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EXAMINING GEOGRAPHIC VARIATION IN MENTAL AND BEHAVIORAL HEALTH OUTCOMES OF SEXUAL MINORITY YOUTH

Kerry M. McLoughlin

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A Project

Presented to the

Faculty of

California State University,

San Bernardino

In Partial Fulfillment

of the Requirements for the Degree

Master of Social Work

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ABSTRACT

Sexual minority youth (SMY) are a population vulnerable to behavioral health challenges. While behavioral health disparities between SMY and heterosexual youth are well documented, less attention has been given to how such disparities vary geographically. The aim of this study is to begin to fill this gap by using a national dataset to examine how behavioral health disparities between SMY and heterosexual youth vary by geography. Understanding how SMY's experiences vary by location will allow social workers to better allocate resources. Secondary data analysis of cross-sectional data from the Population Assessment of Tobacco and Health (PATH) Study was conducted to examine the relationship between sexual identity, mental and behavioral health outcomes, and geographic region among youth. The survey data, collected between 2018 and 2019, comes from youth ages 14-17 (*N*=8,886). Univariate, bivariate, and multivariate analysis was conducted. Results showed SMY were significantly more likely to experience symptoms of anxiety, depression, and trauma, and to rate their mental health as worse compared to a year ago than non-SMY. SMY were also significantly more likely struggle with substance use than non-SMY. Geographic region had no relationship with the mental health outcomes of youth who identified as a sexual minority, and little relationship with their behavioral health outcomes. Future research with more precise measures of geographic factors may better capture the influence of geographic location on SMY's mental and behavioral health outcomes.

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INTRODUCTION

Problem Formulation

The percentage of high school students who identify as a sexual minority (lesbian, gay, bisexual, or not sure) has doubled since 2009, increasing from 7% to 15% by 2019 (Raifman et al., 2020; Underwood et al., 2020). The increase in sexual minority youth (SMY) warrants attention, as research indicates they are a population vulnerable to mental and behavioral health challenges. SMY are more likely to experience depressive symptoms (Hatchel et al., 2019; Lucassen et al., 2017; Marshal et al., 2011), suicidal ideation, and suicide attempts (Aranmolate et al., 2017; CDC, 2019; Ivey-Stephenson et al., 2020; Johns et al., 2019; Marshal et al., 2011; Raifman et al., 2019) than heterosexual youth. SMY also have higher rates of substance use and abuse (Choi et al., 2017; Felt et al., 2020; Fish & Baams, 2018). The higher rates among SMY are concerning as experiencing behavioral health challenges can have a negative impact on youth's educational achievement, peer and family relationships, and physical health.

While mental and behavioral health disparities between SMY and heterosexual youth are well documented, less attention has been given to how such disparities vary geographically. For SMY, living in a rural area may be a risk factor for behavioral health issues due to the socio-cultural context. While research is limited, SMY who live in rural areas are more likely to report that their

community is hostile or unaccepting of LGBTQ people (Hulko & Hovanaes, 2017; Paceley et al., 2019), and to experience more negativity at school than those in urban areas (Choi et al., 2017). Besides rurality, other geographic factors have been found to be associated with behavioral health outcomes, including density of same sex couples in a state (Hatzenbuehler et al., 2011) and number of LGBTQ community resources in an area (Watson et al., 2020). While research indicates that where SMY live impacts their mental and behavioral health outcomes, no study has used a nationally representative dataset of youth to examine the relationship between geography and mental and behavioral health outcomes.

In order to successfully promote healthy outcomes for SMY in adolescence and adulthood, social workers need information to guide their efforts. If geographic variation is found among SMY, indicating high behavioral health needs within rural areas, then targeted macro and micro level action could be taken to address it. According to Minority Stress Theory (Meyer, 2007), SMY experience higher rates of mental and behavioral health problems than heterosexual youth due to the prejudice and discrimination they experience, and the resulting psychological toll. To reduce prejudice and discrimination in rural areas, states, counties, or school districts could implement a macro level intervention such as mandating changes to the school districts' curriculum. For example, Proulx et al. (2018) found that SMY who live in states with higher proportions of schools teaching LGBTQ-inclusive sex education were less likely

to experience bullying at school. By increasing students' awareness and acceptance of the LGBTQ community, prejudice and discrimination within school environments may decline.

A second macro level intervention that school districts could implement would be to increase access to mental health care for children and youth. One way to accomplish this would be for state governments to increase funding to school districts to provide mental health counseling at school sites. When services can be accessed for free at school, it reduces barriers often encountered by rural families, such as transportation, stigma, and cost (CDC, 2017). As SMY have increased risk of suicide versus heterosexual youth, access to mental health care is key to avoid dire consequences.

Finally, a micro level intervention to improve mental and behavioral health outcomes for SMY in rural areas would be for school-based mental health programs to offer services to parents of SMY. A study of LGBTQ young adults (18-24) with a history of suicidal ideation or suicide attempt found that family support was a protective factor for suicidality (Lytle et al., 2018). A parent support group or short-term individual counseling could increase family members' abilities to support their children and thus reduce their suicide risk (CDC, 2019; Ivey-Stephenson et al., 2020).

Purpose of the Study

The purpose of the proposed study is to describe how mental and behavioral health outcomes of SMY compare to non-SMY, and how such

outcomes may vary by geography. SMY are a vulnerable population who experience behavioral health disparities. They are more likely to experience depression, suicidal ideation, attempt suicide, and abuse substances, such as alcohol and marijuana. Understanding how SMY's experiences may vary by location will allow social workers and other youth-serving professionals to better target and tailor services. Once identified, social workers can assess whether adequate services are available in such areas to serve SMY's mental health or substance use needs. If not, steps may be taken to increase access, quantity, and quality of behavioral health services for SMY.

For example, if a high percentage of SMY with substance use issues are identified within a particular location, the researcher can then identify the number of substance use treatment programs for youth within the area. This information can then be represented in a map to allow for further spatial analysis regarding travel times to available programs. This type of analysis can inform policy decisions on the macro level.

To investigate how SMY's mental and behavioral health outcomes compare to non-SMY, and vary by geographic context, analysis of existing data will be conducted. A nationally representative dataset of youth will be utilized that includes measures of mental and behavioral health, sexual identity, and geographic location. A nationally representative dataset will allow for comparison of youth from various regions of the country.

Significance of the Study

By describing how mental and behavioral health outcomes of SMY vary by geography, this study's findings will contribute to the application of intersectionality theory in social work. Social workers are called to utilize an intersectional framework and consider how social identities intersect to shape people's lives (Zastrow & Kirst Ashman, 2016). With SMY, interventions and programs that work for urban or suburban youth may not be practical or effective for those living in rural areas. Applying an intersectional approach will allow social workers to better tailor their efforts for SMY rather than utilizing a one-size-fits-all approach. In addition, social workers will be able to identify high-need and underserved areas, and take steps to address service gaps for SMY.

This study is informed by the Assessment Phase of the Generalist Model. Steps will be taken to investigate relationships between mental and behavioral health outcomes and geography. Analysis will be used to explore patterns in the data and identify problems, such as high need areas or lack of available services for SMY. The research questions for this study are: 1) how do the mental and behavioral health outcomes between SMY and non-SMY compare? 2) how do behavioral health disparities between SMY and heterosexual youth vary by geography?

CHAPTER TWO

LITERATURE REVIEW

This chapter will review relevant research and theories on sexual minority youth (SMY) and behavioral health. First, sexual identity development during adolescence will be discussed. Second, research on behavioral health disparities between SMY and non-SMY will be reviewed. Third, two theories guiding the project will be summarized. Fourth, research on how geography is related to behavioral health will be discussed. Fifth, limitations of existing research will be noted. Finally, key points of the chapter will be summarized.

Sexual Identity Development in Adolescence

Adolescence is roughly defined as the period of development between ages 10 and 21, broken into three phases: early (about 10-13 years), middle (about 14-17 years), and late (about 18-21 years) (Allen & Waterman, 2019). During adolescence, young people must grapple with five types of development: physical, cognitive, emotional, social, and moral (U.S. Dept. of HHS, Office of Population Affairs, 2018). Their bodies and minds are developing, while they learn to deal with stress, and navigate an increasingly complex set of relationships at home, school, online, and with peers.

In the 1950s, Erickson posited that adolescents must resolve the dilemma of identity versus role confusion. Youth must develop a sense of self that they will carry with them into adulthood, integrating past experiences with future expectations. Adolescence serves as the bridge from childhood to adulthood,

and thus resolving this identity crisis is key to positive outcomes in the future (Orenstein & Lewis, 2020).

Part of this identity formation process includes developing a sexual identity. Sexual identity is a broad term that encompasses sexual needs, values, preferred characteristics of partners, preferred behaviors, group membership identity, and attitudes (Dillon et al., 2011). Part of sexual identity is one's sexual orientation, which can be defined as "an enduring pattern of emotional, romantic, and/or sexual attractions" to other people (APA, 2008; Dillon et al., 2011). Sexual orientation is based on how people meet their needs for intimacy in relationships with others. It is important to note that the terms sexual orientation and sexual identity are often used interchangeably, even though they are distinct concepts.

In the past, the three main categories of sexual orientation were heterosexual, homosexual (gay or lesbian), and bisexual (APA, 2008). However, the list of categories has expanded in recent years to reflect the growing diversity and awareness within the LGBTQ community. Newer categories include asexuality, defined as feeling no sexual attraction to others, and pansexual, defined as experiencing romantic or sexual desire for people of all genders and sexes (UC Davis LGBTQIA Resource Center, 2020). Sexual orientation categories will likely continue to grow and change over time.

Most people experience attraction to others between middle childhood and early adolescence (APA, 2008). By high school, national surveys indicate that

the majority of adolescents identify with a sexual identity. According to the 2019 Youth Risk Behavioral Survey (YRBS), a nationally representative survey of students in grades 9-12, about 84% of students identified as heterosexual, 8.7% as bisexual, 2.5% identified as gay or lesbian, and 4.5% were not sure of their sexual identity (Underwood et al., 2020).

YRBS data collected from seven states and six large cities between 2001-2009 show that the number of youth who identify as a sexual minority has increased over time, from 7.5% between 2001-2009 versus about 15% in 2019 (Kann et al., 2011; Underwood et al., 2020). The increase in the percentage of adolescents who identify as a sexual minority over the last ten years is of note. Research shows that Sexual Minority Youth (SMY) are a vulnerable population who are at higher risk for behavioral health challenges, as will be discussed in the next section. Social institutions that serve youth, such as schools, health care, foster care, probation, and mental health care providers need to prepare to work with this population more frequently.

Sexual Minority Youth and Behavioral Health

Behavioral health disparities between heterosexual and SMY are well documented. SMY are more likely to experience depression than heterosexual youth (Marshal et al., 2011; Hatchel et al., 2019). In a meta-analysis of 23 studies published between 1999 and 2015, Lucassen et al. (2017) found that SMY were about three times more likely to experience depressive symptoms or a depressive disorder versus heterosexual youth.

SMY are also more likely to experience suicidal ideation and to attempt suicide (Aranmolate et al., 2017; Johns et al., 2019; Raifman et al., 2019), a trend that has persisted over time. A meta-analysis of 24 research studies from 2009 and earlier found that SMY were about three times more likely to report a history of suicidality compared to heterosexual youth, after controlling for key variables (Marshal et al., 2011). An analysis of 2017 YRBS data found that SMY were still about three times more likely to attempt suicide versus heterosexual students, although researchers also found that suicide attempts declined between 2009 and 2017 for SMY (Raifman et al., 2019).

Another aspect of behavioral health is use and abuse of substances. For adolescents, substance use can be particularly problematic as their brains are still developing. Substance use can also impair judgment, leading to risky behaviors, such as impaired driving. SMY are more likely to use and abuse substances, including alcohol, marijuana, and prescription opioids (Choi et al., 2017; Felt et al., 2020; Fish & Baams, 2018), than heterosexual youth.

Theories Guiding Conceptualization

Most of the research on SMY and behavioral health are guided by Minority Stress Theory. According to Minority Stress Theory, the challenges sexual minority youth experience come from the prejudice and discrimination within their environment (Meyer, 2007). Meyer outlines four processes that lead to stress. First, stress can be produced by external events and conditions, whether acute or chronic, such as being shunned at work or the target of a hate crime. Second,

minority group members may become vigilant, or constantly on guard, as they come to expect negative interactions. Third, minority group members may decide to conceal their identities, if possible, in order to avoid prejudice and discrimination. Finally, minority group members may internalize the negative stereotypes and prejudice in society, leading to a negative impact on their self-esteem and self-efficacy (Meyer, 2007).

Sexual minority youth likely experience a number of stressful social interactions as they move throughout their daily lives. Those who come out as non-heterosexual may feel chronic stress if their family, teachers, or peers are uncomfortable or disapproving of their sexual identity. Those who fear rejection from significant others may conceal their sexual identity, leading to stress as they work to keep their secret. Youth may internalize homophobia pervasive in the larger society, and experience negative effects on their sense of self.

A second theoretical framework that guides research on SMY is intersectionality. Intersectionality posits that multiple factors intersect to shape one's experiences of privilege and disadvantage (Zastrow & Kirst-Ashman, 2016). Using intersectionality in research on SMY means analyzing how sexual identity interacts with factors such as race, ethnicity, social class, religion, gender, immigration status, and geographic location. For example, the experience of upper-class gay men in California will vary from the experiences of low-income lesbians in Texas.

Applying intersectionality in the study of SMY will aid in the development of intervention strategies. Interventions that work for one subgroup of SMY may not be as effective with others. By using intersectionality as a guide in research on SMY, a richer picture of the strengths and challenges they experience can be painted (Crenshaw, 2008). In this research, particular attention will be paid to how sexual identity intersects with geographic location to shape SMY's behavioral health.

The Impact of Geography on Sexual Minority Youth

Research demonstrates that where sexual minorities live impacts their behavioral health. For example, the number of LGBTQ+ community supports in an area has been found to be significantly associated with lower odds of illegal drug use for SMY (Watson et al., 2020). Community supports included presence of LGBTQ events and LGBTQ youth-serving organizations. In a study of lesbian, gay, and bisexual (LGB) adults, Hatzenbuehler et al. (2011) found that those living in states with higher concentrations of same sex couples had lower prevalence of major depression and anxiety disorder than those living in states with lower concentrations.

Living in a rural area may present particular challenges for SMY. In general, research on health disparities shows that people in rural areas face barriers to accessing care. Barriers include fewer providers, long distances to travel for appointments, lack of confidentiality, stigma, and poverty (CDC, 2017). Such barriers may make it harder for SMY living in small towns and less

populated areas to access needed mental health support services. Living in a rural area may be a risk factor for behavioral health issues due to the socio-cultural context. Studies indicate that sexual minorities within rural areas experience more negative attitudes, hostility, and feel less accepted than those living in more populated regions (Choi et al., 2017; Hulko & Hovanaes, 2017; Paceley et al, 2019).

Limitations of Research

Research to date on how geography impacts SMY's mental and behavioral health is limited. First, while mental and behavioral health disparities between heterosexual and sexual minority youth are well documented, less research has examined within-group differences among SMY. Of those that have, they focused on variation by gender, race/ethnicity, and grade in school, but not geographic region or level of rurality (Aranmolate et al., 2017; Felt et al., 2020; Fish & Baams, 2018; Johns et al., 2020; Watson et al., 2020). An exception is Choi et al. (2017) whose study compared rural and urban LGBTQ youth in California in regard to substance use and feelings of school connectedness.

A small number of studies have examined levels of social support in the geographic areas in which SMY live. However, none utilized a nationally representative dataset. Among the studies that have examined social support within the areas SMY live, methodologies differ. Some studies analyzed SMY's perceptions of social supportiveness within their communities from survey or

interview data. Watson et al. (2020) used a different approach. The researchers measured community supports within geographic areas surrounding the schools that survey participants attended. They created buffer zones using a radius of 30-minute drive times, and researched quantity and quality of LGBTQ-friendly events and resources within each zone. Each zone was then scored in terms of LGBTQ community supports. This method can be accomplished using GIS software and a statistical package. The literature review demonstrates a need for further research investigating the intersection of geography and behavioral health for SMY.

Summary

Research reviewed shows that SMY are a vulnerable population, at risk for a number of mental and behavioral health challenges, including depression, substance use, and suicidality. According to Minority Stress Theory, living in contexts in which SMY experience prejudice, discrimination, and lack of social support contribute to their higher rates of mental and behavioral health challenges. Therefore, it is important to examine the relationship between geography and behavioral health for SMY. In addition, focusing on the intersection of sexual identity and geographic location is a way to apply an intersectional framework, key in social work. Existing research is limited, as no nationally representative dataset has been utilized to examine the relationship between SMY's behavioral health outcomes and location.

CHAPTER THREE

METHODS

In this chapter, the methods for this study will be described. First, the dataset from the PATH study will be described to provide information on the principal study's design, sampling methods, data collection, and instruments used. Next, the study design, procedures, measures, variables, and sample for the author's study will be described. Finally, the data analysis procedures will be summarized.

Introduction to the Population Assessment of Tobacco and Health Study

This study utilized data from the Population Assessment of Tobacco and Health (PATH) Study, a longitudinal study of tobacco use among youth and adults in the U.S. The focus of the PATH study is on tobacco use behavior, attitudes, and health outcomes. The study was funded by the National Institutes of Health (NIH), the National Institute on Drug Abuse (NIDA), and the Food and Drug Administration's Center for Tobacco Products. Over 10,000 youth (ages 9-17) and one parent were interviewed about every 12 months since 2013. Wave 5 was released in Fall 2021 (National Addiction & HIV Data Archive Program, 2021).

The PATH participants were chosen from the U.S. non-institutionalized civilian population through a four staged stratified area probability sampling. Tobacco users, young adults, and African American adults were oversampled in

Wave 1. In total, 13,651 youth (12-17 years old) and 32,320 adults (18 years and older) completed Wave 1 questionnaires (National Addiction & HIV Data Archive Program, 2021). Study participants are followed throughout the life of the PATH Study. The PATH study sample was replenished in Wave 4 by adding 14,098 youth and adults (National Addiction & HIV Data Archive Program, 2021).

Data for the PATH study was collected using audio computer-assisted self-interviews (ACASI). Youth and adults were interviewed using separate survey instruments. The youth survey comprised questions on their demographics, use of various tobacco products, risk and harm perceptions of tobacco products, health status, psychosocial and mental health status, substance use, and peer and family influences. A parent of each youth was also interviewed briefly about parental supervision, tobacco use by youth, and school performance. PATH study self-interviews were available in English and Spanish.

Study Design

For the author's social work project, a cross-section of the longitudinal PATH dataset was utilized, specifically, Wave 5, the latest wave available. Wave 5 youth consist of 10,446 youth who completed a prior PATH interview and 1,652 previous "shadow youth" who were at least 12 years old when interviewed. Shadow youth were interviewed for the PATH study beginning at age 9 and followed until old enough to join the youth cohort. The total sample size for Wave 5 was 12,098 youths. Information from each youth's parent, collected during a

brief parent interview, is also available. The youth weighted response rate for Wave 5 is 72.3% (ICPSR, 2021).

Measures of Behavioral Health Problems

In the PATH study, youth participants were assessed for behavioral health problems using items from the Global Appraisal of Individual Needs–Short Screener (GAIN-SS; Dennis et al, 2007). GAIN-SS is a validated instrument used to identify adolescents and adults who likely have mental health and/or substance use disorders, based on self-report. The four subscales in the screener measure: internalizing disorders, externalizing disorders, substance disorders, and crime/violence (Dennis, et al., 2010). For each item, participants were asked to identify the recency of each problem: never, past month, 2 - 12 months ago, or over one year ago. In addition to items from the GAIN-SS, youth participants were asked about recency and frequency of use of various substances such as alcohol, marijuana, and tobacco.

Dependent Variables (Outcome variables)

Mental Health Outcomes

Three items used in the PATH youth questionnaire were chosen to describe youth's mental health outcomes: 1)depressive symptoms: feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future; (2) anxiety symptoms: feeling very anxious, nervous, tense, scared, panicked, or like something bad was going to happen; and (3) trauma symptom: becoming very distressed and

upset when something reminded you of the past. The items are from the internalizing disorders subscale of the GAIN-SS. The items were recoded as dummy variables: ever experienced the symptom (past month, 2-12 months ago, or over one year ago; reference group) versus never. An additional item from the PATH youth questionnaire was chosen as a global measure of mental health. To measure youth's self-perception of their mental health over time, youth were asked: Compared with 12 months ago, how would you say your mental health is now (better, worse, or about the same)? The item was recoded as a dummy variable: worse (reference group) versus better or the same.

Behavioral Health Outcomes

Eight items used in the PATH youth questionnaire were chosen to measure youth's substance use outcomes to derive two sets of dependent variables, one representing lifetime use of any substance and another indicating current use of alcohol and marijuana.

Lifetime Use. Lifetime use was measured using six items from the substance disorder subscale of the GAIN-SS that asked recency of the following: (1) spent a lot of time getting alcohol or other drugs; (2) kept using alcohol or other drugs even though it was causing social problems, leading to fights, or getting you in trouble with other people; (3) use of alcohol or other drugs caused you to reduce your involvement in activities at work, school, etc.; (4) spent a lot of time using or recovering from alcohol or other drugs; (5) had

withdrawal problems (shaky hands, throwing up, sleeping, having trouble sitting still); and (6) used alcohol or other drugs to stop being sick or avoid withdrawal problems. (In the GAIN-SS, items 1 and 4 are combined into one survey question, and items 5 and 6 are combined into one question.) These items correspond to many of the criteria for a substance use disorder in the *Diagnostical Statistical Manual of Mental Disorder* (5th ed., DSM-5; American Psychiatric Association, 2013). The items were recoded as dummy variables (ever experienced the symptom vs. never) and then summed to create a composite score ranging from 0 (*no symptoms ever experienced*) to 6 (*all six symptoms ever experienced*). The score was then recoded as a dummy variable: two or more substance use symptoms ever experienced (reference group) versus one or no symptoms ever experienced. This threshold was chosen as the cutoff for a probable substance use disorder per the DSM-5 diagnostic criteria of SUD (APA, 2013).

Current Use. The final two items from the PATH youth questionnaire used to measure substance use outcomes were whether or not the youth reported using alcohol and/or marijuana in the past year. Alcohol and marijuana were chosen as they are the most commonly used substances among adolescents. Based on national Youth Risk Behavior Survey data, 29.2% of youth surveyed in 2019 reported using alcohol in the last 30 days and 21.7% reported using marijuana (CDC, 2020a; CDC, 2020b).

Independent Variables

Demographics

Participants were asked basic demographic questions, such as age at the time of the interview, gender, race, ethnicity, grade at the time of the interview, sexual orientation, and state of residence. Additionally, the parent of each youth participant interviewed was asked to provide their highest level of education, and total annual household income. All variables except age at time of interview were categorical variables.

Several demographic variables were recoded to reduce the number of categories. Sexual orientation was recoded as a dummy variable: non-sexual minority (heterosexual or straight) versus sexual minority (lesbian ,gay, bisexual, or something else). The latter formed the reference group. A variable for geographic region was created by grouping states into West (reference group), Midwest, Northeast, and South, based on the U.S. Census Bureau definitions (U.S. Census Bureau, 2021). Grade at the time of the interview was collapsed into four categories, namely, 8th grade or lower, 9-12th grades, college/vocational/technical school, and other (i.e. not enrolled, homeschooled, or attending a school that is ungraded). Parent's education was recoded into less than a 4 year college degree vs. 4 year degree or higher (reference group). Parent's income was recoded to reduce the number categories to three: less than $50,000, $50,000-150,000, and over $150,000. The poverty threshold for a family of four was about $25,000 in 2021 (U.S. Census Bureau,

2022). As families with incomes up to 200% of the poverty threshold are often considered low income, $50,000 was used as the cutoff for the lower income category (Kilduff, 2022). The cutoff for the higher income group ($150,000) was created by doubling the median household income in 2020 (about $70,000) (Shrider, et al., 2021).

Data Analysis

All analyses were restricted to youth who were asked the Sexual Orientation question (*n*=8,836). Youth under age 14 were not asked the question, according to the PATH study protocol. Youth who responded “don’t know” (*n* = 36) or refused to answer the question (*n* = 47) were excluded from this analysis. The unweighted Wave 5 data was analyzed.

Univariate, bivariate, and multivariate analyses were conducted to examine the relationship between sexual identity, behavioral health outcomes, and geographic region among youth. The data were analyzed in several ways.

First, descriptive statistics were used to summarize participants' demographic characteristics, namely, participants’ age, gender, race, ethnicity, sexual orientation, geographic region, grade level in school, parents’ education level, and annual total household income.

Second, the demographic characteristics of the sexual minority youth participants to the non-SMY participants were compared in bivariate analysis by using two independent-samples *t*-test and Pearson’s chi-square test of independence for continuous and categorical characteristics, respectively. To

conduct further bivariate analysis, Pearson's chi-square test of independence were performed to compare sexual minority youth vs. non-sexual minority youth in mental health and behavioral health outcomes.

Third, multivariate analysis was conducted using binary logit regression to test the relationship between the independent and dependent variables. The independent variables were sexual orientation of youth and geographic region. Dependent variables included four measures of youth's mental health and three measures of youth's substance use behavior. Covariates were age, race, gender, and parents' education. Age was included as a covariate, as increasing age is associated with greater likelihood of ever experiencing a mental health challenge, and ever using drugs. Race and gender were included as covariates in order to capture mental health and behavioral health disparities among race and gender groups. Parents' education was included as a proxy for socioeconomic status (SES), as low SES is associated with poorer health outcomes. Statistical significance was determined at a *p*-value of less than .05. Binary logit regression was conducted for the full sample (n=8,836) and the subsample of sexual minority youth (n=1,202). Binary logit regression was performed with a reduced number of covariates for the subsample, due to the smaller sample size. Data was analyzed using IBM SPSS Statistics, version 28.0.1.1.

IRB Approval

Approval for the study was obtained from the CSUSB IRB in Fall 2021. As the PATH study restricts access to youth participants' sexual orientation and state of residence data, the author had to apply for permission to the National Addiction & HIV Data Archive Program (NAHDAP), hosted by the Inter-university Consortium for Political and Social Research (ICPSR) at the University of Michigan, to use the Wave 5 Youth/Parent Restricted Use Datafile and Wave 5 State Identifier Youth/Parent Datafile. Once the project was approved, an institutional representative from the CSUSB Office of Procurement and Contracts and the student's faculty research supervisor were required to sign a Restricted Data Use Agreement with ICPSR. Access to the data was then granted to the student and the faculty research supervisor through a virtual data enclave (VDE). Any output generated had to be first submitted for review by ICPSR staff before being released from the VDE for public dissemination.

CHAPTER FOUR

RESULTS

Demographic Characteristics

Table 1 displays the summary statistics of the sample's demographic characteristics. About half of the entire sample (*N*=8,836) was male (51.7%). The sample was racially and ethnically diverse, in that about one-third of participants identified as a race other than White (33.5%), and about one-third of participants identified as Hispanic (31%). The average age of participants was 15.5 years (*SD* = 1.11). A minority of youth (13.6%) identified as lesbian, gay, bisexual, or something else. The majority were in high school at the time of the interview (87%). About one-third (30.2%) speak a language other than English at home. A large portion of the sample came from lower-socioeconomic households, as about two-thirds of their parents had less than a four-year college degree (67.1%), and almost half lived in households in which the annual income was less than $50,000 (43.3%). The largest portion of participants lived in the South (38.7%), while the fewest lived in the Northeast (13.8%).

Table 1. Descriptive Statistics

Variables	All youth[a] (*N*=8,836)	Non-Sexual Minority Youth (*n*=7,634)	Sexual Minority Youth[b] (*n*=1,202)	Test Statistics[e]	p value
	%	%	%		
Sex					
Male	51.70	55.90	25.20	χ2(1, 8803) = 388.11	<.001
Female	48.30	44.10	74.80		
Race					
White alone	66.50	66.20	68.50	χ2(3, 8305) = 9.3	0.026
Black alone	16.70	17.00	14.90		
Asian alone	3.90	4.10	2.70*		
Other race, and multiracial	12.90	12.70	13.90		
Hispanic					
Yes	30.70	31.40	26.40	χ2(1, 8462) = 11.84	<.001
No	69.00	68.60	73.60		
Age in years[c], *M* (*SD*)	15.52 (1.110)	15.50 (1.111)	15.62 (1.103)	t(8834) = -3.57	<.001
Sexual Orientation					
Straight	86.40	100.00	NA	NA	NA
Lesbian, gay, bisexual, something else		NA	100.00		
Grade Level					
8th grade or lower	9.60	9.60	9.10	χ2(3, 8423) = 20.22	<.001
High school (9-12th grade)	87.10	87.40	85.30		
College, Vocational, or Technical School	1.60	1.40	2.60**		
Other[d]	1.70	1.50	3.00**		
Speak a language other than English at home					
Yes	30.20	31.00	24.90	χ2(1, 8825) = 17.71	<.001
No	69.80	69.00	75.10		
Parent's Educational Attainment					
Less than 4 year college degree	67.60	67.30	70.00	χ2(1, 8763) = 3.32	0.064

4 year college degree & higher	32.40	32.70	30.00		
Total Household Income					
Less than $50,000	43.30	42.60	47.20**	$\chi 2(2, 8468) = 7.71$	0.021
$50,000- 150,000	38.70	39.00	37.20		
$150,000 and over	13.80	14.10	12.40		
Missing	4.20	4.30	3.20		
Region					
Northeast	13.80	13.60	15.40	$\chi 2(3, 8836) = 11.22$	0.011
Midwest	21.40	21.10	24.00**		
South	38.70	39.20	35.40*		
West	26.10	26.30	25.30		

[a]All Youth refers to youth ages 14 and up who answered the sexual orientation question. Those who were not asked (youth under 14), answered don't know (n=36), or refused (n=47) were excluded.

[b]Sexual minority = lesbian, gay, bisexual, or something else

[c]Age in years at the time of the Wave 5 interview

[d]Other = youth not enrolled, home schooled, or whose school is ungraded

[e]Yates' Continuity Correction reported to adjust for overestimates of the chi-square values when each variable has 2 categories (Pallant, 2016).

*Based on the adjusted residuals obtained in the chi-square tests (not reported here), the percentages of SMY are lower than expected in this category. Adjusted residuals of less than -2 signify that the number of cases in the cell is less than expected (Pallant, 2016, p. 266).

**Based on the adjusted residuals obtained in the chi-square tests, the percentages of SMY are higher than expected in this category. Adjusted residuals of more than 2 signify that the number of cases in the cell is more than expected (Pallant, 2016, p. 266).

Mental and Behavioral Health Outcomes

Table 2 displays the percentages of youth by mental health outcomes. For the entire sample (*N*=8,836), more than half of the participants reported experiencing depressive symptoms (56.5%), anxiety symptoms (59.6%), and the trauma symptom (53.4%) in their lifetime. A minority of youth reported their mental health was worse compared to one year ago (15%).

Table 3 displays the behavioral health outcomes of youths. A minority of youths used substances in the past 12 months—about one-third of youth used alcohol (30.3%), and a much smaller percentage used marijuana (9%). Similarly, a minority of youths have ever struggled with substance use, evidenced by impaired-control use (spending a lot of time getting alcohol or other drugs [14.4%] and spending a lot of time using or recovering from alcohol or other drugs [5.8%]), social and occupational impairment, risky use (continuing to use alcohol or other drugs even though it was causing social problems [6.8%]; and reducing their involvement in activities due to use of alcohol or other drugs [6.7%]), and physiological dependence (having withdrawal problems [9.5%]; and using alcohol/drugs to stop being sick or to avoid withdrawal problems [9.5%]). When combining these six items into a scale, only about 10% of youth reported experiencing two or more behaviors associated with a possible SUD in their lifetime (9.6%).

Table 2. Percentages for Mental Health Outcomes by Non-Sexual Minority Youth and Sexual Minority Youth

	All youth (*N*=8,836)	**Non-Sexual Minority Youth (*n*=7,634)**	**Sexual Minority Youth (*n*=1,202)**	**Chi-square test for independence***	***p* value**
Mental Health Outcome	%	%	%		
Depressive Symptoms Ever					
Ever	56.50	52.00	84.80	$\chi2(1, n= 8793) = 451.74$	< .001
Never	43.50	48.00	15.20		
Anxiety Symptoms Ever					
Ever	59.60	55.60	84.90	$\chi2(1, n= 8770) = 365.50$	< .001
Never	40.40	44.40	15.10		
Trauma Symptom Ever					
Ever	53.40	49.50	78.60	$\chi2(1, n= 8681) = 347.17$	< .001
Never	46.60	50.50	21.40		
Self-Perception of Mental Health Compared to 12 Months Ago					
Better or the same	85.00	87.0	71.7	$\chi2(1, n= 8806) = 189.76$	< .001
Worse	15.00	13.0	28.3		
*Yates' Continuity Correction reported to adjust for overestimates of the chi-square values when each variable has 2 categories (Pallant 2016).					

Table 3. Percentages for Substance Use Behaviors by Non-Sexual Minority Youth and Sexual Minority Youth

	All youth (*N*=8,836)	**Non-Sexual Minority Youth (*n*=7,634)**	**Sexual Minority Youth (*n* =1,202)**	**Chi -square test for independence***	***p* value**
Current Substance Use Behavior[a]	%	%	%		
Used alcohol in past 12 months	*N=8813*	*n=7614*	*n=1199*		
Yes	30.30	28.60	41.00	$\chi 2(1, n= 8813) = 75.72$	< .001
No	69.70	71.40	59.00		
Used marijuana in past 12 months	*N=8000*	*n=6989*	*n=1011*		
Yes	9.00	8.10	14.70	$\chi 2(1, n= 8000) = 46.24$	< .001
No	91.00	91.90	85.30		
Behaviors Associated with Possible Substance Use Disorder (from GAIN-SS)					
Spent a lot of time getting alcohol or other drugs	*N=5177*	*n=4315*	*n=862*	$\chi 2(1, n= 5177) = 42.39$	
Ever	14.40	13.00	21.60		< .001
Never	85.60	87.00	78.40		
Spent a lot of time using or recovering from alcohol or other drugs	*N=5180*	*n=4319*	*n=861*	$\chi 2(1, n= 5180) = 21.56$	
Ever	5.80	5.10	9.20		< .001
Never	94.20	94.90	90.80		
Kept using alcohol or other drugs even though it was causing social problems, leading to fights, or getting you in trouble with other people	*N=5188*	*n=4323*	*n=865*	$\chi 2(1, n= 5188) = 20.82$	
Ever	6.80	6.10	10.40		< .001
Never	93.20	93.90	89.60		

Use of alcohol or other drugs caused you to reduce your involvement in activities at work, school, etc.	*N=5183*	*n=4319*	*n=864*	$\chi 2(1, n= 5188) = 19.83$	
Ever	6.70	6.00	10.20		< .001
Never	93.30	94.00	89.80		
Had withdrawal problems (shaky hands, throwing up, sleeping, having trouble sitting still)	*N=5188*	*n=4325*	*n=863*	$\chi 2(1, n= 5188) = 28.38$	
Ever	9.50	8.50	14.40		< .001
Never	90.50	91.50	85.60		
Used alcohol or other drugs to stop being sick or avoid withdrawal problems	*N=5189*	*n=4326*	*n=863*	$\chi 2(1, n= 5189) = 24.43$	
Ever	4.10	3.50	7.20		< .001
Never	95.90	96.50	92.80		
Possible SUD[a]	9.60 (*N*=496)	8.50 (*n*=363)	15.60 (*n*=133)	NA	

[a]N size varies because only youth who reported ever using alcohol or drugs were asked more specific questions about their use.

*Yates' Continuity Correction reported to adjust for overestimates of the chi-square values when each variable has 2 categories (Pallant 2016).

Bivariate Analysis

Demographics

As shown in Table 1, the non-sexual minority youth (non-SMY) and sexual minority youth (SMY) varied significantly in a number of ways. SMY were statistically significantly older than non-SMY, 15.62 vs. 15.50 years old, $t(8834) = -3.57$, $p < .001$. By grade, a greater percentage of SMY were in college, vocational or technical school than expected (2.6% vs. 1.4%,) and in the "other" grade category (3.0% vs. 1.50%), which includes those unenrolled, home schooled, or whose school is ungraded, $\chi^2(3, 8423) = 20.22$, $p < .001$. Compared to non-SMY, a significantly larger percentage of sexual minority youth were female, 44.10% vs. 74.80%, respectively, $\chi^2(1, 8803) = 388.11$, $p < .001$.

The SMY group was somewhat less racially and ethnically diverse than the non-SMY. Compared to non-SMY, statistically significantly fewer SMY identified as Asian American (4.1% vs 2.7, respectively, $\chi^2[3, 8305] = 9.3$, $p < .026$) or Hispanic (26.4% vs. 31.4%, $\chi^2[1, 8462] = 11.84$, $p < .0001$. Finally, significantly fewer SMY speak a language other than English at home, 24.90 % vs. 31.40%, $\chi^2(1, 8825) = 17.71$, $p < .0001$.

In terms of socioeconomic status, a significantly greater percentage of SMY lived in low-income households (i.e. less than $50,000 per year) than non-SMY, 47.2% vs. 42.6%, respectively, $\chi^2(2, 8468) = 7.71$, $p <.021$. The regional distribution of the two groups was significantly different ($\chi^2(3, 8836) = 11.22$, p

< .011), as more SMY lived in the Midwest, and fewer lived in the South than expected.

In general, SMY were older, majority female, racially and ethnically less diverse, and socio-economically more disadvantaged than the non-SMY. While about a fourth of SMY lived in the Midwest, only about one-fifth of non-SMY did. Significantly fewer SMY lived in the South than non-SMY.

Mental Health Symptoms

Table 2 displays the results of bivariate analysis comparing SMY and non-SMY on mental health symptoms. SMY were statistically significantly more likely to ever have experienced the mental health symptoms of anxiety, depression, and distress at a reminder of the past (trauma symptom) than non-SMY. SMY were also significantly more likely to report that their mental health was worse than 12 months ago than non-SMY, 28.30% vs. 13.00 %, respectively, $\chi^2(1, 8806) = 189.76$, $p < .0001$. In a separate analysis not displayed in the table, SMY were also significantly more likely than non-SMY to report currently experiencing the mental health symptoms of anxiety, depression, and trauma versus experiencing the symptoms never or over a year ago, at the .001 level. In sum, youth who identified as sexual minorities were more likely to experience poorer mental health outcomes than youth who did not.

Substance Use Behavior

Table 3 displays the results of bivariate analysis comparing SMY and non-SMY on substance use behavior. Results show that sexual minority youth were

significantly more likely to have experienced each of the lifetime substance use behaviors than non-sexual minority youth. For example, 14.4% of SMY reported ever having withdrawal problems vs. 8.5% of non-SMY, $\chi^2(1, 5188) = 28.38$, $p < .0001$. SMY were also significantly more likely to have ever experienced two or more behaviors that indicate a possible substance use disorder, 15.6% vs. 8.5%, $\chi^2(1, 5141) = 40.44$, $p < .0001$.

SMY were more likely to be current users of substances. Significantly more SMY vs. non-SMY used alcohol in the past year (41.00% vs. 28.60%), $\chi^2(1, 8813) = 75.72$, $p < .0001$. Significantly more SMY vs. non-SMY used marijuana in the past year (14.70% vs. 8.10%), $\chi^2(1, 8000) = 46.24$, $p < .0001$.

In general, youth who identified as a sexual minority were more likely to have ever struggled with substance use versus those who did not. Specifically, SMY were more likely to have impaired-control use, social and occupational impairment, risky use, and physiological dependence on any alcohol or drug than non-SMY. As a result, SMY were significantly more likely to have a possible SUD. SMY were also more likely to be current users of alcohol and/or marijuana.

Multivariate Analysis

Mental Health Outcomes

Tables 4-7 display the results of multivariate analysis testing the relationship between youth's sexual orientation, geographic region, and mental health outcomes. Results show that after controlling for sociodemographic characterstics of age, sex, race, SES, and geography, being SMY significantly

increases the odds of ever experiencing the mental health symptoms of anxiety, depression, and distress at reminder of the past (trauma symptom). For example, SMY are 4.2 times more likely to have ever experienced depressive symptoms versus non-SMY (95% confidence interval [CI] [3.54, 4.99], p<.001). SMY are 3.63 times more likely to have ever experienced anxiety symptoms versus non-SMY (95% CI [3.05, 4.31], p<.001). SMY are 3.06 times more likely to have ever experienced the trauma symptom versus non-SMY (95% CI [2.62, 3.56], p<.001). SMY were also 2.34 times more likely to report their mental health was worse compared to one year ago versus non-SMY (95% CI [2.01, 2.72]. p<.001).

The relationship between sexual identity and mental health outcomes was significant. In general, youth who identified as a sexual minority were three to four times more likely to experience negative mental health symptoms than youth who did not. SMY were twice as likely to report their mental health had declined over time versus non-SMY.

Results show that youth who live outside of the Western region of the U.S. have significantly lower odds of ever experiencing mental health symptoms after controlling for sociodemographic characteristics of age, sex, race, SES, and geography. Youth living in the Northeast (OR = 0.73, 95% CI [0.63, 0.85], p<.001) and South (OR = 0.88, 95% CI [0.78, 0.10], p<.041) had lower odds of ever experiencing the trauma symptom versus those in the West. Youth living in the Northeast, Midwest, and South had lower odds of ever experiencing

depressive and anxiety symptoms versus those in the West. More specifically, youth in the Northeast were 0.71 times less likely to experience depressive symptoms (95% CI [.61 – 0.83, p<.001), and 0.80 times less likely to experience anxiety symptoms (95% C.I. [0.68 – 0.93], p=.005) than those in the West. Youth in the Midwest were 0.84 times less likely to experience depressive symptoms (95% CI [0.73 – 0.96, p=.013), and 0.85 times less likely to experience anxiety symptoms (95% C.I. [0.75 – 0.98], p=.024) than those in the West. Youth in the South were 0.81 times less likely to experience depressive symptoms (95% CI [0.71 – 0.91, p<.001), and 0.82 times less likely to experience anxiety symptoms (95% C.I. [0.72 – 0.92], p<.001) than those in the West. Geographic region was not significantly related to self-perception of mental health. In sum, the relationship between geographic region and mental health outcomes was significant for all youth. Youth who lived in the West were at higher risk of negative mental health outcomes.

Of the covariates, females had significantly higher odds than males of ever experiencing each of the mental health symptoms (anxiety, depression, and trauma), and to report that their mental health was worse compared to last year, at the p<.001 level. For example, females were 2.24 times more likely to experience anxiety symptoms compared to males (95% C.I. [2.04 – 2.46], p<.001). Youth who identified as Multiracial or other versus White alone had significantly higher odds of ever experiencing depressive symptoms (OR = 1.19, 95% CI [1.03, 1.37], p=.017) and anxiety symptoms (OR = 1.15, 95% CI [0.99,

1.33], p=.061). Youth who identified as Black alone versus White alone had significantly lower odds of ever experiencing any of the mental health symptoms, and lower odds that their mental health was worse compared to one year ago, at the p<.05 level. For example, Black youth were 0.65 times less likely to report their mental health was worse compared to a year ago than White youth (95% CI [0.54, 0.79], p<.001), and 0.77 times less likely to report depressive symptoms ever compared to White youth (95% CI [0.67-0.87], p<.001. Asian-identified youth had lower odds of ever experiencing anxiety versus White-identified youth (OR = 0.64, 95% CI [0.50, 0.83], p<.001). Youth with a parent with a 4-year college degree had higher odds of ever experiencing anxiety (OR = 1.11, 95% CI [1.01, 1.23], p=.034), and to report their mental health as worse than one year ago versus those whose parents did not have a 4-year college degree (OR = 1.28, 95% CI [1.13, 1.46], p<.001). Odds of ever experiencing depression increased by 1.08 as youth's age increased by one year (95% CI [1.04, 1.13], p<.001).

Overall, being female, Multiracial/Other vs. White, from a higher SES home, and older was associated with higher odds of negative mental health outcomes. In contrast, being Black or Asian versus White was associated with lower odds of negative mental health outcomes. The findings on covariates suggest that gender, race, SES, and age shape one's mental health outcomes.

Table 4. Logistic Regression on Depression Symptoms

Variable	Coef	SE	Wald	95% C.I.		*p*
Age	0.077	0.021	13.18**	1.036	1.126	0.000
Female	0.779	0.048	268.28**	1.986	2.393	0.000
Race (Ref = White alone)			26.28**			0.000
Black alone	-0.265	0.066	16.16**	0.674	0.873	0.000
Asian alone	-0.058	0.123	0.22	0.742	1.202	0.64
Other/Multiracial	0.173	0.073	5.69*	1.031	1.371	0.017
Parent with College	0.055	0.05	1.17	0.957	1.166	0.279
Region (Ref = West)			21.97**			0.000
Northeast	-0.347	0.079	19.41**	0.606	0.825	0.000
Midwest	-0.173	0.069	6.23*	0.734	0.963	0.013
South	-0.216	0.062	12.18**	0.713	0.909	0.000
Sexual Minority Youth (SMY)	1.435	0.088	265.65**	3.535	4.992	0.000
Constant	-1.265	0.334	14.37**			0.000

*p<.05, **p<.001

Note. Coef, estimated coefficient; SE, standard error of estimated coefficient; Wald test statistic ; p, the significance level of the Wald test.

Table 5. Logistic Regression on Anxiety Symptoms

Variable	Coef	SE	Wald	95% C.I.		*p*
Age	-0.026	0.021	1.456	0.935	1.016	0.228
Female	0.806	0.048	280.24**	2.037	2.461	0.000
Race (Ref = White alone)			45.77**			0.000
Black alone	-0.335	0.066	25.81**	0.629	0.814	0.000
Asian alone	-0.446	0.122	13.34**	0.504	0.813	0.000
Other/Multiracial	0.138	0.073	3.506	0.994	1.325	0.061
Parent with College	0.108	0.051	4.472*	1.008	1.231	0.034
Region (Ref = West)			12.74*			0.005
Northeast	-0.224	0.079	7.978*	0.684	0.934	0.005
Midwest	-0.158	0.07	5.065*	0.745	0.98	0.024
South	-0.203	0.063	10.564*	0.722	0.922	0.001
SMY	1.288	0.088	211.85**	3.048	4.311	0.000
Constant	0.454	0.336	1.828			0.176

*p<.05, **p<.001

Table 6. Logistic Regression on Trauma Symptom

Variable	Coef	SE	Wald	95% C.I.		*p*
Age	0.027	0.021	1.649	0.986	1.07	0.199
Female	0.694	0.047	218.35**	1.826	2.196	0.000
Race (Ref = White alone)			12.25*			0.007
Black alone	-0.151	0.066	5.23*	0.756	0.979	0.022
Asian alone	-0.109	0.121	0.818	0.707	1.136	0.366
Other/Multiracial	0.146	0.071	4.17*	1.006	1.331	0.041
Parent with College	-0.197	0.05	15.67**	0.745	0.905	0.000
Region (Ref = West)			16.54*			0.001
Northeast	-0.316	0.078	16.51**	0.626	0.849	0.000
Midwest	-0.118	0.068	2.964	0.777	1.016	0.085
South	-0.125	0.061	4.17*	0.783	0.995	0.041
SMY	1.117	0.078	202.92**	2.62	3.563	0.000
Constant	-0.54	0.33	2.683			0.101

*p<.05, **p<.001

Table 7. Logistic Regression on Self-Perception of Mental Health

Variable	Coef	SE	Wald	95% C.I.		*p*
Age	-0.05	0.03	2.788*	0.902	1.01	0.095
Female	0.547	0.07	70.59**	1.522	1.96	0.000
Race (Ref = White alone)			20.96**			0.000
Black alone	-0.42	0.1	18.55**	0.539	0.79	0.000
Asian alone	0.182	0.15	1.413	0.889	1.62	0.234
Other/Multiracial	-0.09	0.1	0.803	0.761	1.11	0.37
Parent with College	0.25	0.07	14.468**	1.129	1.46	0.000
Region (Ref = West)			3.35			0.341
Northeast	-0.11	0.11	1.093	0.729	1.1	0.296
Midwest	0.074	0.09	0.692	0.904	1.28	0.405
South	-0.03	0.08	0.154	0.824	1.14	0.694
SMY	0.851	0.08	122.05**	2.014	2.72	0.000
Constant	-1.44	0.45	10.489			0.001
*p<.05, **p<.001						

Behavioral Health Outcomes

Tables 8 – 10 display the results of multivariate analysis testing the relationship between youth's sexual orientation, geographic region, and substance use behaviors. Results show that being SMY significantly increases the odds of a possible SUD and current use of alcohol and marijuana. More specifically, SMY were almost twice as likely as non-SMY to report two or more behaviors related to a possible SUD in their lifetime than non-SMY (OR = 1.97, 95% CI [1.56, 2.48], p<.001). SMY were 1.48 times (95% CI [1.29, 1.70], p<.001) and 1.85 times (95% CI [1.51, 2.28], p<.001) more likely to have used alcohol and marijuana, respectively, in the past year than non-SMY. Overall, youth who identified as a sexual minority were more likely to experience negative behavioral health outcomes related to substance use, and to currently use drugs.

Results show that geographic region was not significantly related to a possible SUD. However, living in the Midwest vs. the West was associated with higher likelihood of using alcohol but lower likelihood of using marijuana currently. Youth in the Midwest were 1.22 times more likely to report using alcohol in past year (95% CI [1.06, 1.40], p=.006), and 0.68 times less likely to report using marijuana (95% CI [0.54, 0.85], p = .001) than those in the West. Youth living in the South vs. West were 0.50 times less likely to report using marijuana in the past year (95% CI [0.41, 0.62], p < .001). In sum, geographic region had little relationship to youth's behavioral health outcomes. One exception is that living in the West was associated with higher odds of using

marijuana, while living in the Midwest was associated with higher odds of alcohol use.

Of the covariates, age was significantly associated with higher odds of a possible SUD (OR = 1.16, 95% CI [1.06-1.27], p = .002). With each one year increase in age, the odds of using substances in the past year increased by 1.37 times for alcohol (95% CI [1.31, 1.43], p<.001), and 1.52 times for marijuana (95% CI [1.41, 1.64], p<.001). Youth who identified as Multiracial or Other vs. White alone were 1.41 times more likely to have a possible SUD (95% CI [1.08, 1.83], p = .011), and 1.30 times more likely to report using marijuana in the past year (95% CI [1.04, 1.63], p=.024). Compared to White youth, Black and Asian youth had significantly lower odds of using alcohol in the past year, 0.44 (95% CI [0.37-0.51], p<.001) and 0.73 (95% CI [0.56-0.94], p=.016), respectively. Asian youth also had lower odds of using marijuana versus White youth (OR = 0.50, 95% CI [0.30-0.86], p = .012). Females were 1.56 times more likely than males to have used alcohol in the past year (95% CI [1.42-1.73], p<.001). While having a college educated parent decreased the odds by 0.58 of having a possible SUD (95% CI [0.46-0.73], p < .001), it increased the odds of using alcohol in the past year by 1.60 (95% CI [1.45-1.78], p <.001). Overall, being older and Multiracial/Other vs. White was significantly positively associated with lifetime substance use issues, while being from a higher SES home was negatively associated. Being older, Multiracial/Other, female, and from a higher SES home

was positively associated with current use of drugs, while being Black or Asian versus White was negatively associated with current use.

Multivariable Analysis for Subsample

Multivariate analysis was performed to test the relationship between geographic region and behavioral health outcomes for the subsample of SMY only (*n*=1,202). Parent's education and youth's age were controlled, while sex and race were excluded. Results show that geographic region was not significantly associated with mental health outcomes for SMY. The models testing the relationship between geographic region and anxiety symptoms [$\chi^2(5, 1188) = 5.19$, $p = .393$], the trauma symptom [$\chi^2(5, 1175) = 7.40$, $p = .193$], and self-perception of mental health [$\chi^2(5, 1190) = 9.47$, $p = .092$] were not statistically significant. The model for depressive symptoms was significant, $\chi^2(5, 1192) = 12.48$, $p = .029$. However, geographic region was not significantly associated with depressive symptoms for SMY at the $p<.05$ level. (No tables are included due to the lack of significance of the main independent variable on the dependent variables). In sum, geographic region had no relationship with the mental health outcomes of youth who identified as a sexual minority.

For the behavioral health outcomes, region was significantly associated with current use of marijuana (See Table 11). For SMY, living in the South vs. West decreased the odds of SMY using marijuana in the past 12 months by 0.53 (95% CI [0.33–0.83], p=.006). Geographic region was not significantly associated with alcohol use in the past 12 months nor possible SUD among SMY. Overall,

geographic region had little relationship with the behavioral health outcomes for SMY.

In regard to covariates' relationships to marijuana use (see Table 11), having a parent with a 4-year college degree or more significantly decreased the odds by 0.632 of SMY using marijuana in the past 12 months (95% CI [0.42-0.95], p=.028). As age increases by one year, SMY were 1.49 times more likely to have used marijuana in the past year (95% CI [1.26-1.76], p<.001). In sum, being from a higher SES home decreased the odds of current substance use, while being older increased the odds for SMY.

Table 8. Logistic Regression on Possible Substance Use Disorder (SUD)

Variable	Coef	SE	Wald	95% C.I.		*p*
Age	0.149	0.048	9.88*	1.058	1.274	0.002
Female	0.029	0.104	0.079	0.84	1.263	0.778
Race (Ref = White alone)			10.45*			0.015
Black alone	-0.076	0.148	0.263	0.693	1.24	0.608
Asian alone	-0.613	0.395	2.405	0.25	1.176	0.121
Other/Multiracial	0.341	0.133	6.523*	1.082	1.826	0.011
Parent with College	-0.55	0.117	22.21**	0.459	0.725	0.000
Region (Ref = West)			4.3			0.231
Northeast	-0.253	0.166	2.334	0.561	1.074	0.127
Midwest	-0.18	0.14	1.659	0.635	1.098	0.198
South	-0.242	0.128	3.562	0.611	1.009	0.059
SMY	0.678	0.118	32.93**	1.563	2.483	0.000
Constant	-4.479	0.763	34.463			0.000

*p<.05, **p<.001

Table 9. Logistic Regression on Alcohol Use in Past 12 Months

Variable	Coef	SE	Wald	95% C.I.		*p*
Age	0.314	0.023	188.87**	1.309	1.431	0.000
Female	0.447	0.051	77.26**	1.416	1.728	0.000
Race (Ref = White alone)			109.40**			0.000
Black alone	-0.831	0.081	106.27**	0.372	0.51	0.000
Asian alone	-0.316	0.131	5.77*	0.564	0.944	0.016
Other/Multiracial	-0.091	0.075	1.478	0.789	1.057	0.224
Parent with College	0.471	0.052	81.47**	1.446	1.775	0.000
Region (Ref = West)			21.64**			0.000
Northeast	0.105	0.082	1.669	0.947	1.304	0.196
Midwest	0.195	0.071	7.469*	1.057	1.397	0.006
South	-0.1	0.066	2.325	0.796	1.029	0.127
SMY	0.392	0.069	31.94**	1.292	1.696	0.000
Constant	-6.048	0.364	275.403			0.000

*p<.05, **p<.001

Table 10. Logistic Regression on Marijuana Use in Past 12 Months

Variable	Coef	SE	Wald	95% C.I.		*p*
Age	0.42	0.039	115.79**	1.41	1.643	0.000
Female	-0.008	0.085	0.009	0.841	1.171	0.925
Race (Ref = White alone)			12.274*			0.007
Black alone	0.036	0.123	0.084	0.814	1.319	0.772
Asian alone	-0.685	0.273	6.294*	0.295	0.861	0.012
Other/Multiracial	0.262	0.116	5.07*	1.035	1.632	0.024
Parent with College	0.069	0.088	0.618	0.902	1.272	0.432
Region (Ref = West)			43.816**			0.000
Northeast	-0.175	0.126	1.933	0.656	1.074	0.164
Midwest	-0.386	0.115	11.181**	0.542	0.852	0.001
South	-0.69	0.107	41.429**	0.407	0.619	0.000
SMY	0.617	0.106	33.651**	1.505	2.284	0.000
Constant	-8.695	0.627	192.335			0.000

*p<.05, **p<.001

Table 11. Logistic Regression on Marijuana Use in Past 12 Months for Sexual Minority Youth (SMY) Only

Variable	Coef	SE	Wald	95% C.I.		*p*
Age	0.398	0.086	21.41**	1.258	1.762	0.000
Northeast	-0.345	0.284	1.477	0.406	1.235	0.224
Midwest	-0.308	0.245	1.575	0.455	1.189	0.209
South	-0.641	0.232	7.62**	0.334	0.830	0.006
Parent with College	-0.460	0.208	4.86*	0.420	0.950	0.028
Region (Ref =West)			7.640			0.054
Constant	-7.556	1.371	30.388			0.000
*p<.05, **p<.001						

CHAPTER FIVE

DISCUSSION

This study's purpose was two-fold: 1) to examine the mental and behavioral health outcomes of sexual minority youth (SMY) compared to straight or heterosexual (non-SMY), and 2) to test the relationship between geographic region and mental and behavioral health outcomes for SMY using a nationally representative dataset. As for the first purpose, the results of this study are in line with existing research that shows sexual minority youth experience higher rates of mental and behavioral health challenges (Aranmolate et al., 2017; CDC, 2019; Choi et al., 2017; Felt et al., 2020; Fish & Baams, 2018; Hatchel et al., 2019; Ivey-Stephenson et al., 2020; Johns et al., 2019; Lucassen et al., 2017; Marshal et al., 2011; Raifman et al., 2019). According to bivariate analysis, SMY in the PATH study were significantly more likely to report ever experiencing mental health symptoms of anxiety, depression, and trauma than non-SMY. SMY were also significantly more likely to rate their mental health as worse compared to last year than non-SMY. In regard to behavioral health, SMY were significantly more likely to report lifetime use of alcohol or drugs that put them at risk of a SUD versus non-SMY. SMY were also significantly more likely to be current users of drugs (alcohol and marijuana) in the past 12 months versus non-SMY.

As for the second purpose of the study, while geographic region was significantly related to most of the mental and behavioral outcomes for all youth

(five of seven), region was not significantly associated with most of the outcomes for sexual minority youth alone (six of seven), based on the results of multivariate analysis. For all youth, living in the Western region of the U.S. increased the odds of youth ever experiencing symptoms of anxiety and depression versus living in the Northeast, Midwest, and South, after controlling for SES, age, gender, and race. Compared to the Northeast and South, living in the West significantly increased the odds of ever experiencing the trauma symptom. Compared to the Midwest and South, living in the West also increased the odds of currently using marijuana for all youth. In contrast, living in the West was significantly associated with lower odds of using alcohol vs. living in the Midwest. Region was not significantly associated with self-perception of mental health, nor possible SUD.

For the subsample of SMY, after controlling for SES and age, geographic region was not significantly associated with symptoms of anxiety, depression, nor trauma. Nor was it associated with one's self-perception of their mental health. Geographic region was significantly associated with one measure, current use of marijuana. For SMY, living in the West was associated with higher odds of using marijuana in the past year versus living in the South. The same finding was true for all youth. Geographic region was not significantly related to SMY's lifetime use of substances that would indicate a possible SUD, nor current use of alcohol.

The finding that where SMY live is not significantly associated with the majority of their mental and behavioral health outcomes is not in line with existing

literature. For example, research has found that living in rural areas has a negative impact on sexual minority youth (Choi et al., 2017; Hulko & Hovanaes, 2017; Paceley et al., 2019). Watson et al. (2020) found that quantity of LGBTQ+ community supports in an area was associated with lower odds of illegal drug use. Hatzenbuehler et al. (2011) found that depression and anxiety among sexual minority adults was significantly associated with density of same sex couples within a state. As the density increased, the odds of depression and anxiety decreased.

Possible reasons for the non-significant relationship between geographic location and mental and behavioral health outcomes for SMY in this study are several. First, region of the country may be a poor proxy for measuring factors that influence mental and behavioral health. For example, a more precise measure of rurality may better capture geographic differences among sexual minority youth's mental and behavioral health outcomes. An alternative strategy would be to utilize the Rural-Urban Continuum Codes from the U.S. Department of Agriculture, Economic Research Service. Each U.S. county is assigned one of nine codes, based on population size, and for rural areas, degree of urbanization and adjacency to a metro area (USDA, 2020). Grouping counties along the nine categories and then comparing youth outcomes may increase the likelihood of capturing the influence of geographic location on SMY's mental and behavioral health.

A second reason that geographic region may have been significant for all youth in the multivariate analysis, but not significant for SMY is due to sample sizes. The sample size for examining SMY separately was much smaller (*n*=1,202) compared to the sample size for all youth (*N*=8,836). The large sample may have led to small differences to be found significant, while the smaller sample may have led to significant differences being missed. Third, the sample of sexual minority youth was significantly different from the full sample, in that they were older, less racially and ethnically diverse, and more were from lower SES homes as well as female. This may have impacted which variables were significantly related to the outcomes for all youth versus SMY. Fourth, the sample of SMY was not representative of the national population, as 75% were female. The low representation of male participants may have impacted the results. Fifth, the unweighted Wave 5 data was used rather than the weighted, possibly impacting the results in some way.

For all youth, living in the West was associated with higher odds of experiencing mental and behavioral health challenges. This finding is in line with state rankings published by Mental Health America. Of 13 states with the highest prevalence of mental illness among youth and lowest access to care, eight are in the West (Mental Health America, 2022). State rankings were based on percentages of youth with major depressive episodes, substance use disorders, emotional disturbances, and several measures of access to mental health services.

The negative effect of living in the West on mental health is also in line with long-standing existing research on suicide. Suicide rates are higher in Western states, going back to the 19th century (Pepper, 2017; Rossen et al., 2018). Possible reasons include increased isolation in rural areas, higher rates of gun ownership, and a "culture of suicide" script pervasive in the region (Pepper, 2017).

As for the finding that living in the West is associated with higher odds of marijuana use for all youth and SMY alone, the influence of public policies is likely at play. Marijuana is legal recreationally and medicinally in nine of 13 states in the Western region of the U.S. In contrast, only two of 12 states in the Midwest, and one of 16 states in the South have legalized it for recreational and medicinal purposes (NORML, 2022). While still illegal for people under 21 to use marijuana, legalization may have increased access to marijuana through social contacts, and decreased social stigma toward the drug's use.

Limitations

This study has several limitations. First, restricting sexual minority youth to only youth who identify as lesbian, gay, bisexual, or something else may have excluded some youth who are still in the process of forming their sexual identity, but are at risk for higher rates of mental and behavioral health challenges. The PATH study offers an alternative way to classify youth, in that there is a survey item that asks to which gender(s) one is attracted, even if you do not take any action based on feeling attracted. Using this measure of sexual identity would

likely broaden the net of youth who may be experiencing mental health challenges.

A second limitation is that the mental and behavioral health measures were based on self-report. Some youth may have downplayed their challenges due to social desirability bias or stigma. Third, more precise measures to capture the impact of geographic location were not utilized, such as level of rurality, density of same sex couples, or number of LGBTQ + community supports, factors that have been shown to be related to mental and behavioral health outcomes for SMY.

Conclusions

This project examined the mental and behavioral outcomes of sexual minority youth using a nationally representative dataset. Findings show that sexual minority youth should be targeted for mental health and behavioral interventions. Increasing access to mental health services in public schools is one way to potentially reach this population. Based on Minority Stress Theory (Meyer 2007), efforts to reduce levels of prejudice and discrimination toward those who identify as a sexual minority will also help reduce levels of mental and behavioral health challenges. Public education campaigns, revised school curriculum, community events that celebrate LGBTQ+ history and experiences, and increased legal protections are some ways to reduce prejudice and discrimination toward this group.

While this study did not find geographic region to be significantly associated with SMY's mental and behavioral health outcomes, future research should continue to explore this relationship. By using more precise measures of geographic factors that influence youth's well-being, such as rurality, access to mental health services, and number of LGBTQ+ community resources in an area, variation may be identified in youth outcomes. The intersection of sexual identity and geography is worth further investigation.

APPENDIX A

IRB APPROVAL LETTER

IRB APPROVAL LETTER

Date: October 27, 2021

CSUSB INSTITUTIONAL REVIEW BOARD
Administrative Review
IRB# IRB-FY2022-72
Status: **Exempt**

Caroline Lim
Department of
California State University, San Bernardino
5500 University Parkway
San Bernardino, California 92407

Dear Caroline Lim:

Your application protocol to use existing data of human participants for research purposes, titled " Geographic Variation in Behavioral Health Outcomes of Sexual Minority Youth " has been reviewed and approved by the Chair of the Institutional Review Board (IRB) of California State University, San Bernardino and concurs that your application meets the requirements for exemption from IRB review under OHRP regulations 45 CFR 46 (b) (4) for existing and publicly available data. Please ensure your CITI Human Subjects Training is kept up-to-date and current throughout the study.

As the protocol has been determined to fall under the exempt category of review 45CFR 46 (b) (4) for existing and publicly available data you can make as many copies as needed for yourself and students who utilize this data for research purposes.

If you have any questions regarding the IRB decision, please contact Michael Gillespie, Research Compliance Officer. Mr. Michael Gillespie can be reached by phone at (909) 537-7588, by fax at (909) 537-7028, or by email at mgillesp@csusb.edu. Please include your application identification number (above) in all correspondence.

Best of luck with your research.

Sincerely,

Nicole Dabbs

Nicole Dabbs, Ph.D, IRB Chair
CSUSB Institutional Review Board

ND/MG

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