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Sexual Orientation, Body Mass Index, and Methamphetamine Use Among Chicago Youth

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Walden University
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Abstract

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MPH, Loma Linda University, 2012

MBBS, Veer Narmad South Gujarat University, 2004

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

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Abstract

Drug use and obesity are two of the most challenging health-related issues that young people face. Obesity, substance abuse, and drug addiction lead to brain dysfunction, which can decrease the quality of life and academic performance as well as increase the vulnerability of developing chronic diseases. To date, there has been little research to determine whether sexual orientation influences the relationship between body mass index (BMI) and methamphetamine use. Focusing on youth, the relationship between BMI, methamphetamine use, and sexual orientation were examined in this study through secondary data analysis of the Youth Risk Behavioral Surveillance System in Chicago. Guided by Bandura's social cognitive theory, this quantitative cross-sectional study, used Fisher's exact test and multiple linear regression to understand the relationship between BMI and methamphetamine use by sexual orientation. The findings revealed that there was no significant association between BMI and methamphetamine use among Chicago youth; however, there were significant results when a moderating variable was introduced to the equation. The results indicated that BMI significantly predicted methamphetamine use, sexual orientation significantly predicted methamphetamine use, and a significant relationship was found between BMI and methamphetamine use when sexual orientation was included as a moderating variable. The findings of this study could contribute to social change by encouraging the promotion of a wider range of health services to youth (including sexual minorities) as a result of interventions, thus reducing drug addiction and obesity, and bringing about positive changes in the health status of youth.

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Dedication

I dedicate this doctoral study to my late father, Shri. Lallubhai R. Panchal, who sadly died while I was completing my medical degree. I would not be who I am today without his love, support, and encouragement. He always taught me that hard work is the key to success and motivation for higher studies. I also dedicate this work to my wife, Nisha Panchal; my sons, Shanil and Shiven; my mother, Shardaben Panchal; my brothers, Amish Panchal and Umang Panchal; and my in-law family. Your support, love, prayers, motivation, and encouragement made the completion of this journey possible.

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Table of Contents

List of Tables

List of Figures

Section 1: Foundation of the Study and Literature Review

Introduction

The relationship between obesity and methamphetamine use is complex. Some studies have indicated a significant relationship between drug use and body mass index (BMI; Blackstone & Herrmann, 2016; Gearhardt, Waller, Jester, Hyde, & Zucker, 2018). Despite numerous studies on drug usage relative to weight, there is limited research regarding factors that might affect the relationship between BMI and methamphetamine use, specifically by sexual orientation. In order to identify factors that influence the relationship between drug usage and weight, I conducted a quantitative, cross-sectional study of secondary data from the Youth Risk Behavioral Surveillance System (YRBSS).

Methamphetamine is one of the most widely abused drugs (Henry, Minassian, & Perry, 2010; Salehi, Taheri, Riasi, & Mehrpour, 2017). This illicit drug is highly addictive to the central nervous system and is usually administered intravenously, snorted, smoked, or consumed orally (National Institute of Drug Abuse, 2019). Many cities face problems related to substance abuse; however, I focused on the greater Chicago area in this study. Youth of the greater Chicago area are comparatively more addicted to this drug and suffer from high BMI than other metropolitan cities in the United States (Centers for Disease Control and Prevention [CDC], 2018). Illinois had one of the highest reported cases of methamphetamine abuse and obesity among youth in comparison to other states, such as New York and California, as reported by the CDC (2018). Moreover, the CDC also reported that methamphetamine use is higher among youth residing in Chicago in comparison to other metropolitan cities, such as New York

City, Los Angeles, San Francisco, and the Miami-Dade metropolis. In this study, I also examined whether bisexual or homosexual populations are more likely to gain a higher BMI in relation to substance abuse in the metropolitan city of Chicago.

A substance abuser is risking more than just their health, and the consequences of abusing illicit drugs have greater effects on youth. Gearhardt et al. (2018) reported that obesity, substance abuse, and drug addiction lead to brain dysfunction, which causes further negative effects, such as a decrease in the quality of life, poor academic performance, and increased vulnerability of developing chronic diseases. The findings from this study could help healthcare workers improve the overall health and quality of life for youth and reduce health inequalities among the sexual minority (SM) population. The results could also help in framing population-specific policies directed towards the diverse, sexually oriented minority population and, thereby, help youth to overcome both increased BMI and substance abuse.

There is a relationship between obesity and substance abuse (Gearhardt et al., 2018). Gearhardt et al. (2018) reported that obesity, or high BMI, among adolescents and young adults is associated with lower illicit drug use during their early childhood. Huang, Lanza, and Anglin (2013) highlighted a complex relationship between high BMI and the use of the drug methamphetamine. However, none of the studies conducted thus far have helped in gaining a detailed insight into how a higher BMI promotes or influences the tendency of consumption of methamphetamine or vice versa. What is even less understood is whether there are any additional factors that modulate the relationship between the sexual orientation of youth, substance abuse, and BMI.

As sexual orientations are becoming more diverse, health workers are faced with treating health concerns that differ from group to group. Friedman et al. (2014) reported that bisexuals and homosexual men and women in the United States experience health-related disparities in comparison to heterosexual males and females. The researchers also recommended that new health policies directed towards homosexuals and SM groups would help to encourage health-related empowerment and, therefore, help them to lead a healthy life. Moreover, bisexual and homosexual individuals often experience stigmatization, prejudice, and discrimination like biphobia.

Smith et al. (2010) found that lesbian females have higher BMI, whereas gay males have lower BMI in comparison to their heterosexual counterparts. Moreover, Flentje, Heck, and Sorensen (2015) indicated that gay men are more likely to use methamphetamine compared to lesbian females and heterosexual individuals. However, there has been no research conducted so far that highlights how the sexual orientation of individuals influences both BMI and substance abuse or whether the use of methamphetamines increases BMI levels. Flentje, Bacca, and Cochran (2015) reported that there is also data missing in the domain of substance abuse, sexual orientation, and gender identity.

Eliason, Sanchez-Vaznaugh, and Stupplebeen (2017) suggested that there is a close relationship between sexual orientation and BMI. For example, they found that sexual and gender minority (SGM) women have greater weight issues than heterosexual women. They also found that lesbian and bisexual women had significantly greater BMI than heterosexual women. In a study that examined substance abuse and sexual

orientation, researchers established that bisexual or gay men are more likely to become victims of methamphetamine intoxication in comparison to heterosexual men (Eliason et al., 2017). This finding helped researchers realize that there is a relationship between sexual orientation and the use of methamphetamines. The relationship was found to be significant among homosexual males in comparison to homosexual females (Eliason et al., 2017). However, no studies have been conducted so far that determine whether sexual orientation influences the relationship between BMI and the use of methamphetamine (Flentje, Heck, et al., 2015).

Mattocks et al. (2014) stated that understanding the healthcare needs of the lesbian and gay community helps to meet the specific needs of SGM. The results of the current study may help in highlighting the resilience and risk factors of the SGM community by improving the understanding of the relationship between sexual orientation, BMI, and methamphetamine use. With a full understanding of how these factors are possibly related, the findings could help others to identify early interventions to prevent drug use and obesity.

There are limited extant policies directed towards the improvement of the health-related quality of life for homosexual and bisexual individuals. The findings from this study might prove helpful for bringing change in their health status. With new information, knowledge may prove helpful to improve the understanding of the relationship between sexual orientation, BMI, and methamphetamine use among youth. The information could also help with future implementations of early interventions to

reduce drug addiction and obesity and bring about positive changes in the health status of youth.

Problem Statement

Two of the most challenging health problems in the United States today are obesity and substance abuse among young people (Barry & Petry, 2009; Sarwer & Polonsky, 2016). Obesity, defined as a BMI greater than 30 kg/m^2, had a prevalence rate of 14.8% among U.S. youth in 2017 (CDC, 2018). The healthcare costs associated with obesity in the United States in 2013 was $342.2 billion (Biener, Cawley, & Meyerhoefer, 2017).

Methamphetamines, a highly addictive central nervous system stimulant, have one of the highest reported substance abuse records among youth (Kidd, Grey, Torrone, & Weinstock, 2019). Researchers have indicated that methamphetamine usage is steadily increasing among college students (Gonzales, Mooney, & Rawson, 2010). Nationally, approximately 85%-90% of stimulant-related drug deaths involve methamphetamines, and 5,716 people died in 2015 as a result of the stimulant overdose (U.S. Department of Justice, 2017).

Chicago has a higher obesity and methamphetamine use rate as compared to other major cities in the United States (CDC, 2018). The obesity rate among youth in 2017 was 18.2 % in Chicago, 13.5% in New York, and 16.4% in Los Angeles (CDC, 2018). The methamphetamine use rate among youth in 2017 was 4.7% in Chicago, which was higher than Los Angeles (2.7%), San Francisco (3.5%), and Miami-Dade County (4.2%) and almost double the national rate of 2.5% (CDC, 2018).

Both obesity and drug addiction have been linked to dysfunction in the brain's reward system (Gearhardt et al., 2018). Researchers have indicated that obesity among adolescents is associated with lower illicit drug use in early adulthood (Gearhardt et al., 2018). Huang et al. (2013) found that drug use among adolescents is associated with subsequent obesity in young adulthood. There is a complex relationship between obesity and methamphetamine use, but it is unclear if obesity leads to methamphetamine abuse or vice versa. What is less understood is whether there are additional factors that impact the relationship between BMI and methamphetamine use.

Researchers have also indicated that there is a close relationship between sexual orientation and BMI. Smith et al. (2010) found that SM females have higher BMI and sexual minority males have lower BMI than their same-gender heterosexual counterparts. There is also a known connection between sexual orientation and methamphetamine use. Flentje, Heck, et al. (2015) reported significantly higher rates of methamphetamine use among gay (44.5%) and bisexual (21.8%) men compared to heterosexual men (7.7%). However, there has been no research to determine whether sexual orientation influences the relationship between BMI and methamphetamine use.

Purpose of the Study

The purpose of this study was to determine whether there is an association between BMI and methamphetamine use within a population with higher rates of these diseases. The secondary purpose was to examine whether sexual orientation moderates the relationship between BMI and methamphetamine use. In this study, I used data from the YRBSS (CDC, 2018) in Chicago and considered BMI and methamphetamine use as

both independent and dependent variables, with sexual orientation as the moderating variable.

Research Questions and Hypotheses

The following research questions and hypotheses were addressed in this study:

RQ1: Is there any association between body mass index (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) among Chicago youth?

$H_0$1: There is no statistically significant association between body mass index (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) among Chicago youth?

H_a1: There is a statistically significant association between body mass index (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) among Chicago youth?

RQ2: Does the association between body mass index (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) differ by sexual orientation (i.e., the moderating variable)?

$H_0$2: The association between body mass index (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) does not differ by sexual orientation (i.e., the moderating variable)?

H_a2: The association between body mass index (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) differs by sexual orientation (i.e., the moderating variable)?

RQ3: Is there an association between methamphetamine use (i.e., the independent variable) and body mass index (i.e., the dependent variable) among Chicago youth?

$H_0$3: There is no statistically significant association between methamphetamine use (i.e., the independent variable) and body mass index (i.e., the dependent variable) among Chicago youth.

H_a3: There is a statistically significant association between methamphetamine use (i.e., the independent variable) and body mass index (i.e., the dependent variable) among Chicago youth.

RQ4: Does the association between methamphetamine use (i.e., the independent variable) and body mass index (i.e., the dependent variable) differ by sexual orientation (i.e., the moderating variable)?

$H_0$4: The association between methamphetamine use (i.e., the independent variable) and body mass index (i.e., the dependent variable) does not differ by sexual orientation (i.e., the moderating variable)?

H_a4: The association between methamphetamine use (i.e., the independent variable) and body mass index (i.e., the dependent variable) differs by sexual orientation (i.e., the moderating variable)?

Theoretical Foundation of the Study

The most appropriate theoretical model for this research study was Bandura's (2002) social cognitive theory (SCT). Bandura's SCT offers a framework that helped explain behaviors related to obesity and drug use among youth. Oldenburg, French, and

Glanz (1999) explained a similar concept of SCT based on environmental factors. Because environmental factors are not used for this study, the modified version of Bandura's 1986 model is shown in Figure 1.

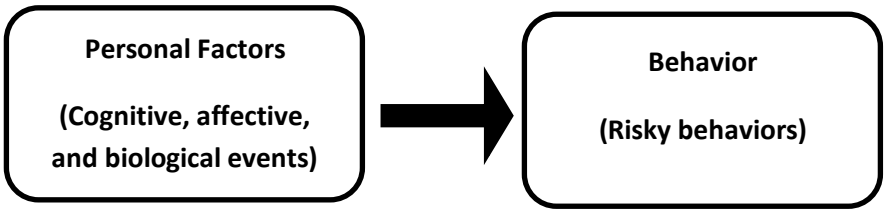

Figure 1. Modification of Bandura's (1986) theory based on Pajares (2002).

I developed a modification of Bandura's (1986) model to demonstrate how personal and behavioral factors are the major risk factors in the study population. SCT helped to explain how sexual orientation (i.e., personal factors) impact obesity and methamphetamine use (i.e., behavior factors). SCT is based on the factors likely to determine a behavior change and how these factors could influence specific behavioral change (Bandura, 1986).

Obesity and Social Cognitive Theory

Adolescence is an important age to consider for developing obesity. Obesity has become an international concern and an escalated problem among youth (Sharma, Mehan, & Surabhi, 2010). Many health researchers have utilized Bandura's SCT to explore the behaviors of obese youth. Bagherniya et al. (2017) noted that SCT is relevant to the study of obesity because "behavioral factors involve health-related knowledge and skills referred to as behavioral capability, and skills in regulating and taking action" (p. 27). The primary construct of SCT relative to understanding health concerns is an individual's confidence in their ability to influence habits and "expectations about

expected costs and benefits for different health habits, and self-control or goals that a person sets for himself or herself" (Sharma et al., 2010 ,p. 193). Because self-efficacy, or an individual's confidence, is fundamental for behavior change, this theory was relevant to this study on the relationship between obesity and drug use.

Methamphetamine and Social Cognitive Theory

In many health-related studies involving both humans and animals, researchers have found many negative effects to be associated with methamphetamine drug use, including "neurological damage and altered cognitive and behavioral functioning" (Homer et al., 2008, p. 301). Homer et al. (2008) also indicated that changes in social behavior have been associated with chronic methamphetamine exposure. Alexander and Ward (2018) explained that SCT is often utilized to explain drug use and mental health issues. Many researchers have relied on SCT to help understand and explain risky behaviors, such as drug use (Eslami, Norozi, Hajihosseini, Ramazani, & Miri, 2018). These researchers also indicated that "in the context of drug use treatment, self-efficacy can be defined as the confidence to resist drug use across different high-risk situations" (p. 300). Because methamphetamine drug use is a risky behavior, SCT was relevant to the focus of this study.

Sexual Orientation and Social Cognitive Theory

SCT addresses many distinct human characteristics. Considering sexual orientation as a factor of this study, SCT was suitable for examining the diverse culture and behaviors that are unique to each SM group. Bussey and Bandura (1999) noted that SCT "acknowledges the influential role of evolutionary factors in human adaptation" (p.

683). SM individuals face several stressors and oppressive social behavior, and this is important to consider within research because SCT asserts that indirect learning strengthens or weakens thought processes, beliefs, and values (Robbins, 2018). The stressors that the SM community face could impact their cognitive behavior and functions.

Nature of the Study

In this quantitative, cross-sectional study, I used a secondary data analysis to understand the relationship between BMI and methamphetamine use by sexual orientation. In the first set of analyses, BMI was considered as the independent variable, and methamphetamine use was the dependent variable. In the second set of analyses, these variables were reversed. Data were drawn from the YRBSS national, school-based survey conducted by the CDC (2018). The target population was Chicago youth, and data came from the last 10 years collected: 2007-2017. The YRBSS data set contains 124 variables collected from 1,883 participants; however, in the analysis, I used five variables (i.e., city, weight, sexual orientation, BMI, and methamphetamine use) to determine the relationship between BMI and methamphetamine use by sexual orientation.

Literature Search Strategy

The databases used to identify relevant literature were Google Scholar, Pub Med, the Walden University Library, Academic Search Complete, DATA USA, EBSCO eBooks, SAGE Stats, ProQuest, and the CDC YRBSS database. I used these academic and professional databases to locate scholarly journal articles published in the last 5 years. All studies on the topic published between 2009 and 2019 were also reviewed to

examine the increase rate, prevalence, and trend of drug use among youth in the United States and determine associations and confounding factors of associations. The keyword search terms used to locate sources for this literature review included *methamphetamine use, illicit drug use in the United States, race and methamphetamine, BMI and methamphetamine, illicit drug use, obesity and substance use, Chicago youth and methamphetamine use, sexual orientation and BMI, sexual orientation and drug use, sexual orientation and methamphetamine use, YRBSS, YRBS, adolescents and illicit drug use, methamphetamine use at school, association of BMI*, and *sexual orientation and methamphetamine use*. Phrase searching, truncation, and Boolean searching using the aforementioned terminology helped me narrow results down by relevance.

Literature Review Related to Key Variables

Obesity

Obesity and drug use both are compelling issues in the United States, and these are also leading contributors to death in the United States (Gearhardt et al., 2018). Obesity can be defined as an individual with a BMI of more than 30 kg/m^2 (Nuttall, 2015). In the last few years, the prevalence of obesity has increased dramatically. In the case of the United States, between the years 2005 and 2006 more than 33% males and 35% females suffered from issues related to obesity (Nuttall, 2015). Obesity prevalence was 16.8% (95% CI, 14.2%-19.8%) in 2007-2008 and 18.5% (95% CI, 15.8%-21.3%) in 2015-2016 among youth (Hales, Fryar, Carroll, Freedman, & Ogden, 2018). Many major cities have reported increases in obesity among their youth. In 2017, the rate of obesity

among youth was 18.2% in Chicago, 16.4% in Los Angeles, and 13.5% in New York (CDC, 2018).

Numerous medical conditions, like hypertension, diabetes, and hyperlipidemia, are associated with obesity factors (Anari, Amani, Latifi, Veissi, & Shahbazian, 2017; Crawford et al., 2010) According to the American Cancer Society, it is estimated that around 90,000 individuals suffer from cancer due to obesity-related issues (Vanbuskirk & Potenza, 2010). Obesity is the second major cause of death in the United States, and it is directly linked with cardiovascular disease, hypertension, diabetes disorder, and some cancer (Anari et al., 2017). The data from the Medical Expenditure Panel Survey suggested that the medical cost per obese adult rose from $3,070 to $3,508, which was an increase of 14.3%, and the total cost of obesity rose from $212.4 billion to $315.8 billion, an increase of 48.7% between 2005 and 2010 (Carroll & Rhoades, 2012). The factors considered are an increase in costs per obese individual, an increase in the population, and an increase in the prevalence of obesity (Biener et al., 2017).

In the past 3 decades, the rate of obesity has significantly increased among the U.S. population from approximately 15% to 34%, which has led to an increase in associated health consequences (Blumenthal & Seervai, 2018). Between the years 2007-2008, 75% of women above 20 years old were identified as overweight (25.0 =< BMI < 30) and obese (BMI >= 30), and they were also labeled at risk for various related conditions (Sansone & Sansone, 2013). Prevalence of obesity is higher in some groups. There are studies that have identified the increased likelihood of obesity and becoming

overweight among bisexuals and lesbian females in comparison to their heterosexual counterparts (Everett & Mollborn, 2013).

Obesity is an important public health issue among the youth of the United States. Research conducted in the past among White youth indicated that among the identified race, SM females have a significantly higher BMI and SM males have a reduced BMI compared to their same-sex, heterosexual counterparts, with sexual orientation disparities among men rising in adolescence stages (Katz-Wise et al., 2014). In a study that investigated the relationships between obesity and drug abuse, obesity and being overweight were linked with an increased risk for lifetime methamphetamine use and other substance dependence among men (not women); however, BMI was not associated with the illicit methamphetamine use disorder (Sansone & Sansone, 2013). The report indicated the use of the methamphetamine was attributed to lack of control towards food and substances as well as cravings among the obese population (Sansone & Sansone, 2013).

Methamphetamine Use

Methamphetamine (commonly referred to as meth) is categorized as an illicit element; moreover, it causes high addiction to the central nervous system stimulant and can be administered through smoking, oral ingestion, injection, and snorting (National Institute of Drug Abuse, 2019). Methamphetamine has been reported to be one of the most addictive substances in the United States; an individual can get addicted from just a single use (Mishra, Pena-Bravo, Leong, Lavin, & Reichel, 2017; Patterson & Lautieri, 2017). In comparison to any synthetic drug of abuse, methamphetamine is ancient, and it

was used by the soldiers in World War II as a stimulant to help them stay focused and alert during the battle periods (Rasmussen, 2015). During the post-war period, methamphetamine was medically sanctioned to be used in the treatment of depression and was recommended for weight loss (Rasmussen, 2015). In addition, during that period, the drug was used for nonmedical purposes (Rasmussen, 2015). The drug was found to enhance the ability in feats of athletic completion and strength, help individuals stay alert to study during an exam period, and help people stay focused and alert during a long-distance drive (Cannon, 2018). On the other hand, Cannon noted the high abuse rate in the country led the government to regulate and restrict the use of methamphetamine by declaring it an illegal drug.

The extremely addictive nature of methamphetamines can result in financial risks (Resnik, 2018). Its production causes a large amount of toxic by-product, which can pollute the air, food, and objects in its surroundings (Martyny, Arbuckle, McCammon, Esswein, & Erb, 2004; Willers-Russo, 1999). New users can actually die from toxic exposure (Boyer, Seifert, Hernon, & Burns, 2018). On the other hand, when methamphetamine has been injected or smoked, the action leads to rush that results in an increase in blood pressure, heart rate, and pleasure, inducing the neurotransmitters in the brain (Prakash et al., 2017). Many youths that experiment with methamphetamine often take repeated doses because the high (or feeling of euphoria) of the drug usually fades quickly and it increases the amount of dopamine in the brain (Patterson & Lautieri, 2017). The use of methamphetamine has been seen to propagate among youth, especially college students (Gonzales et al., 2010). An estimated 85%-90% of the deaths in 2015

were as a result of stimulant drugs that involved the use of methamphetamine, and an aggregate of 5,716 people died due to stimulant overdose (United States Department of Justice, 2017).

In the United States, methamphetamine use is one of the most prevalent illegal stimulants. Information from the National Survey on Drug Use and Health indicated that methamphetamine use appeals equally across both sexes (Hatzenbuehler, Jun, Corliss, & Austin, 2015). Among youth reporting in Monitoring the Future, 6.5% of men and 5.7% of women reported ever using methamphetamine (Hunt, Kuck, & Truitt, 2006). In 2015, the National Survey on Drug Use and Health began a survey that questioned respondents on their sexual orientation, sexual attraction, and about their sexual identity (Hatzenbuehler, Jun, Corliss, & Austin, 2015). Their study indicated that respondents in the SM groups had higher drug use and drug-related issues compared to those in the sexual majority. According to their findings, 1 in 8 men among the respondents reported methamphetamine use in the past year. The same sequence was reported as being similar among different states (Lyons, Pitts, & Grierson, 2013). Hatzenbuehler et al.'s research concluded that the use of methamphetamine is evidently higher among gay males than in the general population.

Flentje, Heck et al. (2015) found that the prevalence of methamphetamine use was higher in gay and bisexual men compared to heterosexual men. According to reports completed for Chicago Crystal Prevention project needs assessment of 2007-2011, more than 60% gay males were using methamphetamine in the Chicago area and the use was prevalent due to the ease of access to methamphetamine in the Northside communities

(Hirshfield, Remien, & Chiasson, 2006). Sales were conveniently conducted through the Internet (Hirshfield et al., 2006).

Research from Texas Education Data Standards substantiated that there was an equal split in terms of sexual orientation in 2003, in which the report indicated 55% of methamphetamine admissions being for males and 45% being for females (Hunt et al., 2006). This is different from a gender split among users of other substances (Hunt et al., 2006). Hunt et al. also noted that people who identify as other thanheterosexual are at a risk for higher health and drug abuse issues in comparison to the heterosexual population.

Connection Between Obesity and Drug Use

In one study, the researchers concluded that elevated BMI is a high risk and associated with increased drug use among adolescents (Ogden et al., 2016); however, there is limited research to determine the factors that impact the relationship between BMI and drug use. Researchers have indicated that a high BMI among adolescents was associated with some illicit drug use in early adulthood (Gearhardt et al., 2018).

In a recent study, researchers argued that both obesity and drug use included a number of risk elements that impact the human body (e.g., impulsivity and reward dysfunction are impacted; Volkow, Wang, Tomasi, & Baler, 2013). Volkow et al. explained that in 2011, substance abuse and mental health services administration (SAMSHA)estimated that there were more than 22.1 million consumers who suffered from obesity and drug use disorders. In addition, more than 4.2 million consumers were classified with a drug use disease for illicit drugs (Volkow et al., 2013). Volkow et al. analysed data for a significant relationship between drug use and BMI. In a few research

studies, different researchers have argued there is no relationship between obesity and drug use disorder; therefore, a drug use disorder is not dependant on obesity or overweight disease (Beck-Friis, von Rosen, Kjellman, Ljunggren, & Wetterberg, 1984; John, Meyer, Rumpf, & Hapke, 2005).

Kalarchian et al. (2007) indicated that around 32.6% of bariatric surgery individuals produced a lifetime history of drug use and suggested that the rate of substance use is more than twice that of the general population. Other researchers found that the correlation between BMI and illicit drug use was more complex to evaluate because recent studies argued that the rate of drug use is little compared to the other influencing factors (Blackstone & Herrmann, 2016). From the collected data and facts, it is difficult to find a better conclusion about the potential relationship between obesity or overweight and addictions. Due to the large prevalence of illicit drug use in the United States and a lack of proper information about both BMI and illicit drug use, there is a gap in the literature specific to these factors. My major aim with this research study was to reduce this gap by analysing the relationship between BMI and illicit drug use in an effective manner.

Chicago Youth and Methamphetamine Use

In contrast to other key cities in the United States, Chicago has a high rate of people that suffer from both methamphetamine use and obesity (Yonek & Hasnain-Wynia, 2012). Yonek and Hasnain-Wynia (2012) noted that there are other additional factors that have an impact on the association between methamphetamine use and BMI. The exceedingly addictive nature of methamphetamine use can result in high costs to the

community in the form of expenses for hospitalization, substance abuse treatment, mental health, counseling services, medical health, and other related costs (Gonzales et al., 2010). Yonek and Hasnain-Wynia study indicated that both drug addiction and obesity are affiliated in a way that results in an addictive nature among youth in Chicago; therefore, the impact of obesity among Chicago youth was linked to use of the lower illicit drugs in early adulthood. Yonek and Hasnain-Wynia indicated an association between methamphetamine use and obesity exists, but it is still not clear if obesity results in the abuse of methamphetamine or vice versa.

Youth drug and alcohol abuse and experimentation occur at all socioeconomic levels; however, medical and mental treatment options do vary by socioeconomic level. In a 2011 report, of the 35,000 Illinois youth between the ages of 12 and 17 years old that reported drug use and misuse, few youth (3.4%) reported receiving treatment (Reichert, Delong, & Konefal, 2017). Reichert et al. also noted that drug use among youth is especially troublesome because brain development continues through adolescence and into young adulthood. Reichert et al. (2017) noted that efforts should be made to increase understanding and reduce drug use disorders and the related negative consequences on youth and young adults.

Sexual Orientation and Body Mass Index

Researchers have found that there is an association between methamphetamine use and sexual orientation (Lowry, Johns, Robin, & Kann, 2017). For example, in one study, a higher proportion of methamphetamine use was reported among bisexual men (21.8%) and gay men (44.5%) in contrast to heterosexual men (7.7%; CDC, 2018). The

CDC's 2018 YRBSS study offers evidence that suggests methamphetamine use can vary by sexual orientation.

There has been limited research conducted to find additional factors that influence the relationship between BMI and methamphetamine use. Researchers have depicted a significant relationship between BMI and sexual orientation. Smith et al. (2010) showed that the BMI of SM women is higher and that of SM men is lower than their counterparts who are of the same-gender and heterosexual. Other researchers have found that bisexual and lesbian women have higher BMI of more than 30 kg/m^2 as compared to that of heterosexual women (Keenan, Wroblewski, Matthews, Hipwell, & Stepp, 2018; Struble, Lindley, Montgomery, Hardin, & Burcin, 2010). The only time that BMI was noted as unsteady was at the onset of teenage years and adolescence where a variation in weight occurred (Keenan et al., 2018). However, these researchers did not indicate a greater incidence of physical disorders, which have been linked with weight in other research studies (Keenan et al., 2018; Struble et al., 2010).

For several years now, various medical researchers have indicated that there is a significant increase in BMI among women and have tried to demonstrate the potential health risks that are related to weight gain (Jun et al., 2012). However, so far, little research has been conducted concerning the health status of SM women. Women who belong to SM identify themselves as queer, bisexual, lesbian, not completely heterosexual, or those who do not utilize any labels to identify their sexuality but participate in behaviors of same-sex individuals. A medicine report on lesbian,

transgender, gay and bisexual health listed obesity as one of the health variations in SM women (Graham et al., 2011).

During the 1990s, it was suggested by various research articles in social science and biomedical literature that SM women were bound to be obese or overweight as compared to heterosexual women. Bowen, Balsam, and Ender (2008), indicated that from 1993-2006 they obtained 19 studies and classified four of them as big samples that contained more than 500 bisexual/lesbian respondents. Two studies were categorized as medical reviews and 13 of them were categorized as convenience samples. Bowen et al. found that 9 of the 14 studies, which had comparison sets, had found substantially higher weight in SM women even though the definite variations were relatively minor. Six of these studies found no variations in weight by sexual orientation; however, the rest of the studies found that bisexual/lesbian women were substantially heavier or bound to be obese with the exception of one study that did not have a heterosexual comparison group. One study identified bisexual females specifically as a group that were bound to be obese (Bowen et al., 2008).

One study found that African American and White bisexual and lesbian women were substantially heavier at the age of 18 as compared to their heterosexual counterparts. However, their heaviness did not differ by sexual orientation in any subgroup of ethnicity. Studies on SM youth have also shown that there is a slight difference between bisexual, lesbian and heterosexual women, especially when differentiated by race. It was found that obesity prevalence in bisexual girls was highest among African Americans,

Latina, and White groups. However, Latina lesbians were less prone to obesity as compared to Latina heterosexuals (Bowen et al., 2008).

It was reported in one study that lesbians were more likely to be morbidly obese as compared to heterosexual or bisexual women (Everett & Mollborn, 2013). Everett and Mollborn noted that the difference in BMI and obesity associated with bisexual women and lesbians, however, was hard to determine. Everett and Mollborn also examined the results of several studies on bisexual and lesbian women; four of the studies found that lesbians were much heavier that bisexual women and mixed findings or no difference was found in seven of the studies.

Researchers Bowen et al. (2008), analyzed 37 various studies on weight and identified how weight differs in SM women compared with heterosexual women. For this study, 2,822 bisexual/lesbian women and 97,720 heterosexual women were used in the analysis. The researchers found that bisexual or lesbian women were heavier in comparison. Differences in health concerns was also compared in the analysis. Bowen et al. noted that a substantial interaction was found between sexual identity and weight status in all four chronic diseases under investigation. Two-thirds of the studies found that there were substantial statistical differences in weight between heterosexual and SM women. On measures of health, bisexual/lesbian women had a mean BMI that was slightly higher and the majority of them were categorized as Obese II and Obese III (Bowen et al., 2008).

Many research studies found that bisexual and lesbian women had higher BMI of more than 30 as compared to that of heterosexual women (Bowen et al., 2008; Everett &

Mollborn, 2013). A medical report on lesbian, transgender, gay and bisexual health listed obesity to be one of the health variations in SM women (Graham et al., 2011). Research also indicated that within the lesbian/bisexual community, SM women acknowledge and accept obesity as a normal physical appearance.

Initial studies containing a majority of White youth depicted SM females had a high BMI and SM males had a low BMI compared to their heterosexual counterparts (Eliason et al., 2015). Also, teenage males were noted to have the highest variety of sexual orientation compared with other SM age groups. Although there have been many studies on sexual orientation, few have studied the patterns of sexual orientation among multiethnic adult samples. Eliason et al. (2015) found that amongst women, African American and White sexual minorities were at a higher risk of becoming overweight as compared to the same ethnicity or race of heterosexuals. In adult males, gay males were less likely to be overweight than heterosexuals among African Americans, White, Latino and Asian men (Eliason et al., 2015).

In a study of White youth and young adults between age 12 and 13, it was found that SM teens had a BMI that was higher than heterosexual teens. The same pattern was observed in adult women. In the same cohort, it was found that gay males in early teenage years had a higher BMI as compared to heterosexual males, however; in late teenage years, gay males had lower BMI than their peer heterosexuals. The same pattern was observed in adult males (Eliason et al., 2017).

A systematic review of the literature (Eliason et al., 2014) found SM women have greater weight than heterosexual women, and lesbian and bisexual women had

significantly greater BMI than heterosexual women. Research indicates that there is a close relationship between sexual orientation and BMI. There is also a known connection between sexual orientation and methamphetamine use.

Definitions

Body mass index (BMI): According to the CDC (2019), BMI is defined as a person's weight (kg) divided by height (m) and indicates high body fat and overall health of an individual.

Drug use: According to the National Institute of Drug Abuse (2019), drug use refers to any form of use of illegal drugs (e.g., heroin, cocaine, and methamphetamine).

Methamphetamine: The United States National Library of Medicine (2018) defines methamphetamine as a very addictive stimulant that when used can quickly lead to addiction. Use of the illegal substance can cause a rush of feelings, rise in body temperature, itchy skin, and emotional problems. It is sometimes referred to as meth and has also been called crystal, glass, ice, or speed.

Sexual minority (SM): A SM is a group of individuals whose sexual identity, orientation, preferences, and practices differ from the majority (Math & Seshadri, 2013). The SM may include individuals that identify as lesbian, gay, bisexual, and transgender.

Sexual orientation: Moser (2016) defined sexual orientation as "a distinct type of an intense sexual interest" (p. 505). However, for the purpose of this study, sexual orientation will be defined as involving both a psychological (e.g., emotions, feelings, urges and passions) and a behavioral (e.g., sexual contact) component (Sell, 2007).

Assumptions

Many assumptions were made in this study. The first assumption was that it is possible to collect and adequately measure the three variables of interest. Empiricists have studied research questions such as the ones posed in this investigation before (e.g., Hunt et al., 2006; Katz-Wise et al., 2014) and so this was a defendable assumption. Furthermore, the empirical aspect of the research used a secondary data set that is known to be valid, reliable, and representative.

A second assumption was that the respondents who supplied data did so in a truthful manner. As noted earlier, this was a validated data set. However, it should be acknowledged that there may be some errors or oversights in the data set. This is because all variables were captured through self-reports which can often suffer from respondent biases, whether accidental or intentional. For example, studies of self-reports of drug use behavior indicated that there are often instances of dissent bias (where the respondent answers 'no' to all questions) and social desirability bias (where the respondent provides answers that are socially acceptable; Krumpal, 2013). However, as a secondary dataset was employed, some level of respondent error was to be tolerated.

Scope and Delimitations

Before summing up and concluding this section, the scope and delimitations of the study are outlined. The data set used for analysis was disaggregated geographically, and the analysis was restricted only to young people located in the Chicago metropolitan area, which describes the city of Chicago and its surrounding suburbs (also referred to as Chicagoland). The reasons for limiting the scope in this way were both methodological

and practical. From a methodological point of view, it makes sense to restrict the sample in this way in order to eliminate as many extraneous variables as possible (Walliman, 2017). There may be characteristics (e.g., quality of transportation system, accessibility of drugs, extent to which the criminal justice system campaigns against illicit drug use) which vary across different geographical regions. By restricting the analysis to Chicagoland, the possible influence of geographically determined extraneous variables were minimized.

From a practical perspective, it was noted that this study is conducted utilizing previously data collected by a public health department. It was expected that the study would yield conclusions that could support practical interventions that would reduce risky behaviors among young people in Chicago. Geographically restricting the sample means that public health institutions and professionals in Chicago could be assured that the insights gleaned from the study were of direct relevance to their local area.

Another delimitation was that the study focuses only on methamphetamine use among students in middle and high school. This means that other drug use, which could be associated with sexual orientation and/or BMI, and among other (i.e. younger or older) cohorts, was not assessed in this work. The conclusions of the study cannot be used to derive conclusions relating to drug use generally, nor to young people generally. This delimitation was acknowledged in the writing up of the research results.

Significance

This section presents the problem statement and the study. In addition, based on a critical review of the extent literature, a set of hypotheses was developed. Drawing on the

results of earlier studies, the study examined whether there is any association between BMI and methamphetamine use among Chicago youth and whether any observed association between BMI and methamphetamine use differs by sexual orientation. A study of this nature had both scholarly and practical significance. From a scholarly perspective, it should first be noted that studies of sexual orientation, drug use, and BMI are rare. The interrelationships between the three constructs are not well understood, as demonstrated in the review of the extent literature. Knowledge is especially limited when it comes to young people. Therefore, it was expected that this study could make a valuable contribution to the public health literature in the domains of sexual orientation, drug use, and BMI. It could also generate further insights that are worthy of scholarly study.

The study is of significance to the public health community in Chicago. Campaigns are underway, both in this metropolitan region and nationally, that are designed to promote healthy behaviors and habits among young people. This includes reducing the propensity to engage in illicit drug use, as well as other activities that will support healthy weights. By examining the relationships between sexual orientation, drug use and BMI, and whether any observed association between BMI and methamphetamine use differs by sexual orientation, this study yielded knowledge that could feed into public health campaigns.

Summary and Conclusions

This section presents the foundation for this research study and included information on the problem, purpose of the study, research questions, theoretical

foundation, and nature of the study. The section also included a literature review of information on obesity, methamphetamine use, and sexual orientation and BMI. Key terms that used throughout the study were defined and assumptions, scope, delimitations, and significance of study were all discussed. The next section, Section 2, will present the research design, data collection process and analysis methods.

Section 2: Research Design and Data Collection

Introduction

In this section, I discuss and provide a justification for the research design and process by which data were collected and analyzed. First, the overarching research design is outlined along with a rationale for its employment. Next, attention turns to the methodological approach used to address the research questions and to test the hypotheses. I describe the population for the study, followed by a detailed presentation of the sampling procedures used to derive the sample as detailed in the secondary data set from which the data were collected. In the next subsection, I describe the data collection instrument and the constructs that formed the basis of the analytic model. Attention is paid to the way in which the key variables were constructed and operationalized. Next, the threats to validity are discussed. Finally, before, the section is summarized, I briefly outline ethical procedures.

Research Design and Rationale

In this study, I used a quantitative, cross-sectional analysis research design with secondary data. The rationale for this research design was as follows. First, it should be noted that a study of this nature could be carried out using either primary or secondary data (Parahoo, 2014). Parahoo also explained that primary data collection occurs when a researcher gathers original data for the sole and express purpose of addressing their own research questions. Oftentimes, the primary approach is preferred, for it enables a researcher to maintain control over the process of data collection and the nature of the data that are collected (Parahoo, 2014). Since the researcher is in control of the data

identification and data collection process, they may be better able to locate the data that specifically serves their purposes.

In this study, however, I preferred a secondary approach for several reasons. Secondary data describes any data that has previously been gathered, stored, or used by an earlier researcher or institution for a different purpose or which is otherwise publicly available for reanalysis (Walliman, 2017). There are multiple benefits to the analysis of secondary data. In the first instance, where the data can be accessed and used easily, the secondary approach enables the researcher to keep the costs associated with data collection low. According to some researchers, "data obtained in this way [through secondary processes] is likely to be higher [in quality] than a relatively inexperienced researcher can hope to obtain" (Parahoo, 2014, p. 257). This is especially the case when the researcher is hoping to extract data from hard-to-reach populations, such as drug users, or where there are practical or ethical reasons that preclude the researcher from being able to gather data from their preferred population (Parahoo, 2014). In this study, it would have been a challenge for me to gather data from middle- and high-school students in Chicagoland.

In addition, the quantitative approach is commensurate with the hypothetico-deductivist approach to data gathering and analysis (Walliman, 2017). This approach, which is commensurate with a positivist epistemology, describes the movement from theory to hypothesis testing, which is used to yield conclusions (Walliman, 2017). The hypothetico-deductivist model is appropriate when the researcher has a clear theoretical basis from which a set of hypotheses can be derived (Parahoo, 2014). In this study, I

used existing knowledge about drug behaviors, sexual orientation, and BMI to develop hypotheses for empirical testing.

The cross-sectional approach means that the data are collected at a single point in time (Walliman, 2017). My decision to adopt a cross-sectional approach was guided by the availability of the secondary data, which will be discussed in more detail later in the section. Although surveys that feed into the YRBSS are administered every 2 years, each survey is delivered to a new, representative sample of high school students, and no explicit attempt is made to track members of the sample (CDC, 2018). This means that it is not possible to track changes in behavior over time, and the data that are collected should be considered to be a snapshot of events (Walliman, 2017).

There are some limitations of the cross-sectional approach, which I acknowledge in the reporting of the research results. Cross-sectional studies do not facilitate assessment of causal relationships between variables of interest or is it possible to determine causal mechanisms underlying any observed relationships (Parahoo, 2014).

The between-subjects approach means that the outcome measures (in the case of this study, BMI and methamphetamine use) are measured and compared among the subjects in the study (Parahoo, 2014). The between-subjects design is appropriate when the subjects can be disaggregated into distinct categories (Parahoo, 2014). The use of sexual orientation as both a dependent and a moderating variable was possible because sexual orientation was treated as an independent, nonoverlapping categorical variable in this study.

Methodology

Population

The population for the study was high school students in Chicagoland. Chicagoland includes the city of Chicago and surrounding suburbs, and this area included 92, district-run high schools. High school students are those aged between 14 and 18 years old and in school Grades 9 through 12. During the 2018-2019 school year, there were 105,867 high school students enrolled in this area, and 10,600 of these students (10%) were listed as bilingual based on the state definition of English learners and 82% received free and reduced lunch, which indicates that a majority of students were officially listed as economically disadvantaged students (CDC, 2018). Of these students, 39,261 (37.1%) were African American, 50,805 (48%) were Hispanic, 9,367 (8.8%) were White, and the remaining 7%-8% of students were either Asian/Pacific Islander, Native American/Alaskan, Asian, Hawaiian/Pacific Islander, multiracial, or unknown (Chicago Public Schools, 2019).

Sampling Procedures Sample

According to the data collection guidelines, the YRBSS is a representative sample of high school students (CDC, 2018). All regular public (including charter schools), Catholic schools, and other non-public schools with students in at least one of Grades 9–12 in the 50 states and in the District of Columbia formed the sampling frame for the study. There were some exclusion criteria, and data were not collected from students based in schools operated by the Department of Defense, alternative schools, special education schools, and certain vocational schools (CDC, 2018). In addition, very small

schools with an enrollment of fewer than 40 students across the sampled grades were excluded from the study.

In order to develop the sample, a three-stage cluster sampling strategy was conducted in the schools (CDC, 2018). In the first stage, the researchers identified many primary sampling units, which were determined broadly at the county level. In the 2017 wave, 1,257 primary sampling units were identified. These primary sampling units were then classified into 16 strata depending on their metropolitan statistical area status. In the second stage of sampling, secondary sampling units were defined, which was the school-level unit. Finally, a random sample of students from each of the specified grades was extracted from each of the physical schools (CDC, 2018). This approach had been demonstrated to produce a representative sample of middle and high school students for analyses.

Power Calculation

To identify a sample size that is minimally sufficient for the research design, I considered several components derived from the design requirements. Naiji et al. (2013) noted that the purpose for conducting a power analyses would be

> (a) to estimate the minimum sample size needed in the study to detect an effect of a certain magnitude at a given level of statistical power or (b) to determine the level of statistical power in a completed study for detecting an effect of a certain magnitude given the sample size in the study. (p. 260)

For this study, the sample size was part of the secondary data. According to the CDC (2017), “approximately 15,000 U.S. high school students participated in the 2017

YRBSS" (para. 6). The latest report, released June 2018, included data from surveys conducted in 39 states including 21 large urban school districts (CDC, 2018).

For the power analysis, I used G*Power 3.1.9.4 to calculate how much power was obtained with the sample size given. In order to calculate the effect size for use in the power analyses for this study, I used the results of the analyses conducted by Wong, Zhou, Goebert, and Hishinuma (2013). To obtain smaller statistically significant effect, the small effect size was used to perform both chi-square and linear regression tests. A minimal statistical power of 0.80 is typical; however, 0.95 is often the standard for research focused on public health (Wong et al., 2013). Following the recommendations of Frankfort-Nachmias, Nachmias, and DeWaard (2015), this power analysis proposes Fisher's exact test, an alpha of .05, and a statistical power of .95. I conducted the power analysis in relation to the Fisher's exact using G*Power 3.1.9.4 (Frankfort-Nachmias et al., 2015), a chi-square test, an alpha of 0.05, a small effect size 0.20, and a minimum statistical power of 0.95 to produce a total minimum sample size of 495 respondents to achieve this minimum statistical power of 0.95.

For the linear regressions, I conducted the power analysis and assumed a two-tail test, an odds ratio of 4.74, an alpha of 0.05, and a minimum statistical power of 0.95. The odds ratio was found for methamphetamine (at least one lifetime use of methamphetamine) variable (*OR* = 3.01–7.39). The midpoint of the odds ratio was then calculated, which resulted in an odds ratio of 4.74. This power analysis specified a two-tailed test, an odds ratio of 4.7, a null hypothesis probability of the dependent variable being equal to 1 if the independent variable is equal to 1 of 0.45, an alpha of 0.05, and a

minimum statistical power of 0.95. This produced a minimum sample size of 41. These results indicated that the data set used for this study incorporated a sample size that was much larger than what was needed to find a statistically significant small effect.

Instrumentation and Operationalization of Constructs

Instruments

Data for the study comes from the last 10 years collected, 2007–2017, of the YRBSS (2017). The data collection instrument was the YRBSS, which was administered every 2 years, typically during the spring semester. The full data set was a pooled sample of surveys conducted either at the national level by the CDC or at the state, territorial, tribal government, and local level by departments of health and education (CDC, 2018).

The three main variables extracted for analysis were sexual orientation, methamphetamine use, and BMI; each of which was introduced into data analysis models as the dependent, the independent, or the moderating variable. In the following subsections, I describe each variable in full.

Operationalization

Body mass index (BMI). Based on national guidelines, there are standardized methods for collecting, calculating, and reporting on BMI in health surveys, and the YRBSS follows these standard guidelines (CDC, 2018). Respondents to the survey reported their height and weight, and BMI was calculated manually using the following formula:

$BMI = kg/m^2 = \text{Weight (in kg)}/[\text{Height (in m)}^2]$

Accordingly, BMI was a continuous measure in the raw data set.

A caveat was necessary regarding the treatment of missing data. If a respondent failed to report their height or weight, then BMI was set to missing in the final data set. However, the exact calculations of BMI depended upon the individual's age or sex. Therefore, if a respondent failed to report either their age or their sex, then BMI was also set to missing because it could not be reliably calculated.

A BMI is a continuous variable. In order to reduce and refine the data for analysis of descriptive statistics and moderator variables, I recoded BMI into a four-group categorical variable for some analyses in this study because there were standardized categories for BMI that designated whether an individual was healthy for their age and sex. A BMI that falls below 18.5 is said to be in the underweight range (CDC, 2019). A BMI that falls in the 18.5 to below 25 range indicates that the individual is a healthy or a normal weight (CDC, 2019). A BMI that is between the ranges of 25.0 to just below 30 suggests that the individual is overweight (CDC, 2019). Finally, an individual who has a BMI of 30.0 or higher is officially classified as being in the obese range (CDC, 2019). However, I retained the BMI variable in its original form as a continuous variable for the regression analysis. The linear approach to analysis was used when BMI was the dependent variable.

Sexual orientation. Sexual orientation is a categorical variable. The YRBSS categorizes young people into three main categories (heterosexual, gay or lesbian, and bisexual) and one category (not sure) on the basis of self-reported sexual orientation. Respondents were asked to indicate their sexual orientation from four categories: heterosexual, gay or lesbian, bisexual, or not sure. Individuals that failed to report their

sexual orientation were classified as missing. There was also a validity check which measured sexual orientation in behavioral terms. Respondents were asked to respond to a statement about their history of sexual contact. The possible responses were, I have never had sexual contact, I have had sexual contact with females, I have had sexual contact with males, and I have had sexual contact with females and males. This study used the self-report measures but also used the behavioral measure as a validity check. The limitations of this approach for capturing the nuances of sexual interest were acknowledged.

Methamphetamine use. Methamphetamine use is a continuous variable. The YRBSS includes surveillance summaries on the use of methamphetamines among students. The continuous variable of methamphetamine use was based on self-reported measures included in the YRBSS report.

In order to measure methamphetamine use, the following question was presented to respondents in the survey. During your life, how many times have you used methamphetamines (also called speed, crystal, crank, or ice)? Respondents were able to select from one of the following options:

A. 0 times

B. 1 or 2 times

C. 3 to 9 times

D. 10 to 19 times

E. 20 to 39 times

F. 40 or more times

This was a ratio level scale with a true zero point. In order to reduce and refine the data for analysis of descriptive statistics and moderator variables, a categorical variable was created as follows. Individuals who had never used methamphetamines were classified as never using the drug. Individuals who indicated that they had used the drug between one and nine times were coded as light users. Individuals who used the drug more than 10 times were classified as heavy users. However, the variable was retained in its original form as a continuous variable for the regression analysis. The linear approach to analysis was used when methamphetamine use was the dependent variable. For Research Questions 2 and 4, a multiple linear regression analysis was performed between two continuous variables (BMI and methamphetamine use) and one outcome variable (sexual orientation).

Data Analysis Plan

The data were cleaned, recoded and refined as described above, and then extracted into a statistical software program to facilitate analysis. Examining the data, a check for assumptions was done to ensure parametric tests were appropriate. Given that the YRBSS (CDC, 2018) resulted in a large response rate, the normal distribution of the data reflected the same assumptions of this study and satisfied the requirements to use parametric tests. To answer each hypothesis, the following tests were used:

- Is there any association between BMI (independent variable) and methamphetamine use (dependent variable) among Chicago youth? (Fisher's exact test)

- Does the association between BMI (independent variable) and methamphetamine use (dependent variable) differ by sexual orientation (moderating variable)? (multiple linear regression)
- Is there an association between methamphetamine use (independent variable) and BMI (dependent variable) among Chicago youth? (Fisher's exact test
- Does the association between methamphetamine use (independent variable) and BMI (dependent variable) differ by sexual orientation (moderating variable)? (multiple linear regression)

The standard cut-off points for probability values ($p < .01$, $p < .05$, $p < .001$) were used to determine if there is a statistical significance among BMI, sexual orientation, and methamphetamine use.

Depending on the research questions, there were several ways to introduce moderator variables into the analysis. Loglinear analysis was one possibility (Hayes, 2017). The approach proposed by Baron and Kenny (1986) involving the application of Sobel's test was another possibility. Ultimately, the decision depended upon the sample size because the reliability of regression analysis was sensitive to both sample size and the number of variables introduced into the analysis (Hayes, 2017). As sample size permitted, it was possible to conduct separate chi-square analyses according to the three main categories of sexual orientation: heterosexual, gay or lesbian, and bisexual. This allowed not only an analysis of whether or not sexual orientation moderates the relationship between BMI and methamphetamine use but also identified a finer grained

determination of which sexual orientations are associated with stronger or weaker relationships.

Threats to Validity

It is crucial that quantitative research was carried out in a rigorous and replicable way if the researcher was to be confident of their conclusions, ensuring that the research was valid therefore crucial to achieving rigor in the collection and analysis of data. Validity refers to the degree to which the research is measuring or assessing what it purports to measure. So, a measurement instrument that is intended to measure behavior in relation to methamphetamine use, for instance, should actually measure that behavior, and not some other outcome, such as attitudes or perceptions towards the drug (Walliman, 2017).

More specifically, there were three dimensions of validity that could have posed a threat to this study. Internal validity is a measure of the extent to which any observed differences can be attributed to the data that has been collected and analyzed (Parahoo, 2014). It is especially important to ensure internal validity where inferences about causal relationships are being made. Although it was not possible in this study to determine causal relationships, efforts were made to ensure internal validity was high through the elimination of confounding variables (i.e. variables that are not important to analysis, but which could affect the results) from the data analysis plan. As outlined earlier, this is one of the reasons why the study focused only on the Chicago area.

The second potential threat to validity would come from external validity. External validity describes the extent to which the conclusions yielded from the study can

be generalized beyond the study sample to the wider population (Parahoo, 2014). External validity is determined by the way in which the study is undertaken, the sampling procedure is implemented, and the participants defined. As discussed earlier, the YRBSS employed a rigorous sampling framework and the dataset was known to be representative of the broader sample from which it was drawn. Therefore, this risk to validity was deemed to be low.

Finally, a threat to validity could come from construct validity which describes the degree to which constructs being measured have been properly operationalized. BMI and methamphetamine use were operationalized in the study. Sexual orientation, as discussed earlier, was a challenge to define and operationalize, and there were many ways that survey participants could interpret questions about their sexual orientations (e.g., preferences or interests, or behaviors). For this reason, the analyses that involved sexual orientation used both the behavior-based and orientation-based measures separately and the results compared.

Ethical Procedures

It was crucial that empirical research, even research which did not involve the collection of primary data, was carried out in accordance with the principles of research ethics. Ethical research describes research that is executed in a rigorous, responsible and honest manner, with consideration paid to the stakeholders of the research. Ethical approval from the relevant authority must be sought for all research that involves human subjects. Institutional Review Board approval (20-19-0669840) for this study was granted before data collection and analysis began. The research was conducted in accordance

with the standard principles for ethical research that were established for the health sciences. Most of these standards (e.g., the principles of confidentiality and anonymity) were already met by the CDC, which gathers and stores the data. However, ensured that the data analysis was conducted in a rigorous way and the results were reported honestly.

Summary

This section presents the research design and process by which data were collected and analyzed. A quantitative, cross-sectional, between-subjects research design was conducted using secondary data from the last 10 years collected, 2007 - 2017 of the YRBSS. Self-reports of sexual orientation, BMI, and amphetamine use formed the variables for analysis and the analytic procedure involved Fisher's exact test and multiple linear regression analysis depending on the research question. The next section, Section 3, will present results and findings.

Section 3: Presenting of Results and Findings

Introduction

The purpose of this quantitative, cross-sectional study using secondary data analysis was to determine whether there is an association between BMI and methamphetamine use within a population with higher rates of these diseases. I conducted an investigation to determine the association between BMI and methamphetamine use of Chicago youth in Grades 9 to 12 and examined whether sexual orientation moderated the relationship between BMI and methamphetamine use.

In this section, I present and discuss the results of the analyses conducted for this study. First, a series of descriptive analyses were conducted, which included a frequency table and percentages for each response category for all variables included in this study. This was followed by a statistical analysis using Fisher's exact test and multiple linear regression. I used the IBM Statistical Package for the Social Sciences (SPSS) statistics software to address the following research questions and test the corresponding hypotheses:

RQ1: Is there any association between BMI (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) among Chicago youth?

$H_0$1: There is no statistically significant association between BMI (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) among Chicago youth?

H_a1: There is a statistically significant association between BMI (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) among Chicago youth?

RQ2: Does the association between BMI (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) differ by sexual orientation (i.e., the moderating variable)?

H_02: The association between BMI (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) does not differ by sexual orientation (i.e., the moderating variable)?

H_a2: The association between BMI (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) differs by sexual orientation (i.e., the moderating variable)?

RQ3: Is there an association between methamphetamine use (i.e., the independent variable) and BMI (i.e., the dependent variable) among Chicago youth?

H_03: There is no statistically significant association between methamphetamine use (i.e., the independent variable) and BMI (i.e., the dependent variable) among Chicago youth.

H_a3: There is a statistically significant association between methamphetamine use (i.e., the independent variable) and BMI (i.e., the dependent variable) among Chicago youth.

RQ4: Does the association between methamphetamine use (i.e., the independent variable) and BMI (i.e., the dependent variable) differ by sexual orientation (i.e., the moderating variable)?

$H_0$4: The association between methamphetamine use (i.e., the independent variable) and BMI (i.e., the dependent variable) does not differ by sexual orientation (i.e., the moderating variable)?

H_a4: The association between methamphetamine use (i.e., the independent variable) and BMI (i.e., the dependent variable) differs by sexual orientation (i.e., the moderating variable)?

Data Collection of Secondary Data Set

I collected data for the secondary data set from the 2007-2017 YRBSS (see CDC, 2018). The 2007-2017 YRBSS was a nationally conducted survey that was completed by high school student participants that were in Grades 9 to 12 in both public and private schools. The survey was administered every 2 years (i.e., odd years; CDC, 2018). The 2007-2017 YRBSS used a three-stage cluster design to obtain a representative sample with a 95% confidence level (CDC, 2013). The survey consisted of a questionnaire with 86 questions that pertained to demographic information, physical injuries and violence, drug and alcohol use, sexual behavior, mental health (e.g., depression or suicidal thoughts), physical activity, diet and nutritional habits, and general health (CDC, 2013). For recruiting during the initial research study, parental permissions were obtained before students completed any of the self-administered questionnaire, which was given during one of the student participant's class periods (CDC, 2013). During this study, each

student participant recorded answers directly on a scanned booklet that was machine-readable (CDC, 2013). Once the data collection was complete, the research student response rate ranged from 64% to 90% (CDC, 2013). Considering the data collection and analysis plan presented in Section 2, I found no discrepancies in the data set using secondary data analysis.

Representative sampling was appropriate for this secondary analysis of data. The sample participants from the YRBSS represent a population of interest (i.e., adolescents in Grades 9 to 12), and this group is representative of a population from a previous empirical study that demonstrated a high degree of external validity (CDC, 2013).

Descriptive Analysis

As reported in Table 1, over half of the youth in the sample reported a healthy BMI (59.8%). While 11.8% reported that they were obese, 20.6% reported they were overweight, and 7.7% reported they were underweight. The vast majority of youth also reported never using methamphetamines (96.8%). A small percentage reported light (2.2%) and heavy (1.0%) methamphetamine use. Additionally, most of the youth reported their sexual orientation as heterosexual (86.5%), while only 3.1% reported being gay or lesbian, and 6.6% reported being bisexual. A small percentage of youth reported not being sure of their sexual orientation (3.8%).

Table 1

Frequencies of Study Variables

	Frequency	Percent
BMI		
Healthy	3,922	59.8%
Obese	776	11.8%
Overweight	1,352	20.6%
Underweight	506	7.7%
Methamphetamine use		
Heavy user	67	1.0%
Light user	143	2.2%
Never use	6,346	96.8%
Sexual orientation		
Heterosexual	5,672	86.5%
Gay or lesbian	203	3.1%
Bisexual	434	6.6%
Not sure	247	3.8%

Statistical Analysis Findings by Research Questions and Hypotheses

Hypothesis 1

I employed Fisher's exact test to investigate the association between BMI and methamphetamine use among Chicago youth. Results indicated that there was no statistically significant association between BMI and methamphetamine use among Chicago youth (see Table 2). The *p* value 0.553 is greater than the significance level 0.05, and the critical value of 4.88 does not meet the critical region of significance (see Table 3). This means that I failed to reject the null hypothesis of having no statistical significance.

Table 2

Fisher's Exact Test of BMI and Methamphetamine Use

		Methamphetamine use group			
		Heavy user	Light user	Never used	Total
BMI group	Healthy	40	75	3,807	3,922
	Obese	10	19	747	776
	Overweight	13	34	1,305	1,352
	Underweight	4	15	487	506
Total		67	143	6,346	6,556

Note. Fisher's Exact Test, $p = .553$.

Table 3

Chi-Square Tests of BMI and Methamphetamine Use

	Chi-Square Tests				
	Value	*df*	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi square	4.600[a]	6	.596	.[b]	
Likelihood ratio	4.451	6	.616	.627	
Fisher's exact test	4.884			.553	
Linear-by-linear association	.752	1	.386	.[c]	.[c]
N of valid cases	6556				

[a.] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.17.

[b.] Cannot be computed because the time limit has been exceeded.

[c.] Cannot be computed because there is insufficient memory.

Hypothesis 2

I used multiple linear regression to investigate the association between BMI and methamphetamine use. Additionally, sexual orientation was tested as a moderation. The analysis was implemented in SPSS. To test for moderation, a two-way interaction term was created using BMI X sexual orientation. I conducted a preliminary analysis to ensure there were no violations of the assumptions (see Table 4). Correlations indicated weak to moderate influence with each other. All correlations were less than .80, which is below the threshold for multicollinearity. Additionally, the collinearity statistics indicated no evidence of multicollinearity (see Table 5). The results of the regression indicated that three predictors explained 1.3% of the variance. Additionally, the ANOVA summary table (see Table 6) indicated that a rejection of the null hypothesis can be made as the multiple *R* in the population equals 0 and the model is statistically significant, F (3,6555) =30.06, $p < .00$.

The results indicated that BMI significantly predicted methamphetamine use, $\beta = .01$, $p = .02$ (see Table 7). Additionally, sexual orientation significantly predicted methamphetamine use ($\beta = .16$, $p = .00$). Lastly, sexual orientation significantly moderated the association between BMI and methamphetamine use ($\beta = -.004$, $p = .01$). This means that the association between BMI and methamphetamine use changed depending on specific sexual orientation identifications.

Table 4

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.117[a]	.014	.013	.456

a. Predictors: (Constant), BMISEX, BMI, SexualOrientation
b. Dependent Variable: MethUse

Table 5

Collinearity and Tolerance

	Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
Model	*B*	Std. Error	Beta	*t*	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1(Constant)	.864	.052		16.555	.000					
BMI	.005	.002	.054	2.282	.023	.003	.028	.028	.267	3.749
Sexual orientation	.161	.035	.261	4.655	.000	.112	.057	.057	.048	20.953
BMISEX	-.004	.001	-.165	-2.734	.006	.095	-.034	-.034	.041	24.326

[a.] Dependent Variable: MethUse

Table 6

ANOVA[a]

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	18.776	3	6.259	30.063	.000[b]
	Residual	1364.061	6552	.208		
	Total	1382.837	6555			

[a.] Dependent Variable: MethUse
[b.] Predictors: (Constant), BMISEX, BMI, SexualOrientation

Table 7

Regression Analysis

			95% Wald Confidence Interval		Hypothesis Test		
Parameter	*B*	Std. Error	Lower	Upper	Wald Chi-Square	*df*	Sig.
(Intercept)	0.864	0.0522	0.762	0.966	274.245	1	0.000
BMI	0.005	0.0021	0.001	0.009	5.209	1	0.022
Sexual orientation	0.161	0.0345	0.093	0.228	21.684	1	0.000
BMI * Sexualorientation	-0.004	0.0014	-0.006	-0.001	7.477	1	0.006
(Scale)	.208[a]	0.0036	0.201	0.215			

Note. Dependent Variable: Methamphetamine Use
Model: (Intercept), BMI, SexualOrientation, BMI * SexualOrientation
[a.] Maximum likelihood estimate.

Hypothesis 3

I employed a Fisher's exact test to investigate the association between methamphetamine use and BMI among Chicago youth (see Table 8). Results indicated that there is no statistically significant association between BMI and methamphetamine use among Chicago youth (see Tables 8 and 9). The *p* value is above .05 and the critical value of 4.88 does not meet the critical region of significance. This means that I failed to reject the null hypothesis of having no statistical significance.

Table 8

Fisher's Association between Methamphetamine Use and BMI

		BMI Group				
		Healthy	Obese	Overweight	Underweight	Total
Methamphetamine use group	Heavy user	40	10	13	4	67
	Light user	75	19	34	15	143
	Never use	3,807	747	1,305	487	6,346
Total		3,922	776	1,352	506	6,556

Note. Fisher's Exact Test, $p = .553$.

Table 9

Chi-Square Tests Association between Methamphetamine Use and BMI

	Value	*df*	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson chi-square	16.549[a]	15	.347	.[b]		
Likelihood ratio	14.949	15	.455	.000		
Fisher's exact test	.000			.000		
Linear-by-linear association	.250[c]	1	.617	.000	.000	.000
N of valid cases	6556					

[a.] 10 cells (41.7%) have expected count less than 5. The minimum expected count is 1.23.

[b.] Cannot be computed because the time limit has been exceeded.

[c.] The standardized statistic is .000.

Hypothesis 4

Multiple linear regression was utilized to investigate the association between methamphetamine use and BMI. Additionally, sexual orientation was tested as moderation. Analysis was implemented in SPSS. To test for moderation, a two-way interaction term was created using methamphetamine X sexual orientation. A preliminary analysis was conducted to ensure there were no violations of the assumptions (see Table 10). Correlations indicated a weak to moderate influence with each other. All correlations were less than .80 with each other which is below the threshold for multicollinearity. Additionally, the collinearity statistics show no evidence of multicollinearity (see Table 11). The results of the regression indicated that three predictors explained .2% of the variance. Additionally, the ANOVA summary table (see Table 12) indicates that we can reject the null hypothesis that the multiple *R* in the population equals 0 and the model is statistically significant, F (3,6555) =5.37, $p < .01$.

Results indicated that methamphetamine use did not predict BMI, $\beta = .49$, $p = .08$ (see Table 13). Additionally, sexual orientation significantly predicted BMI ($\beta = .63$, $p = .00$). Lastly, sexual orientation significantly moderated the association between BMI and methamphetamine use ($\beta = -.29$, $p = .04$). This means that the association between methamphetamine and BMI changed depending on specific sexual orientation identifications.

Table 10

Preliminary Analysis and Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.050[a]	.002	.002	5.174769440084475

a. Predictors: (Constant), MethSex, MethUse, SexualOrientation
b. Dependent Variable: BMI

Table 11

Collinearity Statistics

Model		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
		B	Std. Error	Beta	*t*	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	23.142	.328		70.655	.000					
	SexualOrientation	.625	.181	.090	3.452	.001	.042	.043	.043	.223	4.485
	MethUse	.491	.282	.044	1.743	.081	.003	.022	.022	.244	4.099
	MethSex	-.289	.140	-.074	-2.074	.038	.021	-.026	-.026	.121	8.290

[a.] Dependent Variable: BMI

Table 12

ANOVA[a] *Summary with BMI as Dependent Variable*

Model		Sum of Squares	*Df*	Mean Square	*F*	Sig.
1	Regression	431.049	3	143.683	5.366	.001[b]
	Residual	175451.020	6552	26.778		
	Total	175882.069	6555			

[a.] Dependent Variable: BMI
[b.] Predictors: (Constant), MethSex, MethUse, SexualOrientation

Table 13

Regression Analysis

Parameter	*B*	Std. Error	95% Wald Confidence Interval Lower	Upper	Hypothesis Test Wald Chi-Square	*df*	Sig.
(Intercept)	23.142	0.3274	22.500	23.784	4995.233	1	0.000
MethUse	0.491	0.2816	-0.061	1.043	3.041	1	0.081
SexualOrientation	0.625	0.1811	0.270	0.980	11.921	1	0.001
MethUse * SexualOrientation	-0.289	0.1395	-0.563	-0.016	4.304	1	0.038
(Scale)	26.762[a]	0.4674	25.861	27.694			

Note. Dependent Variable: BMI
Model: (Intercept), MethUse, SexualOrientation, MethUse * SexualOrientation
[a.] Maximum likelihood estimate.

Summary

In this section, results were presented and discussed. Information was shared on the data collection and analysis of the secondary data set. Findings were organized by a descriptive analysis of each research question. For the first research question, there was no statistically significant association between BMI (independent variable) and methamphetamine use (dependent variable) among Chicago youth. For the second research question, results indicated that BMI significantly predicted methamphetamine use, $\beta = .01$, $p = .02$. The sexual orientation significantly predicted methamphetamine use ($\beta = .16$, $p = .00$), and sexual orientation significantly moderated the association between BMI and methamphetamine use ($\beta = -.004$, $p = .01$). For the third research question, results indicated that there is no statistically significant association between methamphetamine use and BMI among Chicago youth. For the final research question,

results indicated that methamphetamine use did not predict BMI, β = .49, *p* = .08. The sexual orientation significantly predicted BMI (β = .63, *p* = .00), and sexual orientation significantly moderated the association between BMI and methamphetamine use (β = -.29, *p* = .04). The results indicated several important findings and these findings will be discussed in the following section, Section 4. Information will include an interpretation of the findings, recommendations for future research, implications for practice, and a conclusion.

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

Introduction

The purpose of this quantitative, cross-sectional study was to determine whether there was an association between BMI and methamphetamine use within a population with higher rates of these diseases (i.e., high-school students in the Chicago area). The secondary purpose was to examine whether sexual orientation moderated the relationship between BMI and methamphetamine use. In this study, I used data from the YRBSS (see CDC, 2018) in Chicago and considered BMI and methamphetamine use as both independent and dependent variables, with sexual orientation as the moderating variable. To analyze the resulting data, I conducted descriptive analysis, including a frequency table and percentages of responses for each category, which includes all variables in the study. In this section, I discuss the interpretation of findings, limitations of the study, recommendations for future research, and implications for professional practice and social change.

Interpretation of the Findings

In this subsection, I present an interpretation of the findings organized by research question. The statistical analyses of Fisher's extract test and multiple linear regression were used to derive the results reported and discussed in this subsection. The IBM SPSS Statistics software was used to address the research questions and test the corresponding hypotheses.

The first research question was: Is there any association between BMI (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) among

Chicago youth? As mentioned previously, BMI is considered a risk factor associated with increased drug use among adolescents (Ogden et al., 2016). However, there is little evidence to determine which factors impact the relationship between BMI and drug use. Results from a previous study indicated that a high BMI among adolescents was associated with some illicit drug use in early adulthood (Gearhardt et al., 2018). However, in this study, the results revealed that there is no significant association between BMI and methamphetamine use among Chicago youth; however, there were significant results when a moderating variable was introduced to the equation. Information on differing results with a moderator is presented in the following paragraph concerning the second research question.

The second research question was: Does the association between BMI (i.e., the independent variable) and methamphetamine use (i.e., the dependent variable) differ by sexual orientation (i.e., the moderating variable)? There was a significant relationship between BMI and methamphetamine use when sexual orientation was included as a moderating variable. This finding supports the methamphetamine and SCT discussion because sexual orientation is a personal factor that mediates risky behaviors, mentioned in Bandura's (1986) SCT.

Alexander and Ward (2018) explained drug use and mental health issues with the inclusion of SCT. Many researchers have relied on SCT to help understand and explain risky behaviors, such as drug use (Eslami et al., 2018), which the findings of this study also support. Because methamphetamine drug use is a risky behavior that is influenced by social and cognitive factors, drug use fits within the SCT model that risky behavior is

linked to BMI and sexual orientation and helps provide an understanding to why no link was found between BMI and risky behavior when the personal factor was not included in the model.

The third research question was: Is there an association between methamphetamine use (i.e., the independent variable) and BMI (i.e., the dependent variable) among Chicago youth? This question yielded a failure to reject the null hypothesis. As such, there was no measured association between methamphetamine use and BMI among Chicago youth. This result supports the position of a group of researchers who have argued that there is no relationship between obesity and drug use disorder; therefore, a drug use disorder is not dependant on obesity or overweight disease (see Beck-Friis et al., 1984; John et al., 2005).

However, the results appear significant when sexual orientation is included in the equation as a moderator, and this is evident in the fourth research question. The fourth research question was: Does the association between methamphetamine use (i.e., the independent variable) and BMI (i.e., the dependent variable) differ by sexual orientation (i.e., the moderating variable)? The results indicate that methamphetamine use did not predict BMI; however, sexual orientation significantly predicted BMI. Sexual orientation also significantly moderated the association between BMI and methamphetamine use. As such, these findings indicate that the correlation between methamphetamine use and BMI was modified depending on an individuals' sexual orientation identification. This finding aligns with the previous discussion that SCT addresses many distinct human characteristics. Since the results were significant only after including a personal factor

(i.e., sexual orientation as a moderating factor), SCT is suitable for explaining how culture and behaviors influence risky behaviors like methamphetamine use.

According to these results, SM individuals face several stressors and oppressive social behavior that may moderate the use of methamphetamines. Sexual orientation can be considered integral to this study because SCT asserts that indirect learning strengthens or weakens thought processes, beliefs, and values (see Robbins, 2018) on the processes mediating methamphetamine use. SM individuals must respond to stressors that impact their cognitive functioning, impairing their ability to assess risks associated with their drug use.

The current results indicate that Bandura's SCT helps explain the results related to obesity and drug use among youth. Personal factors (in this case, sexual orientation) lead to modified behaviors, such as risky behaviors like methamphetamine use. The SCT model demonstrates how personal and behavioral factors are of great interest in understanding illicit drug use among high school students. Specifically, Bandura's (DATE) SCT helps explain how sexual orientation (i.e., personal factors) impacts obesity and methamphetamine use (i.e., behavior factors). As such, SCT helps researchers determine behavior change based on specific factors that can influence illicit drug use.

In this study, I used quantitative, cross-sectional data and secondary analysis data to understand the relationship between methamphetamine use and BMI by sexual orientation. The results revealed that high school students who are obese are not more likely to use methamphetamine compared to their non-obese peers. The results support several past studies in which researchers have found no association between obesity and

illicit drug use in youth. However, new to the field of relative research, the results do indicate that sexual orientation is a significant mediator of the relationship between BMI and methamphetamine use.

Limitations of the Study

The data set used for analysis was restricted only to young people located in the Chicago metropolitan area, which describes the city of Chicago and its surrounding suburbs (also referred to as Chicagoland). As such, the results may not be generalizable to youth in the areas outside of Chicago or surrounding suburbs. The reason for this limitation in scope in the study was from a methodological point of view because it made sense to restrict the sample in this way in order to eliminate as many extraneous variables as possible (see Walliman, 2017). By restricting the analysis to Chicagoland, I minimized the possible influence of geographically determined extraneous variables.

Another delimitation is that I focused only on methamphetamine use among students in high school in this study, while there are knowledge gaps in the area of interest and other available illicit drugs. The results are also not generalizable to middle school students or adults because the sample only contained high school students. The results of the current research study cannot be used to develop conclusions relating to drug use in general or all young people in general.

Recommendations for Future Research

The results of this study may be used to develop or amend policies concerning the improvement of the health-related quality of life of homosexual and bisexual individuals. New knowledge regarding younger populations and older populations outside of the high

school population may prove helpful in the understanding of the relationship between sexual orientation, BMI, and methamphetamine use among other age populations. I recommend future research be conducted that explores interventions that may reduce drug addiction and obesity as well as bring about positive change in the health status of youth. Additionally, the findings of this research study may help future researchers understand how to identify at-risk youth who are homosexual or bisexual. It is also possible to use the data from this study to pinpoint how homosexual and bisexual youth who are also overweight may classify as a population of particular risk for using methamphetamines.

Implications for Professional Practice and Social Change

The findings from this study contribute important information concerning the public health of the Chicagoland community. To promote healthy behaviors and habits (modified behaviors) among young people, campaigns are underway nationally and, in the Chicago, metropolitan region. The modified behaviors include those that support having a healthy body weight and the reduction of engaging in illicit drug usage. The findings from this study encourage the promotion of a wider range of health services to youth (including SMs) as a result of interventions. Public health campaigns can benefit from this research because the findings show relationships between sexual orientation, drug use, and BMI as well as that the associations between BMI and methamphetamine use differ by sexual orientation.

Conclusion

The results of this study support the findings of Yonek and Hasnain-Wynia (2012) who noted that there might be additional factors that affect the use of methamphetamines and BMI. It is important to find a solution to methamphetamine use among youth because research suggests that the addictive nature of methamphetamine use can result in high costs to the community in the form of expenses for hospitalization, substance abuse treatment, mental health, counseling services, medical health, and other related costs (Gonzales et al., 2010).

The findings from this study indicate that drug addiction and obesity are linked in a way that results in addictive behaviors among youth in Chicago and surrounding suburbs. The findings indicate that there are indeed other factors, such as sexual orientation, which mediate the effects of BMI on methamphetamine use. Yonek and Hasnain-Wynia (2012) indicated that an association between methamphetamine use and obesity exists, but the information was still unclear if obesity was a result of methamphetamine use or vice versa. The information from this study helps to untangle this lack of clarity concerning whether obesity leads to methamphetamine use or vice versa. The findings of the current study show that obesity does lead to methamphetamine use when the person in question identifies as a SM.

As such, Bandura's SCT was integral for explaining the variation in results. As mentioned, sexual orientation represents a personal factor, which leads to a change in behavior in the SCT model. The model posits that there is an array of social stressors that result from these personal factors that lead to a change in social behaviors and an increase

in risky behaviors (Bandura, 1986). As such, the findings of this study are novel concerning how sexual orientation is a key factor in predicting methamphetamine use among youth in Chicago and surrounding suburbs.

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