more prevalent in adolescence than other developmental stages of life (Lanza et al., 2014). Additionally, LGB adolescents face an increased risk of substance use (CDC, 2016). This may be due to distal and proximal stressors that disproportionately affect sexual minorities and may lead to greater prevalence of substance use (Reisner et al., 2015).

The findings of the present study also align with the concepts of intersectionality, distal and proximal behaviors, and minority stress model in that adolescents who are at the intersection of multiple collective identity (i.e., racial/ethnic and sexual minority) experience both distal (stigmatization and harassment) and proximal (weight-bias, anti-fat attitude, internalized homophobia and self-stigma) minority stress. Chronic exposure to minority stress is correlated to an adverse impact on adolescents both physically and psychologically. Both internal and external sources of minority stress can potentiate the use of substance (i.e., marijuana) as a way of alleviating related feelings of anxiety and sadness (Meyer, 2003). Furthermore, these distal and proximal stresses experienced by

adolescents with multiple collective identity is often associated with a maladaptive coping mechanism such as marijuana use.

These theories combined, provided a useful framework to analyze and interpret the findings relating to racial/ethnic and sexual minority adolescents who often experience prejudice and discrimination formed by dynamic interlocking structural and social determinants (overweight/obesity). The theoretical framework of intersectionality as an analytical tool to guide this study was useful in recognizing that there is a significant relationship between being overweight/obese and substance (marijuana) use among racial/ethnic and sexual minority adolescents. Using this framework, I was able to consider the interplay of varying social identities (i.e., racial/ethnic and sexual minority) among adolescents with a social determinant of health (overweight/obesity) and the relationship with substance (marijuana) use. The findings of this study indicated that the relationship between being overweight/obese and substance (marijuana) use is significant by aligning with these theories. Specifically, the results showed that race/ethnicity and sexual identity interplay with the social determinant of health (overweight/obesity) to shape the health outcomes of adolescents (marijuana use).

The findings of this study partly contradict many large epidemiological researchers studying adolescents who reported conflicting results related to being overweight/obese and substance use, particularly the use of marijuana (Jin et al., 2017). The majority of these studies showed an inverse relationship between marijuana use and being overweight/obese (Jin et al., 2017). Other cross-sectional studies have shown similar results, with current marijuana usage correlated with a lower BMI (Jin et al.,

2017). I found that being overweight/obese does predict substance (marijuana) use in racial/ethnic and sexual minority adolescents after controlling for family income and sex. However, with the variance of the model accounting for between roughly 5.9% and 8.7% based on the Cox, Snell R^2, and Nagelkerke R^2 statistics, there is clear evidence that other distal and proximal factors may play a major role in marijuana use among this vulnerable population.

According to Shiver (2019), lack of social support and non-existent family relationship often leads to higher levels of psychiatric disorders, substance use, physical abuse, and suicide. This falls in line with the minority stress theory which implies that challenging social conditions produce a state of chronic stress that leads to poor health outcomes. The results of the present indicated that a significant relationship between being overweight/obese and marijuana use exist; however, the mechanisms underlying that relationship remain unknown. Thus, more comprehensive research studies are needed to identify other potential mechanisms.

Limitations of the Study

This research study has several limitations related to its design and methodology. The findings of this study showed a significant association between being overweight/obese and the outcome variable of interest marijuana use, however, due to its cross-sectional nature, it does not show causality, effect, or long-term outcomes. Additionally, NSDUH data are self-reported, and they are subject to recall and social desirability bias which can lead to either over or under-reporting (Guttmannova et al., 2019). The NSDUH survey does not include adolescents who are homeless or living in an

institution (Guttmannova et al., 2019). As such, further research is required to explore the relationship between being overweight/obese and the use of marijuana among racial/ethnic and sexual minority adolescents who are not represented in a school-based survey.

Among adolescents, only 18 and 19-year-old were asked questions pertaining to their sexual identity. Hence, the number of respondents was not consistent with the total adolescents' population for the categories of racial/ethnic and sexual minority. Therefore, it is important to exercise appropriate caution when extrapolating the results of this study to racial/ethnic and sexual minority adolescents of other age groups.

Implications for Professional Practice

A continued primary goal of Healthy People 2030 is to gather data on LGB individuals to reduce and ultimately eliminate social determinants of health such as being overweight/obese and other health disparities faced by this vulnerable and often understudied population. To assist in this effort, I combined three prevailing theoretical frameworks (i.e., minority stress model, distal and proximal behavior and intersectional) to identify whether being overweight/obese is a potential mechanism contributing to marijuana use in this population.

The result of the present study contributes to the limited but increasing body of research examining the health disparities among racial/ethnic and sexual minority adolescents. However, with the model accounting for between 5.9% to 8.7% of the variance, this suggests that there are other factors that need to be explored to see what contributes to the negative health consequences faced by racial/ethnic and sexual

minority adolescents. Consideration should be given to the use of intersectionality, minority stress model and distal and proximal behavior to identify other health risks that not only co-occur in this population but those contributing to their elevated health risks. In relation to substance use among LGB adolescents, the application of the minority stress model has not been well studied (Goldbach et al., 2015). Adolescence is a crucial phase of growth marked by new social environments, additional obligations and opportunities for improvement in self-definition (Goldbach et al., 2015). Racial/ethnic minority adolescents, especially those at the intersection of gender are significantly affected by health disparities (Reisner et al., 2015). A better understanding of and reduction of these health disparities is a central goal of Healthy People 2020 (Reisner et al., 2015).

Implications for Positive Social Change

To inform positive social change, public health research and associated intervention and prevention efforts aimed at reducing and mitigating multiple health risks in racial/ethnic and sexual minorities would benefit from considering the effects of being overweight/obese in adolescents as a predictor of substance (marijuana) use. The results of this study are helpful in expanding our understanding of the relationship between being overweight/obese and substance (marijuana) use in racial/ethnic and sexual minority adolescents. The findings could be used to aid in the development of more specialized treatment and intervention strategies to reduce and reverse the trend in both overweight/obesity and substance (marijuana) use in this population which could ultimately reduce the financial burden on society as a whole. The findings could bring

about positive social change by contributing to an important debate that this country needs in recognizing overweight/obesity as a serious public health problem that has comorbidity with substance (marijuana) use in racial/ethnic and sexual minority adolescents. The co-existence of these conditions contributes to a rapid trend towards health inequality in the United States, particularly in racial/ethnic and sexual minorities. Hence, to bring about positive social change public health practitioners should screen overweight/obese racial/ethnic and sexual minority adolescents for substance (marijuana) use and provide evidence-based strategy to a more comprehensive course of care.

Recommendations

Although the results of this research study showed a significant relationship between being overweight/obese and substance (marijuana) use (*OR* = 2.26, 95% CI (1.11, 4.59), *p* = .02), additional questions remain; thus, there is a critical need for further research on the topic. Public health practitioners should continue screening adolescents, especially those at higher risk for substance use behaviors. According to Reisner et al. (2015) this appears to be especially critical for adolescents with a gender-nonconforming identity. Gender disparities in marijuana use among subgroups of adolescent at the intersection of race/ethnicity and sexual identity should be exploited to see what is exacerbating these risks and is key for future work in this area.

Researchers may want to address the age and sample size limitation of the study to ensure that the sample is a true reflection of the adolescent's population. This research study only included 189 eighteen and nineteen-year-olds; therefore, the extent to which overweight/obesity predicts substance (marijuana) use in adolescents younger than 18-

year-old remains uncertain. Additionally, I recommend that further research in this area examine other covariate variables to determine their influence. Further research should also be conducted to examine environmental factors that contribute to health disparities among racial/ethnic and sexual minority LGB adolescents.

Conclusion

The aim of this study was to examine whether there is a link between being overweight/obese and the psychosocial outcome of substance (marijuana) use. The finding from this study showed that being overweight/obese was a significant predictor of substance (marijuana) use in racial/ethnic and sexual minority adolescents after controlling for family income and sex. As a result, being overweight/obese and substance use have become significant public health challenges especially among racial/ethnic and sexual minority adolescents (Flentje et al., 2015).

Although, the result of this study was significant, the independent variable examined accounted for only a small percentage of the variance in the regression model (between 5.9% and 8.7%); therefore, it is reasonable to believe that there are other factors which contribute to substance (marijuana) use among racial/ethnic and sexual minority adolescents. The literature has outlined various factors which are believed to influence the disparities in substance (marijuana) use, including stress due to stigma and discrimination especially among adolescents at the intersection of multiple collectively identity. The minority stress model, intersectionality, and distal and proximal framework are prevailing theoretical frameworks which provide some explanation for the risks in racial/ethnic and sexual minority adolescents, in that they are subject to higher levels of

minority stress (both distal and proximal) due to the intersection of their multiple collective identity, and that these stressful interactions aggregate to contribute to health challenges.

However, more research is needed to examine causal and protective factors affecting racial/ethnic and sexual minority adolescents and how these contextual and experience factors affect their health outcomes. Due to their membership in multiple minority groups, racial/ethnic and sexual minority adolescents face additive stress. Therefore, a greater understanding and knowledge of the intersection of race/ethnicity and sexual orientation and how this intersection contributes to substance (marijuana) use in this vulnerable population may provide a way to develop targeted intervention and prevention approaches to reduce the burden of substance use (specifically marijuana use) in racial/ethnic and sexual minority adolescents.

Despite efforts to reduce health disparities, there remains a critical gap in prevention and intervention measures which target LGB adolescents (Toomey et al., 2018). The results of this study highlight that there is a significant relationship between being overweight/obese and substance (marijuana) use among racial/ethnic and sexual minority adolescents which suggest that efforts aimed at reducing substance (marijuana) use in this population must take overweight/obesity into account. The treatment of adolescents who are overweight/obese has not been effective (Widhalm, 2018). Since these two conditions can co-occur in adolescents, there needs to be a pivot on policies, prevention, and intervention efforts to foster healthy and safe environments for LGB adolescents (Toomey et al., 2018). If we do not find a way to address these critical health

problems effectively, we risk leaving an entire segment of population behind. Therefore, overweight/obesity and substance use prevention and intervention programs should consider targeting multiple risk factors since they may coexist in adolescents.

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Part 3: Summary

Integration of the Studies

The disproportionate overweight/obesity rates among racial/ethnic diverse and sexual minority adolescents is well documented in the literature (Azagba et al., 2019; Hall et al., 2019; Zilanawala et al., 2015), and the understanding of the myriad of distal and proximal causal and protective factors that contributed to this have evolved over time. However, despite this added knowledge to the literature along with prevention and intervention efforts, the prevalence and rates of being overweight/obese continue to rise among this population (Byrd et al., 2018). Overweight/obese adolescents often face many psychosocial problems that interfere with their quality of life and their well-being (Sagar & Gupta, 2018).

The purpose of this quantitative research study was to examine whether being overweight/obese influences the psychosocial outcomes of depression, suicidality, and substance (marijuana) use among racial/ethnic minority LGB adolescents in the United States, which could have implications for negative health outcomes and decrease quality of life. The results of the study demonstrated that being overweight/obese does not predict the psychosocial outcomes of depression and suicidality among racial/ethnic minority LGB adolescents utilizing the 2017 YRBS. But the results do show that being overweight/obese predicts substance (marijuana) use among racial/ethnic minority LGB adolescents. The results also show that both depression (OR =.55, p = .001) and suicidality (OR = .64, p = .005) are higher in racial/ethnic and sexual minority females than males.

Importance of Findings to Literature

The study results regarding being overweight/obese as a predictor of substance use in adolescents are consistent with the literature indicating that disparities in substance use are linked to sexual minority status and are typically higher in adolescent females than in males (Dermody et al., 2020). Similarly, studies have found that female adolescents disclose suicidality, plans, and attempts more often that male adolescents (Mueller et al., 2015). Adolescent females also have a higher prevalence of attempting suicide than adolescent males (Mueller et al., 2015). The results of this study on racial/ethnic and sexual minority adolescents are mixed, which demonstrate that other distal and proximal stressors are also leading to psychological distress and unhealthy behaviors (Puhl et al., 2019). There is a growing disparity in adolescent overweight/obesity rates based on race/ethnicity (Byrd et al., 2018), but the mechanism of being overweight/obese development is not well known, and it is presumed to be a disease with multiple causes (Sahoo et al., 2015). The results of this study, which found that being overweight/obese does predict substance use among racial/ethnic and sexual minority adolescents align with the literature that reports that obesity does not affect all population equally (Azagba et al., 2019; Byrd et al., 2018; Hall et al., 2019; Zilanawala et al., 2015). Thus, when assessing overweight/obesity prevalence and treatment methods, racial/ethnic disparities must be taken into account (Byrd et al., 2018).

Theoretical Implications of this Research

I applied three theoretical frameworks in this study because combined they provide multiple analytical functions in examining being overweight/obesity and the

psychosocial outcomes of depression, suicidality, and substance (marijuana) use in racial/ethnic and sexual minority adolescents. The minority stress model offers a theoretical framework for systematic analysis on how both LGB and racial/ethnic stressors adversely affects mental health through common mechanism (McConnell et al., 2018). The theory of intersectionality offers a theoretical framework for recognizing that social identities and the related privilege and marginalization experiences are not merely additive, but co-constructed and interdependent (McConnell et al., 2018). Distal and proximal factors of health behaviors provided a theoretical framework to understand the relative contribution of distal and proximal factors and their influence on predicting and explaining health behaviors such as being overweight/obese, depression, suicidality, and substance use. Combining these frameworks were useful to analyze and interpret the findings relating the relationship between being overweight/obese and the psychosocial outcomes of depression, suicidality, and substance (marijuana) use in racial/ethnic and sexual minority adolescents.

The findings of this study showed that the independent variable overweight/obesity does not predict the dependent variables of depression and suicidality in racial/ethnic and sexual minority adolescents, but it does predict marijuana use in this population. The results also showed that racial/ethnic and sexual minority females reported both more depression and suicidality which correspond with other works (Baams et al., 2015; Johns et al., 2017; La Roi et al., 2016) in the literature. These findings correspond with the theory of intersectionality, which posits that trends of double jeopardy emerged among sexual minority adolescent females. Also consistent

with the findings in this study, the theory of intersectionality found that intersectional stigma influences psychological and behavioral outcomes, such as depression and substance use. Similarly, the minority stress model posits that stressors faced by LGB adolescents causes them to use substances as a mechanism for coping or avoidance (Meyer, 2003). LGB adolescents experience inequalities in mental health along with added stressors that come with membership in a stigmatized minority group (Meyer, 2003).

The distal and proximal factors of health behaviors also align with the findings in this study. Distal related stigma and stressors contribute to increased experiences of proximal stigma and stressors related to psychological processes such as difficulties in emotional control, which in turn leads to depression, anxiety, and substance (marijuana) use. Distal and proximal stressors, such as elevated rates of discrimination and victimization, faced by overweight/obese LGB adolescents often lead to psychological distress and unhealthy behaviors (Puhl et al., 2019). This suggests there is a need for additional research to examine the various distal and proximal factors which may contribute to health disparities among this vulnerable population. This would align with the concepts associated with the distal and proximal model and minority stress model in that health disparities found in LGB communities do not represent LGB peoples' psychological problems but are the end product of persistent stigma aimed at them.

Implications for Positive Social Change and Practice

The results of this study advance fundamental knowledge that all racial/ethnic and sexual minority adolescents are not completely homogenous and that gender may pose a

unique risk to the health outcome of this population and therefore must be assessed in all areas of research. The findings contribute to the limited but increasing body of research examining the health disparities among racial/ethnic and sexual minority adolescents which will aid public health leaders in the development of more tailored and effective treatments and interventions programs to meet the needs of this vulnerable population and encourage seeking care. The results of this study will also aid in the promotion of healthy weight-related behavior and weight perceptions. The results of this study contribute to a clearer understanding of the relationship between being overweight/obese and the psychosocial outcomes of depression, suicidality, and substance (marijuana) use in racial/ethnic and sexual minority LGB adolescents. Ultimately, this understanding of being overweight/obese and the psychosocial outcomes studied could lead to the implementation of recommended interventions leading to a reduction in the incidents of being overweight/obese.

The results of this study may assist in alleviating a gap in practice by providing added knowledge and comparative information to the literature which can aid healthcare providers, policy makers, and community leaders in the development of programs to promote systematic changes which are vital in promoting a safe and welcoming environment for LGB adolescents. It also advances a better understanding of the significant and non-significant relationship between being overweight/obese and the psychosocial outcomes of depression, suicidality, and substance use. Evidence from the literature indicate that racial/ethnic and sexual minority adolescents face mounting health disparities relative to their heterosexual counterparts. The findings of this study offer

empirical support for the ideas that being overweight/obese is significantly associated with substance use, but it is distinct from depression and suicidality in racial/ethnic and sexual minority adolescents. Therefore, intervention and prevention efforts should be tailored specifically to individual conditions in minority adolescents. This will in no doubt constitute a positive social change for LGB adolescents, institutions, and communities.

Future Research

In order to inform preventive strategies, it is important to better define the development of substance use habits among racial/ethnic and sexual minority adolescents because the use of these substances increases the likelihood of many negative health and social outcomes. Although this study found that being overweight/obese does predict marijuana use in racial/ethnic and sexual minority adolescents, the number of adolescents that self-identified as LGB or not sure, only included 18- and 19-year old's (N=186, or <.5%). Although this did not affect the analysis, the results may not be generalized to the adolescent population in the United States. Hence, future research may benefit from a sample size which includes adolescents from all age group, as well as one that is more generalized.

The aim of this study was to examine marijuana use among racial/ethnic and sexual minority adolescents in the United States within the past 30 days; however, given the low reported substance usage among this population, I only assessed marijuana usage. Thus, future research should examine the relationship between being overweight/obese and other substances to see if they are significantly related.

Future research should also explore both causal and protective factors which contribute to minority stress among adolescents at the intersection of race, gender, and social status. Examining the proposed mechanisms could enhance the understanding of researchers concerning the relationship of being overweight/obese and the psychosocial outcomes. The following are relative examples of questions that needs to be explored: (a) What factors of minority stressors actually have adverse effects on LGB adolescents' mental wellbeing?; (b) What factors leads to the disparities in being overweight/obese, depression, suicidality, and substance use between LGB males and females?; (c) Do these disparities between LGB males and females change over time?; (d) What are the co-contributing variables that boost and reduce the rates of LGB adolescents being overweight/obese? and (e) Do overweight/obese LGB adolescent males and females react differently to stigma and prejudice? More research studies are needed to dissect these questions and ultimately help to improve the lives of LGB adolescents.

Lessons Learned

As a result of conducting this research study, I learned many lessons. One lesson is that gender-based health risks exist between racial/ethnic and sexual minority male and female adolescents as was evident from the increase odds of both depression and suicidality in females. This is consistent with the notion that they all do not share the same risks of negative health outcomes (Caputi et al., 2017). Stigma and discrimination against racial/ethnic and sexual minority LGB adolescents still serve as barriers to public health. According to Healthy People 2030, LGB adolescents still face regular

discrimination as a result of their stigmatized identity, which places them at an elevated risk of emotional distress (U.S. Department of Health and Human Services, 2020).

Another lesson learned is the challenge and limitations of working with secondary data. Although secondary data offers opportunities for researchers to participate in work to test new ideas, theories, frameworks, and models of research design with great flexibility (Johnston, 2017), it is limited in that the gathering of the data was for some other reason than to answer my specific research questions. Some of the information that could have been beneficial to my research study such as family income and geographical location was not available with the 2017 YRBS data set. With the 2017 National Survey on Drug Use and Health dataset, the number of adolescents who self-identify as LGB or were unsure was very small. Also, many of the factors which have been identified in the literature as a potential contributor to being overweight/obese among my population of interest was not available in the 2017 YRBS dataset. With more time and resources, primary data collection could have taken on powerful ambience especially with the overwhelming rise in health disparities due to the current state and the stress of dealing with COVID-19.

Conclusion

Being overweight/obesity and the psychosocial outcomes threaten the psychological and physical health of racial/ethnic and sexual minority adolescents. The stigma and discrimination that they face impedes ongoing efforts to combat the obesity epidemic, and exacerbates inequalities in health. Recent scholarship and public policy studies indicated that within the United States, not only are racial/ethnic and sexual

minorities at risk for poorer health outcomes but many of these risks persist into adulthood (McKay et al., 2019). The results of this align with the literature that indicate that gender gaps exist among this population and remain wide. However, despite this widening gap, most adolescents, specifically ethnic minorities, do not seek professional assistance (Guo et al., 2015). The fact that substance (marijuana) use is higher in racial/ethnic and sexual minority adolescents and is significantly related to being overweight/obese, is critical knowledge that must be taken into account by healthcare professionals.

LGB adolescents, especially those at the intersection of race/ethnicity and gender experience many distal and proximal stressors as a result of their minority status (Santos & VanDaalen, 2016). As such, to understand the pathway to treatment among racial/ethnic and sexual minority adolescents, it is prudent to understand the various factors which contribute to being overweight/obesity in adolescence (Byrd et al., 2018). Being overweight/obese early on in life is a strong indicator of being overweight/obese later in life and is exacerbated by racial/ethnic differences (Byrd et al., 2018). Hence in both the prevalence and treatment of being overweight/obese, racial/ethnic disparities are pronounced and must be addressed in an effort to reduce overweight/obesity among this vulnerable population. As we combat social roadblocks and disparities that make it more difficult for racial/ethnic minorities to benefit from care for being overweight/obese, we should ensure access to evidence-based treatment modalities (Byrd et al., 2018).

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