SEXUAL IDENITY, MINORITY SRESS, AND THE MENTAL HEALTH

OF LESBIAN, GAY, BISEXUAL, AND HETEROSEXUAL CANADIANS

by

Barbara (Basia) Joanna Pakula

Bachelor of Arts (Honours), Simon Fraser University, Burnaby, Canada, 2004

Master of Public Policy, Simon Fraser University, Burnaby, Canada, 2006

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE AND POSTDOCTORAL STUDIES

(Population and Public Health)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

September 2017

© Barbara (Basia) Joanna Pakula, 2017

Abstract

Background: Addressing mental health has emerged as a priority in Canada. The mental illness burden is thought to disproportionately affect some subgroups, including those self-identifying as lesbian, gay, and bisexual (LGB). Yet, to date, no reliable population estimates are available to characterize the prevalence of common mental health disorders amongst LGB Canadians.

Objectives: (1) Investigate the prevalence and correlates of anxiety, mood, and anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking among Canadians self-identified as LGB. (2) Examine whether life stress mediates and sense of community belonging moderates the relationship between sexual identity and the study outcomes. (3) Assess the heterogeneity in the prevalence of the study outcomes by sexual identity at intersections with other social positions (i.e., sex, age, income, education, and racialized minority status).

Methods: Pooled data from the 2007–2012 cycles of the Canadian Community Health Survey (N = 222,548) were used to obtain a multi-year sample of Canadians aged 18–59 years, who self-identified as LGB or heterosexual. Analyses included a series of logistic regression models, stratified binary mediation models, and models with multiple interaction terms. Bootstrapping was used to obtain standard errors and confidence intervals.

Results: LGB-identified Canadians reported substantially greater odds of mental health disorders compared with heterosexual peers: the odds of anxiety, mood, anxiety-mood, and co-occurring disorders were double for gay/lesbian-identified respondents, and more than triple for bisexual-identified respondents. Perceived life stress partially mediated the effects of sexual identity on the outcomes, and the greatest odds were observed for bisexual respondents. Combinations of disadvantaged positions of reporting a gay/lesbian or bisexual identity (vs. heterosexual) with

vulnerabilities related to income, age and sex were found to have multiplicative effects on the rates of mood and anxiety disorders.

Discussion: The results provide the first national estimates for common mental health disorders reported by LGB-identified Canadians. They suggest that universal interventions (thought to be applicable to all sexual identities) may ameliorate *some*, but not substantially diminish *all*, observed mental health disparities. Informed by these results, future interventions tailored to meet the specific needs of LGB people, particularly bisexual-identified, may hold promise.

Lay Summary

People's mental health is shaped by many factors, including biological, psychological, and social factors. Some groups of people have a greater burden of poor mental health. People who identify as gay, lesbian, or bisexual often have poorer mental health than do people who identify as heterosexual. This study asked, What is the mental health status of gay, lesbian, and bisexual Canadians and what influences it? The study found that gay, lesbian or bisexual people have greater likelihood of experiencing problems such as anxiety and mood disorders, and concluded that they experience more of the factors that lead to poor mental health. This disparity likely arises from the everyday experiences of stress and social isolation caused by the prejudice and discrimination to which they are exposed, and that heterosexual Canadians do not experience. These results should underpin interventions designed to protect or improve gay, lesbian, and bisexual people's mental health.

Preface

I had the primary responsibility of conceiving and designing the study, conducting and interpreting the analyses, and writing the dissertation. All steps of the research study were completed with input from and under the guidance of members of my research supervisory committee. Co-authored with my research supervisors, parts of the dissertation have been published, as follows.

Components of Chapters 1 and 4 using a subset of the dataset were published: Pakula, B., & Shoveller, J. A. (2013). Sexual orientation and self-reported mood disorder diagnosis among Canadian adults. *BMC Public Health, 13*, 209. I conceived of the study design, was responsible for the statistical analyses and their interpretation, and the writing of the manuscript.

A version of Chapter 4 was published: Pakula, B., Shoveller, J. A., Ratner, P. A., & Carpiano, R. (2016). Prevalence and co-occurrence of heavy drinking and anxiety and mood disorders among gay, lesbian, bisexual, and heterosexual Canadians. *American Journal of Public Health, 106*(6), 1042-1048. I conceived of the study design, was responsible for the accuracy of the statistical analyses and their interpretation, and the writing of the manuscript.

A version of Chapter 5 was published: Pakula, B., Carpiano, R. M., Ratner, P. A., & Shoveller, J. A. (2016). Life stress as a mediator and community belonging as a moderator of mood and anxiety disorders and co-occurring disorders with heavy drinking of gay, lesbian, bisexual, and heterosexual Canadians. *Social Psychiatry and Psychiatric Epidemiology, 51*(8), 1181-1192. I conceived of the study design, was responsible for the accuracy of the statistical analyses and their interpretation, and the writing of the manuscript.

Ethical review of the study, by a research ethics board, was not required; Article 2.2 of the Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans, 2014

exempts this type of research that relies on publicly available information that is legally

accessible and appropriately protected by law.

Table of Contents

List of Tables

List of Figures

Acknowledgements

I would like to express my deepest gratitude to my supervisory committee, Profs. Jean Shoveller, Pamela Ratner, and Richard Carpiano. Jeannie, thank you for always having my back, for your infectious optimism, humour, and your wise advice on all fronts. You are an extraordinary scientist, supervisor, and person, and I am incredibly lucky to have found you. Pam, thank you for your mentorship from day one, your wisdom and gentle guidance in difficult moments (I will not forget them), and for always caring about the small things. Rich, thank you for challenging my thinking and my comfort zone and, ultimately, for making me a better researcher. All three of you have showed me care and kindness that has truly touched me and supported me beyond what I can express.

Thank you to my family without whom this thesis would not have been possible. Mama, thank you for showing me every day what it means to work hard for what you want and what you believe. Laura, thank you for your love, reassurance, and extraordinary patience. A heartfelt thank you to Cathy and Rasmus for your generous friendship and many days and nights of babysitting during which large segments of this thesis were written. And to Beth… who has inspired me and has looked over me from the moon.

A special thank you to Judy Bradford for her invaluable mentorship. I am also indebted to all the participants of the Fenway 2014 Summer Institute for your inspiration. I want to acknowledge Elisheba Muturi and Ashleigh Rich for their professional guidance in conducting the literature review. Thank you, finally, to the Canadian Institutes of Health Research and to Killam Trust for financial support.

To my mother and my aunts, ciocia Basia, Zosia, and Wanda, who taught me that

I can be and do anything.

Chapter 1: Introduction

1.1   Problem Statement

It is estimated that nearly one in five Canadian adults will experience a mental illness during their lifetime.[1,2] Mood disorders, such as depression and bipolar disorders, and anxiety disorders are the most commonly reported mental health conditions in Canada, with an estimated 3 million Canadians aged 18 years or older (11.6% of the adult population) reporting that they had a mood or anxiety disorder, or both, in 2013.[3] Mood disorders are slightly more prevalent than anxiety disorders – recent surveys have shown that 7.8% of Canadians aged 12 years and older (9.6% of women and 6.0% of men) reported having been diagnosed with a mood disorder,[4] while diagnosed anxiety disorders were reported by 5.3% of Canadians[5] – and these disorders often co-occur. People reporting heavy alcohol use (consuming five or more drinks on one occasion, one or more times per week) have high rates of comorbidity with depression and other mental health disorders.[2,6,7] In 2014, 22.7% of Canadian men and 13.2% of Canadian women, aged 12 or older, reported heavy drinking.[8] Mood and anxiety disorders, as well as heavy alcohol use, pose a substantial health burden with serious adverse effects for people's general health, and for their social, occupational and educational functioning.[9]

This mental health burden has disproportionately affected some population subgroups. Previous studies in the United States (US) have found that lesbian, gay, and bisexual (LGB) adults and adolescents consistently report poorer mental health compared with heterosexuals, including greater rates of depression, anxiety, substance use, and suicide ideation and attempts.[10–23] These findings have been corroborated in European[24–31] and Australian[32–35] studies

where non-heterosexual orientation was found to be associated with elevated rates of mental health disorders, self-harm, suicidality, and problematic alcohol use. A systematic review of international studies between the years of 2005 and 2014 found that sexual minority men and women have an elevated risk for depression, anxiety, suicide attempts or suicides, and substance-related problems. Importantly, while all sexual minority subgroups were found to have increased risk, there were several notable subgroup differences, with bisexual people having the greatest risk.[36]

A small number of Canadian studies have examined the association between sexual orientation and mental health status in regional[37,38] and national samples,[39–43] generally noting considerably poorer outcomes for LGB respondents. For example, an examination of a subset of the data analysed in this dissertation research, based on the 2007-2008 Canadian Community Health Survey, found that as many as 17.1% of LGB respondents reported having a current mood disorder compared with 6.9% of heterosexual respondents.[41] Higher rates of poor mental health and greater substance use have been found for bisexual Canadians relative to the rates reported for the general population.[38] In a study of healthcare use in Canada, gay men, lesbian women and bisexual people were more likely than heterosexuals to consult mental health service providers.[42] However, to date, no reliable prevalence data are available related to the common mental health disorders for gay, lesbian or bisexual Canadians, and no national estimates exist of the prevalence of heavy drinking or of co-occurring heavy drinking and mental disorders for this population.

The proportion of Canadians who self-identify as LGB has grown, over time, with shifts in attitudes towards homosexuality, and about 1.3% of Canadians aged 18-59 years identified as

bisexual and 1.7% identified as gay or lesbian in 2014.[44] Based on estimates from another study of Canadians aged 15 years or older, which utilized data from the 2012 Canadian Community Health Survey – Mental Health, as many as 317,337 Canadians self-identified as gay or lesbian and 238,292 as bisexual.[43] For comparison, depending on the measures used, estimates put the percentage of people who identify as LGB in the US at about 3.5%, representing about 9 million people.[45,46]

Knowledge gaps arising from methodological limitations, such as insufficient sample sizes, are not specific to Canada. Large population-based studies are few in number and, consequently, few researchers have been able to provide precise prevalence rates and to report findings separately for lesbian, gay, and bisexual people (as opposed to treating them as an undifferentiated LGB group).[11,25,47] The majority of research has been conducted in the US[25] where, in many states, sexual minorities face relatively significant structural forms of discrimination (e.g., barriers to health care and health insurance; lack of power to make medical and legal decisions on behalf of an ill or deceased partner; and lack of opportunity for same sex marriage).[48,49] Few researchers have been able to conduct stratified analyses by age, sex, ethnicity, or other relevant characteristics, despite the heterogeneity of LGB populations.[50,51] Studies of mental health and alcohol misuse comorbidities are rare,[52–55] and, in particular, knowledge gaps exist regarding the possible processes that underlie the elevated prevalence rates, including possible moderating and mediating factors, an understanding that is needed to address these disparities.[56]

Two perspectives are drawn upon, in this work, to address the knowledge gaps related to the processes that are thought to underlie the elevated prevalence rates of mental health and

alcohol misuse comorbidities. To begin (in Chapters 3 and 4), somewhat conventional epidemiological approaches (e.g., adjusting for confounders and examining mediation and effect moderation processes) are used to describe the prevalence of, and test hypothesized explanations for, the observed inequalities. From there (in Chapter 5), the approach is extended beyond the discipline of epidemiology – drawing on intersectionality theory in an effort to offer a more nuanced means of understanding these inequalities. Taken as a whole, the empirical work included in this dissertation offers a rich set of insights into this complex phenomenon and establishes a new benchmark for future studies.

From the standpoint of minority stress theory, the leading framework for studying sexual minority health in the field of population and public health, the observed disparities implicate adverse distal stressors (defined as objective events and conditions, such as prejudice and discrimination) and proximal stressors (defined as subjective personal processes, such as expectations of rejection and hypervigilance)[11] that LGB persons experience throughout their lives. Such stressors increase the risk for health problems,[57] including mental health problems (particularly in adolescence).[11,58] Although Canada has made substantial gains in affording LGB people the legal rights enjoyed by heterosexuals, discrimination and victimization experienced by LGB people remain significant social and public health problems. For example, recent analyses of Canadian police-reported data reveal that violent offences occurred in two-thirds of all reported hate crimes that targeted people because of their actual or perceived sexual orientation.[59] Between 2010 and 2013, among the victims of violent hate crimes motivated by sexual orientation, 61% identified the accused as a stranger and nearly one half (46%) of the victims sustained injuries.[60]

At the same time, intersectionality theory, or the recognition of multiple interlocking

identities, defined by relative sociocultural power and privilege, offers a new direction in sexual

minority health research across multiple domains of inquiry.[61] As a construct, intersectionality

captures the idea that social identities, identities that stem from group membership, are

organizing features of social relationships, and these social identities mutually constitute,

reinforce, and naturalize one another.[62–65] Identity multiplicity and intersectionality may be of

particular relevance for research with sexual minorities because the unique combinations of

stressors (e.g., related to one's racial or sexual identity, or socio-economic position) may be

experienced differently (than what would have been captured by consideration of either identity

alone) and mutually reinforcing (i.e., synergistic).[66–68] While there is some empirical evidence

that multiple disadvantaged social locations may lead to multiplicative disadvantage among

sexual minorities with respect to health,[69–72] including in Canada,[51,73] public health studies that

reflect intersectionality in their theoretical frameworks, designs, analyses, or interpretations are

rare.[51,68,74,75]

Finally, while it is generally acknowledged in government publications that Canadian

people identifying as lesbian, gay, bisexual, transgender, Two Spirited or queer/questioning

(LGBTQ) are more likely to be affected by poor mental health and mental illness,[76] existing

studies have been unable to provide accurate, nationally representative epidemiological data for

this population and to disaggregate the results for relevant subgroups. Furthermore, there is a

dearth of Canadian studies that tested hypothesized explanations for the disparities experienced

by LGB people – evidence that is required to point towards ways to address them. Because the

Government of Canada has made the mental health of all Canadians a priority,[77,78] addressing

these knowledge gaps is both critical and timely.

1.2 Research Objectives

The goals of the research reported here were to respond to the above noted substantive and methodological knowledge gaps by providing previously unavailable prevalence rates of anxiety and mood disorders, as well as heavy drinking, stratified by the sexual identity of Canadian adults and by proposing and testing explanatory frameworks for the observed disparities. Specifically, informed by the principles of two theoretical frameworks – minority stress theory and intersectionality theory – distinct explanatory models were applied and tested to better understand the mediating and moderating effects of life stress, community belonging, and social position on mental health and substance use. The research objectives and specific research questions were as follows:

1. To investigate the prevalence and correlates of anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking among Canadians self-identified as lesbian/gay, bisexual, or heterosexual.

    (a) What are the prevalence rates of anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking as reported by self-identified lesbian/gay, bisexual, and heterosexual Canadians?

    (b) What are the correlates of these disorders for lesbian/gay, bisexual, and heterosexual Canadians?

    (c) What is the regional distribution of the prevalence of these disorders, stratified by sexual identity?

(d) Do the prevalence rates vary for gay/lesbian, bisexual, and heterosexual respondents? Do the prevalence rates vary by sex as well as sexual identity?

2. To examine whether life stress mediates and sense of community belonging moderates the relationship between sexual identity and the study outcomes (anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking).

   (a) Does life stress mediate the relationships between sexual identity and the study outcomes? If so, what are the changes in the magnitude of the effects when the indirect effect of life stress is accounted for?

   (b) Is the mediating effect of life stress on the relationships between sexual identity and the study outcomes moderated by a sense of community belonging?

   (c) Does the magnitude of the observed mediating and moderating effects significantly differ by sexual identity?

3. To assess the heterogeneity in the prevalence of the study outcomes by sexual identity at intersections with other social positions (i.e., sex, age, income, education, and racialized minority status).

   (a) Do respondents at disadvantaged social positions have greater odds of mood, anxiety, and co-occurring disorders?

   (b) Are the interactions of reporting a sexual minority identity (vs. heterosexual) with other disadvantaged social positions multiplicative in their effects on mood, anxiety, and co-occurring disorder risk?

This research offers a contribution to the field by providing new epidemiological data generalizable to the adult Canadian population, and advancing understandings of both the distribution of, and potential explanations for, the differential prevalence of mental health disorders and substance use among lesbian/gay, bisexual, and heterosexual Canadians. Second, it seeks to further develop what might be viewed as a fairly conventional epidemiological methodological perspective by introducing the theoretical insights of intersectionality theory with the aim of taking the research in a new direction; this newer and perhaps more sophisticated postulation and analysis has the potential to offer greater explanatory power – or more nuanced ways of thinking – about the processes that lead to poor mental health. The findings can inform future population-level research related to the health of sexual minorities in Canada and contribute to the design of effective interventions for the improvement of the mental health of this population.

1.3   Overview of Dissertation

In Chapter 2, I review the literature on the mental health of sexual minorities. Specifically, I focus on the seminal theoretical frameworks in the field to establish a foundation for the research, and I review the existing empirical evidence, highlighting particular knowledge gaps. In Chapter 3, I describe the research methodology for the dissertation. While each of the three research objectives was undertaken as a stand-alone study, with distinct methodological and analytic approaches, Chapter 3 describes the methodology for the entire set of studies, including the study design, data sources, and study variables.

Empirical Chapters 4 through 6 address research objectives 1 through 3. In Chapter 4, I document the prevalence rates of substance use and mental health disorders reported by gay/lesbian and bisexual Canadians contrasted with their heterosexual peers. Chapters 5 and 6 explore the observed prevalence rates by testing two distinct explanatory models. In Chapter 5, I consider and test the mediating effects of life stress and the moderating effects of community belonging in explaining the observed prevalence rates across sexual identities. In Chapter 6, I provide a more nuanced understanding of the prevalence rates by examining their heterogeneity across sexual identities at intersections with other social positions. While each of these empirical chapters comprises a distinct research study along with a unique analytical approach and discussion, Chapters 4 through 6 are designed to be read in concert, building on each other to form a more complete understanding of the results. In Chapter 7, I present a unified discussion of the findings, including the overarching strengths and limitations of the entire set of studies. The chapter concludes with a discussion of some recommendations for future research and areas for possible intervention.

Chapter 2: Literature Review

This chapter reviews the literature related to the mental health of sexual minorities. I had two aims in reviewing this literature: (a) to synthesize the existing empirical evidence, highlighting gaps that the current research sought to address and (b) to describe the seminal theoretical frameworks that supported the study design. I begin by defining the key terms used in this review.

2.1   Definitions

The term *sexual orientation* is used to denote a person's self-identification, such as lesbian, gay, bisexual (LGB), or heterosexual. In the literature, the term may refer to self-identification (how one defines one's own sexual orientation), behaviour (defined on the basis of the sex of one's sexual partners), sexual or romantic attraction (the sex or gender of people to whom one feels attracted), or combinations thereof, which may vary over one's lifetime. Although this review is primarily focused on individuals' self-identification, all aspects of sexual orientation are included.

The term *sexual minority* denotes a group whose sexual identity, orientation, or practices differ from the majority of society, and typically is composed of lesbian, gay, bisexual, and transgender people. The literature also uses the term *sexual minority status* to denote the historically marginalized position of sexual minorities relative to society's norms.[47] While this review is focused specifically on LGB populations, the literature may also include and refer to other sexual minority populations, including transgender (a person whose gender identity differs

from the sex assigned at birth) or genderqueer (a person whose gender identity cannot be categorized as exclusively male or female, masculine or feminine).

The term *mental health* refers to a state of cognitive, emotional, and psychological wellbeing, not merely the absence of mental illness. The concept of mental health includes substance-related outcomes. *Mental illness* is used to refer to a wide range of disorders that can be diagnosed by a healthcare professional. Both terms are included in this review.

2.2 Search Strategy

Exhaustive searches of the peer-reviewed literature were conducted focusing on two overarching research questions, corresponding to the three research objectives:

1. What is the mental health status of lesbian, gay, and bisexual populations compared with heterosexuals? (Research objective 1)

2. What are the explanations of the observed mental health differences, if any, experienced by sexual minorities relative to heterosexuals? (Research objectives 2 and 3)

For each research question, I conducted searches of the PubMed®, PsycINFO®, Sociological Abstracts, CINAHL, and ProQuest databases. The searches were modified to meet the requirements of each database. In addition, targeted searches were conducted via the Cochrane Library and Google Scholar, and citation searches of seminal articles. Further references were identified through hand searches of relevant reference lists. The included studies were limited to those published in the English language, between 2000 and 2017 (research question 1) and 2010 and 2017 (research question 2).

I did not conduct a formal systematic review for three reasons. First, a small number of systematic reviews of relatively more specific research questions, over other periods, have been conducted.[11,32,36,79] Rather than synthesising and assessing the level of evidence related to a relatively narrow question, I sought to ensure that all relevant literature from the past two decades was identified (research question 1). Second, as evidence in the field has emerged rapidly over the last few years, I focused the search for question 2 on literature published since 2010; in so doing, I assessed the current state of knowledge from studies that tested explanations for the observed disparities (see Appendix A for details about the methods used to conduct this search). Finally, I sought to bring together the literature related to the two questions to contextualize the literature review findings, including the literature related to potentially relevant explanatory frameworks for related outcomes (e.g., distress) in this population.

The search terms were selected according to three primary domains: sexual orientation; mental health outcomes with a focus on mood, anxiety, and concurrent mood-anxiety disorders; and alcohol misuse. For sexual orientation, the search terms included lesbian, gay, bisexual, homosexual, sexual orientation, and sexual minority (the term transgender was not included). For alcohol misuse, the search terms included alcohol-related disorders, binge drinking, heavy drinking, problem drinking and hazardous drinking. For mental health, the search terms included general terms such as mental illness and mental disorders and specific terms for the psychological disorders of interest – depressive disorder, anxiety, mood disorder, phobic disorder, panic disorder, manic depression, and concurrent disorders. In addition, for the second question, a fourth domain was added to identify explanations for the observed differences in mental health status. For this concept, the search included terms such as risk factors, protective factors, minority stress, stigma, and victimization. Search term variants and synonyms were

applied using a combination of MeSH, keyword terms, and words in the text and titles appropriate for each database.

To be included in the literature review, relevant studies had to be quantitative in method, that is, they were required to include original data collection and analysis, or some secondary data analysis of original datasets. For question 1, I included studies from industrialized countries with a heterosexual population as a comparator to synthesize comparable prevalence rates from international contexts. Studies that examined both diagnosed disorders (or symptoms of those disorders) and self-reported disorders were included. Studies about binge and heavy drinking were included. Given the underlying differences in the epidemiology and etiology of binge and heavy drinking,[80] studies on alcohol disorders and dependence were excluded. Similarly, studies on suicidality were excluded. For the second question, I included studies from industrialized countries with and without a heterosexual population comparator (i.e., within-group analyses for those without a comparator). I included studies that explicitly aimed to explain the differences in mental health outcomes. Studies that focused on specialized populations (e.g., military veterans) or on personality traits and processes (e.g., neuroticism) were excluded.

2.3   Empirical Evidence

This section synthesizes the evidence from the literature on gay, lesbian, and bisexual people and their mental health (anxiety disorders and mood disorders) and alcohol outcomes (heavy or binge drinking). First, I describe the prevalence of mental health disorders and alcohol outcomes of LGB versus heterosexual populations. Second, I summarize the literature that identifies the factors associated with the observed outcomes, focusing, in particular, on

explanations for the observed disparities. A separate section is provided of a synthesis of the findings from Canadian studies. Finally, I end by summarising the key gaps in the existing literature, and from which the current research emerged and was intended to address.

Before summarising the findings, two points with respect to the methodological constraints of the literature deserve noting. First, the studies reviewed utilized different definitions of sexual orientation. The findings reported might have referred to the prevalence rates classified on the basis of answers to questions about identity, attraction, behaviour, or some combination. While I have chosen to use the term "LGB" to describe the population in the discussion that follows, it is important to note that the prevalence rates reported by various researchers may not be directly comparable. Second, I focused on epidemiological studies with explicit measures of recognized diagnoses (e.g., anxiety disorder) rather than other indicators of mental health status. The reader is cautioned that the studies may have used different diagnostic criteria and measures for the relevant study outcomes. To respond to these constraints, where possible, I report the specific terminology used by the cited study.

2.3.1 Prevalence of Anxiety Disorders, Mood Disorders, and Heavy Drinking among Gay, Lesbian, Bisexual, and Heterosexual People

Tables 1-3 summarize the prevalence rates of anxiety disorders, mood disorders, and heavy drinking reported in studies of LGB and heterosexual people. The findings from existing epidemiological research indicate that sexual minority individuals consistently report elevated rates of these outcomes compared with heterosexuals. Many studies collapse LGB respondents into one group to increase their sample size. However, when disaggregated findings are reported,

14

bisexual people generally report the highest rates of the relevant outcomes. Gender or sex subgroup differences are also observed and tend to vary by outcome.

These findings are consistent with previously published meta-analyses and systematic reviews in the field. A 2003 meta-analysis of studies that compared lesbian, gay, and bisexual populations with heterosexual peers, from samples in the US, New Zealand, and the Netherlands, found that sexual minorities were 2.5 times more likely to have a lifetime history of a mental health disorder compared with heterosexuals, and twice as likely to have a current mental health disorder.[11] A 2008 systematic review and meta-analysis, which compiled data for heterosexual and non-heterosexual people from 25 studies, revealed a 1.5-fold greater risk of depression and anxiety disorders, and of substance use dependence.[24] Finally, an extensive 2015 systematic literature review of the mental health of sexual minorities found that sexual minority individuals report more mental health problems (i.e., depression, anxiety, suicide attempts or suicides, and substance use related problems) across many studies, reviews, and meta-analyses.[36]

Table 1 summarizes the prevalence rates of anxiety disorders found in studies identified in the literature review. Anxiety disorders refer to a group of disorders characterized by anxiety and fear, including (but not limited to) generalized anxiety disorders, social anxiety disorders, and panic disorders. The majority of studies reviewed reported the prevalence of any type of disorder (both 12-month and lifetime), and some reported generalized anxiety disorders, specifically. In terms of anxiety disorders, 17 of the 20 studies reviewed found higher rates amongst LGB populations compared with heterosexual populations.

A US population-based study of nationally representative data (N = 34,653) found the prevalence rates of lifetime anxiety to be 40.8% for lesbian women, 41.2% for gay men, 57.8%

for bisexual women, and 38.7% for bisexual men.[81] In comparison, the rates for heterosexual women were 31.3%, and 11.6% for heterosexual men. This study also found that gay and bisexual men were significantly more likely than heterosexual men to have both a lifetime and a past year anxiety disorder.[81] Results of the studies that measured 12-month anxiety were comparable. For example, data from a Netherlands Mental Health Survey and Incidence Study (N = 6,646) found that the 12-month prevalence rates of anxiety for sexually-active bisexual and homosexual women and men were 22.1% and 17.9%, respectively.[30] In contrast, the rates for exclusively heterosexual women and men were 12.1% and 7.0%, respectively. These patterns were observed in the same study when same-sex attraction, rather than sexual identity, was used to classify the respondents' sexual orientation.[30] Current self-reported anxiety was measured in a recently published large population survey (N = 69,695) in Sweden.[27] The authors reported anxiety prevalence rates of 7.3% for lesbian and 12.8% for bisexual women, and 6.4% for gay and 5.9% for bisexual men. In comparison, the prevalence rates were 4.6% for heterosexual women and 2.9% for heterosexual men.[27]

Significant differences were observed for men and women across the studies identified in the review. Bisexual women generally reported the highest prevalence rates compared with any other group. For men, the findings were mixed, with some studies observing higher rates for bisexual men[42,82] whilst others for gay men.[21,81] When examining the effect sizes derived from adjusted models (vs. heterosexual respondents), many of the studies reported larger effects for gay men,[26,36,83] although some studies reported mixed findings, depending on the dimension of sexual orientation.[81]

Table 1. General Population Studies Reporting the Prevalence Rates of Anxiety Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Bjorkenstam et al[27]	2017	Population Survey (2010)	Sweden	Self-reported current anxiety	Lesbian women	874	7.3
					Gay men		6.4†
					Bisexual women	841	12.8†
					Bisexual men		5.9†
					Heterosexual women	67,980	4.6
					Heterosexual men		2.9
Kerridge et al[20]	2017	National Epidemiologic Survey on Alcohol and Related Conditions-III (2012-13)	USA	Any anxiety disorder (12-month) (DSM-5)	Gay/ lesbian	36,309	22.2†
					Bisexual		28.9†
					Not Sure		30.5†
					Heterosexual		12.6
				Any anxiety disorder (Lifetime) (DSM-5)	Gay/ lesbian	36,309	26.4†
					Bisexual		33.7†
					Not Sure		35.1†
					Heterosexual		16.5
Semlyen et al[28]	2016	Health Survey for England (2011-13)	UK	Anxious or depressed (EQ-5D)	Gay/ lesbian	14,004	29.2*
					Bisexual		39.1*
					Other		43.9*
					Heterosexual		23.0
Bos et al[29]	2015	Netherlands Study of Depression and Anxiety	Netherlands	Anxiety symptoms (21-item self-report Beck Anxiety Inventory) (Mean score; min=0, max=63)	Same-sex attracted men	54	14.8
					Heterosexual men	528	16.4
					Same-sex attracted women	68	14.9*
					Heterosexual women	1,130	17.1

Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.
†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 1 (Continued). General Population Studies Reporting the Prevalence Rates of Anxiety Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Sandfort et al[30]	2014	Netherlands Mental Health Survey and Incidence Study (NEMESIS-2) (2007-09)	Netherlands	Any anxiety disorder (12-month) (CIDI 3.0)	Bisexually and homosexually active men	60	17.9†
					Exclusively, heterosexually active men	2,379	7.0
					Same-sex attracted men	71	17.6†
					Heterosexually attracted men	2,799	7.5
					Bisexually and homosexually active women	57	22.1
					Exclusively, heterosexually active women	2,832	12.1
					Same-sex attracted women	88	26.7†
					Heterosexually attracted women	3,435	12.4
				Anxiety disorder (lifetime) (CIDI 3.0)	Bisexually and homosexually active men	60	28.2†
					Exclusively, heterosexually active men	2,379	14.6
					Same-sex attracted men	71	34.0†
					Heterosexually attracted men	2,799	15.5
					Bisexually and homosexually active women	57	30.1
					Exclusively, heterosexually active women	2,832	23.3
					Same-sex attracted women	88	38.6†
					Heterosexually attracted women	3,435	23.4

Notes. [#]*Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors. †Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).*

Table 1 (Continued). General Population Studies Reporting the Prevalence Rates of Anxiety Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Gattis et al[84]	2012	National Epidemiologic Survey on Alcohol and Related Conditions (2001-02, 2004-05)	USA	Generalized anxiety disorder (lifetime) (AUDADIS-IV)	Gay concordant males	39	17.2*
					Heterosexual discordant males	22	6.3
					Heterosexual concordant males	668	4.8
					Lesbian concordant females	43	20.3*
					Heterosexual discordant females	25	6.5
					Heterosexual concordant females	1,877	10.1
Bolton & Sareen[21]	2011	National Epidemiological Survey on Alcohol and other Conditions (2004-2005)	USA	Any anxiety disorder (lifetime) (AUDADIS-IV)	Gay males	190	45.8†
					Bisexual males	81	40.6†
					Unsure males	69	35.1†
					Heterosexual males	14,109	21.4
					Lesbian females	145	48.4†
					Bisexual females	161	66.2†
					Unsure females	101	40.3
					Heterosexual females	19,489	36.3
Chakraborty et al[25]	2011	Adult Psychiatric Morbidity Survey (2007)	England	Generalized anxiety disorder (current) (CIS-R)	Non-heterosexuals	650	6.3†
					Heterosexuals	6,811	4.2
					Any same gender partners	667	6.0†
					Opposite gender partners	6,794	4.2
Oswalt & Wyatt[85]	2011	American College Health Association - National College Health Assessment (2009)	USA	Anxiety, diagnosed but not treated, self-report (12-month)	Gay/ lesbian	27,224	2.8
					Bisexual		4.5
					Unsure		4.9
					Heterosexual		2.0
				Anxiety, diagnosed and treated, self-report (12-month)	Gay/ lesbian	27,224	14.3
					Bisexual		15.3
					Unsure		10.7
					Heterosexual		7.0

Notes. [#]*Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.*
†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 1 (Continued). General Population Studies Reporting the Prevalence Rates of Anxiety Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Bostwick et al[81]	2010	National Epidemiological Survey on Alcohol and other Conditions (2004-05)	USA	Any anxiety disorder (lifetime) (AUDADIS-IV)	Lesbian females	145	40.8*
					Bisexual females	161	57.8†
					Heterosexual females	19,489	31.3
					Gay males	190	41.2†
					Bisexual males	81	38.7†
					Heterosexual males	14,109	18.6
Brennan et al[40]	2010	Canadian Community Health Survey (2003)	Canada	Mood or anxiety disorder (self-report)	Gay men	49,901	15.8†
					Bisexual men		13.8†
					Heterosexual men		5.1
Hatzenbuehler et al[18]	2009	National Epidemiological Survey on Alcohol and other Conditions (2001-02, 2004-05)	USA	Any anxiety disorder (12-month)	Lesbian/ gay/ bisexual	577	30.1†
					Heterosexuals	34,076	16.1
				Generalized anxiety disorder (12-month)	Lesbian/ gay/ bisexual	577	8.5†
					Heterosexuals	34,076	3.7
Cochran & Mays[82]	2009	California Quality of Life Survey (2004-05)	USA	Generalized anxiety disorder (past 12 months) (CIDI-SF)	Lesbian females	-	9.2
					Bisexual females	-	20.3†
					Heterosexual females	-	7.6
					Gay males	-	15.4†
					Bisexual males	-	15.6†
					Heterosexual males	-	5.9

Notes. [#]*Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group ($p < .05$), as reported by the original authors.
†Statistically significantly different from the heterosexual group after adjustment ($p < .05$), as reported by the original authors (adjusted odds ratios).*

Table 1 (Continued). General Population Studies Reporting the Prevalence Rates of Anxiety Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Tjepkema[42]	2008	Canadian Community Health Survey (2003-05)	Canada	Anxiety disorder (self-report)	Gay males	1,103	8.5*
					Bisexual males	498	10.1*
					Heterosexual males	72,972	3.0
					Lesbian females	695	8.7*
					Bisexual females	833	17.7*
					Heterosexual females	83,723	5.8
Cochran et al[86]	2007	National Latino and Asian American Survey (2002-03)	USA	Any anxiety disorder (12-month)	Gay/ bisexual males	84	10.9
					Heterosexual males	1,982	6.8
					Lesbian/ bisexual females	161	11.3
					Heterosexual females	2,271	10.3
				Any anxiety disorder (lifetime)	Gay/ bisexual males	84	18.7
					Heterosexual males	1,982	11.1
					Lesbian/ bisexual females	161	14.1
					Heterosexual females	2,271	17.0

Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.
†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios)

Table 1 (Continued). General Population Studies Reporting the Prevalence Rates of Anxiety Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
McNair et al[35]	2005	Australian Longitudinal Study on Women's Health ♮ aged 22-27 ♯ aged 50-55	Australia	Doctor-diagnosed anxiety (last four years)	Exclusively heterosexual females♮	8,132	4.6
					Mainly heterosexual females♮	603	11.0†
					Bisexual females♮	73	15.4†
					Homosexual females♮	90	9.3
					Exclusively heterosexual females♯	8,207	6.6
					Mainly heterosexual females♯	606	12.3
					Bisexual females♯	73	2.9
					Homosexual females♯	90	7.3
				Self-reported anxiety (12-month)	Exclusively heterosexual females♮	8,132	7.9
					Mainly heterosexual females♮	603	16.9†
					Bisexual females♮	73	23.1†
					Homosexual females♮	90	12.6
					Exclusively heterosexual females♯	8,207	19.6
					Mainly heterosexual females♯	606	34.2†
					Bisexual females♯	73	6.1

Notes. [#]*Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.*
†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 1 (Continued). General Population Studies Reporting the Prevalence Rates of Anxiety Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Cochran et al[13]	2003	National Survey of Midlife Development in the United States (1995)	USA	Generalized anxiety disorder (12-month)	Gay/ bisexual males	37	2.9
					Heterosexual males	1,239	1.8
					Lesbian/ bisexual females	37	14.7*
					Heterosexual females	1,604	3.8
Gilman et al[12]	2001	National Comorbidity Survey (1990-92)	USA	Any anxiety disorder (12-month)	Males with same sex partner	74	15.0
					Males with opposite sex partner	2,310	11.6
					Females with same sex partner	51	40.0*
					Females with opposite sex partner	2,475	22.4
Sandfort et al[26]	2001	Netherlands Mental Health Survey and Incidence Study (1996)	Netherlands	Any anxiety disorder (12-month)	Gay males	82	19.5†
					Heterosexual males	2,796	7.6
					Lesbian females	43	16.3
					Heterosexual females	3,077	16.4
				Any anxiety disorder (lifetime)	Gay males	82	31.7†
					Heterosexual males	2,796	13.2
					Lesbian females	43	25.6
					Heterosexual females	3,077	25.1
Cochran & Mays[83]	2000	National Household Survey of Drug Abuse (1996)	USA	Generalized anxiety disorder (12-month)	Males with same sex partner	98	3.1
					Males with opposite sex partner	3,922	1.6
					Females with same sex partner	96	3.5
					Females with opposite sex partner	5,792	2.6

Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors. †Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 2 summarizes the prevalence rates of mood disorders, including depression if reported separately, found in studies of LGB and heterosexual people. Mood disorders refer to a group of disorders characterized by disturbances in a person's mood and include (but not limited to) depression and bipolar disorder. The majority of studies reported any mood disorder (12-month and lifetime), and some reported major depression, specifically. In terms of mood disorders, 21 of 24 studies reported higher rates amongst LGB populations compared with heterosexual populations. These elevated prevalence rates for sexual minority groups were present across different measures of sexual orientation. The findings from studies of depression were similar to the findings for mood disorders. Significant differences were observed for men and women, and bisexuals reported the highest rates compared with the rates of those with other sexual identities.

The previously described population survey from Sweden (N = 69,695) measured any past diagnosis of self-reported depression,[27] and found the highest prevalence rates in bisexual women (30.1%), followed by lesbian women (20.6%), gay men (19.1%) and bisexual men (14.6%). The prevalence rates for all sexual minority groups were significantly different from those of heterosexuals (16.0% for heterosexual women and 8.3% for heterosexual men).[27] A US study (N = 27,227) measured self-reported 12-month depression (diagnosed and treated) and found prevalence rates of 18.2% for bisexual respondents, 15.8% for gay/lesbian respondents, and 13.6% for "unsure" respondents (vs. 7.1% for heterosexuals).[85] This sample was not stratified by gender/sex. In studies of mood disorders, the overall prevalence rates were higher, but similar patterns across subgroups emerged, with bisexual respondents,[18,20,41] particularly women,[21,42,81,82] reporting the highest rates of mood disorders. In general, the studies of

prevalence rates of self-reported mood disorders, 12-month or current, that combined sexual minority respondents into one group ranged from about 17.0% to 20.4% (vs. 7.0% to 10.2% for heterosexuals).[18,41] In studies of data from the US National Epidemiological Survey on Alcohol and other Conditions, which measured lifetime mood disorders, the prevalence rates were 58.7% and 44.4% for bisexual and lesbian women, respectively, and 36.9% and 42.3% for bisexual and gay men, respectively (vs. 30.5% and 19.8% for heterosexual women and men, respectively).[21,81] These rates are comparable with other studies that measured lifetime mood disorder prevalence.[20,26,84] When stratified by gender/sex, most of the studies found the highest rates for bisexual women while the rates for men tended to be highest for the gay respondents. When examining the effect sizes (vs. heterosexual respondents) found in adjusted models, most of the studies reported the largest effects for bisexual people and for gay identified men.[26,36,41,81,87]

Table 2. General Population Studies Reporting the Prevalence Rates of Mood Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Bjorkenstam et al[27]	2017	Population Survey (2010)	Sweden	Self-reported depression (any past diagnosis)	Lesbian women	874	20.6†
					Gay men		19.1†
					Bisexual women	841	30.1†
					Bisexual men		14.6†
					Heterosexual women	67,980	16.0
					Heterosexual men		8.3
Kerridge et al[20]	2017	National Epidemiologic Survey on Alcohol and Related Conditions-III (2012-13)	USA	Any mood disorder (12-month) (DSM-5)	Gay/ lesbian	36,309	23.1†
					Bisexual		32.3†
					Not Sure		28.7†
					Heterosexual		13.0
				Any mood disorder (Lifetime) (DSM-5)	Gay/ lesbian		45.4†
					Bisexual		48.0†
					Not Sure		43.3†
					Heterosexual		24.0
Semlyen et al[28]	2016	Health Survey for England 2012, Scottish Health Survey 2008-13, Longitudinal Study of Young People in England 2009/10, Understanding Society 2011/12	UK	Symptoms of Common Mental Disorder (GHQ-12 score of 4 or higher)	Gay/ lesbian	14,004	26.2*
					Bisexual		34.0*
					Other		23.8*
					Heterosexual		16.8
Scott et al[43]	2016	Canadian Community Health Survey (2012)	Canada	Major Depressive Disorder (12 month) (Modified CIDI)	Gay/ lesbian	24,788	13.5
					Bisexual		22.4†
					Other		4.6
					Heterosexual		4.5

*Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors. †Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).*

Table 2 (Continued). General Population Studies Reporting the Prevalence Rates of Mood Disorders among Gay, Lesbian,

Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Bos et al[29]	2015	Netherlands Study of Depression and Anxiety	Netherlands	Depressive symptoms inventory (30-item self-report) (Mean score; min=0, max=84)	Same-sex attracted men	54	27.9
					Heterosexual men	528	29.0
					Same-sex attracted women	68	26.4
					Heterosexual women	1,130	28.7
Lhomon et al[31]	2014	Contexte de la Sexualite en France (2006)	France	Self-reported depression (12-month)	Homosexual women	27	31.6
					Bisexual women	42	43.8
					Heterosexual women	164	42.3
					Homosexual men	60	39.0*
					Bisexual men	40	28.1*
					Heterosexual men	97	17.0
				Self-reported depression (chronic)	Homosexual women	27	13.1
					Bisexual women	42	10.7
					Heterosexual women	164	6.2
					Homosexual men	60	7.9*
					Bisexual men	40	7.3*
					Heterosexual men	97	2.5
Sandfort et al[30]	2014	Netherlands Mental Health Survey and Incidence Study (NEMESIS-2) (2007-09)	Netherlands	Any mood disorder (12-month) (CIDI 3.0)	Bi- & homo-sexually active men	60	9.0
					Exclusively, heterosexually active men	2,379	3.9
					Same-sex attracted men	71	15.6
					Heterosexually attracted men	2,799	4.2
					Bi- & homosex. active women	57	13.2
					Exclusively, heterosexually active women	2,832	7.2
					Same-sex attracted women	88	20.8†
					Heterosexually attracted women	3,435	7.5

*Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors. †Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).*

Table 2 (Continued). General Population Studies Reporting the Prevalence Rates of Mood Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Sandfort et al[30]	2014	Netherlands Mental Health Survey and Incidence Study (NEMESIS-2) (2007-09)	Netherlands	Mood disorder (lifetime) (CIDI 3.0)	Bisexually and homosexually active men	60	25.9
					Exclusively, heterosexually active men	2,379	13.4
					Same-sex attracted men	71	33.4†
					Heterosexually attracted men	2,799	13.8
					Bisexually and homosexually active women	57	33.1
					Exclusively, heterosexually active women	2,832	25.2
					Same-sex attracted women	88	43.7†
					Heterosexually attracted women	3,435	25.3
Pakula & Shoveller[41]	2013	Canadian Community Health Survey (2007-08)	Canada	Self-reported mood disorder diagnosis	Gay/ lesbian/ bisexual	1,630	17.1†
					Heterosexual	75,000	6.9
Gattis et al[84]	2012	National Epidemiologic Survey on Alcohol and Related Conditions (2001-02, 2004-5)	USA	Major depression (lifetime) (AUDADIS-IV)	Gay concordant males	83	36.4*
					Heterosexual discordant males	95	25.4
					Heterosexual concordant males	2,146	15.2
					Lesbian concordant females	131	46.0*
					Heterosexual discordant females	108	34.3
					Heterosexual concordant females	5,222	27.2

Notes. [#]*Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.*
†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 2 (Continued). General Population Studies Reporting the Prevalence Rates of Mood Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Chakraborty et al[25]	2011	Adult Psychiatric Morbidity Survey (2007)	England	Depressive episode (past week) (CIS-R)	Non-heterosexuals	650	4.1†
					Heterosexuals	6,811	2.1
					Any same gender partners	667	4.0†
					Opposite gender partners	6,794	2.1
Oswalt & Wyatt[85]	2011	American College Health Association - National College Health Assessment (2009)	USA	Depression, diagnosed but not treated, self-report (12-month)	Gay/ lesbian	27,227	2.2
					Bisexual		4.0
					Unsure		4.6
					Heterosexual		1.4
				Depression, diagnosed and treated, self-report (12-month)	Gay/ lesbian	27,227	15.8
					Bisexual		18.2
					Unsure		13.6
					Heterosexual		7.1
Bolton and Sareen[21]	2011	National Epidemiological Survey on Alcohol and other Conditions (2004-05)	USA	Any mood disorder (lifetime) (AUDASIS-IV)	Gay males	190	42.3†
					Bisexual males	81	36.9†
					Unsure males	69	36.4†
					Heterosexual males	14,109	19.8
					Lesbian females	145	44.4†
					Bisexual females	161	58.7†
					Unsure females	101	36.6
					Heterosexual females	19,489	30.5
Bostwick et al[81]	2010	National Epidemiological Survey on Alcohol and other Conditions (2004-05)	USA	Any mood disorder (lifetime) (AUDASIS-IV)	Lesbian females	145	44.4†
					Bisexual females	161	58.7†
					Heterosexual females	19,489	30.5
					Gay males	190	42.3†
					Bisexual males	81	36.9†
					Heterosexual males	14,109	19.8

Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors. †Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 2 (Continued). General Population Studies Reporting the Prevalence Rates of Mood Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Brennan et al[40]	2010	Canadian Community Health Survey (2003)	Canada	Mood or anxiety disorder (self-report)	Gay men	49,901	15.8†
					Bisexual men		13.8†
					Heterosexual men		5.1
Cochran & Mays[82]	2009	California Quality of Life Survey (2004-05)	USA	Major depressive disorder (12-month)	Lesbian female	2,272	24.7†
					Bisexual female		35.8†
					Exclusively heterosexual		14.4
					Gay male		21.5†
					Bisexual male		15.7
					Heterosexual male		8.7
Hatzenbuehler et al[18]	2009	National Epidemiological Survey on Alcohol and other Conditions (2001-02, 2004-05)	USA	Any mood disorder (12-month)	Lesbian, gay, or bisexual	577	20.4†
					Heterosexuals	34,076	10.2
Tjepkema	2008	Canadian Community Health Survey (2003-05)	Canada	Mood disorder (self-report)	Gay males	1,103	11.1*
					Bisexual	498	11.4*
					Heterosexual males	72,972	4.0
					Lesbian females	695	11.4*
					Bisexual females	833	25.2*
					Heterosexual females	83,723	7.7

Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors. †Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 2 (Continued). General Population Studies Reporting the Prevalence Rates of Mood Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Cochran et al[86]	2007	National Latino and Asian American Survey (2002-2003)	USA	Any depressive disorder (12-month)	Gay/ bisexual male	84	8.1
					Heterosexual male	1,982	6.0
					Lesbian/ bisexual female	161	16.0†
					Heterosexual female	2,271	9.2
				Any depressive disorder (lifetime)	Gay/ bisexual male	84	9.7
					Heterosexual male	1,982	10.5
					Lesbian/ bisexual female	161	24.7†
					Heterosexual female	2,271	17.2
McNair et al[35]	2005	Australian Longitudinal Study on Women's Health ♮ aged 22-27 ♯ aged 50-55	Australia	Doctor-diagnosed depression (last four years)	Exclusively heterosexual females♮	8,132	10.9
					Mainly heterosexual females♮	603	24.2†
					Bisexual females♮	73	29.6†
					Homosexual females♮	90	26.2†
					Exclusively heterosexual females♯	8,207	11.2
					Mainly heterosexual females♯	606	21.8†
					Bisexual females♯	73	8.7
					Homosexual females♯	90	18.4

Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors. †Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 2 (Continued). General Population Studies Reporting the Prevalence Rates of Mood Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
McNair et al[35] (continued)	2005	Australian Longitudinal Study on Women's Health ♮ aged 22-27 ♯ aged 50-55	Australia	Self-reported depression (last year)	Exclusively heterosexual females♮	8,132	18.7
					Mainly heterosexual females♮	603	37.6†
					Bisexual females♮	73	46.3†
					Homosexual females♮	90	40.7†
					Exclusively heterosexual females♯	8,207	32.8
					Mainly heterosexual females♯	606	51.3†
					Bisexual females♯	73	35.2
					Homosexual females♯	90	26.5
Cochran et al[13]	2003	National Survey of Midlife Development in the United States (1995)	USA	Major depression (12-month)	Gay/ bisexual males	37	31.0†
					Heterosexual males	1,239	10.2
					Lesbian/ bisexual females	37	33.5
					Heterosexual females	1,604	16.8
Diamant & Wold[88]	2003	Los Angeles County Health Survey (1999)	USA	Diagnosed depression (lifetime)	Lesbian female	43	20.9
					Bisexual female	69	13.0
					Heterosexual female	4,023	10.6
Gilman et al[12]	2001	National Comorbidity Survey (1990-1992)	USA	Any mood disorder (12 months)	Male with same sex partner	74	11.7
					Male w/ opposite sex partner	2,310	8.0
					Female with same sex partner	51	35.1*
					Female with opposite sex partner	2,475	13.9

Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.
†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 2 (Continued). General Population Studies Reporting the Prevalence Rates of Mood Disorders among Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Sandfort et al[26]	2001	Netherlands Mental Health Survey and Incidence Study (1996)	Netherlands	Any mood disorder (12-month)	Gay males	82	17.1†
					Heterosexual males	2,796	5.2
					Lesbian females	43	14.0†
					Heterosexual females	3,077	9.3
				Any mood disorder (lifetime)	Gay males	82	39.0†
					Heterosexual males	2,796	13.3
					Lesbian females	43	48.8†
					Heterosexual females	3,077	24.3
Cochran & Mays[87]	2000	National Household Survey on Drug Abuse (1996)	USA	Major depression (last 12 months)	Male with same sex partner	98	13.3†
					Male with opposite sex partner	3,922	5.1
					Female with same sex partner	96	15.0

Notes. [#]Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors. †Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

Table 3 summarizes the prevalence rates of heavy drinking reported in studies of LGB and heterosexual people. Heavy drinking (or binge drinking) refers to becoming intoxicated by heavy consumption of alcohol over a short period of time. Researchers define heavy alcohol use in different ways, with the majority of studies using the measure of four or five drinks on one occasion for women and men, respectively (although the timeframe within which the occasions occur vary by study). In terms of heavy drinking, 15 of 16 studies reported higher rates of heavy drinking amongst LGB respondents. In the majority of studies, the rates were significantly different from those of heterosexual counterparts for sexual minority women only, although they tended to be less dissimilar than the disparities observed for the mental health outcomes. Overall, the rates of heavy drinking among gay or bisexual men were not statistically significantly different from those of heterosexual men.

The results of the studies that utilized the above definition of binge drinking showed that the prevalence rates ranged from about 16% to 22% for gay/bisexual men (vs. 10% to 23% for heterosexual men) and 8% to 21% for lesbian/bisexual women (vs. 3% to 8% for heterosexual women).[23,33,89] The studies that reported findings separately for bisexual and gay/lesbian respondents showed similar rates for lesbian and bisexual women, which were statistically significantly different from those of heterosexual women. The rates ranged from about 13% to 20% for lesbian women, 15% to 25% for bisexual women, and 9% to 11% for heterosexual women.[22,90–92] The rates for gay and bisexual men tended to be similar to each other, and were not statistically significantly different from heterosexual men's. They ranged from 15% to 27% for gay men, 15% to 34% for bisexual men, and 14% to 22% for heterosexual men.[22,90–92] Some

studies reported lower rates of binge drinking for gay/bisexual men compared with their heterosexual counterparts.[23,91,93]

Comorbidity is defined as the presence of more than one disorder. Several studies with a heterosexual comparison group examined mental health comorbidities and found evidence of significantly higher rates of comorbidity in the LGB population.[13,18,26,30] Most recently, a prospective study of respondents aged 18-64 years, from the general Dutch population, found that LGB individuals had 2.4 times higher adjusted odds of having two or more Axis I disorders compared with heterosexuals. No studies were found that examined comorbidities with heavy alcohol use, however studies with alcohol (and drug) dependence comorbidities also revealed greater prevalence rates for LGB populations.[17,94]

Table 3. General Population Studies Reporting the Prevalence Rates of Heavy Alcohol Use Outcomes of Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Roxburgh et al[33]	2016	National Drug Strategy Household Survey (2013)	Australia	High risk drinking (AUDIT-C)	Gay/ bisexual men	277	16.1
					Heterosexual men	9,396	10.2
					Lesbian/ bisexual women	302	7.9†
					Heterosexual women	11,776	2.8
Operario et al[23]	2015	National Health and Nutrition Examination Survey (2001-10)	USA	Ever heavy alcohol user (>= 5 or more drinks per day)	Sexual minority men	234	21.9
					Heterosexual men	5,053	22.7
					Sexual minority women	377	21.3†
					Heterosexual women	5,450	8.3
Blosnich et al[22]	2014	Behavioral Risk Factor Surveillance System (2010)	USA	Binge drinking (>= 5 drinks on one occasion for men and >= 4 drinks on one occasion for women) (last month)	Lesbian women	615	20.2†
					Bisexual women	451	20.9†
					Heterosexual women	51,639	10.5
					Gay men	654	26.9
					Bisexual men	232	30.7
					Heterosexual men	33,238	22.1

Notes. [#]*Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group ($p < .05$), as reported by the original authors.
†Statistically significantly different from the heterosexual group after adjustment ($p < .05$), as reported by the original authors (adjusted odds ratios).*

Table 3 (Continued). General Population Studies Reporting the Prevalence Rates of Heavy Alcohol Use Outcomes of Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Garland-Forshee et al[90]	2014	Oregon Behavioral Risk Factor Surveillance System (2005-08)	USA	Binge drinking (>= 5 drinks on one occasion for men and >= 4 drinks on one occasion for women) (last month)	Lesbian women	347	16.4†
					Bisexual women	322	25.4†
					Heterosexual women	25,602	8.9
					Gay men	268	31.9†
					Bisexual men	123	34.2†
					Heterosexual men	16,084	18.7
				Heavy drinking (>= 2 drinks per day on average for men and >= 1 drink on average for women) (last month)	Lesbian women	347	8.5
					Bisexual women	322	7.1
					Heterosexual women	25,602	5.6
					Gay men	268	10.2†
					Bisexual men	123	4.4
					Heterosexual men	16,084	5.5
Lanfear et al[95]	2013	Washington State Needs Assessment Household Survey (2003)	USA	Binge drinking (>= 5 drinks on one occasion for men and >= 4 drinks on one occasion for women) (last month)	Gay/ lesbian	103	35.0†
					Bisexual	98	40.8†
					Heterosexual	6,234	22.2
Fredriksen-Goldsen et al[89]	2013	Washington State Behavioral Risk Factor Surveillance System (2003-10)	USA	Excessive drinking (>= 5 drinks on one occasion for men and >= 4 drinks on one occasion for women) (last month)	Lesbian/ bisexual women	96,992	7.9†
					Heterosexual women		4.6
					Gay/ bisexual men		17.1†
					Heterosexual men		11.1

Notes. [#]*Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.
†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).*

Table 3 (Continued). General Population Studies Reporting the Prevalence Rates of Heavy Alcohol Use Outcomes of Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Brewster & Tillman[15]	2012	National Survey of Family Growth Cycle 6	USA	Binge drinking (>= 5 drinks within 'a couple of hours' on one occasion (last year)	Lesbian/ bisexual females	12,571	64.0*
					Unsure/other females		41.0
					Heterosexual females		47.0
					Gay/ bisexual males		67.0*
					Unsure/ other males		51.0
					Heterosexual males		60.0
Bloomfield et al[96]	2011	Gender, Alcohol and Culture: An International Study (GENASIS)	14 countries worldwide	High volume drinking (average consumption of > 20g of pure alcohol for per day for women and > 30g for men)	Lesbian women	122	13.0†
					Heterosexual women	1,830	7.0
					Gay men	126	13.0
					Heterosexual men	1,890	13.0
				Risky single-occasion drinking (monthly or more frequent episodes of consumption of > 60g of alcohol)	Lesbian women	122	23.0†
					Heterosexual women	1,830	11.0
					Gay men	126	27.0
					Heterosexual men	1,890	29.0
Brennan et al[40]	2010	Canadian Community Health Survey (2003)	Canada	Risky drinking (> 8 drinks per week)	Gay men	49,901	11.1
					Bisexual men		16.3
					Heterosexual men		13.3
Conron, Mimiaga & Landers[97]	2010	Massachusetts Behavioral Risk Factor Surveillance Survey (2001-08)	USA	Binge drinking (undefined) (past month)	Gay males	926	31.0
					Bisexual males	194	26.7
					Heterosexual males	25,387	29.5
					Lesbian females	719	17.5
					Bisexual females	432	17.6†
					Heterosexual females	39,701	12.6

Notes. [#]*Prevalence rate per 100 population.* **Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.* *†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).*

Table 3 (Continued). General Population Studies Reporting the Prevalence Rates of Heavy Alcohol Use Outcomes of Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Needham & Austin[98]	2010	National Longitudinal Study of Adolescent Health (Wave 3) (2001-02)	USA	Heavy drinking (>= 5 or more drinks in a row) 1-2 times per week (12-month)	Lesbian females	72	12.5*
					Bisexual females	152	15.1†
					Heterosexual females	5,416	8.1
					Gay males	121	15.0
					Bisexual males	40	15.0
					Heterosexual males	5,352	20.7
Hughes et al[34]	2010	Australian Longitudinal Study of Women's Health (2003)	Australia	Binge drinking (>= 5 drinks on one occasion) (past week)	Exclusively heterosexual females	8,083	11.6
					Mainly heterosexual females	568	19.6*
					Bisexual females	100	19.6*
					Lesbian females	99	24.5*
McCabe et al[92]	2009	National Epidemiological Survey on Alcohol and Related Conditions	USA	Heavy drinking in past year (>= 5 drinks on one occasion for men and >= 4 drinks on one occasion for women) (last month)	Lesbian females	145	20.1
					Bisexual females	161	25.0†
					Heterosexual females	19,489	8.4
					Gay males	190	18.1
					Bisexual males	81	16.4
					Heterosexual males	14,109	13.7
Burgard et al[99]	2005	Californian Women's Health Survey	USA	Binge drinking (>= 5 drinks on one occasion) (past month)	Females with same sex partners	350	15.0*
					Females with male sexual partners only	10,854	7.3
				Heavy drinking (binge drinking on 5 or more occasions) (past month)	Females with same sex partners	350	3.7
					Females with male sexual partners only	10,854	1.4

Notes. [#]*Prevalence rate per 100 population.* **Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.*
†*Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).*

Table 3 (Continued). General Population Studies Reporting the Prevalence Rates of Heavy Alcohol Use Outcomes of Gay, Lesbian, Bisexual and Heterosexual Respondents (published between 2000 and 2017)

Author(s)	Year	Data	Location	Measures	Population	n	Prevalence[#]
Eisenberg & Wechsler[93]	2003	College Alcohol Study	USA	Binge drinking (>= 5 drinks on one occasion for men and >= 4 drinks on one occasion for women) (past 2 weeks)	Males with same sex partners	112	50.0
					Males with both sex partners	83	47.0†
					Males with opposite sex partners	3,896	59.0
					Females with same sex partners	134	39.0
					Females with both sex partners	301	53.0
					Females with opposite sex partners	5,775	46.0
Robin et al[100]	2002	Vermont/ Massachusetts Youth Risk Behavior Survey (grades 9-12 students)	USA (Vermont)	Binge drinking (>= 5 drinks on one occasion) (past 30 days)	Same sex partners	249	51.1
					Both sex partners	336	61.2*
					Opposite sex partners	6,873	52.5
			USA (Massachusetts)	Binge drinking (>= 5 drinks on one occasion) (past 30 days)	Same sex partners	106	44.3
					Both sex partners	122	58.7
					Opposite sex partners	3,948	46.9

Notes. [#]*Prevalence rate per 100 population. *Statistically significantly different from the heterosexual group (p < .05), as reported by the original authors.*
†Statistically significantly different from the heterosexual group after adjustment (p < .05), as reported by the original authors (adjusted odds ratios).

2.3.2 Canadian Studies

A small number of studies estimated the prevalence of mood and anxiety disorders in the Canadian population. All of these studies utilized data from the Canadian Community Health Survey (CCHS). Scott et al. found that the 12-month prevalence rates of major depressive disorder were 13.5%, 22.4%, and 4.5% for gay/lesbian, bisexual, and heterosexual respondents, respectively, with the prevalence for bisexuals (compared with heterosexuals) attaining statistical significance in a regression model adjusted for age, education, income, marital status, employment status, race/ethnicity, and perceived physical health (CCHS 2012, N = 24,788).[43] In an earlier study, I found that LGB respondents had significantly higher prevalence rates of self-reported mood disorder diagnosis at 17.1% (vs. 6.9% for heterosexuals) (CCHS 2007-08, N = 76,630).[41] Tjepkema disaggregated data for men and women and found that bisexual women reported the highest rates of mood disorders (25.2%) and anxiety disorders (17.7%), with prevalence rates for all sexual minority groups significantly different from those of heterosexuals (CCHS 2003-05, N = 159,824). Finally, Brennan et al. examined the prevalence of mood or anxiety disorders among sexual minority men and found the prevalence rates to be 15.8% for gay men and 13.8% for bisexual men, both of which were statistically significantly different from the rate for heterosexual men. The differences between groups in risky drinking were not statistically significant (CCHS 2003, N = 49,901).[40]

Given the limited Canadian literature related to LGB mental health, I highlight the results from several other studies with relevant outcomes. Saewyc et al. surveyed over 30,000 youth in Grades 7 to 12, in British Columbia, in three years of the BC Adolescent Health Survey (1992, 1998, and 2003). Compared with their heterosexual peers, LGB youth were more likely to have reported emotional stress and suicidal thoughts, as well as to have experienced physical and

sexual abuse, harassment in school, and discrimination in the community.[37] Steele et al. studied correlates of the mental health service use of LGB mothers (current or prospective) (N = 73); they found that one third of the women reported some mental health service use within the past year, with another one third reporting a perceived unmet need for mental health services.[39] Analysing data from the Risk and Resilience Survey of Bisexual Mental Health (N = 405) from Ontario, Ross et al. found that the burden of mental health and substance use among bisexuals in Ontario is high relative to population-based studies of other sexual orientation groups.[38] Finally, using the population attributable fraction to derive and compare indirect estimates of mortality for both HIV and suicide, Hottes et al. estimated that, in 2011, there were 46 suicide deaths per 100,000 gay and bisexual men, surpassing HIV as a leading cause of premature mortality for gay and bisexual men.[101]

In summary, the epidemiological evidence related to the mental health of the LGB population and its subgroups, in Canada, is largely limited to the handful of studies reviewed here. In the following section, I review the literature concerned with explanations of the observed sexual minority mental health disparities.

2.3.3 Explanations of sexual minority mental health disparities

The previous section summarized the empirical evidence regarding the higher prevalence of anxiety disorders, mood disorders, and heavy drinking among LGB people compared with heterosexuals. Having established an increased mental health burden, researchers have advanced to systematically examine explanations for the observed disparities.

Many theoretical frameworks have been postulated to explain the distribution of health and illness in a population.[102,103] The leading theoretical framework to explain the health disparities experienced by LGB people is the minority stress theory.[11,104] The theory posits that sexual (and other) minorities experience chronic stressors (henceforth minority stressors) as a result of the distal (i.e., external, objective stressful events and conditions, such as prejudice, discrimination, and violence) and proximal stressors (i.e., expectations of the distal stressors and the vigilance this expectation requires, such as expectations of rejection).[11,57] Minority stressors include structural factors (e.g., social isolation beyond a person's control and rooted in the social environment), interpersonal microaggressions (the brief and commonplace exchanges that send hostile or derogatory messages to individuals because of their group membership),[105] as well as personal processes (e.g., internalization of negative societal attitudes, such as internalized homophobia), that combine to create a toxic everyday environment for LGB people, thereby increasing their risk for various health problems.[57] Key premises of the theory (and its later extensions) include its focus on explaining mental health disparities, not differences, and on average effects on the group as a whole notwithstanding variability among group members.[106] Health disparities are defined as differences in the distributions of health and disease that exist due to social factors or the allocation of resources.[107] They represent an excess of disease for disadvantaged, compared with advantaged, social groups that is systemic, unfair, and avoidable.[108,109]

Intersectionality theory is a framework that has been proposed for, and applied to, the understanding of LGB mental health disparities.[47] Intersectionality theory posits that multiple features of social position intersect with one another and that characteristics, such as sexual identity, are better understood in combination with other social structures (e.g., sex/gender,

race/ethnicity).[62,64,110,111] Indeed, an intersectional approach suggests that it is a particular combination of disadvantage that affects health outcomes and therefore multiple marginalizations cannot be understood or ameliorated by unitary approaches that treat sexual identity or sex/gender as distinct subjects of inquiry.[74] Accordingly, applied to the field of sexual minority mental health, studies employing an intersectional framework formulate and test hypotheses about the impact of such intersections on the mental health of sexual minorities and their subgroups, illuminating factors that help explain intragroup heterogeneities.[72] This complicates our thinking about any one sexual identity as a singular, homogenous category because it spotlights the ways in which intersectional positions of sexual identities articulate with other salient dimensions of identity (e.g., gender identity, racial ethnicity, socioeconomic status, and age) that may confer advantage or disadvantage.[65] At the socio-structural level, the combination of multiple disadvantaged positions may be associated with stressors that are synergistic in their effects and that deprive segments of the LGB sexual minority community the benefits of group-level coping and resilience resources. The intersections of racism, xenophobia, classism, sexism, ageism, biphobia, and other exclusions within the community serve to divide and estrange, rather than unify.[65,112] The case of multiple or intersecting disadvantaged identities is typically overlooked or ignored, which results in a lack of resources needed to contest the disadvantage.

Other theoretical frameworks that have been proposed and applied, albeit to a lesser extent, include life course and multi-level perspectives, most notably, syndemics.[47] A life course perspective acknowledges that events at each stage of life influence subsequent stages and recognizes that experiences are shaped by one's age cohort and historical context.[47] A syndemic is the aggregation of two or more diseases in a population and refers to the consequential

44

interactions between concurrent or sequential diseases in a population and in relation to the social conditions that cluster the diseases within the population.[113] Applied most frequently to the field of gay men's health (and men who have sex with men), some have proposed that the interaction of health problems and risk factors may make sexual minority men more vulnerable to HIV infection.[114,115] This framework has been extended to sexual minority mental health, with studies suggesting that these mental health disorders are syndemic and causally associated with factors such as adverse childhood and adolescent developmental experiences (e.g., childhood abuse or discrimination).[116,117]

The published literature identifies numerous risk and, to a lesser extent, protective factors in reference to LGB mental health outcomes, and falls into two broad categories. The first set of studies focus on established general cognitive, affective, and social risk factors and processes applicable to both LGB and heterosexual populations (e.g., peer or family supports or general stressors). In explaining any observed disparities, these studies examine the differences in the putative shared factors that LGB individuals experience more or less compared with their heterosexual peers. The second set of studies focus on factors and processes unique to the LGB population (e.g., sexuality-based violence or discrimination), postulating that studies of general processes may leave unexamined factors that only LGB individuals experience or to which they are exposed. This literature rests largely on examinations of within-group differences, assessing the role of sexual minority-specific factors in explaining the variation in outcomes among LGB individuals. Although the body of literature can generally be categorized into these two broad groupings, it is noteworthy that a small number of authors stress the need for research that combines the general and unique factors and processes in integrative models.[56,106,118] The minority stress theory has been applied in both sets of literature described above.[119] Indeed, the

majority of studies contained in the review applied the principles of minority stress theory, or extensions thereof.

The literature consistently reports that minority stress factors (both distal and proximal) contribute to the higher prevalence rates of mental health disorders in LGB populations.[120–134] These factors are commonly, though not exclusively, treated as mediators of the observed relationships. The findings related to distal factors suggest that victimization and discrimination,[71,124,135–152] community connectedness or belonging,[153–159] institutional discrimination and structural stigma,[127,160–163] social supports, peer or family supports,[98,126,155,164–169] and social environments[170–172] explain some of the variation in the prevalence rates of mental health and substance use outcomes. Bisexuals, in particular, may experience poorer mental health outcomes compared with both heterosexuals and other sexual minority groups because of greater experiences of minority stressors[173] whilst potentially deriving fewer benefits from protective factors, such as peer support.[168] Although not a focus of this review, proximal stressors (e.g., internalized homophobia) also have been identified as relevant explanatory factors.[134,147,174]

The literature reviewed identifies several socio-demographic characteristics, including sex/gender,[41,56,149,170] age,[35,114,175] educational attainment,[55,69,156,176,177] income,[69,156] as well as race/ethnicity,[129,178,179] as potential moderators, with a small number of studies applying an intersectional framework to examine their joint effects.[54,69,72,163,179–181] For example, evidence from longitudinal population-based data suggests that while minority stress factors may explain disparities in mental health and substance use disorders for sexual minorities, the degree of disparity also differs by sexual orientation group, gender, and age.[124] Intersectional

discrimination (i.e., sexual- orientation-based discrimination in combination with other forms of identity-based discrimination) also have been associated with higher odds of mental health and substance use disorders.[182–184] In general, the existing evidence suggests that multiple factors are inter-related, which contributes towards further understanding of the development of alcohol and mental health problems amongst the LGB population.[32]

2.3.4   Knowledge Gaps

Multiple knowledge and methodological gaps exist in the field of sexual minority health, both in Canada and internationally. Here I summarize the gaps from which this study emerged and highlight the limitations associated with research in the field as a whole. More detailed discussions of the specific research gaps, which each empirical chapter was intended to address, are provided in Chapters 4 through 6.

With respect to prevalence rates, several studies conducted around the world have demonstrated that LGB populations experience mental health disparities across a wide range of mental health outcomes. Studies of alcohol use are generally fewer in number, and no studies were found that examined mental health comorbidities with heavy alcohol use. The majority of research has been conducted in the United States and most of the evidence is based on self-reported data. Few population-based studies contain samples of a size sufficient to determine relatively precise prevalence estimates or to disaggregate the rates for lesbian, gay, and bisexual people and for men and women. In Canada, the epidemiological evidence related to the mental health of LGB populations is limited to a handful of studies. Precise estimates (both national and regional) of LGB prevalence rates of mental health disorders, relative to heterosexual peers and disaggregated by sexual identity or by sex/gender, are currently not available.

With respect to explanations of the observed LGB mental health disparities, the evidence implicates minority stress factors as contributors to the higher prevalence rates. The majority of studies have applied the principles of the minority stress theory, and extensions thereof, and a few studies have applied intersectional approaches. Studies with longitudinal data are rare as reflected in the currently narrow knowledge base of the impact of cumulative mental health stressors over the life course. Knowledge gaps exist regarding the possible processes underlying the elevated prevalence rates, including possible moderating and mediating factors. To date, understanding of how stress operates for bisexual people, in particular, and how different or intersecting stress-related experiences operate, is limited. Given the aforementioned sample size limitations, very few studies have been able to conduct stratified analyses by age, sex, ethnicity, or other relevant characteristics to disentangle the heterogeneity of outcomes for LGB populations. In Canada, the factors that may shape the mental health of LGB people remain under examined.

2.3.5   Summary

The findings from existing epidemiological research indicate that sexual minority individuals consistently report elevated rates of mental health disorders compared with heterosexuals. The rates of heavy drinking are generally significantly different from those of heterosexual counterparts for sexual minority women only. Bisexual people report the highest rates of mental health disorders, in the majority of studies. Gender or sex subgroup differences are also observed and tend to vary by outcome. These findings are consistent with published meta-analyses and systematic reviews in the field,[11,24,36] with studies showing that the disparities emerge early in the life course and persist into adulthood.[35,56,185] The literature reports that

minority stress factors (both distal and proximal) contribute to the higher prevalence rates of mental health disorders in LGB populations.[120–134] Multiple knowledge and methodological issues regarding the relatively poor mental health status (and its underlying causes) of sexual minority populations remain unaddressed both in Canada and internationally.

Chapter 3: Study Methodology

This section provides an overview of the methodology for the entire set of research studies. Methodological and analytic approaches specific to each research objective are discussed in Chapters 4 through 6.

3.1   Study Design

The set of studies utilizes data from multi-year, cross-sectional surveys to examine the associations between sexual orientation (gay/lesbian, bisexual, or heterosexual) with the study outcomes (anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking) and to test the mediating (life stress) and moderating (community belonging, sex, age, income, education, and racialized minority status) effects of individual-level factors while controlling for multiple cofounders.

3.2   Data Sources

Data for the study were obtained from the 2007–2012 cycles of the Canadian Community Health Survey (CCHS) conducted by Statistics Canada. The CCHS is an ongoing, national, cross-sectional survey that collects information on health status, healthcare utilization, and health determinants of the Canadian population. The survey relies upon a large sample of respondents and is designed to provide reliable estimates at the health region level.[186] The CCHS is representative of approximately 98% of the Canadian population aged 12 years and over living in private dwellings in the health regions from all provinces and territories. Excluded from the

sampling frame are individuals living on First Nations Reserves and Crown Lands, institutional residents (e.g., federal penitentiaries), full-time members of the Canadian Forces, and residents of extremely remote regions.

The survey uses a multistage stratified cluster design. Data are collected using computer-assisted in-person and telephone interviewing. The CCHS has four content components: core, theme, optional, and rapid response. The core content is collected from all survey respondents and remains relatively unchanged over several years. The theme content, also collected from the entire sample, varies from year to year. The optional content is unique to each region or province, with year-to-year variations. The rapid response component is offered to organizations interested in national estimates on an emerging or specific issue related to the population's health status. All the variables used in this study are specific to the core content.

In 2007, major changes were made to the CCHS survey design with the goal of improving its effectiveness and flexibility through data collection on an ongoing basis, every year.[187,188] Since then, Statistics Canada has produced an annual microdata file and a file combining two years of CCHS data. The analyses in this study are from three biennial CCHS data files (2007-2008, 2009-2010, and 2011-2012) and from a combined pooled sample (2007-2012). The response rates across the cycles ranged from 68.4% to 76.0%. Further details about the methodology of the CCHS, including measures put in place to detect and minimize errors, are reported by Statistics Canada.[186]

3.3 Pooled Data

The research reported here relied upon published guidelines to combine the three biennial survey datasets.[189] Specifically, the following guidelines to ensure the appropriateness of combining the datasets were followed: (1) ensured that the same characteristic was measured from cycle to cycle; (2) ensured that the same population was targeted by the different sources; (3) verified that the geographic boundaries had not changed between cycles; (4) verified that the same values for the characteristics were measured between cycles; and (5) considered the possible impact of the method of data collection (i.e., mode effect).[189] Before pooling the data, I merged the cycle-specific external files containing bootstrap weights and imputed income variables (the 2011-2012 cycle contained imputed income data). The questionnaire content in all cycles was examined to ensure that the items were identical with the CCHS content tracking tool, developed by the Population Health Improvement Research Network.[190]

The data from each CCHS biennial file were combined at the micro-data level, resulting in one dataset. This data pooling was feasible because the CCHS cycles involved comparable sample designs, survey content, and interview modes. Because the data collected in the CCHS represent the changing characteristics of an evolving population, the pooled dataset should be considered a sample of an "average" population, covering the period of the survey cycles.[189] The combined sample is not necessarily representative of the population included in any single cycle; rather, it is representative of the combined population, with estimates representing the period 2007 to 2012.

3.4 Study Sample

The initial survey samples were restricted to people who participated in the three biennial cycles ($N_{2007\text{-}08} = 131{,}959$; $N_{2009\text{-}10} = 124{,}870$; and $N_{2011\text{-}12} = 125{,}645$). These samples were then further restricted to cases with valid responses for the sexual identity item. Persons who responded "don't know," did not state, or refused to answer the question were excluded from the analyses presented here, but were included in supplemental analyses. Because the sexual identity question was asked only of respondents aged 18 to 59 years, the study sample is restricted to people of this age range. These restrictions yielded cycle samples of 79,957 in 2007-08, 72,554 in 2009-10, and 70,037 in 2011-12, for a final pooled sample of 222,548. Approximately 4% of the pooled respondents had missing values for the sexual identity item, and the missing values for all other study variables were minimal ($< 2.5\%$).

3.5 Study Variables

A summary table of all of the study variables, including a description of how they were derived from the original CCHS variables, can be found in Appendix B.

3.5.1 Sexual Identity

The primary explanatory variable in the study, self-reported sexual identity, was based on the question: "Do you consider yourself to be: heterosexual (sexual relations with people of the opposite sex)? Homosexual, that is lesbian or gay (sexual relations with people of your own sex)? Bisexual (sexual relations with people of both sexes)?"

3.5.2   Study Outcomes

Mood Disorder

The mood disorder variable (yes/no) was based on the following question, prefaced by the statement: "Now I'd like to ask about certain long-term health conditions which you may have. We are interested in "long-term conditions" which are expected to last or have already lasted 6 months or more and that have been diagnosed by a health professional. Do you have a mood disorder such as depression, bipolar disorder, mania or dysthymia?" The interviewers were instructed to include "manic depression" if mentioned by the respondent.

Anxiety Disorder

The anxiety disorder variable (yes/no) was based on the survey question, subject to the preamble about conditions diagnosed by a health professional with duration of 6 months or more: "Do you have an anxiety disorder such as a phobia, obsessive-compulsive disorder or a panic disorder?"

Anxiety-Mood Disorder

The anxiety-mood disorder variable (yes/no) was derived to indicate whether a respondent reported having both an anxiety and mood disorder.

Heavy Drinking

The heavy drinking variable was based on the question: "How often in the past 12 months have you had 5 or more drinks on one occasion?" Respondents were advised that the word "drink" meant "one bottle or can of beer or a glass of draft; one glass of wine or a wine

cooler; or one drink or cocktail with 1 and a ½ ounces of liquor." Consistent with the World

Health Organization (WHO) and Health Canada definitions of heavy drinking, responses were

recoded to define heavy drinking (yes/no) as consuming 5 or more drinks on one occasion, 12 or

more times over the past year (i.e., "yes" = once a month or more often).[191,192] Respondents who

reported not drinking at all, or drinking 5 or more drinks less often than once a month or never,

were recoded as "no."

Co-occurring anxiety or mood disorder and heavy drinking

The co-occurring anxiety or mood disorder and heavy drinking variable (yes/no) was

derived to indicate whether a respondent reported an anxiety or mood disorder and heavy

drinking.

3.5.3   Covariates

Perceived Life Stress

The perceived life stress variable was recoded into a binary variable from the survey

question: "Thinking about the amount of stress in your life, would you say that most days are:

not at all stressful, not very stressful or a bit stressful, quite a bit stressful, or extremely

stressful?" "Quite a bit stressful" and "extremely stressful" were recoded as "stressful" and the

remaining responses were recoded as "not stressful."

Community Belonging

A sense of belonging to a local community was a binary variable derived from the survey

question: "How would you describe your sense of belonging to your local community? Would

you say it is: very strong, somewhat strong or somewhat weak, or very weak?" "Very strong"

and "somewhat strong" were recoded as "strong" and "somewhat weak" and "very weak" were

recoded as "weak." Other researchers have used this survey item as a measure of social

capital[193,194] or community connectedness.[195] A study assessing the CCHS community belonging

construct's relationship with mental health showed that the item most closely captured one's

neighbourhood social capital, and the degree to which a respondent was integrated into one or

more neighbourhood networks from which they could potentially obtain resources.[196]

Age Group

Age was derived from a continuous variable based on the survey question, "What is your

age?" It was grouped into three categories: 18–29, 30–39, and 40–59 years.

Sex

The survey variable sex was a binary variable coded as male or female. The sex of the

respondent was automatically entered by the interviewer, or followed up with the question, "Is

respondent male or female?"

Educational Attainment

Educational attainment was a CCHS derived variable, which denoted the highest level of

the respondent's educational attainment. I preserved the original response categories of: "less

than secondary school graduation," "secondary school graduation," "some post-secondary

education," and "post-secondary graduation."

Household Income

The household income variable had slight differences in the income categories for the 2007-08 and 2009-10 cycles. The following categories were derived from the available data: $0-$39,999; $40,000-$59,999; $60,000-$99,999; and $100,000 or more. To address missing responses for the income questions, CCHS provided imputed income data, using nearest neighbour donor imputation.[197]

Racialized Minority Status

The variable *racialized minority* was based on a question that asked the respondents to indicate their cultural or racial background. Those who self-identified as "White" were retained as "White" and all others, including those who self-identified as Aboriginal or First Nations, were coded as belonging to a "racialized minority" group.

Marital Status

The marital status variable was based on the question "What is your marital status? Are you married, living common-law, widowed, separated, divorced, or single, never married?" Because of the small numbers of LGB respondents in several of these categories, the variable was recoded as a binary variable denoting "married/common law" or "single, never married/ separated/divorced."

Region of Canada

The region of Canada variable was based on the province of residence of the respondent and was recoded as follows because of the small numbers of LGB respondents in some

provinces: Ontario, Atlantic (New Brunswick, Newfoundland, Nova Scotia, and Prince Edward

Island), Quebec, Prairies (Alberta, Manitoba, and Saskatchewan), British Columbia, and

Northern Territories (Northwest Territories, Nunavut, and Yukon).

Urban/Rural

The binary variable, urban/rural, indicating the respondent's area of residence, was

categorized by Statistics Canada based on population size and density according to current

census population counts.

3.6   Data Analysis

This section outlines the data analyses applicable to the empirical Chapters 4 through 6.

All analyses were conducted with Stata 13 (StataCorp LP, College Station, TX). I used *svyset*

procedures and Statistics Canada's guidelines to apply design and bootstrap weights in an effort

to produce unbiased estimates with variances adjusted for the sampling method.[198] With respect

to assumptions of time equality across survey cycles, the use of a pooled approach in fitting

models can be justified according to a model-design-based view.[199] Consequently, I examined

differences in the variable distributions across the cycles, included a survey cycle–time effect in

the models, and tested for statistical significance ($\alpha = .05$). All bivariable relationships were first

examined using χ^2 tests. Associations were examined via unadjusted and adjusted logistic

regression models and odds ratios (ORs) with 95% confidence intervals. Diagnostic statistics

were obtained and examined to satisfy the assumptions for the logistic regression models (see

Appendix C). Specific analytical procedures used to address the three research objectives are

described in the respective chapters.

3.7   Ethical Considerations

Ethical approval for the study was not required, commensurate with Article 2.2 (data legally accessible to the public and appropriately protected by law) of the Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans. Access to the data was regulated by Statistics Canada, which is a legally designated custodian/steward of the data that protects its privacy and proprietary interests. The researcher accessed the data through Canada's Research Data Centre in accordance with the confidentiality provisions of the *Statistics Act*.

Chapter 4: Prevalence and Co-Occurrence of Heavy Drinking and Anxiety and Mood Disorders Among Gay, Lesbian, Bisexual, and Heterosexual Canadians

4.1 Introduction

As reviewed in Chapter 2, previous research indicates that lesbian, gay, and bisexual people experience poorer mental health compared with their heterosexual counterparts. However, no comparable prevalence data are available for the Canadian population. The prevalence rates of common mental health disorders, heavy drinking, and their co-occurrence among gay, lesbian or bisexual Canadians are currently unknown.

The literature widely implicates adverse distal and proximal stressors that LGB people experience throughout their lives, which increase their risk for mental health problems.[11,57] Despite this context, and the likelihood that being a member of a stigmatized sexual minority group may lead to mental health challenges, few Canadian studies have examined the relationships between sexual identity and mental health and substance misuse. The goal of this study was to address the existing substantive and methodological knowledge gaps that were outlined in the earlier chapters.

My research objective was to investigate the prevalence and correlates of anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking among Canadians self-identified as lesbian/gay, bisexual, or heterosexual. The specific research questions were:

(a) What are the prevalence rates of anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking as reported by self-identified lesbian/gay, bisexual, and heterosexual Canadians?

(b) What are the correlates of these mental health outcomes for lesbian/gay, bisexual, and heterosexual Canadians?

(c) What are the regional distributions of the prevalence rates stratified by sexual identity?

(d) Do these prevalence rates vary for gay, lesbian, bisexual, and heterosexual respondents? Do these prevalence rates vary by sex as well as sexual identity?

4.2 Methods

The data were derived from three biennial files (2007–2008, 2009–2010, and 2011–2012) of the Canadian Community Health Survey conducted by Statistics Canada, forming a combined pooled sample (2007–2012). The methodological details regarding the study data and the pooled sample are detailed in Chapter 3. These methods yielded cycle samples of 79,957 in 2007-08, 72,554 in 2009-10, and 70,037 in 2011-12, for a final pooled sample of 222,548.

In addition to the primary explanatory variable (self-reported sexual identity) and the five main study outcomes (anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking), I selected known and potential confounders established in a literature review focusing on associations between sexual identity, mental health, and substance misuse.[13,56] Study covariates included sex, age, educational

attainment, household income, marital status, racialized minority status, and residence (i.e.,

region of Canada and urban/rural area).

I used *svyset* procedures in Stata and Statistics Canada's guidelines to apply design and

bootstrap weights in an effort to produce unbiased estimates with variances adjusted for the

sampling method.[198] Analyses were initially performed on each biennial dataset and then with the

pooled sample dataset. I conducted χ^2 tests to examine bivariable relationships between sexual

identity, the study outcomes, and the confounders. Associations between sexual identity and the

study outcomes were examined via unadjusted and adjusted logistic regression models and odds

ratios (ORs) with 95% confidence intervals. I also obtained weighted prevalence rates stratified

by sex and tested sex–identity interaction terms for significance in all models.

4.3   Results

4.3.1   Sexual Identity and Socio-Demographic Characteristics

During the period 2007 to 2012, 97.8% of CCHS respondents self-identified as

heterosexual; 1.3% and 1.0% identified as gay/lesbian and bisexual, respectively. Differences in

self-identification between survey cycles were minimal and not statistically significant. Table 4

presents information about the socio-demographic characteristics of the respondents. Whereas

nearly equal proportions of heterosexual respondents were men and women, more than 62% of

those who identified as gay/lesbian were men, and more than 69% of those identifying as

bisexual were women.

The proportions of gay/lesbian respondents across the age categories were similar to

those of the heterosexual respondents, and a greater proportion of gay/lesbian respondents

(73.0%) reported attaining post-secondary education (vs. 64.3% of heterosexuals). Bisexual respondents were significantly younger than both the heterosexual and gay/lesbian respondents, and they were more likely to report having attained less education. The majority of gay/lesbian (60.9%) and bisexual (67.2%) respondents were single, widowed, or divorced, while the majority of heterosexual respondents (63.2%) were married or in common law relationships. Differences in the proportions of respondents living in the various regions of Canada stratified by sexual identity were also observed.

Table 4. Socio-Demographic Characteristics of Heterosexual, Gay/Lesbian and Bisexual

Respondents: CCHS, 2007-12

	All (100%)	**Heterosexual** (97.8%)	**Gay/Lesbian** (1.3%)	**Bisexual** (1.0%)
	n (%)	n (%)	n (%)	n (%)
Sex*				
Female	115,010 (50.1)	112,371 (50.1)	1,191 (37.7)	1,448 (69.2)
Male	98,216 (49.9)	95,919 (49.9)	1,589 (62.3)	708 (30.8)
Age (in years)*				
18-29	52,934 (27.5)	51,349 (27.2)	604 (26.4)	981 (51.3)
30-39	49,057 (22.5)	48,149 (22.5)	512 (20.5)	396 (18.5)
40-49	49,005 (25.7)	47,731 (25.7)	876 (29.4)	398 (18.1)
50-59	62,230 (24.4)	61,061 (24.5)	788 (23.6)	381 (12.1)
Educational Attainment*				
Less than secondary school graduation	23,715 (9.3)	23,184 (9.4)	170 (4.9)	361 (13.4)
Secondary school graduation	39,238 (17.6)	38,395 (17.7)	386 (13.0)	457 (20.7)
Some post-secondary education	17,159 (8.7)	16,639 (8.6)	235 (9.1)	285 (16.2)
Post-secondary graduation	132,170 (64.3)	129,153 (64.3)	1,975 (73.0)	1,042 (49.7)
Household Income*				
$0 – $39,999	54,014 (21.5)	52,293 (21.3)	788 (23.1)	933 (38.9)
$40,000 – $59,999	38,685 (16.9)	37,777 (16.9)	514 (18.0)	394 (18.6)
$60,000 – $99,999	62,289 (29.6)	61,029 (29.7)	770 (27.0)	490 (25.0)
$100,000 or more	58,238 (32.0)	57,191 (32.1)	708 (31.8)	339 (17.5)
Racialized Minority Status*				
Racialized Minority	32,689 (21.9)	31,958 (22.0)	326 (13.9)	405 (21.2)
White	179,571 (78.1)	175,403 (78.0)	2,435 (86.1)	1,733 (78.8)
Marital Status*				
Single/ Widowed/ Divorced	90,833 (37.4)	87,486 (36.8)	1,858 (60.9)	1,489 (67.2)
Married/ Common Law	122,064 (62.6)	120,486 (63.2)	916 (39.1)	662 (32.8)
Region*				
Atlantic	25,845 (6.9)	25,333 (6.9)	284 (6.7)	228 (6.0)
Quebec	40,556 (23.2)	39,425 (23.1)	755 (31.1)	376 (19.8)
Prairies	44,996 (17.5)	44,180 (17.6)	378 (11.4)	438 (17.2)
British Columbia	25,054 (13.2)	24,320 (13.2)	402 (14.1)	332 (19.7)
Northern Territories	6,739 (0.3)	6,583 (0.3)	66 (0.2)	90 (0.4)
Ontario	700,36 (39.0)	68,449 (39.0)	895 (36.5)	692 (36.9)
Rural / Urban Area*				
Rural	55,656 (17.0)	54,793 (17.1)	437 (9.7)	426 (11.8)
Urban	157,570 (83.0)	153,497 (82.9)	2,343 (90.3)	1,730 (88.2)

Notes. Weighted data. Based on the $\mathcal{X}^2$ test of association. * p < .001.

4.3.2 Prevalence and Correlates of Anxiety and Mood Disorders and Heavy Drinking

Table 5 displays the prevalence rates of the study outcomes for gay/lesbian, bisexual and heterosexual respondents and their associations with all the study variables. Across the five study outcomes, higher prevalence rates were observed among sexual minority (vs. heterosexual) respondents, with rates substantially higher among bisexual respondents than among respondents of any other sexual identity.

In the 2007 to 2012 period, anxiety disorders were reported by 5.9% of heterosexual respondents, 11.4% of gay/lesbian respondents, and 20.7% of bisexual respondents. Mood disorders were reported by 7.0% of heterosexuals, 14.5% of gay/lesbian respondents, and 24.8% of bisexual respondents. Overall, 2.7% of heterosexuals, 6.6% of gay/lesbian respondents, and 13.5% of bisexuals reported combined anxiety–mood disorders. Heavy drinking was reported by 22.6% of heterosexual respondents, 27.9% of gay/lesbian respondents, and 30.4% of bisexual respondents. A total of 2.2% of heterosexuals, 5.2% of gay/lesbian respondents, and 10.0% of bisexuals reported co-occurring anxiety or mood disorders and heavy drinking. This pattern was observed for each of the separate CCHS cycles, with small cycle-to-cycle differences (see Appendix D. The frequency distributions of the study outcomes, stratified by sexual identity of the CCHS (2007-2012) respondents, are included in Appendix E.

All confounders were significantly associated with anxiety, mood, anxiety-mood disorders, and heavy drinking. For the co-occurring disorders, sex and rural/urban area did not reach statistical significance. Compared with men, women were more likely to report mood, anxiety, and anxiety-mood disorders, and less likely to report heavy drinking. Heavy drinking was most prevalent among respondents in the younger age groups. All study outcomes were

more likely to be reported by single, widowed, or divorced respondents. In general, respondents with relatively more educational attainment or household income were less likely to report anxiety, mood, anxiety-mood, and co-occurring disorders. Respondents in the higher household income categories were more likely to report heavy drinking. The same patterns of bivariable associations were observed in the unpooled, biennial CCHS cycles (data not shown).

Table 5. Prevalence Rates of Anxiety, Mood, Anxiety-Mood Disorders, Heavy Drinking, and Co-Occurring Anxiety or Mood Disorder and Heavy Drinking by Sexual Identity and Socio-Demographics: CCHS, 2007-2012

	Anxiety Disorder	Mood Disorder	Anxiety-Mood Disorder	Heavy Drinking	Co-Occurring Anxiety or Mood Disorder and Heavy Drinking
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Sexual identity					
Heterosexual	5.9 (5.8-6.1)	7.0 (6.8-7.2)	2.7 (2.6-2.8)	22.6 (22.3-22.9)	2.2 (2.1-2.3)
Gay/ Lesbian	11.4 (9.9-13.2)	14.5 (12.5-16.7)	6.6 (5.5-7.8)	27.9 (25.2-30.8)	5.2 (4.1-6.5)
Bisexual	20.7 (18.3-23.4)	24.8 (22.0-27.7)	13.5 (11.4-15.8)	30.4 (27.2-33.8)	10.0 (7.9-12.4)
Sex					*n.s.*
Female	8.0 (7.7-8.2)	9.6 (9.3-9.9)	3.8 (3.7-4.0)	13.6 (13.3-13.9)	2.3 (2.2-2.4)
Male	4.5 (4.3-4.7)	5.2 (5.0-5.4)	2.0 (1.9-2.1)	31.3 (30.8-31.8)	2.4 (2.2-2.5)
Age (in years)					
18-29	6.3 (6.0-6.7)	5.9 (5.6-6.3)	2.7 (2.5-2.9)	34.8 (34.2-35.5)	3.3 (3.1-3.6)
30-39	5.9 (5.6-6.2)	7.0 (6.7-7.4)	2.8 (2.6-3.0)	20.2 (19.6-20.8)	2.1 (1.9-2.3)
40-49	6.5 (6.2-6.9)	8.0 (7.6-8.4)	3.1 (2.9-3.4)	17.9 (17.3-18.4)	2.0 (1.9-2.2)
50-59	6.1 (5.8-6.5)	8.7 (8.4-9.1)	3.0 (2.8-3.2)	15.4 (14.8-15.9)	1.7 (1.5-1.9)
Educational Attainment					
Less than secondary school graduation	10.3 (9.8-10.9)	11.6 (10.9-12.3)	5.7 (5.3-6.1)	23.8 (22.9-24.8)	3.8 (3.4-4.3)
Secondary school graduation	6.3 (6.0-6.6)	7.5 (7.1-7.9)	2.9 (2.7-3.2)	24.6 (24.0-25.3)	2.5 (2.3-2.7)
Some post-secondary education	8.1 (7.5-8.8)	8.9 (8.3-9.6)	4.2 (3.7-4.7)	29.4 (28.4-30.5)	3.3 (2.9-3.7)
Post-secondary graduation	5.3 (5.1-5.5)	6.5 (6.3-6.8)	2.3 (2.2-2.4)	20.7 (20.3-21.1)	2.0 (1.8-2.1)
Household Income					
$0 – $39,999	10.0 (9.7-10.4)	12.3 (11.9-12.7)	5.7 (5.4-6.0)	20.4 (19.9-21.0)	3.6 (3.4-3.9)
$40,000 – $59,999	6.5 (6.1-6.9)	7.7 (7.3-8.1)	3.0 (2.7-3.3)	21.0 (20.4-21.6)	2.5 (2.3-2.8)
$60,000 – $99,999	5.1 (4.9-5.4)	6.1 (5.9-6.5)	2.2 (2.1-2.4)	22.2 (21.6-22.7)	1.9 (1.7-2.1)
$100,000 or more	4.3 (4.1-4.6)	4.8 (4.5-5.1)	1.5 (1.4-1.7)	24.9 (24.3-25.4)	1.7 (1.6-1.9)
Racialized Minority Status					
Racialized Minority	4.1 (3.8-4.4)	5.1 (4.8-5.5)	1.9 (1.7-2.2)	12.7 (12.1-13.3)	1.3 (1.2-1.5)
White	6.8 (6.7-7.0)	8.0 (7.8-8.3)	3.2 (3.1-3.3)	25.2 (24.9-25.5)	2.6 (2.5-2.7)

Notes. Weighted data. All associations between socio-demographics and the study outcomes estimated with the χ^2 test of association. All corresponding p values found to be < .05 except where indicated by "n.s."

Table 5 (Continued). Prevalence Rates of Anxiety, Mood, Anxiety-Mood Disorders, Heavy Drinking, and Co-Occurring

Anxiety or Mood Disorder and Heavy Drinking by Sexual Identity and Socio-Demographics: CCHS, 2007-2012

	Anxiety Disorder	Mood Disorder	Anxiety-Mood Disorder	Heavy Drinking	Co-Occurring Anxiety or Mood Disorder and Heavy Drinking
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Marital Status					
Married/ Common Law	5.0 (4.9-5.2)	5.9 (5.7-6.1)	2.1 (2.0-2.3)	17.9 (17.6-18.3)	1.5 (1.4-1.6)
Single/ Widowed/ Divorced	8.2 (7.9-8.5)	9.9 (9.6-10.2)	4.2 (4.0-4.4)	29.9 (29.4-30.4)	3.7 (3.5-3.9)
Region of Canada					
Ontario	6.4 (6.1-6.7)	7.8 (7.4-8.1)	3.2 (3.0-3.4)	20.9 (20.4-21.4)	2.3 (2.1-2.4)
Atlantic	7.9 (7.5-8.4)	8.5 (8.0-9.0)	3.8 (3.4-4.1)	28.0 (27.2-28.7)	3.3 (3.0-3.6)
Quebec	5.9 (5.6-6.2)	5.6 (5.3-6.0)	2.1 (2.0-2.3)	23.0 (22.4-23.7)	2.1 (1.9-2.3)
Prairies	5.7 (5.4-6.0)	7.8 (7.4-8.2)	2.8 (2.5-3.0)	24.4 (23.7-25.1)	2.5 (2.3-2.7)
British Columbia	6.2 (5.7-6.6)	8.4 (7.9-9.0)	3.1 (2.8-3.5)	20.3 (19.6-21.1)	2.3 (2.1-2.6)
Northern Territories	5.2 (4.5-6.0)	7.1 (6.4-7.9)	2.5 (2.0-3.0)	32.1 (30.5-33.6)	3.5 (3.0-4.1)
Rural/Urban Area					*n.s.*
Rural	5.9 (5.6-6.2)	6.9 (6.6-7.3)	2.6 (2.4-2.8)	24.5 (23.9-25.1)	2.2 (2.0-2.4)
Urban	6.3 (6.1-6.5)	7.5 (7.3-7.7)	3.0 (2.9-3.1)	22.0 (21.7-22.3)	2.4 (2.3-2.5)

Notes. Weighted data. All associations between socio-demographics and the study outcomes estimated with the χ^2 test of association. All corresponding p values found to be < .05 except where indicated by "n.s."

4.3.3   Regional Distributions of Rates of Anxiety and Mood Disorders and Heavy Drinking by Sexual Identity

Differences in the regional distributions of the study outcomes by sexual identity were observed (see Table 6). Overall, the rates of the study outcomes for heterosexual respondents from Ontario most closely resembled those for the rest of Canada while respondents in Quebec and the Atlantic provinces reporting the lowest and the highest rates of mental health disorders, respectively. LGB respondents in the Atlantic provinces consistently reported the highest rates of the study outcomes compared with LGB respondents of other regions in Canada. As many as 30.5% of bisexual respondents reported anxiety disorders, 32.0% reported mood disorders, and 20.6% reported co-occurring disorders in the Atlantic provinces (compared with 20.7%, 24.8%, and 10.0% of bisexuals reporting those outcomes, respectively, in the other regions of Canada). Similarly, over 33.0% of gay/lesbian respondents from the Atlantic regions reported heavy drinking and 19.4% reported mood disorders (compared with 27.9% and 14.6% of gay/lesbian respondents reporting those outcomes, respectively, in the other regions of Canada). In British Columbia, gay/lesbian respondents reported the lowest rates of heavy drinking relative to all sexual identities in the rest of Canada; however, the rates of mood disorders for bisexuals in British Columbia were elevated compared with their Canadian peers. While some of the differences in the regional prevalence rates were not statistically significant, as indicated by the overlapping confidence intervals, they nonetheless indicate that the mental health burden experienced by LGB individuals has substantial regional variation.

Table 6. Regional Distributions of Prevalence Rates of Anxiety, Mood, and Anxiety-Mood Disorders, Heavy Drinking, and Co-Occurring Anxiety or Mood Disorder and Heavy Drinking by Sexual Identity: CCHS, 2007-12

	All Canada	Ontario	Atlantic	Quebec	Prairies	British Columbia	Northern Territories
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Anxiety disorders							
All	6.1 (6.0-6.3)	6.3 (6.0-6.6)	7.8 (7.4-8.3)	5.8 (5.5-6.2)	5.7 (5.4-6.0)	6.1 (5.6-6.5)	5.2 (4.5-6.0)
Heterosexual	5.9 (5.8-6.1)	6.0 (5.8-6.3)	7.6 (7.1-8.0)	5.7 (5.4-6.1)	5.5 (5.2-5.8)	5.7 (5.3-6.2)	No Release
Gay/ Lesbian	11.4 (9.9-13.2)	10.8 (8.3-13.9)	13.9 (9.8-19.3)	10.6 (7.9-14.0)	12.5 (8.8-17.6)	13.1 (9.0-18.7)	
Bisexual	20.7 (18.3-23.4)	25.5 (20.8-30.8)	30.5 (23.0-39.1)	11.5 (7.8-16.8)	15.3 (11.6-19.9)	22.8 (17.0-29.9)	
Mood disorders							
All	7.3 (7.1-7.5)	7.7 (7.3-8.0)	8.4 (7.9-8.9)	5.5 (5.1-5.8)	7.7 (7.3-8.1)	8.3 (7.8-8.9)	7.1 (6.4-8.0)
Heterosexual	7.0 (6.8-7.2)	7.4 (7.0-7.7)	8.0 (7.5-8.5)	5.3 (5.0-6.4)	7.5 (7.1-7.9)	7.9 (7.4-8.5)	6.9 (6.2-7.7)
Gay/ Lesbian	14.5 (12.5-16.7)	16.1 (12.3-20.8)	19.4 (13.5-27.0)	11.1 (8.3-14.8)	15.1 (10.9-20.5)	14.7 (10.2-20.8)	9.8 (3.6-24.0)
Bisexual	24.8 (22.0-27.7)	27.3 (22.2-33.1)	32.0 (24.5-40.6)	14.5 (10.5-19.6)	23.0 (17.7-29.3)	29.8 (23.3-37.2)	24.1 (15.2-35.9)
Anxiety-mood disorders							
All	2.8 (2.7-3.0)	3.1 (2.9-3.3)	3.7 (3.4-4.1)	2.1 (1.9-2.3)	2.7 (2.5-2.9)	3.1 (2.8-3.4)	2.5 (2.0-3.0)
Heterosexual	2.7 (2.6-2.8)	3.0 (2.8-3.2)	3.5 (3.2-3.9)	2.0 (1.8-2.2)	2.6 (2.4-2.8)	2.8 (2.6-3.2)	2.4 (1.9-2.9)
Gay/ Lesbian	6.6 (5.5-7.8)	7.0 (5.2-9.4)	8.0 (5.2-12.1)	5.9 (4.1-8.6)	5.4 (3.5-8.3)	7.2 (4.2-12.1)	No release
Bisexual	13.5 (11.4-15.8)	16.5 (12.6-21.4)	20.0 (13.6-28.3)	6.5 (4.1-10.2)	11.2 (8.3-15.1)	14.7 (9.9-21.3)	8.9 (4.6-16.6)
Heavy drinking							
							n.s.
All	22.7 (22.4-23.0)	21.2 (20.6-21.7)	28.2 (27.4-29.0)	23.2 (22.6-23.9)	24.7 (24.0-25.4)	20.6 (19.9-21.4)	32.2 (30.7-33.8)
Heterosexual	22.6 (22.3-22.9)	21.0 (20.5-21.5)	28.0 (27.2-28.9)	23.1 (22.4-23.8)	24.6 (23.9-25.3)	20.5 (19.8-21.3)	32.2 (30.6-33.8)
Gay/ Lesbian	27.9 (25.2-30.8)	30.9 (25.5-36.8)	33.3 (26.0-41.6)	27.6 (23.3-32.3)	27.9 (21.2-35.7)	18.5 (14.1-24.0)	22.9 (11.8-39.6)
Bisexual	30.4 (27.2-33.8)	25.5 (20.8-30.8)	40.1 (33.0-47.6)	30.9 (24.6-37.9)	35.6 (27.9-44.0)	31.6 (24.5-39.7)	41.5 (29.4-54.7)
Co-occurring disorders							
All	2.3 (2.2-2.4)	2.3 (2.1-2.4)	3.3 (3.0-3.6)	2.1 (1.9-2.3)	2.5 (2.3-2.7)	2.3 (2.1-2.6)	3.5 (3.0-4.1)
Heterosexual	2.2 (2.1-2.3)	2.2 (2.0-2.3)	3.1 (2.8-3.4)	2.0 (1.8-2.2)	2.4 (2.2-2.6)	No Release	No Release
Gay/ Lesbian	5.2 (4.1-6.5)	4.7 (3.2-6.9)	6.3 (3.4-11.1)	6.6 (4.4-9.8)	4.9 (2.3-10.0)		
Bisexual	10.0 (7.9-12.4)	11.1 (7.6-16.0)	20.6 (14.5-28.3)	5.7 (3.2-9.7)	10.1 (6.4-15.8)		

Notes. Weighted data. All associations significant at $p < .05$ based on the χ^2 test of association except where indicated by "n.s." Some prevalence data were not released due to small frequencies in the region.

4.3.4 Associations between Sexual Identity and the Study Outcomes

Table 7 shows the adjusted odds ratios for the associations between sexual identity and the study outcomes. Stratified odds are reported if the omnibus test of significance for the interaction between sex and sexual identity was statistically significant ($p < .05$). In all of the unadjusted and adjusted logistic regression models (for the former, estimates are not shown in tables, but are reported below for comparison purposes), gay/lesbian or bisexual respondents were significantly more likely than heterosexual respondents to report anxiety, mood, and anxiety–mood disorders; heavy drinking; and co-occurring anxiety or mood disorders and heavy drinking.

Relative to heterosexuals, gay/lesbian respondents had twice the unadjusted and adjusted odds of reporting an anxiety disorder. In the stratified model, the difference in the estimates for gay men (adjusted OR = 2.5) and lesbian women (adjusted OR = 1.5) was statistically significant. Bisexual respondents had 4.1 times higher unadjusted odds than heterosexuals of reporting an anxiety disorder; the adjusted odds ratio was 3.0 and remained significant. In addition, gay/lesbian respondents had 2.2 times higher unadjusted and adjusted odds than heterosexuals of reporting a mood disorder. Bisexual respondents had 4.4 times higher unadjusted and 3.4 times higher adjusted odds of a mood disorder compared with heterosexuals.

Gay/lesbian respondents had 2.5 times higher unadjusted and adjusted odds of combined anxiety and mood disorders than heterosexual respondents. In the stratified models, the estimates for gay men (adjusted OR = 2.9) and lesbian women (adjusted OR = 1.9) indicated a statistically significant interaction between sex and sexual identity. Bisexual respondents had 5.6 times

higher unadjusted and 3.8 times higher adjusted odds than heterosexuals of anxiety–mood disorders.

Table 7. Adjusted Odds Ratios for Anxiety, Mood, and Anxiety-Mood Disorders, Heavy Drinking, and Co-Occurring Anxiety or Mood Disorder and Heavy Drinking: CCHS, 2007-2012

	Anxiety Disorder	Mood Disorder	Anxiety-Mood Disorder	Heavy Drinking	Co-Occurring Anxiety or Mood Disorder and Heavy Drinking
	(n = 210,852)	(n = 210,826)	(n = 210,724)	(n = 210,020)	(n = 204,208)
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Sexual Identity					
Heterosexual	1.0	1.0	1.0	1.0	1.0
Gay/ Lesbian	**2.0*** (1.7-2.4)	**2.2*** (1.8-2.6)	**2.5*** (2.0-3.0)	1.0 (0.9-1.2)	**2.0*** (1.6-2.6)
Male	**2.5*** (1.9-3.1)		**2.9*** (2.2-3.9)	0.9 (0.8-1.1)	
Female	**1.5*** (1.1-1.9)		**1.9*** (1.4-2.6)	**1.6*** (1.2-2.0)	
Bisexual	**3.0*** (2.5-3.5)	**3.4*** (2.8-4.0)	**3.8*** (3.0-4.7)	**1.4*** (1.2-1.7)	**3.3*** (2.5-4.3)
Male				1.1 (0.8-1.4)	
Female				**1.6*** (1.3-1.9)	

*Notes. Weighted data. AOR = Adjusted odds ratio. Stratified odds are reported when the omnibus test of significance for the sex-sexual identity interaction achieved $p < .05$. All models adjusted for sex, age, educational attainment, household income, racialized minority status, marital status, region of Canada, rural/ urban area, and survey cycle. * $p < .001$.*

Gay/lesbian respondents had 1.3 times higher unadjusted odds than heterosexual respondents of heavy drinking, but this association was not significant in the adjusted model. In the stratified analyses, odds ratios for gay and heterosexual male respondents were not significantly different, but lesbian women had 1.6 times (significantly) higher odds than heterosexual women of heavy drinking. Relative to heterosexuals, bisexual respondents had 1.5 times greater unadjusted odds of heavy drinking, and this difference remained statistically significant and of a similar magnitude in the adjusted model (adjusted OR = 1.4). Although the odds of heavy drinking among bisexual and heterosexual men did not differ significantly, bisexual women had 1.6 times (significantly) greater odds than heterosexual women. Also, the interaction was statistically significant.

Gay/lesbian respondents had 2.4 times higher unadjusted and 2.0 times higher adjusted odds than heterosexual respondents of reporting co-occurring anxiety or mood disorders and heavy drinking. Bisexual respondents had 4.8 times and 3.3 times higher odds than heterosexuals in respective unadjusted and adjusted models.

The survey cycle–time effect was included in all of the adjusted models and tested for significance. The coefficient for the 2011–2012 cycle (vs. the 2007–2008 reference cycle) was statistically significant in all of the adjusted models and associated with higher odds of reporting each of the study outcomes.

4.3.5   Missing Data on Sexual Identity

To determine whether the missing data were randomly distributed, I repeated all of the analyses with four sexual identity groups: heterosexual (reference), gay/lesbian, bisexual, and

missing (i.e., those who answered "don't know," refused to answer the question, or neglected to respond). Relative to heterosexuals, those with missing data were more likely to be male, older, and single; to have lower educational attainment; to live in British Columbia; and to self-identify as a racialized minority.

Respondents with missing information had higher rates of anxiety (8.0%), mood (9.8%), and combined anxiety and mood (4.3%) disorders than heterosexuals but lower rates than gay/lesbian and bisexual respondents. Rates of heavy drinking (14.5%) and co-occurring anxiety or mood disorders and heavy drinking (2.2%) were lower among respondents with missing information than among any other sexual identity groups. This same pattern was observed for the respondents with missing data in sensitivity analyses that used adjusted logistic regression models (see Appendix F).

4.4 Discussion

This study, involving pooled data from the 2007 to 2012 cycles of the CCHS, documents disparities in the prevalence rates of self-reported anxiety and mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking among gay/lesbian and bisexual Canadians relative to their heterosexual peers. The substantially greater odds of these outcomes among LGB people, even after controlling for multiple confounders, point to the disproportionate mental health burden experienced by this population in Canada. Particularly concerning is the markedly higher prevalence among bisexual respondents, with nearly quadruple the rates of anxiety, mood, and combined anxiety and mood disorders relative to heterosexuals and approximately twice the rates of gay/lesbian respondents.

The relatively large adjustment in the odds of the study outcomes after controlling for confounders, among bisexual but not gay/lesbian respondents indicates the potential confluence of multiple social factors in influencing bisexual people's mental health. The results also point to the important moderating role of sex, with higher adjusted odds of anxiety and anxiety–mood disorders among gay male respondents and higher adjusted odds of heavy drinking among lesbian and bisexual women. There is some evidence that, at least for alcohol use, the factors associated with negative outcomes may be different for women (e.g., social contexts) and men (discrimination related stress).[152]

These results corroborate and extend the findings of existing population-based studies showing that gay, lesbian, and bisexual sexual identities are associated with poorer mental health and substance misuse.[11,13,24,25] This study is the first in Canada to pool epidemiological data to document prevalence rates and the co-occurrence of mental disorders and alcohol misuse among gay/lesbian and bisexual Canadians relative to their heterosexual peers. Accordingly, the findings add to the existing national studies of LGB populations[39,41–43,101] and enlarge the evidence base regarding health disparities related to sexual identity. In addition, this investigation corroborates other studies indicating that bisexuality confers the greatest odds of adverse health outcomes, including mood and anxiety disorders,[42,81] by providing new population-level evidence of the disparities experienced by bisexual Canadians.

The results implicate the consequences of minority stressors experienced by LGB people.[11] According to minority stress theory, members of sexual- and sex-identity (and other) minority groups experience chronic stressors as a result of a number of distal and proximal social conditions,[11,57] all of which increase risks for health problems.[57] Consistent with this theory, a

burgeoning literature on micro-aggressions (i.e., micro-level forms of discrimination and prejudice) considers how seemingly minor events can be psychologically damaging because of the message of rejection they convey, especially when accumulated over time.[57,200] These experiences can diminish psychological well-being, resulting in symptoms of depression, anxiety, or substance misuse.[56,58]

Such experiences are not rare. In a 2013 survey of LGB and transgender Americans, 66% of respondents reported experiencing at least one incident of discrimination or exclusion (e.g., being subjected to slurs or jokes, rejected by a family member, or threatened or physically attacked) because of their sexual orientation or gender identity.[201] In addition, as noted, a 2012 analysis of Canadian national data suggested that police-reported hate crimes were more likely to be violent when they were motivated by a victim's sexual orientation.[59] Robust evidence links trauma and victimization to negative outcomes such as depression,[120] anxiety,[202] and alcohol and tobacco use,[203] and there is some evidence of higher rates of traumatic stress in LGB samples.[204] Finally, the finding that LGB respondents in the Atlantic provinces reported the highest rates of the study outcomes compared with LGB respondents of other regions provides additional support for minority stress theory because there was variation in access to various human rights across the country (e.g., Newfoundland and PEI were the last provinces to add sexual orientation to their human rights legislation).

Possible explanations for the observed disparities among bisexual people focus on the unique, double stigma these individuals experience from within both the heterosexual and gay/lesbian communities. Pervasive stereotypes about and negative attitudes toward bisexuality (e.g., identity confusion, experimentation, promiscuity)[81] present consistent messages to bisexual

people about the unintelligibility (i.e., bisexuality as an unknowable entity) and illegitimacy of their identity[205] and are often coupled with a lack of an identifiable supportive community.[206] Qualitative research has documented how bisexual women experience a range of micro-aggressions (e.g., targeted hostility, perceived hypersexuality, lack of legitimacy within the gay/lesbian community)[207] and how notions of monosexism (the belief that one can be only heterosexual or gay/lesbian) and biphobia (aversion toward bisexuality and bisexual people as a social group) exert broad-reaching mental health effects.[208] Finally, with respect to heavy drinking specifically, there is emerging evidence that bisexual women may binge drink alcohol to cope with sexual victimization.[209]

4.4.1   Limitations

In Chapter 7, I extensively discuss the limitations and strengths of the entire set of studies and the methodological approach taken. Several observations specific to the analyses reported in this chapter deserve noting here.

First, because of the stigma some attach to LGB status, collecting information about sexual identity may be sensitive to the mode of data gathering used.[201] A review of multiple surveys estimated that approximately 3.5% of adults self-identify as LGB;[45] the proportion of LGB Canadians in the CCHS is therefore probably underestimated. This discrepancy may lead to underestimates of the true associations between sexual identity and the study outcomes because respondents who self-identified might, on average, be healthier and experience less stress than those who did not self-identify or disclose (i.e., those who remained "closeted").[41] Second, about 4% of respondents chose not to answer the sexual identity question. The findings may therefore not be generalizable to all LGB people in Canada, including those who identify with specific

dimensions of same-sex sexuality (e.g., behaviour or attraction) but do not identify as LGB. Although complete case analysis is a reasonable approach when data are missing for fewer than 10% of cases,[210] the sensitivity analyses showed that respondents with missing information on sexual identity had significantly different socio-demographic characteristics, higher rates of mental disorders, and lower rates of heavy drinking than those without missing information. Finally, diagnostic analyses for the logistic regression models with the heavy drinking indicated that the models may not have been correctly specified (the hatsq (the square of the predictor) value from the *linktest*, which was used to test misspecification of the link function, was < .001) and the model may be inconsistent with the data (p-value from *estat* to test goodness of fit was < .001). This suggests that the model with heavy drinking may have omitted relevant variables, resulting in unobserved confounding, or that the logistic model is not an appropriate representation of the relationship between the predictors and heavy drinking.[211] I discuss relevant omitted variables in limitations contained in Chapter 7.

Consequently, due to these limitations, the results, although informative, may represent imprecise estimates of existing disparities. Nonetheless, the primary strength of this study is the use of pooled epidemiological survey data, which allowed us to examine disparities across specific sexual identities and to calculate relatively precise prevalence rates and reasonable confidence intervals while adjusting for multiple confounders.

4.4.2   Conclusion

I have documented the prevalence rates of common mental disorders, heavy drinking, and their co-occurrence among people of various sexual identities. At a population level, the results point to the importance of concomitantly addressing treatment (responding to current rates of

mental disorders and heavy drinking) and prevention (addressing factors known to affect mental health and heavy drinking among LGB communities). With respect to treatment, there is some evidence that LGB people report less healthcare utilization and may experience barriers to accessing care.[212–214] Existing health services are often ill equipped to address the needs of LGB clients, and in particular, healthcare providers may be unaware of bisexual-specific factors that affect mental health.[215] At a clinical level, there are existing guidelines for best practices in treating LGB individuals that could be better disseminated and applied.[216]

Further research is needed to develop and test explanatory models of the disparities observed in this study, including examinations of stress, coping, resilience, and other factors associated with the health of LGB people. The sex-stratified findings highlight the utility of analyses that assess the potential multiple effects of sexual identity at its intersection with other advantaged and disadvantaged social positions. It is important to remember that, despite being more likely than their heterosexual peers to report mental health disorders, the majority of LGB people do not experience mental health problems. Therefore, research on how LGB people not only experience adversity, but overcome it and demonstrate significant resilience,[217,218] could offer value in understanding and addressing mental health and substance misuse disparities related to sexual identity.

Having documented the mental health disparities experienced by LGB individuals in Canada, in Chapter 5, I consider and test the mediating effects of life stress and the moderating effects of community belonging to begin to explain the observed prevalence rates across sexual identities.

Chapter 5: Life Stress as a Mediator and Community Belonging as a Moderator of the Effects of Sexual Identity on Mood and Anxiety Disorders, Heavy Drinking, and Co-occurring Disorders

5.1 Introduction

The population-based findings presented in the previous chapter illustrate that the greater risk of mental health disorders experienced by LGB people compared with heterosexuals, and documented in international samples[10,11,24–26] is also evident in Canada. As previously described, this greater risk is most compellingly attributed to the inter-connected theories of social or minority stress and other consequences of social disadvantage,[11,55,106,161,219] which posit that socially disadvantaged groups are exposed to more stressors, such as discrimination, and have access to fewer coping resources, such as social support.[55] In addition, minority stress theory[11,220] suggests that disadvantaged groups are also exposed to unique minority stressors, which are chronic, socially based, and additive to the everyday life stressors LGB people experience.[207,221] In the current chapter, I engage more deeply with the prevailing theories in this field to develop and test a conceptual framework for understanding the observed disparities in mental health outcomes in the Canadian population.

Minority stress theory postulates that minorities are disadvantaged not only by greater exposure to stress, but also by greater barriers to resources, such as supportive social networks.[222] Likewise, a weak sense of community belonging has been linked to adverse mental health outcomes among LGB individuals.[41,223,224] The evidence suggests that, due to family and peer rejection, sexual minority persons are more likely than their sexual majority peers to have

diminished levels of social support (i.e., the content and quality of their relationships) and lower

levels of social integration (i.e., the existence and quantity of their relationships).[225–227]

Nevertheless, stronger social supports may facilitate the ability to cope with stressful life events

and buffer the negative effects of identity-based stressors.[182,227,228] It has been suggested that

community belonging (to both LGB and general communities) is necessary for a person's

psychological well-being and self-actualization, and that community connectedness may be a

particularly important coping resource by providing LGB individuals with non-stigmatising

environments that support more positive identity development and that ameliorate the

relationship between minority stress and mental health.[11,72,223,229] Finally, as previously

discussed, because bisexual-identified people may be more likely to experience stress due to the

"double discrimination" of homophobia and biphobia, they may benefit from various forms of

social supports more than others because of the double stigma they face.[227] Indeed, there is

amassing evidence that experiences of stigma, prejudice and discrimination are qualitatively

different for bisexuals, as compared with gay and lesbian people's experiences.[72,182]

5.1.1   Research Gaps

In Chapters 1 and 2, I extensively discussed the existing knowledge and methodological

gaps in the field of sexual minority mental health. In this section I reiterate and examine further

the specific research gaps that this work aims to address.

Although minority stress theory has elucidated the role of social stress related to

prejudice and discrimination in explaining mental health disparities, several knowledge gaps

exist. First, existing research has tended to treat sexual minority populations as one group,

generally ignoring distinctions that exist within sexual minority subgroups (e.g., lesbian or gay

versus bisexual), including that they may have different or intersecting stress-related experiences.[179,182,206] More research is needed to understand how stress operates for bisexual people.[38] Second, while studies with LGB samples (termed "within-group studies") have allowed for more in-depth assessment of the workings of stress tailored to the specific experiences of the LGB population (e.g., the ways in which experiences of stigma and discrimination affect mental health outcomes), they lack generalizability and a comparator (i.e., a heterosexual group).[202] In addition, general-stress processes are typically not investigated despite evidence that they may be elevated in sexual minorities relative to heterosexual people.[56]

Third, although ameliorative coping is one of the processes identified in the minority stress framework, few studies have examined the effects of ameliorative (i.e., buffering or protective) factors, such as community belonging.[119,227,230] Existing research, however, suggests that feeling part of general and LGB communities may allow sexual minorities to make positive social comparisons and promote positive self-esteem.[223,229] While a sense of community belonging may ameliorate negative mental health outcomes associated with minority stress, insufficient attention has been paid to the processes that mediate (i.e., transmit the effect of an explanatory variable on an outcome variable) or moderate (i.e., affect the magnitude of the hypothesized relationships among a set of variables[231]) the links between minority status and mental health. This limits our understanding of interventions that could target stressors at both the individual and structural levels.[56,232]

Fourth, the few existing studies comparing sexual minority and heterosexual respondents (i.e., "between-group" studies) that have employed general life stress measures suggest that LGB people report more life stress or stressful life events than do heterosexual respondents.[41,233] No between-group studies were found that considered life stress as a mediator of the minority status-

mental health relationship. Regarding community belonging, one between-group analysis testing

additive, moderation, and mediation models of the interrelations among sexual orientation, sense

of belonging to the general community, and depression, did not find support for the additive and

moderation models—only mediation: self-identifying as a gay (versus heterosexual) man was

associated with a lessened sense of belonging which, in turn, was associated with higher levels of

depression.[224] No studies were found that examined the joint effects of stress and community

belonging in moderator and mediator models.

5.1.2   Conceptual Framework

Informed by the literature on stress and community belonging with respect to LGB

people's mental health, I propose a moderated mediation model.[234] Specifically, perceived life

stress is hypothesized to be a mediator of the sexual identity–mental health relationship, and this

mediation effect is contingent upon the extent of the sense of community belonging (see Figure

1). This model is consistent with conceptualizations of stress in the general population, wherein

perceived stress may be a consequence of environmental stress, and may be moderated by factors

such as social support.[235]

Figure 1. Conceptual Framework: A Moderated Mediation Model for the Effect of Sexual Identity on Mental Health
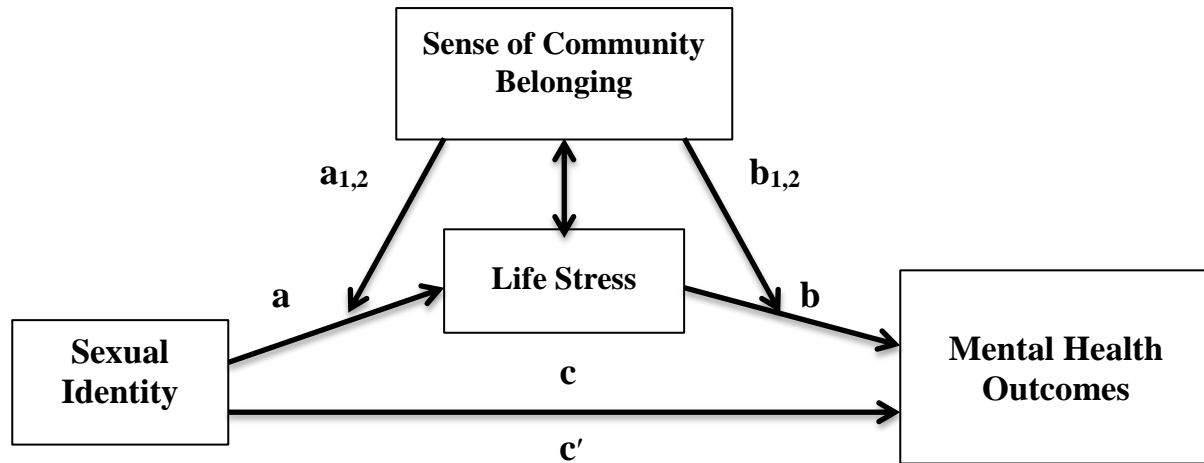
The conceptual framework guiding this study is theoretically grounded in transactional definitions of stress, wherein stress is conceptualized as a series of successive transactions between an individual and the environment, such as external challenges and perceptions of those challenges, coping resources and perceptions of those coping resources, and their dynamic interplay over time.[235–237] Accordingly, stress is a "rubric" for a complex series of subjective phenomena, including cognitive appraisals, stress emotions, coping responses, and reappraisals.[237,238] A sense of community belonging has been characterized, from a psychological perspective, as the experience of personal involvement and integration within a community (i.e., a collective or social network) to the extent that a person believes they play a special role within that network.[223]

5.1.3 Hypotheses

This study examines whether life stress mediates or sense of community belonging moderates the relationships between sexual identity and mental health outcomes (i.e., anxiety disorder, mood disorder, anxiety-mood disorder, and co-occurring anxiety or mood disorder and heavy drinking). Specifically, the study tested the following hypotheses:

(H_1) Life stress partially mediates the relationships between sexual identity and the mental health outcomes, such that a reduction in the magnitude of the direct effects is expected after accounting for the indirect effect of life stress;

(H_2) The mediating effect of life stress on the relationships between sexual identity and the mental health outcomes is reduced in magnitude for respondents with a strong versus a weak sense of community belonging; and

(H_3) The magnitude of the mediating and moderating effects significantly differ for bisexual respondents compared with the other sexual identities, such that the greatest reductions in effects are expected for bisexual respondents who report a relatively strong sense of community belonging.

The study addresses the noted gaps in the literature by (a) proposing a conceptual framework that considers both the mediating effects of life stress and the moderating effects of community belonging in explaining any observed disparities and (b) utilising mediating and moderating measures, applicable to all sexual identity groups, which capture the mechanisms of the hypothesized processes.

5.2 Methods

Details regarding the methodology, including the study sample, were described in the previous two chapters. Four binary outcome variables were examined: anxiety disorders, mood disorders, anxiety-mood disorders, and a co-occurring anxiety or mood disorder and heavy drinking. I did not include heavy drinking as an outcome in this study because I was primarily interested in applying the proposed model to explain disparities, and the odds of heavy drinking as described in the previous chapter were either not statistically significant (men) or relatively small (women), and the binary logistic model did not achieve good fit for the data.

The perceived life stress variable was treated as a mediating variable in the study while sense of belonging to a community, a moderator. Potential confounders were identified from the review of the literature, and included: sex, age group, educational attainment, household income, marital status, racialized minority status, as well as respondents' residence in terms of the region of Canada and urban/rural area where they lived.

The study hypotheses were tested using methods for mediation analysis with categorical data.[239] The analytic models were fitted twice: once for bisexual vs. heterosexual respondents, and again for gay/lesbian vs. heterosexual respondents. For hypothesis 1, path *a* (Figure 1) was estimated by regressing life stress on sexual identity (with the added covariates, sex, age group, educational attainment, household income, marital status, racialized minority status, region of Canada, and urban/rural area). Paths *b* and *c'* were estimated by regressing each of the outcomes (mood disorders, anxiety disorders, and concurrent disorders) on sexual identity and life stress, respectively (and the covariates).

For hypothesis 2, the test of moderated mediation, the mediation models detailed above were calculated separately across the strata of the moderating community belonging variable (see

paths $a_{1,2}$ and $b_{1,2}$ in Figure 1). The statistical significance of the differences between the

mediated effects across levels of the moderator was tested by taking the difference in the sample

estimates of *ab* across groups and dividing by the pooled variance of the estimates, as described

elsewhere,[240] such that: $t_{a_1 b_1 - a_2 b_2} = (a_1 b_1 - a_2 b_2) / s_e a_1 b_1 + s_e a_2 b_2)$, where $a_1 b_1$ is the mediated

effect for respondents with a weak sense of community belonging, $a_2 b_2$ is the mediated effect for

respondents with a strong sense of community belonging, and $s_e ab$ is the square root of variance

of the mediated effect in subgroups stratified by the moderator.[239]

The analyses were conducted in Stata using the "binary mediation" program, which

computes indirect effects using the product of coefficients approach and which standardizes the

coefficients. Bootstrap weights using *svyset* procedures were not applied because of their

incompatibility with the "binary mediation" command in Stata. However, a comparison of

logistic regression models examining the total effects (path *c*) with and without bootstrapping

showed negligible differences in the results (data not shown). The significance of the indirect

effects was determined by using bootstrapping to obtain standard errors and confidence intervals,

as recommended in previous research.[231,241]

5.3 Results

I described the socio-demographic characteristics of the heterosexual, gay/lesbian and

bisexual respondents in Table 4 in Chapter 4. In Table 8 below, I display the distribution of the

primary variables of interest in this study, life stress and sense of community belonging, in the

study sample. As can be seen, the sexual minority respondents were significantly more likely

than were heterosexual respondents to describe their lives as stressful and their sense of

community belonging as weak. About 34% of the bisexual respondents and 31% of the

gay/lesbian respondents indicated that their lives were stressful (vs. 26% of the heterosexual respondents), and nearly 48% of the bisexuals and 42% of the gay/lesbian respondents (vs. 38% of the heterosexual respondents) rated their sense of community belonging as weak.

Table 9 and Table 10 show the results of the mediation models outlined in Figure 1 for the four study outcomes, both in the aggregate and across the two levels of community belonging for gay/lesbian versus heterosexual respondents, and for bisexual versus heterosexual respondents.

Table 8. Life Stress and Community Belonging of Heterosexual, Gay/Lesbian and Bisexual Respondents: CCHS, 2007-12

	All (100%)	Heterosexual (97.8%)	Gay/Lesbian (1.3%)	Bisexual (1.0%)
	n (%)	n (%)	n (%)	n (%)
Life Stress*				
Stressful	53,007 (26.5)	51,539 (26.3)	825 (30.8)	643 (33.8)
Not stressful	159,722 (73.5)	156,264 (73.7)	1,949 (69.2)	1,509 (66.2)
Community Belonging*				
Weak	74,247 (38.5)	72,148 (38.4)	1,143 (41.9)	956 (47.5)
Strong	137,019 (61.5)	134,232 (61.6)	1,613 (58.1)	1,174 (52.5)

*Notes. Weighted data. Based on the $\mathcal{X}^2$ test of association. * p < .001.*

Table 9. Mediation Results across Strata of Community Belonging for Gay/Lesbian versus Heterosexual Respondents

	All				Strong Sense of Community Belonging				Weak Sense of Community Belonging			
	B	**OR**	**SE**	*p*	**B**	**OR**	**SE**	*p*	**B**	**OR**	**SE**	*p*
Anxiety Disorder												
			(n = 206,521)				(n = 134,160)				(n = 72,361)	
Path *a*	0.1	1.1	.043	= .002	0.1	1.1	.058	= .049	0.2	1.2	.064	= .011
Path *b*	0.9	2.5	.018	< .001	0.9	2.5	.025	< .001	1.0	2.7	.027	< .001
Path *c′*	0.7	2.0	.061	< .001	0.7	2.0	.083	< .001	0.6	1.8	.089	< .001
Indirect effect	.002			95% CI: .001 - .003	.001			95% CI: .000 - .003	.003			95% CI: .001 - .004
Total R^2	.07			< .001	.06			< .001	.08			< .001
										Test of equal mediated effects: $t_{a1b1-a2b2}$=-0.94, df=22, p = .36		
Mood Disorder												
			(n = 206,544)				(n = 134,175)				(n = 72,369)	
Path *a*	0.1	1.1	.043	= .002	0.1	1.1	.058	= .051	0.2	1.2	.064	= .010
Path *b*	1.0	2.7	.017	< .001	1.0	2.7	.023	< .001	1.0	2.7	.024	< .001
Path *c′*	0.7	2.0	.056	< .001	0.9	2.5	.074	< .001	0.5	1.6	.084	< .001
Indirect effect	.002			95% CI: .001 - .003	.001			95% CI: .000 - .003	.003			95% CI: .001 - .005
Total R^2	.10			< .001	.08			< .001	.11			< .001
										Test of equal mediated effects: $t_{a1b1-a2b2}$=-2.43, df=22, p = .02		
Anxiety-Mood Disorder												
			(n = 206,427)				(n = 134,108)				(n = 72,319)	
Path *a*	0.1	1.1	.043	= .002	0.1	1.1	.058	= .048	0.2	1.2	.064	= .010
Path *b*	1.2	3.3	.025	< .001	1.2	3.3	.037	< .001	1.2	3.3	.036	< .001
Path *c′*	0.8	2.2	.078	< .001	1.0	2.7	.110	< .001	0.6	1.8	.110	< .001
Indirect effect	.002			95% CI: .001 - .004	.002			95% CI: .000 - .003	.003			95% CI: .001 - .006
Total R^2	.12			< .001	.09			< .001	.12			< .001
										Test of equal mediated effects: $t_{a1b1-a2b2}$=-1.39, df=22, p = .18		
Anxiety or Mood Disorder and Heavy Drinking												
			(n = 200,246)				(n = 131,084)				(n = 69,162)	
Path *a*	0.1	1.1	.045	= .006	0.1	1.1	.060	= .140	0.2	1.2	.067	= .013
Path *b*	0.9	2.5	.029	< .001	1.0	2.7	.040	< .001	0.8	2.2	.043	< .001
Path *c′*	0.7	2.0	.088	< .001	0.8	2.2	.121	< .001	0.6	1.8	.128	< .001
Indirect effect	.002			95% CI: .000 - .003	.001			95% CI: .000 - .003	.002			95% CI: .000 - .004
Total R^2	.06			< .001	.05			< .001	.06			< .001
										Test of equal mediated effects: $t_{a1b1-a2b2}$=-0.98, df=22, p = .34		

Notes. Sex, age group, educational attainment, household income, marital status, racialized minority status, region of Canada and urban/ rural area were entered as covariates in the models. Unstratified models also controlled for community belonging.

Table 10. Mediation Results across Strata of Community Belonging for Bisexual versus Heterosexual Respondents

	B	OR	SE	p	B	OR	SE	p	B	OR	SE	p
		All				**Strong Sense of Community Belonging**				**Weak Sense of Community Belonging**		
Anxiety Disorder												
		(n = 205,898)				(n = 133,722)				(n = 72,176)		
Path *a*	0.3	1.3	.049	< .001	0.2	1.2	.069	.004	0.3	1.3	.070	< .001
Path *b*	0.9	2.5	.018	< .001	0.9	2.5	.025	< .001	1.0	2.7	.027	< .001
Path *c'*	0.9	2.5	.059	< .001	0.9	2.5	.085	< .001	1.0	2.7	.081	< .001
Indirect effect	.003			95% CI: .002 - .004	.002			95% CI: .001 - .004	.004			95% CI: .003 - .006
Total R^2	.08			< .001	.06			< .001	.08			< .001
									Test of equal mediated effects: $t_{a1b1-a2b2}$=0.46, df=22, p = .65			
Mood Disorder												
		(n = 205,920)				(n = 133,735)				(n = 72,185)		
Path *a*	0.3	1.3	.049	< .001	0.2	1.2	.069	= .005	0.3	1.3	.070	< .001
Path *b*	1.0	2.7	.017	< .001	1.0	2.7	.023	< .001	1.0	2.7	.024	< .001
Path *c'*	1.1	3.0	.054	< .001	1.0	2.7	.079	< .001	1.2	3.3	.076	< .001
Indirect effect	.003			95% CI: .002 - .004	.002			95% CI: .001 - .004	.005			95% CI: .003 - .007
Total R^2	.10			< .001	.08			< .001	.11			< .001
									Test of equal mediated effects: $t_{a1b1-a2b2}$=0.98, df=22, p = .34			
Anxiety-Mood Disorder												
		(n = 205,801)				(n = 133,668)				(n = 72,133)		
Path *a*	0.3	1.3	.049	< .001	0.2	1.2	.070	= .005	0.3	1.3	.070	< .001
Path *b*	1.2	3.3	.025	< .001	1.2	3.3	.037	< .001	1.2	3.3	.035	< .001
Path *c'*	1.1	3.0	.071	< .001	1.1	3.0	.110	< .001	1.2	3.3	.094	< .001
Indirect effect	.004			95% CI: .002 - .005	.003			95% CI: .001 - .004	.006			95% CI: .003 - .008
Total R^2	.12			< .001	.09			< .001	.13			< .001
									Test of equal mediated effects: $t_{a1b1-a2b2}$=0.23, df=22, p = .82			
Anxiety or Mood Disorder and Heavy Drinking												
		(n = 199,579)				(n = 130,645)				(n = 68,934)		
Path *a*	0.2	1.1	.052	< .001	0.2	1.2	.072	= .003	0.2	1.2	.077	= .003
Path *b*	0.9	2.5	.029	< .001	1.0	2.7	.040	< .001	0.8	2.2	.042	< .001
Path *c'*	1.2	3.3	.077	< .001	1.2	3.3	.113	< .001	1.2	3.3	.106	< .001
Indirect effect	.003			95% CI: .001 - .004	.002			95% CI: .001 - .004	.003			95% CI: .001 - .005
Total R^2	.07			< .001	.05			< .001	.07			< .001
									Test of equal mediated effects: $t_{a1b1-a2b2}$=0.08, df=22, p = .94			

Notes. Sex, age group, educational attainment, household income, marital status, racialized minority status, region of Canada and urban/ rural area were entered as covariates in the models. Unstratified models also controlled for community belonging.

5.3.1   The Mediating Effect of Life Stress

Sexual minority respondents had significantly greater odds of reporting the mental health outcomes in all of the mediation models after adjustment for the covariates. As hypothesized, after controlling for the confounders, life stress partially mediated the associations between sexual identity and the mental health outcomes. For the gay/lesbian respondents, compared with the heterosexual respondents, life stress significantly mediated the direct effect of sexual identity on anxiety disorders (indirect effect [*ab*] = .002, 95% CI: .001 - .003), mood disorders (*ab* = .002, 95% CI: .001 - .003), anxiety-mood disorders (*ab* = .002, 95% CI: .001 - .004), and anxiety or mood disorders and heavy drinking (*ab* = .002, 95% CI: .000 - .003). For the bisexual respondents, compared with the heterosexual respondents, life stress also significantly mediated the direct effect of sexual identity on anxiety disorders (*ab* = .003, 95% CI: .002 - .004), mood disorders (*ab* = .003, 95% CI: .002 - .004), anxiety-mood disorders (*ab* = .004, 95% CI: .002 - .005), and anxiety or mood disorder and heavy drinking (*ab* = .003, 95% CI: .001 - .004).

5.3.2   The Moderating Effect of Community Belonging

For the test of hypothesis 2, regarding contingent mediation, the results indicated that the mediating effect of life stress was significantly different for the gay/lesbian respondents vs. heterosexual respondents for mood disorders (not for the other outcomes), but in the opposite direction than hypothesized. With respect to the direct effects, compared with heterosexuals, the gay/lesbian respondents with a weak sense of community belonging had 1.6 times the adjusted odds of reporting a mood disorder (95% CI: 1.4 - 1.9) while the gay/lesbian respondents with a strong sense of community belonging had 2.5 times the adjusted odds of reporting a mood disorder (95% CI: 2.1 - 2.8). The test of equal mediated effects showed that this difference was

statistically significant ($t_{a_1b_1-a_2b_2}$= -2.4, df = 22, p = .02). Based on the tests of equal mediated effects, the mediating effect of life stress was not significantly different in any of the other models stratified by community belonging.

5.3.3   The Magnitude of the Mediating and Moderating Effects

For the test of hypothesis 3 regarding the magnitude of the mediating and moderating effects, bisexual respondents had the greatest odds of reporting the mental health outcomes relative to heterosexual respondents. In the non-moderated mediation models (i.e., not stratified by community belonging), bisexual (vs. heterosexual) respondents had 2.5 times the adjusted odds of reporting an anxiety disorder (95% CI: 2.2 - 2.8), 3.0 times the adjusted odds of reporting a mood disorder (95% CI: 2.7 - 3.3), 3.0 times the adjusted odds of reporting an anxiety-mood disorder (95% CI: 2.7 - 3.6), and 3.3 times the adjusted odds of reporting an anxiety or mood disorder and heavy drinking (95% CI: 2.8 - 3.8). Gay/lesbian (vs. heterosexual) respondents had 2.0 times the adjusted odds of reporting an anxiety disorder (95% CI: 1.7 - 2.2), 2.0 greater adjusted odds of reporting a mood disorder (95% CI: 1.8 - 2.3), 2.2 times the adjusted odds of reporting an anxiety-mood disorder (95% CI: 1.9 - 2.6), and 2.0 times the adjusted odds of reporting an anxiety or mood disorder and heavy drinking (95% CI: 1.7 - 2.4). The tests of significance of the observed differences between the mediated effects for the gay/lesbian and the bisexual subgroups were statistically significant (all *p* < .05; data not shown). Although the bisexual respondents with a weak sense of community belonging had greater odds of reporting the study outcomes, compared with the bisexual respondents with a strong sense of community belonging, the differences between the mediated effects across the strata of community belonging were not statistically significant. Jointly, these results partially support the hypotheses

regarding the magnitude of the mediating and moderating effects for bisexual people: while bisexual respondents had the greatest odds of reporting the mental health outcomes, having a strong sense of community belonging did not significantly reduce the observed effects. The amount of variance explained in the mediation models was relatively modest (pseudo-R^2 between .07 and .12).

5.4 Discussion

This study examined the extent to which sexual identity disparities in mental health outcomes (anxiety disorder, mood disorder, anxiety-mood disorder, and co-occurring anxiety or mood disorder and heavy drinking) are mediated by life stress and moderated by a sense of community belonging. Analysing Canadian nationally representative data, the findings provide evidence that life stress mediates the relationships between sexual identity and the mental health outcomes after controlling for common covariates (**H$_1$**), provide partial evidence of moderated mediation by the degree of perceived community belonging (**H$_2$**), and reveal greater magnitudes of these hypothesized effects for bisexual people (**H$_3$**). As hypothesized, a partial mediation effect was observed, with significantly greater odds of mental health outcomes reported by sexual minority compared with heterosexual respondents, and the greatest odds observed for the bisexual respondents. The odds ratios observed in the mediation and moderated mediation models, which accounted for multiple covariates, suggest that the mental health disparities experienced by sexual minorities are socially patterned, rather than determined solely by individual-level factors. These findings are consistent with the literature suggesting that sexual-minority people's mental health is likely determined by circumstances in their social and

institutional environments, and is the result of a complex interplay between individual factors (e.g., self-esteem) and the socio-cultural context within which they are located.[182]

The lack of evidence found in the study for the expected reductions in the adverse mental health effects for bisexual respondents with a stronger sense of community belonging suggests that the social supports that bisexual individuals draw from their local communities may not buffer the negative effects of sexual identity-based stressors. For example, a sense of belonging to a *local* community may not confer the coping functions that *LGBT-specific* affiliations offer. The latter may provide stigmatized persons with social environments in which they are not stigmatized and may provide support and opposing messages for the negative evaluations of the stigmatized minority group proffered by the larger, general or local community.[242] Other literature suggests that the type and source of supports may have differential buffering effects for LGB people's mental health, which could explain my findings.[243,244] Some scholars have argued that the relative importance of the main and moderating effects is complex and conditional—it may vary according to social position and the type of social resources assessed.[245] While the benefits of social relationships vary across population subgroups and stress levels, some authors have argued that it is crucial to identify those who most need and will most benefit from interventions that augment social resources.[227] Because bisexual-identified people may be more likely to experience social stress due to the "double discrimination" of homophobia and biphobia, they may benefit from various forms of social support more than others.[227] Recent evidence suggests that bisexual people report limited connectedness to the LGB community.[72,182] For example, analyses based on a US national probability sample indicated that bisexuals were less likely than gays and lesbians to identify with a sexual-minority community, or to see community membership as a reflection of themselves.[246] Furthermore, LGBT community

connectedness has been found to mediate the association between bisexuality and social well-being.[72] The finding that bisexual respondents had the greatest odds of reporting anxiety, mood, anxiety-mood disorders, and an anxiety or mood disorder with heavy drinking, points to the need for further research regarding the specific moderating and mediating effects on these and other mental health outcomes for bisexuals. Further research is needed to assess the buffering role of community belonging to the LGB-specific (vs. local or general) community and the impact of identity-specific supports for bisexual people.

The unanticipated finding that the mediated effect of life stress on mood disorders is significantly greater for gay/lesbian respondents with a stronger sense of community belonging is challenging to interpret. It is unclear as to whether people become more connected with community-based social supports as a result of their mental health challenges and subsequent diagnoses, or if community belonging (and the associated supports implied) might lead to being diagnosed. Another explanation could be that while a strong sense of community belonging may offer a "safe space" and serve as a buffer that reduces minority stress for some individuals, for others, established community norms and behaviour might be associated with negative outcomes, including pronounced awareness of one's social disadvantage. Evidence from the field of gay men's health supports the need to consider the possible positive and negative influences of networks and neighbourhoods to fully understand the larger social and physical environments that shape health outcomes.[247–249] However, because this study dealt with associations and cross-sectional data, I cannot provide a definitive interpretation.

5.4.1 Limitations

Life stress and a sense of community belonging were treated as categorical measures that did not directly assess discrete, observable stressors or social supports, and did not assess their type, frequency, duration, or intensity. Chronic stressors are stronger predictors of the onset and course of an illness than are acute life events; ideally, the assessment of stressful experiences should be multi-dimensional and provide coverage of all relevant domains.[250] There is evidence of a complex relationship between different types of stressors (e.g., acute stressors may generate new stressors or change the impact of chronic stressors),[250] and individual-level resources may be insufficient to cope with minority stress (i.e., the excess stress individuals from stigmatized groups are exposed to as a result of their social position).[11] Although social support has been shown to improve mental health by facilitating adjustment to stressful life events,[228] the CCHS measure of community belonging did not specify the type or amount of support received. The potentially moderating effects of belonging to an LGBT community (e.g., support groups, peer networks) remains unclear.[72,154,251]

Another limitation of the study results from the individual measures being limited in their capture of the impact of discrimination.[11] Institutional barriers, also known as structural discrimination barriers,[252] such as the lack of training in sexual minority health for service providers, can be difficult to detect at the individual level because, if prejudice and discrimination are legal, socially acceptable, or widely practised, there may be little within-group variability.[253] Finally, exposure to stressors and the availability of social supports may vary as a result of intersections of multiple stigmatized identities, which are likely to result in unique mechanisms.[74,75,182] The assessment of the role of multiple stigmatized identities was beyond the scope of this study. Despite these limitations, through the use of large pooled survey data, I was

able to examine several hypothesized general mediating and moderating mechanisms, addressing several existing knowledge gaps.

5.4.2   Conclusion

Although significant mental health disparities exist for LGB people, the majority of LGB Canadians do not experience mental health problems. In fact, some have argued that LGB people demonstrate considerable resilience by their relative well-being,[217] and that it is important to study the source(s) of resilience in this at-risk population.[137] The study findings indicate that general stress processes and ameliorative factors are important but insufficient in explaining the mental health disparities experienced by sexual minorities in Canada. These findings have implications for policy and practice because they suggest that while addressing the known individual-level determinants of mental health, applicable to all sexual identities, may ameliorate the observed effects for LGB people, interventions that target sexual minority-specific factors (e.g., identity-based stigma and discrimination, social supports for stress related to sexual identity), and bisexual-specific factors in particular (e.g., biphobia, anti-bisexual prejudice) may be needed to reduce the overall prevalence of mood, anxiety, and concurrent disorders in the LGB population and to close the observed disparities. Future research is needed to better examine the unique experiences of multiple minority stressors or buffers, and how these may be intersectional in their effects (such as experiences of discrimination arising from multiple stigmatized identities).[179]

Indeed, the following chapter, Chapter 6, aims to provide further insights into the mental health disparities of the LGB population in Canada by considering such intersectional effects. Specifically, I proceed to assess the heterogeneity in the prevalence of mental health outcomes

by sexual identity at intersections with other social positions (sex, age, income, education, and racialized minority status) to better understand the factors that may serve to exacerbate (or buffer) the adverse mental health outcomes of LGB population subgroups.

Chapter 6: An Intersectional Framework to Explain the Associations between Sexual Identity and Mood and Anxiety Disorders and Co-occurring Disorders with Heavy Drinking

6.1   Introduction

Evidence from several countries indicates that lesbian, gay, and bisexual people experience greater rates of mental health disorders compared with their heterosexual counterparts.[11,13,24,25] New evidence also suggests that there are differences in adverse mental health status across LGB population subgroups. Specifically, a bisexual identity (as compared with other sexual identities) has been noted to have the greatest odds of adverse mental health outcomes.[42,81] Health inequalities are often characterized with a focus on a particular feature of social position, such as sexual identity.[74] However, sex and age have also been found to moderate the associations between sexual identity and mental health outcomes.[41,254] These types of characterizations, grounded in epidemiological approaches, tend to examine how potential third factors related to one's social status serve to moderate the observed effects (i.e., effect measure modification), with stratified analyses presented (similar to the methods employed in the two preceding chapters).

As posited by intersectionality theorists,[62,64,110,111] the effects of stigmatization based on sexual identity may also be reinforced or exacerbated across multiple axes (e.g., socio-economic status and racialization) that reflect interconnected systems of privilege and oppression.[68,72,255] It has been suggested that intersectionality provides the discipline of public health with a critical unifying interpretive and analytical framework for reframing how the field conceptualizes,

investigates, analyzes, and addresses health inequality.[68] It also has been argued that incorporating intersectionality into public health has the potential to enhance validity and to inspire greater attention to both the heterogeneity of effects and the causal processes that produce health inequalities.[74] To date, however, there are very few published public health studies that have applied an intersectional approach. Those that have, have primarily focused on intersecting identities or intersecting categories of social position (e.g., race, gender or sexual identity, class) rather than on processes (e.g., racism, ageism, xenophobia, sexism, homophobia, classism).[68,74] Intersectional approaches to the study of the health of gay, lesbian, and bisexual people are even scarcer,[51,73,256,257] with limited empirical research examining the combined effects on mental health of sexual identity and other socio-demographic characteristics (e.g., being a young bisexual woman of colour).[66,69,72,179,181] Consequently, there is not yet a comprehensive evidence base to inform action to address the potentially combined effects of various social positions, if they do influence the mental health status of LGB populations.

The current study aimed to characterize the prevalence rates of mood, anxiety, and co-occurring disorders at the intersections of sexual identity and sex, age, income, education, and racialized minority status, while controlling for multiple confounders. The study sought to determine whether there is substantial heterogeneity in the outcome predictions (mood and anxiety disorders and co-occurring disorders with heavy drinking) observed for specific subgroups of sexual minority people. In doing so, the analyses presented below seek to bring a more nuanced understanding of the prevalence rates observed for sexual minorities in Canada.

6.1.1 Theoretical Framework and Hypotheses

Minority stress theory is a widely applied theoretical framework that promotes a comprehensive understanding of health disparities (i.e., "inequalities in health due to social factors or allocation of resources"[107]) as experienced by sexual minorities.[11,104] Minority stress theory posits that sexual and gender (and other) minorities experience chronic stress as a result of their stigmatization, with deleterious sequelae for their health while at the same time experiencing greater barriers to resources.[11] Minority stress theory proposes that there are social forces that increase the average risk for members of disadvantaged (vs. advantaged) groups, notwithstanding the potential variability that occurs amongst the minority group members.[106]

Intersectional approaches suggest that simultaneous experiences of multiple social positions are relevant to understanding how health outcomes are shaped, and to better understand mixed findings. This approach is consistent with the myriad ways that individuals acquire and view their own identities, whereby the simultaneous experience of multiple social positions results in different meanings and experiences than what could be captured by one position alone.[66] It allows for an examination of individuals' social positions (and the corresponding stressors) as mutually reinforcing (i.e., sexual identity * sex * social class), rather than as an additive sum of several positions (sexual identity + sex + social class).[51,67,74,179] Consideration of specific intersections of social position can aid in explaining mixed findings wherein some individuals from marginalized groups do not have greater health risks than those of privileged groups.[179]

Here, I draw on intersectional theory to better understand the heterogeneity in the prevalence of mental health disorders across sexual identities in Canada. My key theoretical proposition, which I test empirically, is that there are multiple, simultaneous dimensions of

marginalization, based on social positions, that interact with sexual identity to affect mental health outcomes. In doing so, it is important to distinguish between interaction (the risk of an outcome differing at different intersectional positions where measures can be described for groups at cross-stratified intersections) and effect modification (whether the impact of one factor differs across strata or levels of another).[74,258] While both approaches (albeit sometimes used interchangeably in the literature) have utility in different contexts, using interaction usually allows for an embodied approach, where measures can be described for groups of individuals at each cross-stratified intersection; that is, the social context can be taken into account in the study of biological or pathological processes.[74]

For the purpose of this study, I selected five characteristics – age, sex, income, education, and racialized minority status – for which there is theoretical and empirical evidence of interaction (or effect modification) in sexual minority research. It is worth noting that while intersectionality theory has traditionally focused on inequities related to racial or gender identities, research has expanded to consider other salient dimensions, including socio-economic position and age.[65]

First, with respect to age, young LGB individuals report poorer mental health compared with their older counterparts.[35,41,114,175] Research has pointed to the negative effects of perceived or actual family or peer rejection and the resulting social isolation[56,259,260] as possible mechanisms underlying the age-related differences in the mental health status of LGB people. Indeed, there are developmental periods during which certain psychosocial processes (e.g., emotional regulation) are more likely to be relevant, rendering adolescents more emotionally vulnerable to the effects of stress.[56,225] It has been suggested that findings related to behaviours such as heavy and binge drinking among LGB youth could be related to their experiencing

several developmental transitions in rapid succession.[261] These stronger adverse effects for LGB youth may be associated with a developmental phase of life that is shaped by strong peer influences and opinion.[262] On the other hand, research has also demonstrated that minority stress processes, including lifetime victimization and HIV bereavement, add to aging-related stress to affect the health of LGB older adults.[132,263,264]

Second, research with sexual minorities has demonstrated sex (and gender) differences in mental health disparities[265] as well as in various general psychological processes (e.g., rumination)[56] and in stigma-related stress (e.g., sexual victimization and exposure to hate crimes).[121,266] Intersections of sexism and homophobia may be of particular relevance to understanding the mental health of sexual minorities, and gay and bisexual men especially. Researchers have found that sexual victimization rates are higher for men than women,[266] and gay men are more likely than lesbian or bisexual women to experience violence and property crimes.[121] Some authors have pointed out that the feminization of gay men is a strategy that simultaneously promotes misogyny and patriarchy.[267]

Third, with respect to income, despite having equivalent or higher educational levels compared with their heterosexual peers, sexual minorities, on average, report lower incomes.[268] Structural factors such as institutional discrimination have been implicated in this wage gap,[269] and associated with the increased prevalence of psychiatric disorders in LGB populations.[161] In particular, low income has been linked to disproportionately higher rates of poor health amongst sexual minority men[51,69] and in heterosexual men.[270]

Fourth, educational attainment has been found to moderate mental health disparities in both within[69] and between-group analyses.[55] Educational attainment has been found to interact with income, indicating a multiplicative effect.[69] Indeed, it has been suggested that for sexual

minorities, lower socio-economic status may be concomitantly associated with a greater risk of discrimination, more barriers to employment, fewer opportunities for connection to the LGB community, and therefore greater stress.[69,271,272]

Fifth, few studies have examined racial/ethnic differences (whether through effect modification or interaction analyses) in outcomes across sexual minority populations, and the evidence regarding racial/ethnic variability in mental outcomes is mixed.[47,54,66,69] While some studies indicate that racial/ethnic sexual minorities face stressors that are multiplicative in nature,[56,66] others suggest that race/ethnicity effects may be manifested via socioeconomic factors such as income and education (e.g., economic forms of racial/ethnic discrimination in the labour market or educational system).[69,273,274]

I examined the heterogeneity in the reported occurrence of mood, anxiety, and co-occurring disorders at intersections of sexual identity with sex, age, income, education, and racialized minority status, while controlling for other confounders (marital status, respondents' residence in terms of region of Canada and urban/rural area). Specifically, I hypothesized that: (H1) respondents at disadvantaged social positions (e.g., bisexual vs. heterosexual; low vs. high income) have greater odds of mood, anxiety, and co-occurring disorders and (H2) the interactions of sexual minority identity (vs. heterosexual) with other disadvantaged social positions (e.g., being female vs. male, having low vs. high educational attainment) are multiplicative in their effects on mood, anxiety, and co-occurring disorder risks.

6.2 Methods

Details regarding the methodology, including the study sample, were described in the previous chapters. Three outcome variables were examined: mood disorders, anxiety disorders,

and co-occurring anxiety or mood disorders and heavy drinking. Self-reported sexual identity was the primary explanatory variable, and the interacting variables were sex, age group, household income, educational attainment, and racialized minority status. The included confounders were: marital status, respondents' residence, and survey cycle.

The study hypotheses were tested with the following analyses. First, distributions of the study outcomes across the interacting variables were described with prevalence rates and unadjusted odds ratios (OR) with 95% confidence intervals (CI). Second, sexual identity specific prevalence rates for each interacting variable were calculated. Third, adjusted logistic regression models without interactions were fitted, with all study covariates entered at once. Fourth, adjusted logistic regression models were fitted with 2-way and 3-way interaction terms between sexual identity, and age, sex, income, education, and racialized minority status, entered one-by-one, and tested for significance (p < .05).[51,179] Significant 3-way (including their lower order 2-way interactions) and significant 2-way interactions were then entered all together into a logistic regression model. One 3-way interaction term with the anxiety disorder outcome was no longer significant and was excluded from the final model. Adequacy and fit of the final model were assessed using *linktest* to detect specification errors and goodness of fit statistics. Predictive margins (adjusted predictions) in log odds metric were calculated using the *margins* command for all interactions in the final model.[275] Because significance of the probabilities when interaction is present depends on the values of the covariates, the log odds metric (instead of probability metric) was selected as recommended in the literature.[276] The log odds scale was also selected to assess the presence of multiplicative interaction.[277] The predictive margins were plotted in Excel using bar charts with confidence intervals. Finally, for models with 3-way

interaction terms that did not converge or skipped bootstraps, sensitivity analyses were performed using non-svyset adjusted logistic regressions.

6.3 Results

6.3.1 Prevalence Rates and Odds Ratios of Mood, Anxiety, and Co-occurring Disorders in Models without Interactions

The sexual identity-specific prevalence rates of the mental health outcomes were described in Chapter 4. Table 11 below displays the prevalence rates across all study variables, with the corresponding unadjusted and adjusted odds ratios for mood, anxiety and co-occurring disorders of the survey respondents.

As hypothesized (H1), greater odds of the study outcomes were observed for all respondents with disadvantaged social positions, with some notable exceptions. With respect to income, as hypothesized, the odds of the study outcomes decreased as household income increased: those in the $0–$39,999 income group (vs. $100,000 or more) had 2.6 times the adjusted odds of mood disorders (95% CI: 2.4-2.9), 2.2 times the adjusted odds of anxiety disorders (95% CI: 2.0-2.4), and 1.7 times the adjusted odds of co-occurring disorders (95% CI: 1.5-2.0). For educational attainment, as hypothesized, those with some secondary education (vs. post-secondary graduation) had significantly greater adjusted odds of the study outcomes. However, unlike household income, the odds did not decrease with greater levels of educational attainment. As hypothesized, women (vs. men) had significantly greater adjusted odds of mood and anxiety disorders; however, the odds for co-occurring mood or anxiety disorders and heavy drinking were not significantly different for male or female respondents. With respect to age, while respondents aged 18-29 years (vs. those aged 50-59 years) had significantly greater

adjusted odds of co-occurring disorders, as hypothesized, they had significantly lower adjusted

odds of mood and anxiety disorders. Finally, a finding contrary to the hypothesis was that of the

lower adjusted odds of the study outcomes for racialized minority respondents.

Table 11. Prevalence Rates and Adjusted Odds Ratios of Mood and Anxiety Disorders, and Co-Occurring Mood or Anxiety Disorders and Heavy Drinking: CCHS, 2007-2012

	MOOD DISORDER (n = 210,852)		ANXIETY DISORDER (n = 210,826)		CO-OCCURRING DISORDERS (n = 204,208)	
	% (95% CI)	AOR (95% CI)	% (95% CI)	AOR (95% CI)	% (95% CI)	AOR (95% CI)
Sexual identity						
Gay/Lesbian	14.5 (12.5-16.7)	**2.2***** (1.8-2.6)	11.4 (9.9-13.2)	**2.0***** (1.7-2.4)	5.2 (4.1-6.5)	**2.0***** (1.6-2.6)
Bisexual	24.8 (22.0-27.7)	**3.4***** (2.8-4.0)	20.7 (18.3-23.4)	**3.0***** (2.5-3.5)	10.0 (7.9-12.4)	**3.3***** (2.5-4.3)
Heterosexual	7.0 (6.8-7.2)	1.0	5.9 (5.8-6.1)	1.0	2.2 (2.1-2.3)	1.0
Sex						
Female	9.6 (9.3-9.9)	**1.9***** (1.8-2.0)	8.0 (7.7-8.2)	**1.9***** (1.7-2.0)	2.3 (2.2-2.4)	1.0 (0.9-1.1)
Male	5.2 (5.0-5.4)	1.0	4.5 (4.3-4.7)	1.0	2.4 (2.2-2.5)	1.0
Age (in years)						
18–29	5.9 (5.6-6.3)	**0.5***** (0.5-0.5)	6.3 (6.0-6.7)	**0.9**** (0.8-1.0)	3.3 (3.1-3.6)	**1.5***** (1.3-1.7)
30–39	7.0 (6.7-7.4)	**0.9***** (0.8-0.9)	5.9 (5.6-6.2)	1.1 (1.0-1.2)	2.1 (1.9-2.3)	**1.4***** (1.2-1.6)
40–49	8.0 (7.6-8.4)	1.0 (0.9-1.1)	6.5 (6.2-6.9)	**1.2***** (1.1-1.3)	2.0 (1.9-2.2)	**1.3***** (1.1-1.5)
50–59	8.7 (8.4-9.1)	1.0	6.1 (5.8-6.5)	1.0	1.7 (1.5-1.9)	1.0
Household Income						
$0 – $39,999	12.3 (11.9-12.7)	**2.6***** (2.4-2.9)	10.0 (9.7-10.4)	**2.2***** (2.0-2.4)	3.6 (3.4-3.9)	**1.7***** (1.5-2.0)
$40,000 – $59,999	7.7 (7.3-8.1)	**1.6***** (1.5-1.8)	6.5 (6.1-6.9)	**1.4***** (1.3-1.6)	2.5 (2.3-2.8)	**1.3***** (1.1-1.5)
$60,000 – $99,999	6.1 (5.9-6.5)	**1.3***** (1.2-1.4)	5.1 (4.9-5.4)	**1.2***** (1.1-1.3)	1.9 (1.7-2.1)	1.1 (0.9-1.2)
$100,000 or more	4.8 (4.5-5.1)	1.0	4.3 (4.1-4.6)	1.0	1.7 (1.6-1.9)	1.0
Educational Attainment						
Some secondary school	11.6 (10.9-12.3)	**1.5***** (1.4-1.6)	10.3 (9.8-10.9)	**1.7***** (1.6-1.8)	3.8 (3.4-4.3)	**1.7***** (1.5-2.0)
Secondary school graduation	7.5 (7.1-7.9)	1.0 (1.0-1.1)	6.3 (6.0-6.6)	**1.1*** (1.0-1.2)	2.5 (2.3-2.7)	1.1 (1.0-1.2)
Some post-secondary education	8.9 (8.3-9.6)	**1.3***** (1.2-1.4)	8.1 (7.5-8.8)	**1.7***** (1.6-1.8)	3.3 (2.9-3.7)	**1.3***** (1.1-1.5)
Post-secondary graduation	6.5 (6.3-6.8)	1.0	5.3 (5.1-5.5)		2.0 (1.8-2.1)	1.0
Racialized Minority Status						
Racialized Minority	5.1 (4.8-5.5)	**0.5***** (0.5-0.5)	4.1 (3.8-4.4)	**0.5***** (0.4-0.5)	1.3 (1.2-1.5)	**0.4***** (0.4-0.5)
White	8.0 (7.8-8.3)	1.0	6.8 (6.7-7.0)	1.0	2.6 (2.5-2.7)	1.0

Notes. Weighted data. Adjusted models controlled for marital status, respondents' residence in terms of region of Canada and urban /rural area, as well as survey cycle. AOR = adjusted odds ratio. ***p < .001, **p < .01, *p < .05.

6.3.2 Prevalence Rates and Predictive Margins of Mood, Anxiety, and Co-Occurring Disorders in Models with Interactions

Table 12 displays the prevalence rates of mood, anxiety, and co-occurring disorders at the intersections of sexual identity with the hypothesized interacting variables of sex, age, household income, educational attainment, and racialized minority status. Examining the differential patterns of prevalence at the intersections of these social positions provided preliminary evidence in support of the hypotheses, and I therefore proceeded to conduct formal tests of the interactions.

When the 3-way interactions (along with their corresponding 2-way terms) were added one-by-one, the interaction term, sexual identity*household income*racialized minority status, was significant ($p < .05$) for both mood and anxiety disorders (317 bootstrap replications). In addition, the interaction term, sexual identity*age group*racialized minority status was also significant ($p < .05$) for anxiety disorders (453 bootstrap replications). Sensitivity analyses showed that these 3-way interactions were also significant in non-svyset regression models. None of the 3-way interaction terms was statistically significant for the co-occurring disorders. Multiple models with interactions including educational attainment did not converge; however, sensitivity analyses showed these interactions were not statistically significant in non-svyset models.

Several of the 2-way interactions were statistically significant in the adjusted models when added individually. For mood disorders, the interactions terms, sexual identity*age group, education attainment*age group, age group*sex, household income*age group, and household income*sex were statistically significant. For anxiety disorders, the interaction terms, sexual identity*sex, sexual identity*age group, sexual identity*racialized minority status, education

attainment*age group, household income*age group, household income*sex, and household income*racialized minority status were statistically significantly. For the co-occurring disorders, sexual identity*household income, education attainment*racialized minority status, and age group*sex were statistically significant. All these 2-way interactions remained significant when added to the adjusted models, all together. When the significant 2-way and 3-way interaction terms were added to the adjusted model, the 3-way interaction, sexual identity*age group*racialized minority status, was no longer statistically significant for anxiety disorders. All other interaction terms remained statistically significant.

Table 13 shows the statistically significant 2- and 3-way interaction terms and their corresponding *p*-values from the final logistic regression models for mood, anxiety, and co-occurring disorders. As can be seen, sexual identity acted in combination with household income, racialized minority status, and sex on the study outcomes, with multiple significant interactions in the final models. As hypothesized (H2), several intersections of disadvantaged social position are multiplicative in their effects on mood, anxiety and co-occurring disorder risk, after controlling for confounders. The direct effects in the logistic regression models cannot be interpreted without consideration of the influence of the interaction terms; thus, to describe the heterogeneities of the effects, Figures 2-9 plot the predictive margins derived from the final models for the significant interactions with sexual identity (the subgroup-specific odds ratios are reported in Appendix G).

Table 12. Prevalence Rates of Mood and Anxiety Disorders, and Co-Occurring Mood or Anxiety Disorders and Heavy Drinking at Intersections of Sexual Identity and Social Positions: CCHS, 2007-2012

	MOOD DISORDER			ANXIETY DISORDER			CO-OCCURRING DISORDERS		
	Heterosexual % (95% CI)	Gay/Lesbian % (95% CI)	Bisexual % (95% CI)	Heterosexual % (95% CI)	Gay/Lesbian % (95% CI)	Bisexual % (95% CI)	Heterosexual % (95% CI)	Gay/Lesbian % (95% CI)	Bisexual % (95% CI)
Sex									
Male	4.8 (4.6-5.1)	13.1 (10.5-16.2)	18.9 (15.2-23.3)	4.2 (4.0-4.4)	11.1 (9.2-13.5)	14.7 (11.6-18.3)	2.3 (2.1-2.4)	5.2 (3.8-7.0)	9.4 (6.5-13.3)
Female	9.2 (8.9-9.5)	16.7 (14-19.9)	27.3 (23.8-31.2)	7.7 (7.4-8.0)	11.9 (9.5-14.8)	23.4 (20.3-26.8)	2.2 (2.1-2.3)	5.0 (3.5-7.1)	10.2 (7.7-13.4)
Age (in years)									
18–29	5.3 (5.0-5.6)	9.9 (7.0-13.8)	25.4 (21.4-29.7)	5.8 (5.5-6.1)	11.5 (8.1-16.0)	24.0 (20.1-28.4)	3.2 (2.9-3.4)	6.0 (3.8-9.5)	11.9 (9.0-15.6)
30–39	6.7 (6.4-7.1)	11.3 (8.3-15.3)	26.4 (19.5-34.7)	5.6 (5.3-6.0)	9.4 (6.6-13.1)	23.9 (17.8-31.2)	2.1 (1.9-2.3)	3.4 (2.1-5.5)	11.2 (6.7-18.3)
40–49	7.8 (7.4-8.2)	16.0 (12.8-19.8)	26.3 (20.2-33.5)	6.4 (6.0-6.7)	11.3 (8.6-14.6)	14.9 (11.4-19.3)	2.0 (1.8-2.2)	4.5 (2.9-6.9)	6.7 (3.3-12.9)
50–59	8.4 (8.0-8.8)	20.4 (15.4-26.5)	17.4 (12.4-23.7)	6.0 (5.6-6.3)	13.4 (10.1-17.5)	10.6 (6.8-16.1)	1.6 (1.5-1.8)	6.5 (4.0-10.3)	4.8 (2.1-10.5)
Household Income									
$0 – $39,999	12.1 (11.6-12.5)	21.9 (18.1-26.3)	33.4 (28.8-38.3)	9.6 (9.3-10.0)	20.7 (17.2-24.7)	29.8 (25.8-34.1)	3.5 (3.3-3.8)	9.7 (7.0-13.3)	13.4 (10.1-17.4)
$40,000 – $59,999	7.5 (7.1-7.9)	12.3 (9.1-16.4)	16.4 (10.9-23.9)	6.3 (6.0-6.7)	9.1 (6.4-12.9)	14.6 (9.3-22.1)	2.5 (2.2-2.7)	5.4 (3.3-8.6)	4.4 (2.6-7.3)
$60,000 – $99,999	5.8 (5.5-6.1)	15.2 (11.9-19.4)	20.8 (16.0-26.7)	4.9 (4.7-5.2)	10.7 (8.1-14.1)	16.5 (12.2-22.0)	1.8 (1.7-2.0)	4.5 (2.7-7.4)	8.5 (4.9-14.3)
$100,000 or more	4.6 (4.3-4.8)	9.6 (6.0-15.0)	20.2 (14.4-27.7)	4.2 (3.9-4.5)	6.7 (4.2-10.4)	13.2 (9.0-19.0)	1.7 (1.5-1.9)	2.5 (1.2-5.0)	10.9 (6.3-18.2)
Educational Attainment									
Some secondary school	10.7 (10.1-11.4)	21.4 (13.9-31.5)	34.3 (27.2-42.3)	9.6 (9.0-10.1)	25.2 (16.4-36.7)	25.8 (19.4-33.4)	3.7 (3.3-4.2)	11.4 (4.8-24.8)	18.0 (12.7-25.0)
Secondary school graduation	7.1 (6.7-7.6)	12.8 (8.9-18.4)	21.9 (17.5-27.1)	6.0 (5.6-6.3)	9.9 (6.6-14.4)	21.7 (17.2-27.0)	2.4 (2.2-2.7)	3.5 (2.0-6.0)	15.8 (11.9-20.7)
Some post-secondary education	8.3 (7.7-9.0)	16.2 (10.9-23.3)	30.3 (22.1-40.1)	7.6 (7.0-8.2)	16.8 (11.4-24.2)	30.1 (22.1-39.5)	3.1 (2.7-3.5)	8.7 (4.7-15.6)	18.2 (11.7-27.2)
Post-secondary graduation	6.3 (6.0-6.5)	14.0 (11.6-16.7)	21.5 (17.8-25.8)	5.2 (5.0-5.4)	10.1 (8.4-12.1)	16.0 (13.0-19.6)	1.9 (1.7-2.0)	4.7 (3.5-6.2)	9.8 (7.3-13.1)
Racialized Minority Status									
Racialized Minority	4.8 (4.5-5.2)	7.8 (4.8-12.6)	18.9 (14.1-25.0)	3.8 (3.5-4.1)	10.3 (6.4-16.1)	17.4 (12.8-23.3)	1.2 (1.1-1.4)	4.1 (1.9-8.4)	9.2 (5.3-15.5)
White	7.6 (7.4-7.8)	15.4 (13.2-18.0)	26.3 (23.1-29.8)	6.5 (6.3-6.7)	11.6 (9.9-13.4)	21.5 (18.6-24.6)	2.5 (2.4-2.6)	5.3 (4.1-6.7)	10.1 (7.9-13.0)

Notes. Weighted data.

113

Table 13. Interaction Terms for Sexual Identity and Social Positions in the Final Adjusted Logistic Regression Models: CCHS, 2007-2012

	MOOD DISORDERS #	ANXIETY DISORDERS #	CO-OCCURRING DISORDERS
	Interaction terms: F (df), p-values for omnibus tests		
Sexual identity-Income-Racialized minority status	4.8 (6, 495), p < .001	7.2 (6, 495), p < .001	…………………..
Sexual identity-Racialized minority status	10.2 (2, 499), p < .001	7.8 (2, 499), p < .001	…………………..
Sexual identity-Income	n.s.	n.s.	2.2 (6, 495), p = .038
Income-Racialized minority status	n.s.	4.5 (3, 498), p = .004	…………………..
Sexual identity-Sex	…………………..	5.0 (2, 499), p = .007	…………………..
Sexual identity-Age	3.7 (6, 495), p = .002	3.5 (6, 495), p = .002	…………………..
Age-Sex	4.3 (3, 498), p = .006	…………………..	10.8 (3, 498), p < .001
Age-Education	5.8 (9, 492), p < .001	4.2 (9, 492), p < .001	…………………..
Age-Income	3.5 (9, 492), p < .001	3.4 (9, 492), p < .001	…………………..
Sex-Income	19.0 (3, 498), p < .001	5.2 (3, 498), p = .002	…………………..
Education-Racialized minority status	…………………..	…………………..	5.0 (3, 498), p .002

Notes. Weighted data. All models adjusted for marital status, respondents' residence in terms of region of Canada and urban/ rural area, as well as survey cycle. # Model ran with bootstrap 317 replications. Empty cells indicate the interaction was not included in the model, and "n.s." indicates a not statistically significant result.

114

Figure 2 and Figure 3 graph the predictive margins for the sexual identity*racialized minority status interaction from the final adjusted model for mood disorders and anxiety disorders. A pattern emerges, with overall lower outcome predictions for racialized minority respondents across the sexual identity categories. Contrary to my hypothesis, I observed a stronger effect of sexual minority identity and not reporting racialized minority status, such that gay/lesbian and bisexual who reported being White had higher outcome predictions than their racialized minority counterparts.

Figure 4 and Figure 5 graph the predictive margins for the sexual identity*age group interaction from the final adjusted model for mood disorders and anxiety disorders. There were mixed results regarding the hypothesized stronger effect on the mental health outcomes of sexual minority identity and being of younger age. As hypothesized, bisexual respondents aged 18-29 years of age had significantly higher outcome predictions of mood and anxiety disorders, compared with same-age heterosexual and gay/lesbian respondents. However, for the gay/lesbian respondents, the effect was found for mood disorders, but in the opposite direction than hypothesized, with outcome predictions significantly lower for those aged 18-29 years (vs. 50-59 years).

Figure 2. Predictive Margins for the Sexual Identity-Racialized Minority Status Interaction from the Final Model for Mood Disorders
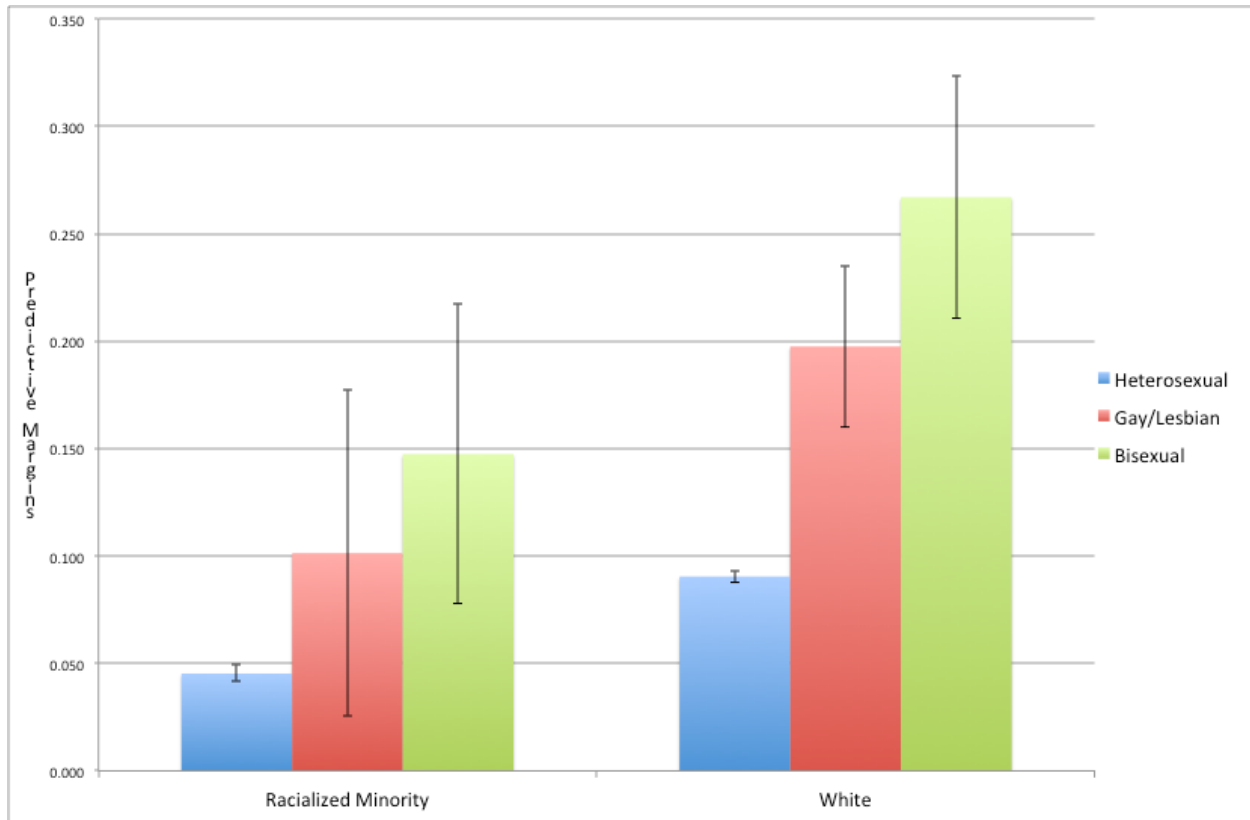
Figure 3. Predictive Margins for the Sexual Identity-Racialized Minority Status Interaction from the Final Model for Anxiety Disorders
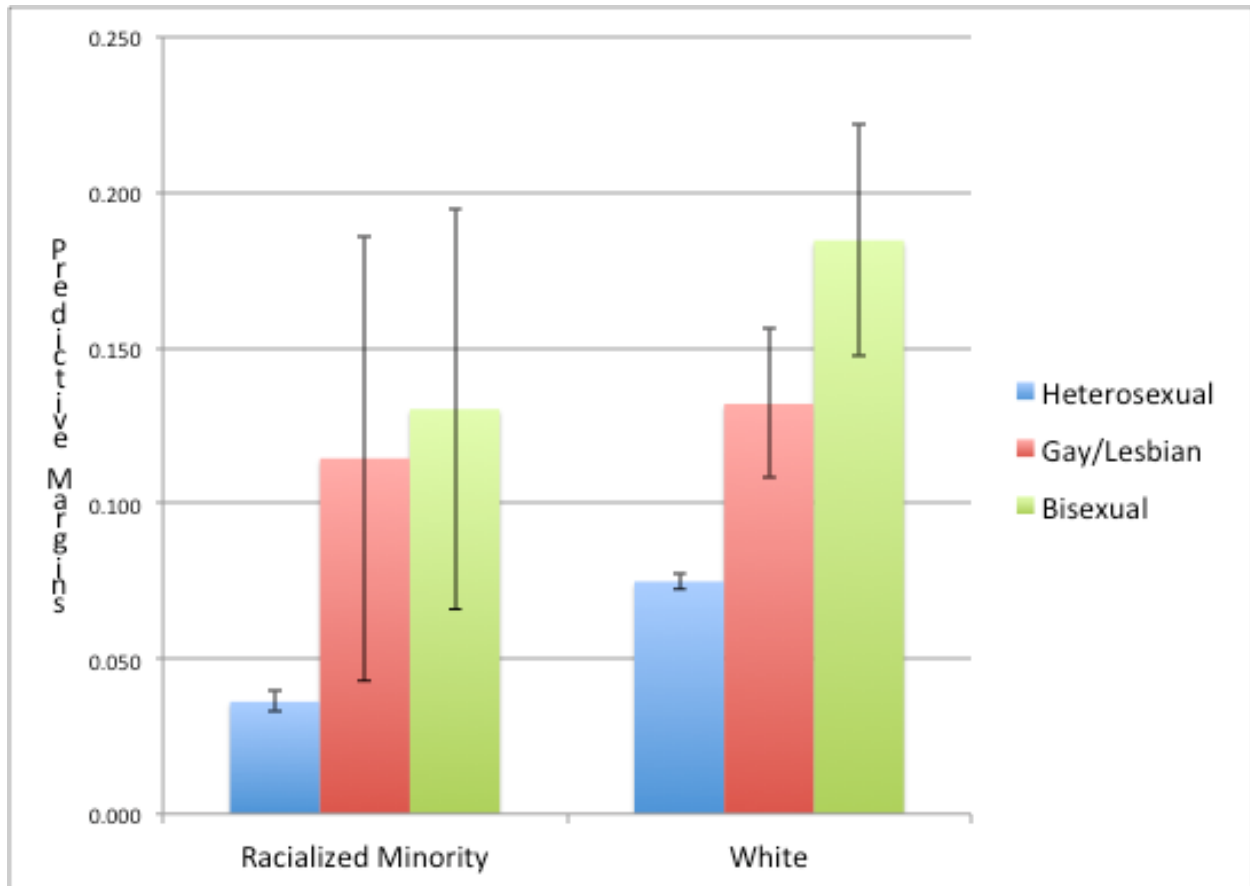
Figure 4. Predictive Margins for the Sexual Identity-Age Interaction from the Final Model for Mood Disorders
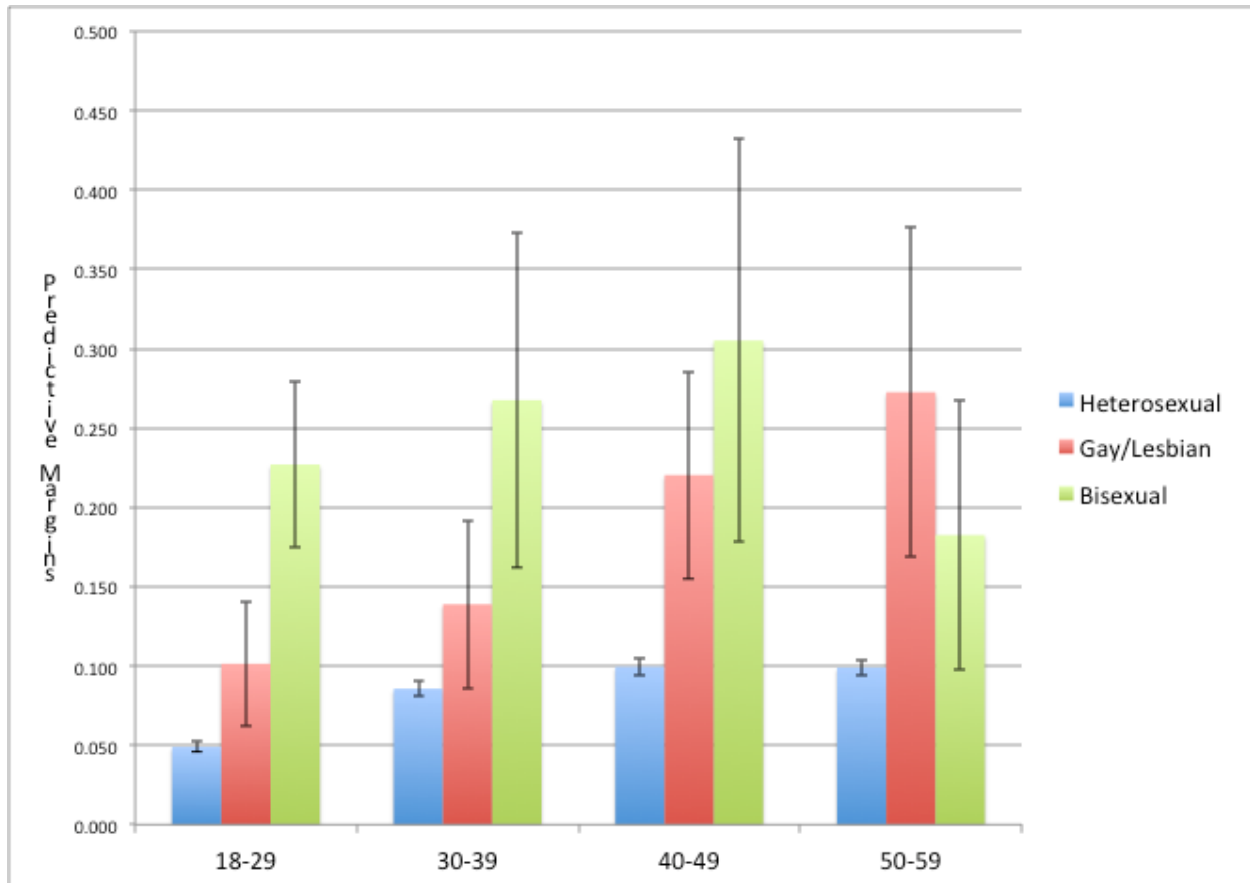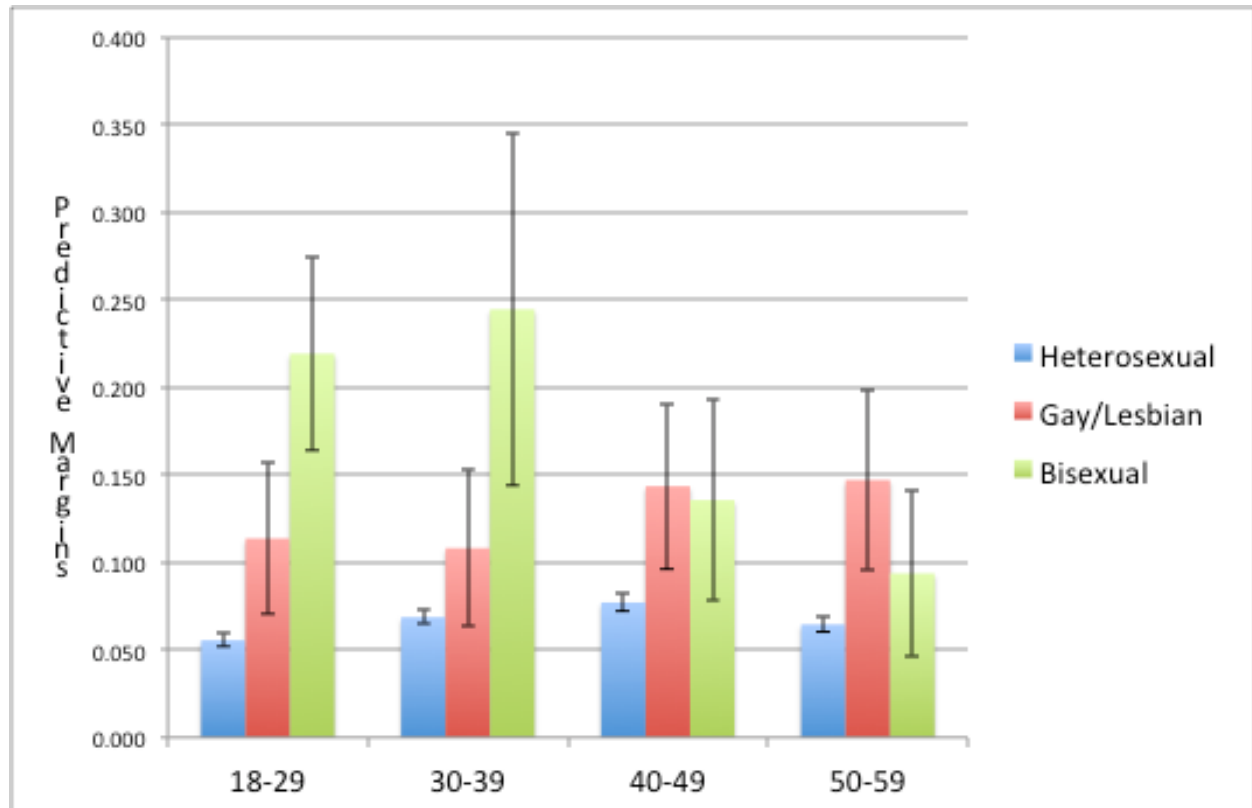
Figure 5. Predictive Margins for the Sexual Identity-Age Interaction from the Final Model for Anxiety Disorders

Figure 6 and Figure 7 graph the predictive margins for mood and anxiety disorders, respectively, of the sexual identity*household income*racialized minority status interaction from the final adjusted model. The results are mixed regarding the hypothesized multiplicative effect of the intersections of disadvantaged social positions. For example, partially consistent with the hypothesis, gay/lesbian respondents who were White and who reported household incomes of between $0 and $39,999 had significantly higher outcome predictions of anxiety disorders than their counterparts in the higher income groups; however, they had significantly higher outcome predictions compared with their racialized minority counterparts. Also partially consistent with the hypothesis, bisexual respondents in the $0 to $39,999 income group had significantly higher outcome predictions of mood disorders compared with their counterparts in the $40,000 to $59,999 income group, an effect observed regardless of racialized minority status. Lower outcome predictions were observed with each higher income category for heterosexual respondents, but with significantly lower predictions for respondents who were racialized (vs. White).

Figure 8 shows the sexual identity*sex interaction derived from the final adjusted model for anxiety disorders. Bisexual men and women had higher outcome predictions compared with their heterosexual counterparts, with bisexual women having the highest overall predictions. Examining the differences in the predictions for gay men (vs. heterosexual men) and lesbian women (vs. heterosexual women), I observed a stronger effect for gay men for anxiety disorders.

Figure 9 the sexual identity*household income interaction derived from the final adjusted model for co-occurring anxiety or mood disorder and heavy drinking, providing partial evidence in support of the hypothesis. I observed a stronger effect of reporting a sexual minority identity and having low household income of $0-$39,999. Sexual minority respondents in this income

group had significantly higher outcome predictions compared with heterosexual respondents. However, I did not observe statistically significant differences for the gay/lesbian (vs. heterosexual) respondents in the higher income groups. I also did not observe reductions in the outcome predictions for bisexual respondents with relatively higher income.

Figure 6. Predictive Margins for the Sexual Identity-Income-Racialized Minority Status Interaction from the Final Model for Mood Disorders
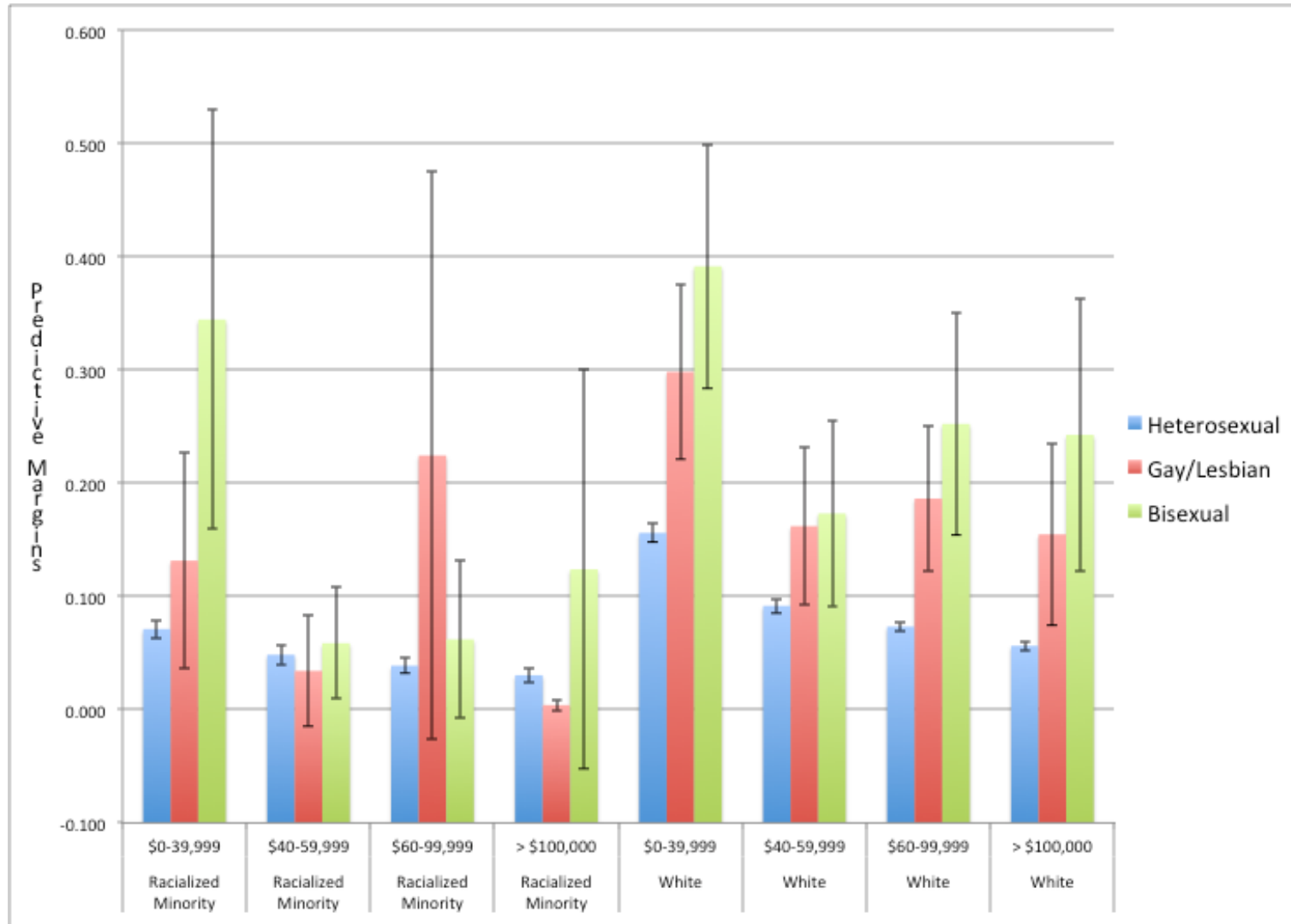
Figure 7. Predictive Margins for the Sexual Identity-Income-Racialized Minority Status Interaction from the Final Model for Anxiety Disorders
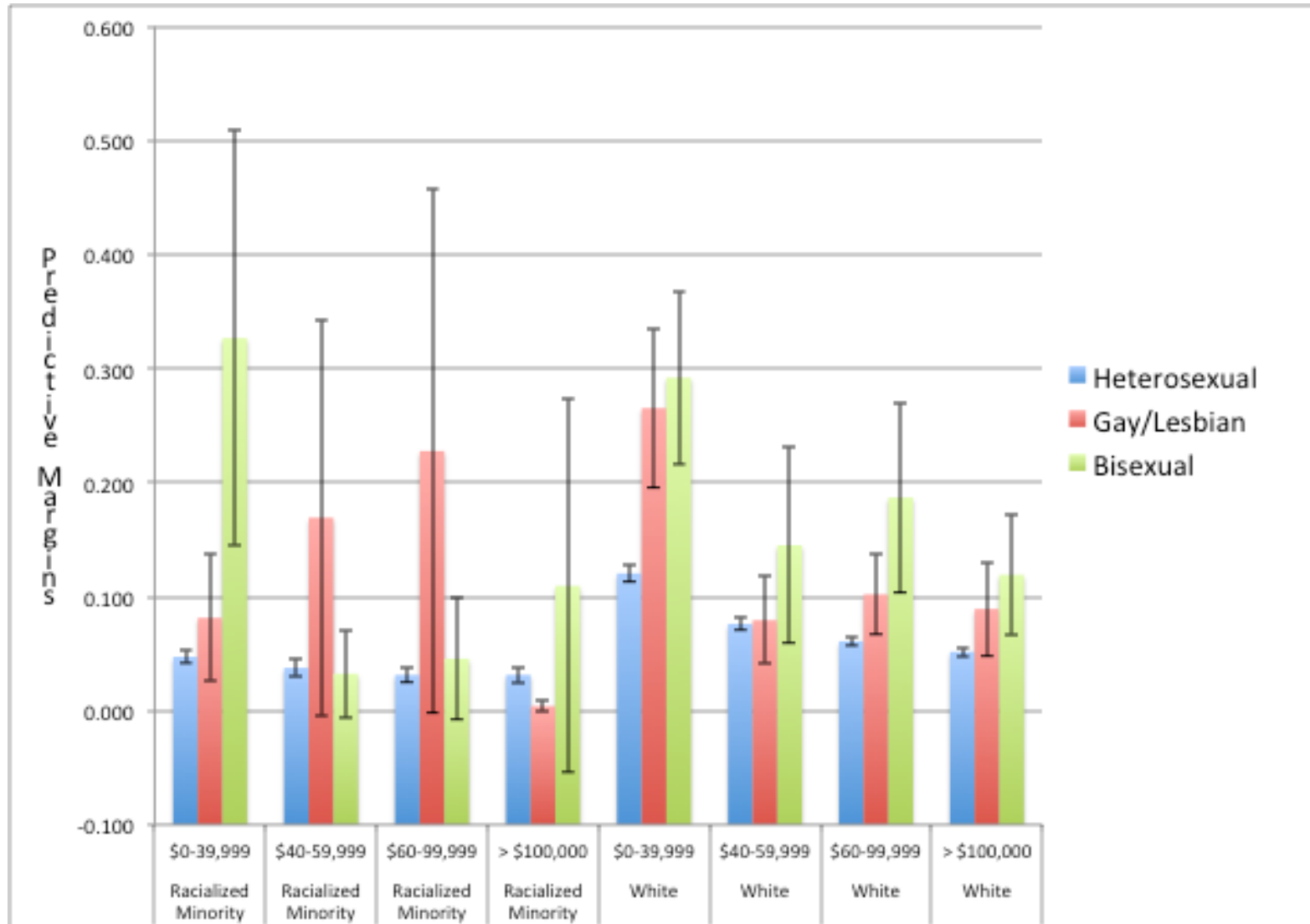
Figure 8. Predictive Margins for the Sexual Identity-Sex Interaction from the Final Model for Anxiety Disorders
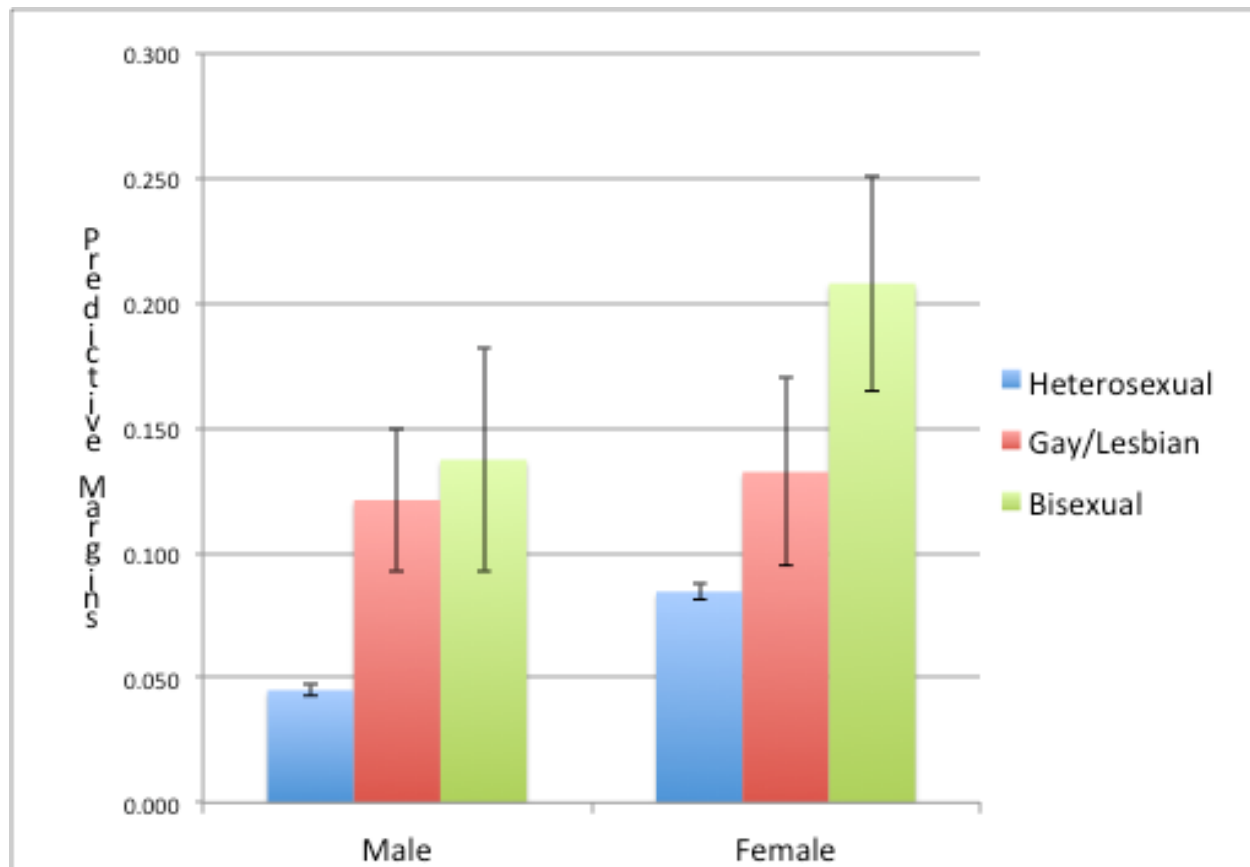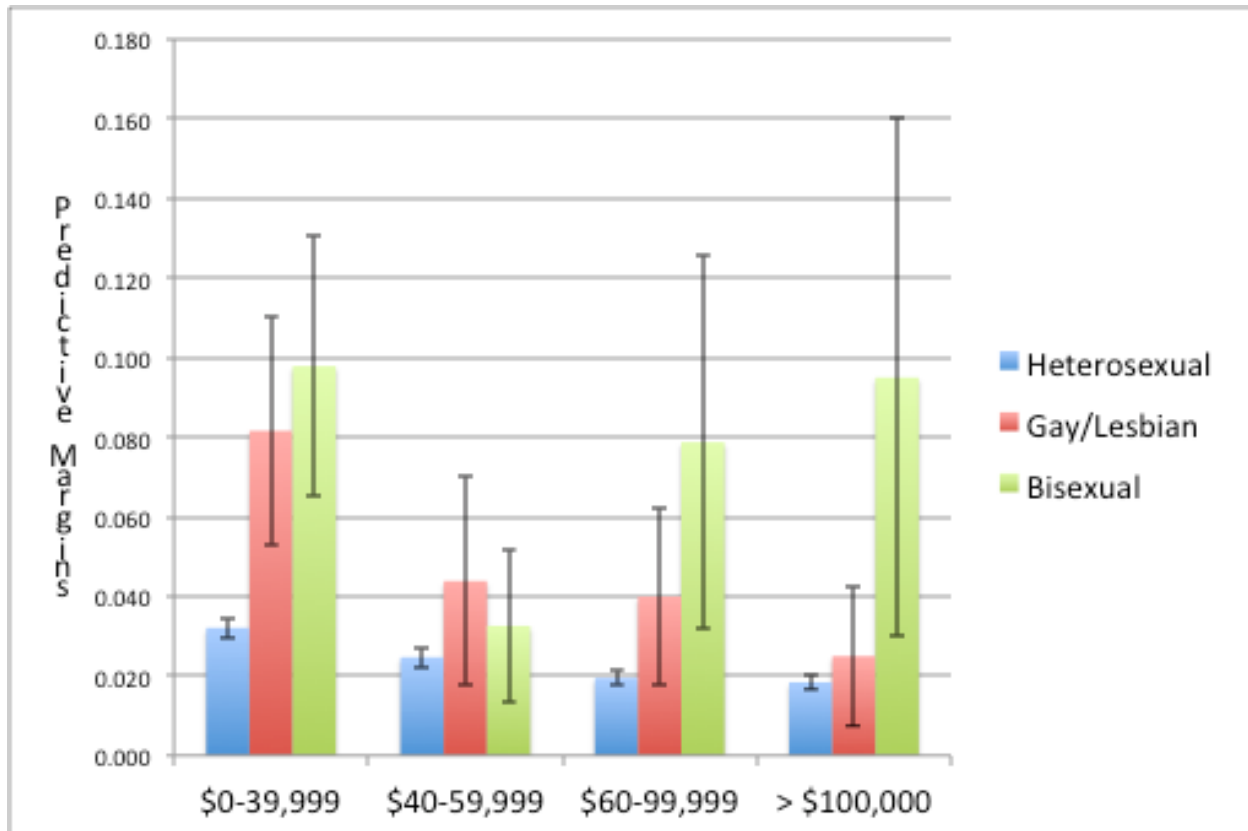
Figure 9 Predictive Margins for the Sexual Identity-Income Interaction from the Final Model for Co-Occurring Anxiety or Mood Disorders and Heavy Drinking

6.4 Discussion

This study applied an intersectional framework to examine the multiplicative effects of sexual identity and its intersections with sex, age, household income, educational attainment, and racialized minority status on the occurrence of mood and anxiety disorders, and co-occurring mood or anxiety disorders and heavy drinking. Three key findings emerged from this study. First, in the models without interactions, greater odds were observed for respondents at disadvantaged social positions of sexual identity (minority), household income (lower), educational attainment (lower) and sex (women) for all of the study outcomes, as well as age group (young) for the co-occurring disorders. However, lower odds were observed for the racialized minority respondents (vs. White) for all the study outcomes. Second, I observed that several intersections of disadvantaged social positions were multiplicative in their effects on the occurrence of mood, anxiety and co-occurring disorders. Specifically, combinations of the disadvantaged positions of reporting a gay/lesbian or bisexual identity (vs. heterosexual) with household income, age group and sex were found to have multiplicative effects on the studied outcomes. Third, while gay/lesbian and bisexual respondents had significantly greater odds of reporting the study outcomes, compared with heterosexuals, there was substantial heterogeneity in the outcomes observed for specific subgroups of the sexual minority respondents. Taken together, the results suggest that intersectional social positions are important to understanding the mental health outcomes of LGB individuals, and point to the need to consider the ways in which a confluence of factors may differentially affect outcomes among gay/lesbian and bisexual people.

Previously, younger LGB individuals were found to report poorer mental health compared with their older counterparts.[35,41,114,175] The data showed a mix of age-related effects;

126

while I found that young bisexual respondents had greater likelihood of anxiety disorders, young gay/lesbian respondents had lower likelihood of mood disorders. The literature discusses the mental health implications as young people navigate the stages of sexual identity development,[41] and it is possible that this process (including the possibility of family/peer rejection) may be more challenging for bisexual adolescents, as they may lack the support of an identifiable community.[207,246] Existing evidence also suggests that young LGB persons report relatively poor social well-being in contrast to older cohorts. It also has been suggested that the experience of "coming out" may be less stigmatizing for today's generation of young sexual minority cohorts, although the impacts of the social environments created by previous generations may be perceived as more supportive of those who identify as lesbian or gay (as opposed to those who identify as bisexual).[72]

The observed greater likelihood of mood disorders for older gay/lesbian respondents may point to the multiple effects of chronic sexual minority stressors accumulated over the life course. The finding is also consistent with other studies suggesting that a liberalization of social attitudes towards homosexuality, over the past decade, particularly for the Millennial generation (born 1982-1999), has led to a decline in the stress experienced by younger sexual minority individuals.[278,279] Although there is some evidence that the psychological distress of LGB adolescents may lessen in young adulthood,[259] there is a dearth of research on the impact of chronic stress over the life course, particularly for subpopulations of sexual minorities.[47,259] In summary, these result are of concern from a public health perspective, with one in four bisexual respondents aged 18-29 years reporting a mood or anxiety disorder, and one in five gay/lesbian respondents aged 50-59 years reporting a mood disorder.

Previous studies of general populations have shown that, on average, women are more likely than men to report mood and anxiety disorders.[280] The results of the current study show that female respondents have significantly higher odds of mood and anxiety disorders (no significant differences were found for co-occurring disorders). However, important heterogeneities were found. Bisexual women had the greatest likelihood compared with all other groups. Examining the differences in the odds for gay men (vs. heterosexual men) and lesbian women (vs. heterosexual women), I observed a stronger effect for gay men's odds of reporting anxiety disorders. This finding is consistent with the results of other studies regarding sex differences in the mental health of gay/lesbian and bisexual respondents that are not present in heterosexual populations,[81,175] and could be a result of the more extreme stigma associated with male homosexuality, and relatively more negative attitudes expressed towards gay men compared with those lesbian women must endure.[81] It also points toward the need for further research to better understand these differential effects as well as the sex- (and gender-) related processes underlying them to ascertain effective responses for subpopulations of sexual minorities.

With respect to household income, it has been suggested that for sexual minorities, lower socio-economic status may be concomitantly associated with a greater risk of discrimination, more barriers to employment, fewer opportunities for connection to the LGB community, and therefore greater stress.[271,272,281] Consistent with this evidence, in this study, reporting a sexual minority identity and low income resulted in a greater likelihood of co-occurring mood or anxiety disorders with heavy drinking. Although reporting being in the higher income groups appeared to mitigate the mental health disparities for gay/lesbian respondents (vs. heterosexuals), it did not have the same effect for bisexual respondents. In general, the results suggest that the

particular combination of low income and sexual minority identity is associated with disproportionately greater likelihood of adverse outcomes, such as co-occurring disorders, consistent with the existing research literature.[51,69] I did not observe a significant interaction between sexual identity and educational attainment, in contrast to some published evidence that educational attainment may be a moderator of mental health disparities.[55,69] It is plausible that the effect of educational attainment manifested itself through another pathway (e.g., income).

There is mixed evidence regarding the moderating role of race/ethnicity on mental health status. In the current study, I observed a multiplicative effect of sexual minority identity and racialized minority status, such that respondents who were not a racialized minority had substantially greater odds of mental health disorders. It is possible, as some previous research suggests, that race/ethnicity effects may be manifested via socioeconomic factors such as income and education,[69,273,274] or that effects of sexual identity on mental health outcomes may manifest differently for racialized minority subgroups.[47,282] It is also possible that the cultural values and norms associated with some respondents' racial/ethnic background may serve as a protective factor or buffer against sexual minority stigma (e.g., strong sanctions against drinking or self-harming behaviour).[283] Finally, I found interactions between other social positions (income*racialized minority status; education*racialized minority status; age*sex; age*education; age*income; sex*income), which were also statistically significant in the final adjusted models, suggesting that there is a need to consider other social locations of LGB individuals, in addition to their sexual identity.

6.4.1 Limitations

Other scholars have eloquently summarized both the benefits and the challenges associated with incorporating intersectionality theory into population health research methodology.[65,68,74,284] Examples of the many challenges include the choice of terminology in theoretical and methodological work (e.g., intersectional multiplicativity vs. multiplicative scale interaction), distinctions between identities, positions and processes, and the choice of appropriate methods to make the intersectional position of interest (and its embodiment) visible. Some of these areas are relevant to the limitations specific to the analyses described in this chapter.

First, the measures of disadvantaged social positions, and their combinations, may not map well onto the lived experiences of people embodying those social locations (e.g., what it is like to live as a low income bisexual man in Canada), nor do they capture the underlying intersecting processes (e.g., classism, biphobia, homophobia and sexism) and the power structures these both reflect and reproduce the disadvantage. Second, because of the categorical nature of several of the studied variables, and the need to further collapse some categories because of sample size limitations, some of the measures were both imprecise and limited in their ability to capture the full intersectional nature of the relevant social positions. For example, it is unlikely that the binary distinction between "White" and racialized minority status respondents captured the complex nature of race relations in Canada, given the disparate experiences of people racialized as Black or Asian or Indigenous. Third, I could not examine other intersecting vulnerabilities, most notably gender identity or gender expression, a pivotal contributor to health outcomes for sexual minorities. In addition, given the large numbers of interactions tested and the relatively small number of LGB respondents in some categories, a

small number of models were unable to converge with 500 bootstrap replications and for some others wide confidence intervals were obtained. Fourth, I followed recommended methods for including interaction terms, and keeping to their level of significance for interactions at 5%.[277] While inclusion of non-significant interactions is generally not recommended because it typically increases the estimated standard errors (indeed a more conservative 1% level of significance also has been recommended),[277] it is worth acknowledging that some in the field graph non-significant interactions to identify potential "tipping points or thresholds" within mostly null patterns of interactions.[285] Finally, the estimates for income and education may be difficult to interpret given that the sample was restricted to those aged 18-59 years, and the data reflect a cross-sectional slice in time. At the time of data collection, some younger respondents may not have yet attained a high school diploma and were in the process of completing higher education. It also is possible that the reported incomes of some respondents who were enrolled in educational pursuits (e.g., college or university) at the time of data collection also may have reflected income received from parents or others. Therefore the gradients in outcomes associated with each level of income or educational attainment observed in other studies with sexual minorities studies[69] may have been obscured in this cross-sectional analysis. Finally, different stressors or buffers were likely operative for different cohorts in the sample. For example, contemporary cohorts of young LGBs (as compared with older generations) may be more easily able to disclose their identity to their family and peers, while later generations may benefit from a stronger sense of social capital accumulated over the life course.[72]

Intersectionality posits that various aspects of one's identities intersect with one another, are dependent upon one another, and act in mutually constituted ways, such that they are not reducible to separately parsed categories. Future intersectional studies with sexual minorities

should look to novel measures that capture the intersectional position (or identity or process) of interest, including methods that go beyond statistical interactions. Despite these limitations, through the use of the pooled survey data with additional sensitivity analyses I was able to examine the heterogeneity in the mental health outcomes of the gay/lesbian, bisexual, and heterosexual respondents and to concomitantly investigate several intersecting social positions while adjusting for confounders.

6.4.2   Conclusion

Intersectionality theory offers a way of understanding intersecting facets of social disadvantage, with the purpose of explicating previously hidden health inequalities.[51] By drawing on and applying the tenets of intersectionality theory, an approach outside of the discipline of public health, I examined the heterogeneity in the occurrence of mood, anxiety, and co-occurring disorders associated with sexual identity and its intersections with age, sex, income, educational attainment, and racialized minority status. The results point to a need to consider the multiple, intersecting effects of social positions in shaping LGB people's mental health, highlighting the diversity of experiences, identities, and processes that might otherwise remain unrecognized or unaddressed, and highlight the utility of intersectional approaches in health research with sexual minorities.

Additional research is needed in this area, particularly regarding new measures of the experiences of sexual minorities that capture the intersecting nature of various social positions. This includes research on the context of institutionalized patterns to help reveal the processes by which resources are distributed in society to confer advantage or disadvantage. In other words, approaches are needed that move beyond 'bundling' intersections of individual categories (e.g.,

sex; income; educational attainment) in favour of moving towards delineating the processes that shape the mental health trajectories of gay/lesbian and bisexual people. To adequately tackle this kind of research, new conceptual models (in addition to sexual minority theory or life course perspectives) that are relevant to sexual minority communities and that incorporate intersectional principles may be needed. Excepting notable efforts,[286] research that develops, utilizes, or tests novel conceptual frameworks in this area remain scarce.

Chapter 7: Discussion and Conclusions

7.1 Overview

This dissertation had three main objectives:

(1) To investigate the prevalence and correlates of anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking among Canadians self-identified as lesbian/gay, bisexual, or heterosexual.

(2) To examine whether life stress mediates and sense of community belonging moderates the relationship between sexual identity and the study outcomes.

(3) To assess the heterogeneity in the prevalence of the study outcomes by sexual identity at intersections with other social positions.

The research was conducted using pooled data from the 2007 to 2012 cycles of the CCHS, which provided new epidemiological information generalizable to the adult Canadian population and documented disparities in the study outcomes among gay/lesbian and bisexual people relative to their heterosexual peers. In applying the principles of minority stress theory and intersectionality theory, I tested two distinct models that sought to explain the distribution of the outcomes in the population: an integrative moderated mediation model of life stress and community belonging, and another that considered effects of combinations of social positions. These analyses sought to combine epidemiological methodological perspectives with influences of intersectionality in the hopes of offering more nuanced ways of thinking about sexual minority mental health. Taken as a whole, the findings provide useful insights to inform interventions designed to improve the mental health of the sexual minority population. The results also offer important insights for future research related to the health of sexual minorities in Canada.

This concluding chapter is divided into four sections. First, I provide a discussion of the key findings from each of the three research objectives addressed in this dissertation, highlighting the contributions of each set of results to the literature. Second, I discuss the overarching limitations and strengths of the dissertation, extending beyond the specific points discussed in each empirical chapter. I also examine the implications of the findings for both research and interventions, focusing on recommendations for addressing mental health and heavy drinking in sexual minority populations within the Canadian context.

7.2   Discussion of Key Findings

7.2.1   Prevalence of anxiety disorders, mood disorders, anxiety-mood disorders, heavy drinking, and co-occurring anxiety or mood disorders and heavy drinking among Canadians self-identified as gay/lesbian, bisexual, or heterosexual

In the current study, LGB identified Canadians reported substantially greater odds of mental health disorders: the odds of anxiety, mood, anxiety-mood, and co-occurring disorders were double for gay/lesbian-identified respondents, and more than triple for bisexual-identified respondents, compared with their heterosexual peers' odds. Bisexual respondents reported nearly quadruple the rates of combined anxiety and mood disorders relative to heterosexuals and approximately twice the rates of gay/lesbian respondents. While less pronounced, the rates of co-occurring heavy drinking and anxiety or mood disorders were also markedly higher for LGB respondents. Sex appears to be a key moderator, with higher adjusted odds of anxiety and anxiety–mood disorders among gay male respondents and higher adjusted odds of heavy drinking among lesbian and bisexual women. All confounders were significantly associated with anxiety, mood, anxiety-mood disorders, and heavy drinking. Differences in the regional

distributions of the study outcomes by sexual identity were also observed, providing further support for minority stress theory because, historically, there was significant variation in access to rights by region (e.g., Newfoundland and PEI were some of the last provinces to add sexual orientation to their human rights legislation).[287,288] The findings regarding the regional differences in the prevalence rates suggest a need for national *and* regional approaches to further study and intervention.

These findings enlarge the evidence base regarding health disparities related to sexual identity in Canada, adding to the findings of other national studies of LGB populations.[39,41–43,101] They corroborate and extend the findings of international population-based studies that have shown that gay, lesbian, and bisexual sexual identities are associated with poorer mental health and substance misuse,[11,13,21,22,24,25,27,28,30,35,82] and that bisexuality confers the greatest odds of adverse mental health outcomes, including mood and anxiety disorders.[14,42,81,289]

However, it is important to point out that sexual identity *per se* is not synonymous with greater risk, nor a causal factor for poor mental health.[32] Some factors associated with the increased mental health burden of sexual minority individuals can *equally apply* to the heterosexual population (e.g., victimization, abuse, lack of social support), but may be experienced to a greater extent by LGB individuals.[290,291] Other factors (e.g., homophobic violence, identity disclosure, familial rejection because of sexual identity) are *unique* to the sexual minority population. Some research has suggested that once the unique, mediating factors are accounted for (in within-group studies), the associations between sexual identity and mental health disorders diminish or become negligible.[32,98,183] Thus, sexual identity is best conceptualized as a *risk marker*, an attribute associated with greater odds of poor outcomes but not a *causal factor*.

7.2.2 Life stress as a mediator and sense of community belonging as a moderator of mood and anxiety disorders, heavy drinking, and co-occurring disorders of gay/lesbian, bisexual and heterosexual Canadians

Having documented a disproportionate mental health burden experienced by LGB people in Canada, the second empirical study aimed to explain the observed prevalence rates across sexual identities. Drawing on the principles of minority stress theory, the extent to which the sexual identity disparities in mental health outcomes are mediated by life stress and moderated by a sense of community belonging was examined. The findings showed that sexual minority (versus heterosexual) respondents were significantly more likely to describe their lives as stressful. They also were more likely (relative to heterosexuals) to describe their sense of community belonging as weak and they had significantly greater odds of reporting negative mental health outcomes. These results provided evidence that perceived life stress may partially mediate the effects of sexual identity on the mental health, with significantly greater odds of negative mental health disorders reported by sexual minority respondents, compared with heterosexual respondents, and the greatest odds were observed for the bisexual respondents, after controlling for common covariates.

These results suggest that general stress processes (e.g., life stress) and ameliorative factors (e.g., sense of belonging to a community) are important, but insufficient in explaining the mental health disparities. These mediating and moderating processes captured the hypothesized mechanisms applicable to all sexual identity groups (i.e., *between-group* analyses). While the majority of research studies have provided *within-group* analyses, there is empirical evidence from both between- and within-group studies showing that the LGB population as a whole has higher prevalence rates of mental health disorders compared with heterosexual people, and that

LGB people who experience relatively more prejudice-related stress have more mental health problems.[11,47,106]

As extensively discussed by Schwartz and Meyer, between- and within-group studies capture different aspects of the stress process.[106] Within-group studies cannot detect those aspects of the social or physical environment that affect all group members and are therefore invariant (e.g., structural distal stressors, such as institutional discrimination in laws and policies). Because there are stressors unique to the minority group, and thus not amenable to comparison, between-group analyses – such as the ones described here – typically model minority status as a proxy for the social stress process. Consequently, the disparity can be interpreted as a reflection of exposure to social stress, without delineating the workings of the stress process.[106] Because this research did not include factors unique to sexual minorities (e.g., experiences of discrimination), I was unable to determine the extent to which such factors account for the unexplained variance. Therefore, the results of higher odds ratios for all study outcomes in the mediation and moderated mediation models, point to the importance of considering sexual minority specific factors in explaining those disparities.

Finally, I observed no statistically significant reductions in the effects for bisexual respondents with a relatively stronger sense of community belonging. This suggests that the social supports that bisexual individuals draw from their communities may not adequately buffer the negative effects of sexual identity-based stressors on their mental health. This – taken with the finding that bisexual respondents had the greatest odds of adverse mental health outcomes – reinforces the need to consider a confluence of multiple social factors that influence bisexual people's mental health, and the ways in which mediating and moderating effects may differ for bisexual identified people.[206,227]

7.2.3 Heterogeneity in the prevalence of mood and anxiety disorders and co-occurring disorders with heavy drinking of gay/lesbian, bisexual and heterosexual Canadians at intersections with other social positions

While some principles of minority stress are not inconsistent with intersectionality (e.g., focus on social hierarchies related to disadvantaged status), the minority stress approach is most frequently considered additive, whereby multiple minority identity stressors have additive negative health results.[179] In contrast, intersectionality contends that social identities are experienced simultaneously and therefore cannot be ranked (e.g., when coefficients for racial or gender or other social categories are added in multiple regression models rendering one social identity more important over another).[67,68,74]

In the third empirical study, I used intersectionality theory to examine the multiplicative effects of sexual identity and its intersections with sex, age, household income, educational attainment, and racialized minority status on the occurrence of mental health disorders. The findings showed that greater odds of these outcomes were observed for respondents at disadvantaged social positions and that several intersections of disadvantaged social positions had multiplicative effects. Most notably, the combinations of social positions had multiplicative effects on reported rates of mood and anxiety disorders. For example, the findings showed that there is substantial heterogeneity in the outcomes, with higher outcome predictions for young (vs. older) bisexual respondents for anxiety disorders and lower outcome predictions for young gay/lesbian respondents for mood disorders. The results also showed that while sexual minority women report the highest rates of anxiety disorders compared with any other group, particularly strong effects are observed for gay identified (vs. heterosexual) men.

The findings from the third empirical study, taken together, highlight the need to consider the combined effects of social positions that appear to shape the mental health of LGB-identified people, including how these factors may differentially affect specific outcomes. They also reveal the benefits of intersectionality for public health theory, research, and policy. The results add to the existing literature by providing evidence of the complexity of age-related effects across subgroup of the LGB population, reinforcing the need for life course approaches to fully understand the trajectories of mental health outcomes among people who identify as LGB. This is consistent with other studies that emphasized the need for life course research to better understand health disparities related to sexual orientation and age, and to assess subgroup differences within these communities.[89] The findings regarding the sex differences in the study outcomes noted above are consistent with several other studies of sexual minority populations.[36] These results also extend existing research by suggesting that the combination of low income and sexual minority identity is associated with disproportionately poorer outcomes for LGB individuals.[51,69]

7.3   Limitations and Strengths

Several overarching limitations warrant consideration.

7.3.1   Study Design

In terms of study design and inference, the data were drawn from the Canadian Community Health Survey, which is a cross-sectional survey. Therefore, all of the results preclude any inferences of causality or directionality of the effects. Nevertheless, Canadian data from longitudinal studies containing sexual identity measures were not available.

7.3.2   Sexual Identity Measure

As I discussed in earlier chapters, several limitations arise because of the CCHS's approach to the measurement of sexual identity.

First, the sexual identity question was asked of only those aged 18 to 59 years, precluding my ability to investigate the prevalence of the study for two key populations – adolescent and elderly LGB Canadians – thus, limiting the generalizability of the findings. Given the evidence that psychological well-being likely follows a curvilinear or U-shaped pattern over the life course,[292] the findings from this study may therefore be underestimates of the true prevalence rates in this population across all ages. Unfortunately, because data with sexual identity measures not limited to ages 18-59 were not available, I was unable to assess the impact of this empirically.

The CCHS respondents may have under-identified as LGB; some people may have been unwilling to self-identify due to stigma or other reasons. Whether or not, and to what extent, one identifies with a sexual minority identity has impact on both exposure to minority stress and the coping and resilience opportunities they have.[112] Existing literature suggests that self-identification or the act of disclosure is an indication of self-acceptance, reducing stress associated with concealing or denying one's sexual orientation.[293,294] The survey respondents who chose to self-identify as LGB in the CCHS may therefore have been more likely to report better mental health than those who did not self-identify (i.e., remain 'closeted'), which may have led to underestimates of the true associations because of the differential misclassification bias.[41] A recent study examining the Statistics Canada survey question on sexual identity found that about 14% of sexual minorities (broadly defined) would not be identified through this measure, and that 79% of the misclassified participants were heterosexually-identified women

who had a same-sex partner.[295] This suggests that "outness" may operate differently in the bisexual population, with a substantial proportion of women choosing other labels (e.g., heterosexual, queer), likely in an effort to navigate microaggressions.[207] Consequently, the results contained in this dissertation, although informative, may represent imprecise estimates of existing disparities.

The potential impact of misclassification is an important limitation to consider. Studies that have measured sexual orientation in different ways have reported different prevalence rates of various disorders within sexual minority subgroups, depending on the measure. For instance, Bostwick et al.'s analyses of the National Epidemiologic Survey on Alcohol and Related Conditions found that 44.4% of women who identified as lesbian reported having had a mood disorder sometime in her lifetime, compared with 23.8% of those women who reported only same sex attraction, and 19.4% of those who reported only same sex behaviour. Similarly, higher prevalence rates for those identifying as LGB (vs. those who were classified based on their sexual attraction or behaviour) were found in a study of substance use behaviour and dependence.[92] However, other studies have not observed this pattern for men who self-identified as gay or in a related fashion, depending on the question posed.[296] These findings point to a complex relationship between dimensions of sexual identity and mental health status that may be different for women and men,[32] leading some to suggest that the consistency of findings in relation to men, compared with the variation (depending on dimension measured) in women could be a result of the more extreme stigma associated with male homosexuality in the US and elsewhere.[81] These findings point to the importance of including multiple measures or indicators of sexual identity in population-based health studies.[81] Given the sole availability of the one-item measure of sexual identity in the CCHS, I was unable to ascertain the mental health disparities

for individuals with specific dimensions of same-sex sexuality (e.g., behaviour or attraction), but who do not identify as LGB (they may have a preference for other identifiers). However, through the analyses contained in this dissertation, I was nonetheless able to address key knowledge gaps regarding the mental health status of those who do self-identify as LGB in Canada.

7.3.3   Outcome Measures

With respect to the CCHS mental health measures, the data used here did not rely on a diagnostic measure to assess mood and anxiety disorder. Rather, the CCHS includes self-report of a doctor's diagnosis, and does not reflect measures of the prevalence of these disorders. These self-reported data may also be subject to recall and social desirability biases as well as subjective interpretations of the questions. Factors such as the age at onset and the chronicity of a disorder are important indicators of the illness's severity and its consequences. Studies suggest that sexual minorities have elevated risk in each of these domains,[12,56] although the reasons for the greater severity and poorer sequelae are not yet fully understood. Although the CCHS asked respondents to report their diagnosed conditions, their clinical nature, such as their severity and chronicity, was not explored. Statistics Canada has collected more detailed measures related to mental health as part of the CCHS-Mental Health module (e.g., presence of 12-month or lifetime depression assessed with the WHO Composite International Diagnostic Interview). However, this survey is occasional and has considerably fewer respondents than the annual CCHS, and would not have allowed for the types of analyses that were possible with the pooled multi-year CCHS data.

7.3.4 Availability of Relevant Variables

Other limitations arise from the lack of availability of relevant variables. First, I was unable to examine the role of unique sexual minority factors that constitute a substantial focus of the sexual minority health disparities literature. Although I have already discussed this limitation at length in the preceding sections, including related to differences in results from within- and between-group studies, it is worth reiterating here that the analyses in this dissertation would have been strengthened with the inclusion of observable stressors (particularly experiences of prejudice and discrimination related to sexual identity) and social supports (at community and institutional levels). Nonetheless, the results offer new Canadian evidence regarding the role of general stress processes and ameliorative factors in understanding the observed mental health disparities.

Gender identity, a fundamental characteristic, was also unavailable. Previous literature documents that gender is a pivotal contributor to the health status of sexual minorities.[32,47] Multiple studies have examined the ways in which childhood gender atypicality and gender non-conformity are related to victimization, childhood abuse, and post-traumatic stress among LGB youth,[58,297] and how these relate to mental health status later in life.[297,298] For example, studies found that girls who grow up to identify as "lesbian" are more likely to report gender non-conforming behaviour than heterosexual females, and gender nonconformity has been identified as a strong predictor of lifetime exposure to childhood physical, psychological, and sexual abuse.[299] Indeed, some have suggested that gender-atypical traits may be more relevant for psychological health than a same-sex sexual orientation.[300,301] Researchers have consistently found fewer social supports, poorer mental health, and a greater likelihood of reporting

experiences of violence and discrimination among transgender (compared with cisgender[1])

populations, irrespective of sexual orientation.[47,263,302,303] The lack of a gender identity measure

in the data available for the current dissertation has precluded my ability to examine the

complexity of its relationship with sexual identity and curbs the relevance of the study outcomes

to transgender populations.

7.3.5   Strengths and Contributions

Notwithstanding the acknowledged limitations, the primary strength of this original

research lies in the use of data from a large national, population-based survey to examine mental

health and substance use disparities across specific sexual identities. The dissertation offers

several contributions to the field by reporting data separately for gay/lesbian and bisexual

respondents (a population typically understudied or combined with gay and lesbian identified

respondents), and by providing reasonable confidence intervals while adjusting for confounders.

These additions were made possible by the application of a relatively new approach to pooling

epidemiological data obtained through several survey cycles.

This investigation is the first in Canada to comprehensively document comparative

prevalence rates and the co-occurrence of mental disorders and alcohol misuse among

gay/lesbian, bisexual and heterosexual people. The findings make a contribution to the literature

by providing evidence of the social patterning of the mental health disparities experienced by

sexual minorities in Canada. That is, the patterns of mental health in this population are likely

heavily influenced by social, cultural and economic conditions experienced over the life course

---

[1] Cisgender refers to the status of a person whose gender identity corresponds with the sex assigned at birth and is used as an antonym of transgender.

(e.g., childhood trauma related to gender non-conformity, experiences of prejudice and discrimination related to one's identity).[304,305] Specifically, the results presented here are consistent with the conclusions of other researchers who conducted studies of sexual minority populations and argued that the observed mental health disparities are the result of a complex interplay between individual factors and the socio-cultural context within which individuals reside.[182]

The analyses reported in this dissertation address several existing knowledge gaps, as discussed in each empirical chapter, most notably by proposing and testing two conceptual frameworks – sexual minority theory and intersectionality theory – to explain the observed disparities in outcomes. It also provides previously unavailable information about the mental health status of Canada's LGB population, with findings generalizable to the adult Canadian population between the ages of 18 and 59 years. The overall findings provide new evidence pertaining to the Canadian population and enlarge the existing knowledge base regarding the mental health disparities experienced by sexual minorities and the possible factors underlying those disparities. They also have important implications for both research and interventions, as described in the section below.

7.4 Implications and Recommendations

7.4.1 Implications for Research

Below, I summarize some of the implications for further research derived from the studies' findings, which extend to three broad areas.

First, the current data capacity in Canada to conduct population-level research on the health and wellbeing of sexual minorities is exceedingly limited. While sexual behaviour

questions were added to the 2015–2016 CCHS cycle, at the time of writing it is unclear whether these will become permanent or strengthened.[295] The under-estimation of sexual minorities in the CCHS, combined with the evidence from the literature, highlight the importance of including other measures or indicators of other dimensions of sexual orientation (identity, attraction, behaviour) to more fully understand mental health outcomes, and how these differ for population subgroups and over time (e.g., attraction is generally thought to be a better measure for adolescent populations compared with identity or behaviour based measures[306]). Including measures of the three aspects of sexual orientation is recommended, and should not be limited to respondents 18-59 years. Other best practices for asking questions about sexual orientation have been published elsewhere.[306] A two-question method for assessing gender categories (i.e., current gender identity and assigned at birth) is recommended.[307] The findings from this dissertation related to the substantial mental health burden experienced by sexual minorities in Canada bring urgency to the need to develop data capacity through longitudinal datasets, both nationally and provincially. This includes developing data capacity to collect measures relevant to sexual minority populations (e.g., experiences of prejudice and community supports).

In addition, further empirical research is needed from large population health datasets that tests direct hypotheses about patterns in the prevalence and incidence rates of various disorders and their causes.[11] This includes research that tests specific bi-directional hypotheses (i.e., relationships between the various predictors, mediators, moderators and outcomes[56]) and contains measures that capture both general and group-specific (i.e., unique to sexual minorities) processes. Indeed, the findings from the studies designed to address the first two research objectives point clearly to the need to combine evidence from the investigation of within- and between-group differences,[11,106] and to examine the ways in which social factors are embodied

and contribute to mental health problems.[11,56,273,308,309] Others have suggested that focusing on either of these processes solely (without considering their interrelationships) may hinder the development of cogent explanations for the mental health disparities among sexual minorities, as well as prevention and intervention efforts with this population.[56] Therefore, future research should include general measures applicable to the general population as well as those that capture unique group-specific processes. Studies of positive mental health and its predictors are extremely rare and particularly needed.[310] The Government of Canada has identified mental health as a priority.[77,78] The results described in the current dissertation demonstrate the importance of understanding and responding to the needs of Canada's sexual minorities as both critical and timely.

As well, the research presented in this dissertation affirms that social positions, such as sexual identity, are not experienced in isolation. Rather, other social positions may be mutually reinforcing in their effects on mental health. Future studies with sexual minorities should look to novel measures that capture the intersectional position (or identity or process) of interest, pay close attention to the selection and diversity of their samples, and utilize both within- and between-group analyses to explore the possible multiplicative effects of positions of inequality.[74] For example, new intersectional research could examine how low income affects bisexual women's depressive symptoms differently than it does for lesbian or heterosexual women, or the ways in which racialized minority status affects gay men's access to mental health services. Pursuing research questions, such as these, offers opportunities to examine the role of multiple factors (such as homophobia-, biphobia- and transphobia-related prejudice experiences in conjunction with racially-based discrimination) in shaping health outcomes – perhaps revealing how their combined, detrimental effects can best be countered.

7.4.2   Implications for Intervention

Most previous research on interventions to improve sexual minority mental health has focused on interventions related to drug and alcohol treatment, particularly at an individual level (e.g., counselling, detoxification).[32] There are relatively fewer studies on interventions to address mental disorders, and little research regarding population-level interventions (and their effectiveness).[32] As a result, little is known about how best to respond in hopes of eliminating or ameliorating the disparities experienced by sexual minorities.[311,312]

To date, previous research points to prevention as a priority for addressing mental health and substance use problems among sexual minorities.[32] The literature identifies adolescence as a critical time for intervention because the onset of many mental health disorders occurs during or directly following this developmental period.[262] Key factors identified in the literature to consider in prevention efforts include: coming out supports, safe spaces, community belonging, social resources and supports, discrimination and stigma, homophobic violence, as well as legal protections and recognition in workplace and institutional policies.[32,163,313–315] Social marketing campaigns directed towards healthful lifestyles targeted for the LGBT community have been implemented, but there has been little evaluation of their effectiveness.[32] While selected publications have focused on addressing structural factors, such as social determinants, legal protections, and homophobia in health and education,[316–318] the body of evidence is sparse.

With respect to treatment, there are several published guidelines on substance abuse treatment for sexual minorities. For example, a comprehensive guide released by the US Substance Abuse and Mental Health Services Administration covers a range of recommendations (e.g., clinical and legal issues, alliance building), and outlines treatment considerations unique to sexual minorities.[319] These issues have been widely documented in the literature and include:

149

openness and disclosure, coming out, societal homophobia, internalized homophobia, family and support systems, homophobic violence, experiences of rejection, discrimination and harassment, relationship concerns, and grief.[32,320,321] Other guidelines have been published to improve treatment interventions for sexual minority substance users,[322] LGBT[323,324] and transgender adolescents,[325,326] men who have sex with men,[315] and those seeking primary care[327,328] and psychological support.[216,329,330] With respect to treatment goals of psychotherapy with bisexual clients specifically, recommendations include supporting an understanding of bisexuality as a natural phenomenon, encouraging clients to identify bisexual role models, cultivate support networks, and disclose bisexual identity to appropriate others.[72,331] Generally, empirical evidence that documents what works, how it works, and for whom, remains limited.

Cultural competence, defined as care that respects diversity as well as the cultural factors that can affect health and health care,[312] also has been addressed in previous literature. Cultural competence is often described as a foundational pillar for reducing disparities through the provision of culturally sensitive and unbiased quality care.[332] Several guidelines have been published, focused on healthcare provider education through training to provide culturally competent care to sexual minorities,[333–338] including one literature review of cultural competence interventions at the system and provider levels to improve the health disparities of LGBT persons.[312] Yet, few researchers have evaluated the effectiveness of interventions to reduce stigma, with the exception of those focused on the training of medical students and health professionals.[314]

As with previous research, the findings of the current dissertation point to promising opportunities for intervention in key areas, including: (a) the improvement of access to existing treatment services for LGB clients (e.g., inclusive policies and programs affirming sexual

minority-specific needs);[262,339] (b) the provision of extensive healthcare professional training and implementation of competency requirements;[312,338] (c) the development and dissemination of practice guidelines for practitioners working with sexual minority populations;[340,341] (d) the incorporation of treatment and clinical approaches that explicitly address minority stress (e.g., family rejection, homophobia);[315,342] (e) the creation of safe spaces that foster positive community belonging and identity development (e.g., LGBT community centres, gay-straight alliances); [172,343] and (f) the implementation of programs at community- and institutional-levels aimed at reducing stigma and discrimination.[32,314]

I suggest below a set of additional implications, based on the findings from the research reported here, that may extend current thinking with respect to interventions, particularly in the following areas: (a) socio-structural versus individual approaches, (b) universal versus sexual minority-specific strategies, and (c) availability and accessibility of services.

(a) Socio-structural approaches

The findings from my dissertation (based on Canadian data) dovetail with the evidence acquired from studies conducted in other countries that implicate exposure to *social* stressors as a key determinant of the observed disparities among sexual minorities. Yet, intervention research (and interventions themselves) has largely focused on *individualized* interventions (e.g., counselling). While such responses are important and warranted, without attending to interventions that focus on the larger socio-economic, cultural and political determinants, little progress will be made in addressing the health disparities experienced by sexual minorities. Indeed, it has been suggested that in focusing on individual-level approaches, we risk a shift from interventions that attempt to correct the pathogenic social environment to interventions that

focus on individual resilience and coping.[112] Policies and interventions must address fundamental social causes (e.g., homophobia) as more structural level efforts to pre-empt the continued (re)production of health inequalities.[309] Interventions aimed at strengthening communities or removing structural barriers are currently lacking.[310] However, some promising research is emerging in this area.

For example, evidence from a study of the "intervenable" (i.e., modifiable) factors associated with suicide risk in transgender persons in Ontario, Canada suggested that interventions at the population-level, such as those designed to increase social awareness and to reduce transphobia, have the potential to contribute to substantial reductions in the prevalence of suicide ideation and attempts within trans populations.[344] Indeed, such population-level interventions could complement individual-level or therapeutic approaches, with the potential to substantially reduce the observed disparities in prevalence rates by addressing their fundamental causes.[344] Much has been written about the importance of group-level resources to address the socially patterned nature of minority stressors.[11,112,182,345,346] It is important to remember that intersectional processes such as racism, classism, sexism, biphobia and transphobia, among other, will affect the extent to which certain sexual minority subgroups access and benefit from those resources.[112] The higher prevalence rates of the multiple and co-occurring disorders in sexual minorities in Canada compared with the general population, along with its heterogeneity, highlight the pressing need for novel interventions to be developed, tested, and implemented.

(b) Universal and sexual minority-specific strategies

My findings suggest that focusing solely on universal interventions designed to address the known determinants of mental health in a population may ameliorate, but will not

substantially diminish, disparities related to minority sexual identity. Universal intervention strategies that are complemented by more targeted and tailored interventions designed to address sexual minority-specific factors (e.g., identity-based stigma and discrimination, social supports for stress related to sexuality) and bisexual-specific factors in particular (e.g., biphobia, anti-bisexual prejudice), may be needed to reduce the overall prevalence of mood, anxiety, and concurrent disorders in the LGB population and to close the observed gaps between sexual minorities and heterosexual populations. Furthermore, existing interventions are likely informed by studies of general populations, which may have substantially different underlying prevalence patterns compared with those of sexual minorities (e.g., relatively higher prevalence rates of heavy drinking among sexual minority women; relatively higher prevalence rates of mental disorders among young bisexual people). Targeted and tailored intervention approaches need to be designed with feasibility as a priority (e.g., the availability of specialists), alongside careful attention to the potential for unintentional negative effects (e.g., reinforcing isolation and exclusion of sexual minorities or averting the need to better address the needs of sexual minority populations within the broader healthcare system).[32]

(c) Availability and accessibility of services

The current body of evidence related to healthcare availability and accessibility for Canada's sexual minorities is extremely limited, although some prior evidence suggests that Canadian sexual minorities, especially bisexual identified individuals, report more unmet healthcare needs than do their heterosexual counterparts.[42] A 1996 study from Ontario documented extensive barriers to addictions services for gay and lesbian youth, including marginalization, avoidance of LGBT issues, ignoring sexual orientation, disclosing a person's

153

sexual identity without consent (i.e., "outing"), harassment, early and inappropriate discharge, and misinformed staff.[213] Further research is urgently required to inform the development and provision of healthcare services and treatment interventions for this population.

7.5   Conclusion

The findings presented in the current dissertation provide robust population estimates related to the common mental health disorders for gay, lesbian or bisexual Canadians. Previously, no national estimates existed to characterize the heavy drinking or co-occurring heavy drinking and mental disorders of sexual minority adults living in Canada. The findings advance understanding of both the distribution of and potential explanations for the prevalence of mental health disorders and substance use among lesbian/gay and bisexual Canadians. The results described here add to a small, but growing, body of evidence to explain the possible processes that underlie the elevated prevalence rates of these outcomes among sexual minorities, including the moderating and mediating effects. Further research is needed to expand upon these findings, particularly research that contributes to the design of effective population-level interventions to improve the mental health and related outcomes of sexual minority populations.

References

1. Health Canada. *A Report on Mental Illnesses in Canada*. Ottawa; 2002. doi:ISBN H39-643/2002E. http://www.phac-aspc.gc.ca/publicat/miic-mmac/pdf/men_ill_e.pdf. Accessed October 22, 2013.

2. Mood Disorders Society of Canada. *Quick Facts: Mental Illness & Addiction in Canada*.; 2009. http://www.mooddisorderscanada.ca/page/quick-facts. Accessed October 22, 2013.

3. Public Health Agency of Canada. *Mood and Anxiety Disorders in Canada; Fast Facts from the 2014 Survey on Living with Chronic Diseases in Canada*.; 2014. https://www.canada.ca/en/public-health/services/publications/diseases-conditions/mood-anxiety-disorders-canada.html. Accessed May 10, 2017.

4. Statistics Canada. Mood disorders by sex, by province and territory (Percent). Statistics Canada, CANSIM table 105-0501 and Catalogue no. 82-221-X. http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health114b-eng.htm. Published 2016. Accessed April 11, 2017.

5. Chief Public Health Officer. *Report on the State of Public Health in Canada 2012: Influencing Health - The Importance of Health and Gender*. Ottawa; 2012. http://publichealth.gc.ca/CPHOreport. Accessed October 22, 2013.

6. Merikangas KR, Mehta RL, Molnar BE, et al. Comorbidity of substance use disorders with mood and anxiety disorders: results of the International Consortium in Psychiatric Epidemiology. *Addict Behav*. 1998;23(6):893-907.

7. Weitzman E. Poor mental health, depression, and associations with alcohol consumption, harm, and abuse in a national sample of young adults in college. *J Nerv Ment Dis*. 2004;192(4):269-277. doi: 10.1097/01.nmd.0000120885.17362.94.

8.   Statistics Canada. Heavy drinking, by age group and sex (Percent). Statistics Canada, CANSIM, table 105-0501 and Catalogue no. 82-221-X. http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health79b-eng.htm. Published 2016. Accessed April 11, 2017.

9.   PHAC. *The Human Face of Mental Health and Mental Illness in Canada 2006*.; 2006. http://www.phac-aspc.gc.ca/publicat/human-humain06/1-eng.php. Accessed October 31, 2013.

10.   Cochran SD, Mays VM. Estimating Prevalence of Mental Substance-Using Disorders Among Lesbians and Gay Men from Existing National Health Data. In: Omoto A, Kurtzman H, eds. *Sexual Orientation, Mental Health, and Substance Use: Contemporary Scientific Perspectives*. Washington, DC: American Psychological Association; 2005:143-165.

11.   Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. *Psychol Bull*. 2003;129(5):674-697. doi:10.1037/0033-2909.129.5.674.

12.   Gilman SE, Cochran SD, Mays VM, Hughes M, Ostrow D, Kessler RC. Risk of psychiatric disorders among individuals reporting same-sex sexual partners in the National Comorbidity Survey. *Am J Public Health*. 2001;91(6):933-939. PMCID: PMC1446471.

13.   Cochran SD, Mays VM, Sullivan JG. Prevalence of mental disorders, psychological distress, and mental health services use among lesbian, gay, and bisexual adults in the United States. *J Consult Clin Psychol*. 2003;71(1):53-61. PMCID: PMC1446471.

14. Marshal MP, Friedman MS, Stall R, et al. Sexual orientation and adolescent substance use: a meta-analysis and methodological review. *Addiction*. 2008;103(4):546-556. doi:10.1111/j.1360-0443.2008.02149.x.

15. Brewster KL, Tillman KH. Sexual orientation and substance use among adolescents and young adults. *Am J Public Health*. 2012;102(6):1168-1176. doi:10.2105/AJPH.2011.300261.

16. Russell ST, Joyner K. Adolescent sexual orientation and suicide risk: evidence from a national study. *Am J Public Health*. 2001;91(8):1276-1281. PMCID: PMC1446760.

17. Talley AE, Tomko RL, Littlefield AK, Trull TJ, Sher KJ. The influence of general identity disturbance on reports of lifetime substance use disorders and related outcomes among sexual minority adults with a history of substance use. *Psychol Addict Behav*. 2011;25(3):530-541. doi:10.1037/a0023022.

18. Hatzenbuehler ML, Keyes KM, Hasin DS. State-level policies and psychiatric morbidity in lesbian, gay, and bisexual populations. *Am J Public Health*. 2009;99(12):2275-2281. doi:10.2105/AJPH.2008.153510.

19. Russell ST, Franz BT, Driscoll AK. Same-sex romantic attraction and experiences of violence in adolescence. *Am J Public Health*. 2001;91(6):903-906. doi:10.2105/AJPH.91.6.903.

20. Kerridge BT, Pickering RP, Saha TD, et al. Prevalence, sociodemographic correlates and DSM-5 substance use disorders and other psychiatric disorders among sexual minorities in the United States. *Drug Alcohol Depend*. 2017;170:82-92. doi:10.1016/j.drugalcdep.2016.10.038.

21. Bolton S-L, Sareen J. Sexual Orientation and Its Relation to Mental Disorders and Suicidal Attempts: Findings From a Nationally Representative Sample. *Can J Psychiatry*. 2011;56(1):35-44. doi:10.1177/070674371105600107.

22. Blosnich JR, Farmer GW, Lee JGL, Silenzio VMB, Bowen DJ. Health inequalities among sexual minority adults: evidence from ten U.S. states, 2010. *Am J Prev Med*. 2014;46(4):337-349. doi:10.1016/j.amepre.2013.11.010.

23. Operario D, Gamarel KE, Grin BM, et al. Sexual Minority Health Disparities in Adult Men and Women in the United States: National Health and Nutrition Examination Survey, 2001–2010. *Am J Public Health*. 2015;105(10):e27-e34. doi:10.2105/AJPH.2015.302762.

24. King M, Semlyen J, Tai SS, et al. A systematic review of mental disorder, suicide, and deliberate self harm in lesbian, gay and bisexual people. *BMC Psychiatry*. 2008;8:70. doi:10.1186/1471-244X-8-70.

25. Chakraborty A, McManus S, Brugha TS, Bebbington P, King M. Mental health of the non-heterosexual population of England. *Br J Psychiatry*. 2011;198(2):143-148. doi:10.1192/bjp.bp.110.082271.

26. Sandfort T, de Graaf R, Bijl R V., Schnabel P. Same-sex sexual behavior and psychiatric disorders: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Arch Gen Psychiatry*. 2001;58(1):85-91. doi: 10.1001/archpsyc.58.1.85.

27. Björkenstam C, Björkenstam E, Andersson G, Cochran S, Kosidou K. Anxiety and Depression Among Sexual Minority Women and Men in Sweden: Is the Risk Equally Spread Within the Sexual Minority Population? *J Sex Med*. 2017;14(3):396-403. doi:10.1016/j.jsxm.2017.01.012.

28. Semlyen J, King M, Varney J, Hagger-Johnson G. Sexual orientation and symptoms of common mental disorder or low wellbeing: combined meta-analysis of 12 UK population health surveys. *BMC Psychiatry*. 2016;16(1):67. doi:10.1186/s12888-016-0767-z.

29. Bos HMW, Boschloo L, Schoevers RA, Sandfort TGM. Depression and anxiety in patients with and without same-sex attraction: Differences in clinical expression, lifestyle factors, and vulnerability indicators. *Brain Behav*. 2015;5(9):n/a-n/a. doi:10.1002/brb3.363.

30. Sandfort T, de Graaf R, Ten Have M, Ransome Y, Schnabel P. Same-Sex Sexuality and Psychiatric Disorders in the Second Netherlands Mental Health Survey and Incidence Study (NEMESIS-2). *LGBT Health*. 2014;1(4):292-301. doi:10.1089/lgbt.2014.0031.

31. Lhomond B, Saurel-Cubizolles M-J, Michaels S. A Multidimensional Measure of Sexual Orientation, Use of Psychoactive Substances, and Depression: Results of a National Survey on Sexual Behavior in France. *Arch Sex Behav*. 2014;43(3):607-619. doi:10.1007/s10508-013-0124-y.

32. Ritter A, Matthew-Simmons F, Carragher N. *Monograph No 23: Prevalence of and Interventions for Mental Health and Alcohol and Other Drug Problems Amongts the Gay, Lesbian, Bisexual and Transgender Community: A Review of the Literature*. Sydney; 2012. https://ndarc.med.unsw.edu.au/sites/default/files/ndarc/resources/23 Prevalence of %26 interventions for mental health %26 alcohol and other drug problems amongst the GLBT community - lit review.pdf. Accessed May 10, 2017.

33. Roxburgh A, Lea T, de Wit J, Degenhardt L. Sexual identity and prevalence of alcohol and other drug use among Australians in the general population. *Int J Drug Policy*. 2016;28:76-82. doi:10.1016/j.drugpo.2015.11.005.

34.   Hughes TL, Szalacha LA, Johnson TP, Kinnison KE, Wilsnack SC, Cho Y. Sexual victimization and hazardous drinking among heterosexual and sexual minority women. *Addict Behav*. 2010;35(12):1152-1156. doi:10.1016/j.addbeh.2010.07.004.

35.   McNair R, Kavanagh A, Agius P, Tong B. The mental health status of young adult and mid-life non-heterosexual Australian women. *Aust N Z J Public Health*. 2005;29(January 2004):265-271. doi:10.1111/j.1467-842X.2005.tb00766.x.

36.   Plöderl M, Tremblay P. Mental health of sexual minorities: A systematic review. *Int Rev Psychiatry*. 2015;27(5):367-385. doi:10.3109/09540261.2015.1083949.

37.   Saewyc E, Poon C, Wang N, Homma Y, Smith A. *Not Yet Equal: The Health of Lesbian, Gay, & Bisexual Youth in BC*. Vancouver, BC; 2007. http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Not+Yet+Equal:+The+Health+of+Lesbian,+Gay,+&+Bisexual+Youth+in+BC#0. Accessed October 31, 2013.

38.   Ross LE, Bauer GR, MacLeod MA, Robinson M, MacKay J, Dobinson C. Mental health and substance use among bisexual youth and non-youth in Ontario, Canada. *PLoS One*. 2014;9(8):e101604. doi:10.1371/journal.pone.0101604.

39.   Steele LS, Ross LE, Epstein R, Strike C, Goldfinger C. Correlates of mental health service use among lesbian, gay, and bisexual mothers and prospective mothers. *Women Health*. 2008;47(3):95-112. doi:10.1080/03630240802134225.

40.   Brennan DJ, Ross LE, Dobinson C, Veldhuizen S, Steele LS. Men's sexual orientation and health in Canada. *Can J Public Health*. 2010;101(3):255-258. doi: http://dx.doi.org/10.17269/cjph.101.2361.

41.   Pakula B, Shoveller JA. Sexual orientation and self-reported mood disorder diagnosis among Canadian adults. *BMC Public Health*. 2013;13(1):209. doi:10.1186/1471-2458-13-209.

42.   Tjepkema M. Health care use among gay, lesbian and bisexual Canadians. *Health Reports*. 2008;19(1):53-64. http://plumlivingproperties.net/images/GLBTHealthCare_StatsCan_.pdf#page=55. Accessed November 4, 2013.

43.   Scott RL, Lasiuk G, Norris CM. Sexual orientation and depression in Canada. *Can J Public Health*. 2017;107(6):e545-e549. doi:10.17269/cjph.107.5506.

44.   Statistics Canada. Same-sex couples and sexual orientation... by the numbers. http://www.statcan.gc.ca/eng/dai/smr08/2015/smr08_203_2015. Published 2015. Accessed April 11, 2017.

45.   Gates GJ. *How Many People Are Lesbian, Gay, Bisexual and Transgender?*; 2011. https://escholarship.org/uc/item/09h684x2. Accessed October 27, 2014.

46.   Wikipedia. Demographics of sexual orientation. https://en.wikipedia.org/wiki/Demographics_of_sexual_orientation. Accessed April 11, 2017.

47.   Institute of Medicine (US) Committee on Lesbian, Gay B and THI and RG and O. *The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding*. Washington, D.C.: National Academies Press; 2011. doi:10.17226/13128.

48.   Family Caregiver Alliance. Legal Issues for LGBT Caregivers.

       http://www.caregiver.org/caregiver/jsp/content_node.jsp?nodeid=436. Published 2011.

       Accessed November 26, 2013.

49.   Levin S, Mayer G. *Statement of the American Medical Association to the Institute of*

       Medicine RE: LGBT Health Issues & Research Gaps & Opportunities.; 2010.

       http://goo.gl/Ek27Ku. Accessed November 26, 2013.

50.   Rainbow Health Ontario. Rainbow Health Ontario Fact Sheet: Bisexual Health.

       www.rainbowhealthontario.ca. Published 2011. Accessed October 22, 2013.

51.   Veenstra G. Race, gender, class, and sexual orientation: intersecting axes of inequality and

       self-rated health in Canada. *Int J Equity Health*. 2011;10(1):3. doi:10.1186/1475-9276-10-

       3.

52.   Wang J, Hausermann M, Ajdacic-Gross V, Aggleton P, Weiss MG. High prevalence of

       mental disorders and comorbidity in the Geneva gay men's health study. *Soc Psychiatry*

       Psychiatr Epidemiol. 2007;42(5):414-420. doi:10.1007/s00127-007-0190-3.

53.   Johnson TP, Hughes TL, Cho YI, Wilsnack SC, Aranda F, Szalacha LA. Hazardous

       Drinking, Depression, and Anxiety Among Sexual-Minority Women: Self-Medication or

       Impaired Functioning? *J Stud Alcohol Drugs*. 2013;74(4):565. PMCID: PMC3711347.

54.   Talley AE, Hughes TL, Aranda F, Birkett M, Marshal MP. Exploring alcohol-use

       behaviors among heterosexual and sexual minority adolescents: intersections with sex,

       age, and race/ethnicity. *Am J Public Health*. 2014;104(2):295-303.

       doi:10.2105/AJPH.2013.301627.

55. Barnes DM, Hatzenbuehler ML, Hamilton AD, Keyes KM. Sexual orientation disparities in mental health: the moderating role of educational attainment. *Soc Psychiatry Psychiatr Epidemiol*. 2014;49(9):1447-1454. doi:10.1007/s00127-014-0849-5.

56. Hatzenbuehler ML. How does sexual minority stigma "get under the skin"? A psychological mediation framework. *Psychol Bull*. 2009;135(5):707-730. doi:10.1037/a0016441.

57. Meyer IH, Frost DM. Minority stress and the health of sexual minorities. Patterson CJ, D'Augelli A, eds. *Handb Psychol Sex Orientat*. 2013:252-266.

58. D'Augelli AR, Grossman AH, Starks MT. Childhood gender atypicality, victimization, and PTSD among lesbian, gay, and bisexual youth. *J Interpers Violence*. 2006;21(11):1462-1482. doi:10.1177/0886260506293482.

59. Statistics Canada. Police-reported hate crimes, 2012. The Daily (June 26, 2014). http://www.statcan.gc.ca/daily-quotidien/140626/dq140626b-eng.htm. Published June 26, 2014. Accessed January 21, 2015.

60. Allen M. Police-reported hate crime in Canada, 2013. *Juristat*. 2014;(85):2-31.

61. Parent MC, DeBlaere C, Moradi B. Approaches to Research on Intersectionality: Perspectives on Gender, LGBT, and Racial/Ethnic Identities. *Sex Roles*. 2013;68(11-12):639-645. doi:10.1007/s11199-013-0283-2.

62. Collins PH. Toward a new vision: Race, class, and gender as categories of analysis and connection. *Mean Differ Am Constr Race, Sex Gender, Soc Class, Sex Orientat*. 1993;1(1):25-45.

63. Collins PH. It's All In the Family: Intersections of Gender, Race, and Nation. *Hypatia*. 1998;13(3):62-82. doi:10.1111/j.1527-2001.1998.tb01370.x.

64. Crenshaw K. Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics. 1989. http://philpapers.org/rec/CREDTI. Accessed July 17, 2014.

65. Warner LR, Shields SA. The Intersections of Sexuality, Gender, and Race: Identity Research at the Crossroads. *Sex Roles*. 2013;68(11-12):803-810. doi:10.1007/s11199-013-0281-4.

66. Stirratt MJ, Meyer IH, Ouellette SC, Gara M a. Measuring identity multiplicity and intersectionality: Hierarchical Classes Analysis (HICLAS) of sexual, racial, and gender identities. *Self Identity*. 2008;7(1):89-111. doi:10.1080/15298860701252203.

67. Bowleg L. When Black + Lesbian + Woman ≠ Black Lesbian Woman: The Methodological Challenges of Qualitative and Quantitative Intersectionality Research. *Sex Roles*. 2008;59(5-6):312-325. doi:10.1007/s11199-008-9400-z.

68. Bowleg L. The problem with the phrase women and minorities: intersectionality-an important theoretical framework for public health. *Am J Public Health*. 2012;102(7):1267-1273. doi:10.2105/AJPH.2012.300750.

69. Pakula B, Marshall BDL, Shoveller JA, et al. Gradients in Depressive Symptoms by Socioeconomic Position Among Men Who Have Sex With Men in the EXPLORE Study. *J Homosex*. 2016;63(8). doi:10.1080/00918369.2016.1150056.

70. Mereish EH, Poteat VP. A Relational Model of Sexual Minority Mental and Physical Health: The Negative Effects of Shame on Relationships, Loneliness, and Health. *J Couns Psycholology*. 2015;62(3):425-437. doi:10.1037/cou0000088.

71.   Khan M, Ilcisin M, Saxton K. Multifactorial discrimination as a fundamental cause of mental health inequities. *Int J Equity Health*. 2017;16(1):43. doi:10.1186/s12939-017-0532-z.

72.   Kertzner RM, Meyer IH, Frost DM, Stirratt MJ. Social and psychological well-being in lesbians, gay men, and bisexuals: the effects of race, gender, age, and sexual identity. *Am J Orthopsychiatry*. 2009;79(4):500-510. doi:10.1037/a0016848.

73.   Veenstra G. Race, gender, class, sexuality (RGCS) and hypertension. *Soc Sci Med*. 2013;89:16-24. doi:10.1016/j.socscimed.2013.04.014.

74.   Bauer GR. Incorporating intersectionality theory into population health research methodology: Challenges and the potential to advance health equity. *Soc Sci Med*. 2014;110:10-17. doi:10.1016/j.socscimed.2014.03.022.

75.   Seng JS, Lopez WD, Sperlich M, Hamama L, Reed Meldrum CD. Marginalized identities, discrimination burden, and mental health: empirical exploration of an interpersonal-level approach to modeling intersectionality. *Soc Sci Med*. 2012;75(12):2437-2445. doi:10.1016/j.socscimed.2012.09.023.

76.   Health Canada, Public Health Agency of Canada. *Evaluation of Mental Health and Mental Illness Activities of Health Canada and the Public Health Agency of Canada 2010-2011 to 2014-2015 Office of Audit and Evaluation*. Ottawa; 2016. http://www.healthycanadians.gc.ca/publications/healthy-living-vie-saine/framework-suicide-progress-report-2016-rapport-d-etape-cadre-suicide/index-eng.php. Accessed April 11, 2017.

77.   Trudeau, J. PM of C. Minister of Health Mandate Letter. http://pm.gc.ca/eng/minister-health-mandate-letter. Published 2015. Accessed April 11, 2017.

78. Government of Canada. Budget 2016: Budget in Brief. http://www.budget.gc.ca/2016/docs/bb/brief-bref-en.html. Published 2016. Accessed April 11, 2017.

79. Wray TB, Grin B, Dorfman L, et al. Systematic Review of Interventions to Reduce Problematic Alcohol Use in Men who have Sex with Men HHS Public Access. *Drug Alcohol Rev*. 2016;35(2):148-157. doi:10.1111/dar.12271.

80. Courtney KE, Polich J. Binge drinking in young adults: Data, definitions, and determinants. *Psychol Bull*. 2009;135(1):142-156. doi:10.1037/a0014414.

81. Bostwick WB, Boyd CJ, Hughes TL, McCabe SE. Dimensions of sexual orientation and the prevalence of mood and anxiety disorders in the United States. *Am J Public Health*. 2010;100(3):468-475. doi:10.2105/AJPH.2008.152942.

82. Cochran SD, Mays VM. Burden of psychiatric morbidity among lesbian, gay, and bisexual individuals in the California Quality of Life Survey. *J Abnorm Psychol*. 2009;118(3):647-658. doi:10.1037/a0016501.

83. Cochran SD, Mays VM. Relation between psychiatric syndromes and behaviorally defined sexual orientation in a sample of the US population. *Am J Epidemiol*. 2000;151(5):516-523. PMCID: PMC3698226.

84. Gattis MN, Sacco P, Cunningham-Williams RM. Substance use and mental health disorders among heterosexual identified men and women who have same-sex partners or same-sex attraction: Results from the national epidemiological survey on alcohol and related conditions. *Arch Sex Behav*. 2012;41(5):1185-1197. doi:10.1007/s10508-012-9910-1.

85.   Oswalt SB, Wyatt TJ. Sexual Orientation and Differences in Mental Health, Stress, and Academic Performance in a National Sample of U.S. College Students. *J Homosex*. 2011;58(9):1255-1280. doi:10.1080/00918369.2011.605738.

86.   Cochran SD, Mays VM, Alegria M, Ortega AN, Takeuchi D. Mental health and substance use disorders among Latino and Asian American lesbian, gay, and bisexual adults. *J Consult Clin Psychol*. 2007;75(5):785-794. doi:10.1037/0022-006X.75.5.785.

87.   Cochran SD, Mays VM. Lifetime prevalence of suicide symptoms and affective disorders among men reporting same-sex sexual partners: results from NHANES III. *Am J Public Health*. 2000;90(4):573-578. PMCID: PMC1446201.

88.   Diamant AL, Wold C. Sexual orientation and variation in physical and mental health status among women. *J Womens Health (Larchmt)*. 2003;12(1):41-49. doi:10.1089/154099903321154130.

89.   Fredriksen-Goldsen KI, Kim H-J, Barkan SE, Muraco A, Hoy-Ellis CP. Health Disparities Among Lesbian, Gay, and Bisexual Older Adults: Results From a Population-Based Study. *Am J Public Health*. 2013;103(10):1802-1809. doi:10.2105/AJPH.2012.301110.

90.   Garland-Forshee RY, Fiala SC, Ngo DL, Moseley K. Sexual Orientation and Sex Differences in Adult Chronic Conditions, Health Risk Factors, and Protective Health Practices, Oregon, 2005–2008. *Prev Chronic Dis*. 2014;11:140126. doi:10.5888/pcd11.140126.

91.   Needham BL. Sexual Attraction and Trajectories of Mental Health and Substance Use During the Transition from Adolescence to Adulthood. *J Youth Adolesc*. 2012;41(2):179-190. doi:10.1007/s10964-011-9729-4.

92. McCabe SE, Hughes TL, Bostwick WB, West BT, Boyd CJ. Sexual orientation, substance use behaviors and substance dependence in the United States. *Addiction*. 2009;104(8):1333-1345. doi:10.1111/j.1360-0443.2009.02596.x.

93. Eisenberg ME, Wechsler H. Social influences on substance-use behaviors of gay, lesbian, and bisexual college students: findings from a national study. *Soc Sci Med*. 2003;57(10):1913-1923. doi: 10.1016/S0277-9536(03)00057-1.

94. Fergusson DM, Horwood LJ, Ridder EM, Beautrais AL. Sexual orientation and mental health in a birth cohort of young adults. *Psychol Med*. 2005;35(7):971-981. doi:10.1017/S0033291704004222.

95. Lanfear C, Akins S, Mosher C. Examining the Relationship of Substance Use and Sexual Orientation. *Deviant Behav*. 2013;34(7):586-597. doi:10.1080/01639625.2012.749149.

96. Bloomfield K, Wicki M, Wilsnack S, Hughes T, Gmel G. International differences in alcohol use according to sexual orientation. *Subst Abus*. 2011;32(4):210-219. doi:10.1080/08897077.2011.598404.

97. Conron KJ, Mimiaga MJ, Landers SJ. A population-based study of sexual orientation identity and gender differences in adult health. *Am J Public Health*. 2010;100(10):1953-1960. doi:10.2105/AJPH.2009.174169.

98. Needham BL, Austin EL. Sexual Orientation, Parental Support, and Health During the Transition to Young Adulthood. *J Youth Adolesc*. 2010;39(10):1189-1198. doi:10.1007/s10964-010-9533-6.

99. Burgard SA, Cochran SD, Mays VM. Alcohol and tobacco use patterns among heterosexually and homosexually experienced California women. *Drug Alcohol Depend*. 2005;77(1):61-70. doi:10.1016/j.drugalcdep.2004.07.007.

100. Robin L, Brener ND, Donahue SF, Hack T, Hale K, Goodenow C. Associations between health risk behaviors and opposite-, same-, and both-sex sexual partners in representative samples of Vermont and Massachusetts high school students. *Arch Pediatr Adolesc Med*. 2002;156(4):349-355. doi:10.1001/archpedi.156.4.349.

101. Hottes TS, Ferlatte O, Gesink D. Suicide and HIV as leading causes of death among gay and bisexual men: a comparison of estimated mortality and published research. *Crit Public Health*. 2014;(August):1-14. doi:10.1080/09581596.2014.946887.

102. Engel GL. The clinical application of the biopsychosocial model. *Am J Psychiatry*. 1980;137(5):535-544. doi:10.1176/ajp.137.5.535.

103. Chae D, Nuru-Jeter A. Conceptualizing Racial Disparities in Health: Advancement of a Socio-Psychobiological Approach. *Du Bois Rev*. 2011;8(1):63-77. doi:10.1017/S1742058X11000166.

104. Brooks VR. The theory of minority stress. In: Brooks VR, ed. *Minority Stress and Lesbian Women*. Lexington, MA: Lexington Books; 1981:71-90.

105. Sue D. *Microaggressions in Everyday Life: Race, Gender, and Sexual Orientation*. Hoboken, New Jersey: John Wiley & Sons, Inc.; 2010.

106. Schwartz S, Meyer IH. Mental health disparities research: the impact of within and between group analyses on tests of social stress hypotheses. *Soc Sci Med*. 2010;70(8):1111-1118. doi:10.1016/j.socscimed.2009.11.032.

107. Miranda J, McGuire TG, Williams DR, Wang P. Mental health in the context of health disparities. *Am J Psychiatry*. 2008;165(9):1102-1108. doi:10.1176/appi.ajp.2008.08030333.

108. Braveman P a, Kumanyika S, Fielding J, et al. Health disparities and health equity: the issue is justice. *Am J Public Health*. 2011;101 Suppl:S149-55. doi:10.2105/AJPH.2010.300062.

109. Whitehead M. The Concepts and Principles of Equity and Health. *Int J Heal Serv*. 1992;22(3):429-445. doi:10.2190/986L-LHQ6-2VTE-YRRN.

110. Brooks, K.D., Bowleg, L., Quina K. Minority sexual status among minorities. In: Loue S, ed. *Sexualities and Identities of Minority Women*. New York: Springer; 2009:41-63.

111. Weber L. *Understanding Race, Class, Gender, and Sexuality: A Conceptual Framework*. 2nd ed. New York: Oxford University Press; 2010.

112. Meyer IH. Resilience in the Study of Minority Stress and Health of Sexual and Gender Minorities. *Psychol Sex Orientat Gend Divers*. 2015;2(3):209-213. doi:10.1037/sgd0000132.

113. Singer M, Bulled N, Ostrach B, Mendenhall E. Syndemics and the biosocial conception of health. *Lancet*. 2017;389(10072):941-950. doi:10.1016/S0140-6736(17)30003-X.

114. Salomon E, Mimiaga MJ, Husnik MJ, et al. Depressive symptoms, utilization of mental health care, substance use and sexual risk among young men who have sex with men in EXPLORE: implications for age-specific interventions. *AIDS Behav*. 2009;13(4):811-821. doi:10.1007/s10461-008-9439-4.

115. Santos G-M, Do T, Beck J, et al. Syndemic conditions associated with increased HIV risk in a global sample of men who have sex with men. *Sex Transm Infect*. 2014;90(3):250-253. doi:10.1136/sextrans-2013-051318.

116. Martinez O, Wu E, Levine EC, et al. Syndemic factors associated with drinking patterns among Latino men and Latina transgender women who have sex with men in New York City. *Addict Res Theory*. 2016;24(6):466-476. doi:10.3109/16066359.2016.1167191.

117. Coulter RWS, Kinsky SM, Herrick AL, Stall RD, Bauermeister JA. Evidence of Syndemics and Sexuality-Related Discrimination Among Young Sexual-Minority Women. *LGBT Health*. 2015;2(3):250-257. doi:10.1089/lgbt.2014.0063.

118. Cox N, Vanden Berghe W, Dewaele A, Vinke J. General and minority stress in an LGB population in Flanders. *J LGBT Health Res*. 2008;4(4):181-194. doi:10.1080/15574090802657168.

119. Lehavot K, Simoni JM. The impact of minority stress on mental health and substance use among sexual minority women. *J Consult Clin Psychol*. 2011;79(2):159-170. doi:10.1037/a0022839.

120. Herek GM, Gillis JR, Cogan JC. Psychological sequelae of hate-crime victimization among lesbian, gay, and bisexual adults. *J Consult Clin Psychol*. 1999;67(6):945-951. doi:10.1037//0022-006X.67.6.945.

121. Herek GM. Hate crimes and stigma-related experiences among sexual minority adults in the United States: prevalence estimates from a national probability sample. *J Interpers Violence*. 2009;24(1):54-74. doi:10.1177/0886260508316477.

122. Lea T, de Wit J, Reynolds R. Minority Stress in Lesbian, Gay, and Bisexual Young Adults in Australia: Associations with Psychological Distress, Suicidality, and Substance Use. *Arch Sex Behav*. 2014;43(8):1571-1578. doi:10.1007/s10508-014-0266-6.

123. Wilson SM, Gilmore AK, Rhew IC, Hodge KA, Kaysen DL. Minority stress is longitudinally associated with alcohol-related problems among sexual minority women. *Addict Behav*. 2016;61:80-83. doi:10.1016/j.addbeh.2016.05.017.

124. Bränström R, Meyer I. Minority stress factors as mediators of sexual orientation disparities in mental health treatment: a longitudinal population-based study. *J Epidemiol Community Health*. 2017;129(5):674-697. doi:10.1136/jech-2016-207943.

125. Simonson J. Toward understanding elevated depression and anxiety symptoms in LGBQ youth: Integrating minority stress theory and the common vulnerabilities hypothesis. *Diss Abstr Int Sect B Sci Eng*. 2013;74(3-B(E)). http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2013-99180-412&site=ehost-live&scope=site. Accessed April 20, 2017.

126. Ebacioni K. Sexual orientation and psychological distress: the role of minority stress. 2014. http://dro.deakin.edu.au/view/DU:30074704. Accessed April 9, 2017.

127. Feinstein BA, Dyar C. Bisexuality, Minority Stress, and Health. *Curr Sex Heal Reports*. 2017;9(1):42-49. doi:10.1007/s11930-017-0096-3.

128. Eldahan AI, Pachankis JE, Jonathon Rendina H, Ventuneac A, Grov C, Parsons JT. Daily minority stress and affect among gay and bisexual men: A 30-day diary study. *J Affect Disord*. 2016;190:828-835. doi:10.1016/j.jad.2015.10.066.

129. Robinson R. Negative Health Outcomes in Men Who Have Sex with Men of Color: An Investigation of Minority Stress and Protective Factors. 2016. https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/19653/Robinson_oregon_0171A_10976.pdf?sequence=1. Accessed April 8, 2017.

130. Sattler FA, Wagner U, Christiansen H. Effects of Minority Stress, Group-Level Coping, and Social Support on Mental Health of German Gay Men. Prestage G, ed. *PLoS One*. 2016;11(3):e0150562. doi:10.1371/journal.pone.0150562.

131. Shilo G, Mor Z. The Impact of Minority Stressors on the Mental and Physical Health of Lesbian, Gay, and Bisexual Youths and Young Adults. *Health Soc Work*. 2014;39(3):161-171. doi:hsw/hlu023.

132. Wight RG, LeBlanc AJ, de Vries B, Detels R. Stress and mental health among midlife and older gay-identified men. *Am J Public Health*. 2012;102(3):503-510. doi:10.2105/AJPH.2011.300384.

133. Grant NE, Goldblum PB, Gomez R. Lesbian, Gay, and Bisexual Relations of Negative Life Events With Depression, Suicide, and Alcohol Use. In: *122nd American Psychological Association Annual Convention, Washington, D.C., August 7-10, 2014*. American Psychological Association (APA); 2014. doi:10.1037/e557012014-001.

134. Wong CF, Schrager SM, Holloway IW, Meyer IH, Kipke MD. Minority Stress Experiences and Psychological Well-Being: The Impact of Support from and Connection to Social Networks Within the Los Angeles House and Ball Communities. *Prev Sci*. 2014;15(1):44-55. doi:10.1007/s11121-012-0348-4.

135. Bariola E, Lyons A, Leonard W. Gender-specific health implications of minority stress among lesbians and gay men. *Aust N Z J Public Health*. 2016;40(6):506-512. doi:10.1111/1753-6405.12539.

136. Drabble L, Trocki KF, Hughes TL, Korcha RA, Lown AE. Sexual orientation differences in the relationship between victimization and hazardous drinking among women in the National Alcohol Survey. *Psychol Addict Behav*. 2013;27(3):639-648. doi:10.1037/a0031486.

137. Burton CM, Marshal MP, Chisolm DJ, Sucato GS, Friedman MS. Sexual minority-related victimization as a mediator of mental health disparities in sexual minority youth: a longitudinal analysis. *J Youth Adolesc*. 2013;42(3):394-402. doi:10.1007/s10964-012-9901-5.

138. Sinclair KO. Sexual orientation victimization, minority stress, and adjustment in lesbian, gay, and bisexual youth. *Diss Abstr Int A Humanit Soc Sci*. 2011. http://ezproxy.library.ubc.ca/login?url=http://search.proquest.com/docview/1018345193?accountid=14656. Accessed April 20, 2017.

139. Mustanski B, Andrews R, Puckett JA. The Effects of Cumulative Victimization on Mental Health Among Lesbian, Gay, Bisexual, and Transgender Adolescents and Young Adults. *Am J Public Health*. 2016;106(3):527-533. doi:10.2105/AJPH.2015.302976.

140. Hughes TL, Johnson TP, Steffen AD, Wilsnack SC, Everett B. Lifetime Victimization, Hazardous Drinking, and Depression Among Heterosexual and Sexual Minority Women. *LGBT Health*. 2014;1(3):192-203. doi:10.1089/lgbt.2014.0014.

141. Hughes T, McCabe SE, Wilsnack SC, West BT, Boyd CJ. Victimization and substance use disorders in a national sample of heterosexual and sexual minority women and men. *Addiction*. 2010;105(12):2130-2140. doi:10.1111/j.1360-0443.2010.03088.x.

142. Hughes T, Szalacha LA, McNair R. Substance abuse and mental health disparities: Comparisons across sexual identity groups in a national sample of young Australian women. *Soc Sci Med*. 2010;71(4):824-831. doi:10.1016/j.socscimed.2010.05.009.

143. Hatzenbuehler ML, Corbin WR, Fromme K. Discrimination and alcohol-related problems among college students: a prospective examination of mediating effects. *Drug Alcohol Depend*. 2011;115(3):213-220. doi:10.1016/j.drugalcdep.2010.11.002.

144. Carter LW, Mollen D, Smith NG. Locus of control, minority stress, and psychological distress among lesbian, gay, and bisexual individuals. *J Couns Psychol*. 2014;61(1):169-175. doi:10.1037/a0034593.

145. Kuyper L, Fokkema T. Minority stress and mental health among Dutch LGBs: Examination of differences between sex and sexual orientation. *J Couns Psychol*. 2011;58(2):222-233. doi:10.1037/a0022688.

146. Sandfort T, Bos H, Knox J, Reddy V. Gender Nonconformity, Discrimination, and Mental Health Among Black South African Men Who Have Sex with Men: A Further Exploration of Unexpected Findings. *Arch Sex Behav*. 2016;45(3):661-670. doi:10.1007/s10508-015-0565-6.

147. Graham LF, Aronson RE, Nichols T, Stephens CF, Rhodes SD. Factors Influencing Depression and Anxiety among Black Sexual Minority Men. *Depress Res Treat*. 2011;2011:1-9. doi:10.1155/2011/587984.

148. McLaughlin KA, Hatzenbuehler ML, Keyes KM. Responses to Discrimination and Psychiatric Disorders Among Black, Hispanic, Female, and Lesbian, Gay, and Bisexual Individuals. *Am J Public Health*. 2010;100(8):1477-1484. doi:10.2105/AJPH.2009.181586.

149. Lee JH, Gamarel KE, Bryant KJ, Zaller ND, Operario D. Discrimination, Mental Health, and Substance Use Disorders Among Sexual Minority Populations. *LGBT Health*. 2016;3(4):258-265. doi:10.1089/lgbt.2015.0135.

150. Keyes KM, Hatzenbuehler ML, Hasin DS. Stressful life experiences, alcohol consumption, and alcohol use disorders: the epidemiologic evidence for four main types of stressors. *Psychopharmacology (Berl)*. 2011;218(1):1-17. doi:10.1007/s00213-011-2236-1.

151. Cerezo A. The impact of discrimination on mental health symptomatology in sexual minority immigrant Latinas. *Psychol Sex Orientat Gend Divers*. 2016;3(3):283-292. doi:10.1037/sgd0000172.

152. Bryan AEB, Kim H-J, Fredriksen-Goldsen KI. Factors Associated With High-Risk Alcohol Consumption Among LGB Older Adults: The Roles of Gender, Social Support, Perceived Stress, Discrimination, and Stigma. *Gerontologist*. 2017;57(suppl 1):S95-S104. doi:10.1093/geront/gnw100.

153. McLaren S, Schurmann J, Jenkins M. The Relationships Between Sense of Belonging to a Community GLB Youth Group; School, Teacher, and Peer Connectedness; and Depressive Symptoms: Testing of a Path Model. *J Homosex*. 2015;62(12):1688-1702. doi:http://dx.doi.org/10.1080/00918369.2015.1078207.

154. Morris S, McLaren S, McLachlan AJ, Jenkins M. Sense of belonging to specific communities and depressive symptoms among Australian gay men. *J Homosex*. 2015;62(6):804-820. doi:10.1080/00918369.2014.999491.

155. Gibbs JJ, Rice E. The Social Context of Depression Symptomology in Sexual Minority Male Youth: Determinants of Depression in a Sample of Grindr Users. *J Homosex*. 2016;63(2):278-299. doi:10.1080/00918369.2015.1083773.

156. Lyons A, Pitts M, Grierson J. Factors Related to Positive Mental Health in a Stigmatized Minority. *J Aging Health*. 2013;25(7):1159-1181. doi:10.1177/0898264313495562.

157. McLaren S, Gibbs PM, Watts E. The interrelations between age, sense of belonging, and depressive symptoms among Australian gay men and lesbians. *J Homosex*. 2013;60(1):1-15. doi:10.1080/00918369.2013.735933.

158. Hatzenbuehler ML, Laughlin KAMC, Xuan Z. Social networks and sexual orientation disparities in tobacco and alcohol use. *J Stud Alcohol Drugs*. 2015;76(1):117-126. doi:10.15288/jsad.2015.76.117.

159. Calhoun DM, Mason TB, Lewis RJ. Sexual Minority Stress and Alcohol Use: Drinking to Cope As a Response to Stress. In: *122nd American Psychological Association Annual Convention, Washington, D.C., August 7-10, 2014*. American Psychological Association (APA); 2014. doi:10.1037/e557142014-001.

160. Pachankis JE, Hatzenbuehler ML, Starks TJ. The influence of structural stigma and rejection sensitivity on young sexual minority men's daily tobacco and alcohol use. *Soc Sci Med*. 2014;103:67-75. doi:10.1016/j.socscimed.2013.10.005.

161. Hatzenbuehler ML, McLaughlin KA, Keyes KM, Hasin DS. The impact of institutional discrimination on psychiatric disorders in lesbian, gay, and bisexual populations: A prospective study. *Am J Public Health*. 2010;100(3):452-459. doi:10.2105/AJPH.2009.168815.

162. Bauermeister JA. How statewide LGB policies go from "'under our skin'" to "'into our hearts'": fatherhood aspirations and psychological well-being among emerging adult sexual minority men. *J Youth Adolesc*. 2014;43(8):1295-1305. doi:10.1007/s10964-013-0059-6.

163. Everett BG, Hatzenbuehler ML, Hughes TL. The impact of civil union legislation on minority stress, depression, and hazardous drinking in a diverse sample of sexual-minority women: A quasi-natural experiment. *Soc Sci Med*. 2016;169:180-190. doi:10.1016/j.socscimed.2016.09.036.

164. Graham JM, Barnow ZB. Stress and social support in gay, lesbian, and heterosexual couples: direct effects and buffering models. *J Fam Psychol*. 2013;27(4):569-578. doi:10.1037/a0033420.

165. la Roi C, Kretschmer T, Dijkstra JK, Veenstra R, Oldehinkel AJ. Disparities in Depressive Symptoms Between Heterosexual and Lesbian, Gay, and Bisexual Youth in a Dutch Cohort: The TRAILS Study. *J Youth Adolesc*. 2016;45(3):440-456. doi:10.1007/s10964-015-0403-0.

166. Rothman EF, Sullivan M, Keyes S, Boehmer U. Parents' Supportive Reactions to Sexual Orientation Disclosure Associated With Better Health: Results From a Population-Based Survey of LGB Adults in Massachusetts. *J Homosex*. 2012;59(2):186-200. doi:10.1080/00918369.2012.648878.

167. Puckett JA, Woodward EN, Mereish EH, Pantalone DW. Parental Rejection Following Sexual Orientation Disclosure: Impact on Internalized Homophobia, Social Support, and Mental Health. *LGBT Health*. 2015;2(3):265-269. doi:10.1089/lgbt.2013.0024.

168. Austin A, Craig SL. Support, discrimination, and alcohol use among racially/ethnically diverse sexual minority youths. *J Gay Lesbian Soc Serv Q J Community Clin Pract*. 2013;25(4):420-442. doi:10.1080/10538720.2013.833067.

169. Brennan-Ing M, Seidel L, Karpiak SE. Social Support and Depression Among Older Lesbian, Gay, Bisexual, and Transgender Adults. In: *APA 120th Annual Convention, Orlando, Florida, August 2-5, 2012*. American Psychological Association (APA); 2012:2. doi:10.1037/e633782012-001.

170. Denny S, Lucassen MFG, Stuart J, et al. The Association Between Supportive High School Environments and Depressive Symptoms and Suicidality Among Sexual Minority Students. *J Clin Child Adolesc Psychol*. 2016;45(3):248-261. doi:10.1080/15374416.2014.958842.

171. Walls NE, Wisneski H, Kane S. School Climate, Individual Support, or Both? Gay-Straight Alliances and the Mental Health of Sexual Minority Youth. *Sch Soc Work J*. 2013;37(2):88-111. ISSN: ISSN-0161-5653.

172. Hatzenbuehler ML. The social environment and suicide attempts in lesbian, gay, and bisexual youth. *Pediatrics*. 2011;127(5):896-903. doi:10.1542/peds.2010-3020.

173. Brennan-Ing M, Seidel L, Larson B, Karpiak SE. Does Bisexual Identity Impart Greater Risk for Depression Among Older Sexual Minority Adults? In: *122nd American Psychological Association Annual Convention, Washington, D.C., August 7-10, 2014*. American Psychological Association (APA); 2014:18. doi:10.1037/e544912014-001.

174. Newcomb ME, Mustanski B. Internalized homophobia and internalizing mental health problems: A meta-analytic review. *Clin Psychol Rev*. 2010;30(8):1019-1029. doi:10.1016/j.cpr.2010.07.003.

175. Bränström R, Pachankis J, Hatzenbuehler ML. Sexual orientation based differences in mental health morbidity: Age effects in a population-based longitudinal study in Sweden. *Eur J Public Health*. 2015;25:2015. doi: 10.1007/s00127-015-1116-0

176. Lyons A, Hosking W, Rozbroj T. Rural-Urban Differences in Mental Health, Resilience, Stigma, and Social Support Among Young Australian Gay Men. *J Rural Health*. 2015;31(1):89-97. doi:10.1111/jrh.12089.

177. Storholm ED, Siconolfi DE, Halkitis PN, Moeller RW, Eddy J, Bare MG. Sociodemographic Factors Contribute to Mental Health Disparities and Access to Services Among Young Men Who Have Sex with Men in New York City. *J Gay Lesbian Ment Health*. 2013;17(3):37-41. doi:10.1080/19359705.2012.763080.

178. Gilbert PA, Perreira K, Eng E, Rhodes SD. Social Stressors and Alcohol Use Among Immigrant Sexual and Gender Minority Latinos in a Nontraditional Settlement State. *Subst Use Misuse*. 2014;49(11):1365-1375. doi:10.3109/10826084.2014.901389.

179. Mereish EH, Bradford JB. Intersecting Identities and Substance Use Problems: Sexual Orientation, Gender, Race, and Lifetime Substance Use Problems. *J Stud Alcohol Drugs*. 2014;75(1):179-188. doi:10.15288/jsad.2014.75.179.

180. Pachankis JE, Eldahan AI, Golub SA. New to New York: Ecological and Psychological Predictors of Health Among Recently Arrived Young Adult Gay and Bisexual Urban Migrants. *Ann Behav Med*. 2016;50(5):692-703. doi:10.1007/s12160-016-9794-8.

181. Marshal MP, Dermody SS, Shultz ML, et al. Mental Health and Substance Use Disparities Among Urban Adolescent Lesbian and Bisexual Girls. *J Am Psychiatr Nurses Assoc*. 2013;19(5):271-279. doi:10.1177/1078390313503552.

182. Bostwick WB, Boyd CJ, Hughes TL, West BT, McCabe SE. Discrimination and mental health among lesbian, gay, and bisexual adults in the United States. *Am J Orthopsychiatry*. 2014;84(1):35-45. doi:10.1037/h0098851.

183. McCabe SE, Bostwick WB, Hughes TL, West BT, Boyd CJ. The Relationship Between Discrimination and Substance Use Disorders Among Lesbian, Gay, and Bisexual Adults in the United States. *Am J Public Health*. 2010;100(10):1946-1952. doi:10.2105/AJPH.2009.163147.

184. Chae DH, Krieger N, Bennett GG, Lindsey JC, Stoddard AM, Barbeau EM. Implications of Discrimination Based on Sexuality, Gender, and Race/Ethnicity for Psychological Distress among Working-Class Sexual Minorities: The United for Health Study, 2003–2004. *Int J Heal Serv*. 2010;40(4):589-608. doi:10.2190/HS.40.4.b.

185. Hatzenbuehler ML, McLaughlin KA, Nolen-Hoeksema S. Emotion regulation and internalizing symptoms in a longitudinal study of sexual minority and heterosexual adolescents. *J Child Psychol Psychiatry*. 2008;49(12):1270-1278. doi:10.1111/j.1469-7610.2008.01924.x.

186. Statistics Canada. Canadian Community Health Survey - Annual Component (CCHS). http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3226. Published 2015. Accessed December 7, 2015.

187. Thomas S, Sarafin C, Simard M. A Review of the Weighting Strategy for the Canadian Community Health Survey. In: *Proceedings of the Federal Committee on Statistical Methodology*. ; 2007:1-6. http://www.ssc.ca/survey/documents/SSC2007_C_Sarafin.pdf. Accessed December 5, 2013.

188. Thomas S, Tremblay S. Interpreting Estimates from the Redesigned Canadian Community Health Survey (CCHS). Ottawa (ON): Statistics Canada. www23.statcan.gc.ca/imdb-bmdi/document/3226_D44_T9_V2-eng.pdf. Published 2008. Accessed November 4, 2013.

189. Thomas S, Wannell B. Combining cycles of the Canadian Community Health Survey. *Health Reports*. 2009;20(1):1-6. http://publications.gc.ca/collections/collection_2009/statcan/82-003-X/82-003-x2009001-eng.pdf#page=55. Accessed November 4, 2013.

190. Population Health Improvement Research Network. Content Tracking Tool: Canadian Community Health Survey. http://www.rrasp-phirn.ca/index.php?option=com_content&view=article&id=254&Itemid=87&lang=en. Accessed November 14, 2014.

191. World Health Organization. *International Guide for Monitoring Alcohol Consumption and Related Harm*. Geneva, Switzerland: World Health Organization; 2000. http://www.who.int/iris/handle/10665/66529#sthash.g4SsTunZ.dpuf. Accessed September 16, 2014.

192. Statistics Canada. Heavy drinking, 2013. http://www.statcan.gc.ca/pub/82-625-x/2014001/article/14019-eng.htm. Published June 12, 2014. Accessed September 16, 2014.

193. Wister A V, Wanless D. A health profile of community-living nonagenarians in Canada. *Can J Aging*. 2007;26(1):1-18. doi: 10.3138/01V7-0287-9231-Q854.

194. Laporte A, Nauenberg E, Shen L. Aging, social capital, and health care utilization in Canada. *Health Econ Policy Law*. 2008;3(Pt 4):393-411. doi:10.1017/S1744133108004568.

195. Romans S, Cohen M, Forte T. Rates of depression and anxiety in urban and rural Canada. *Soc Psychiatry Psychiatr Epidemiol*. 2011;46(7):567-575. doi:10.1007/s00127-010-0222-2.

196. Carpiano RM, Hystad PW. "Sense of community belonging" in health surveys: what social capital is it measuring? *Health Place*. 2011;17(2):606-617. doi:10.1016/j.healthplace.2010.12.018.

197. Yeung CW, Thomas S. *Income Imputation for the Canadian Community Health Survey*.; 2012. http://statcan.egcatalogue.ca/eg/opac/record/120126?qtype=author;query= Thomas Steven ;loc=1. Accessed October 29, 2014.

198. Gagné C, Roberts G, Keown L. Weighted estimation and bootstrap variance estimation for analyzing survey data: How to implement in selected software. *Ottawa Stat Canada*. 2014;6(12). www.statcan.gc.ca/pub/12-002-x/2014001/article/11901-eng.htm. Accessed October 28, 2014.

199. Roberts G, Binder D. Analyses based on combining similar information from multiple surveys. *JSM Proc*. 2009;(2007):2138-2147. http://www.amstat.org/sections/srms/Proceedings/y2009/Files/303934.pdf. Accessed December 5, 2013.

200. Meyer IH, Ouellette SC, Haile R, McFarlane TA. "We'd be free": narratives of life without homophobia, racism, or sexism. *Sex Res Soc policy*. 2011;8(3):204-214. doi:10.1007/s13178-011-0063-0.

201. Taylor P. *A Survey of LGBT Americans: Attitudes, Experiences and Values in Changing Times*. Washington, DC: Pew Research Center; 2013. http://www.pewsocialtrends.org/2013/06/13/a-survey-of-lgbt-americans/. Accessed October 31, 2014.

202. Almeida J, Johnson RM, Corliss HL, Molnar BE, Azrael D. Emotional distress among LGBT youth: the influence of perceived discrimination based on sexual orientation. *J Youth Adolesc*. 2009;38(7):1001-1014. doi:10.1007/s10964-009-9397-9.

203. Schnurr PP, Green BL. Understanding relationships among trauma, post-tramatic stress disorder, and health outcomes. *Adv Mind Body Med*. 2004;20(1):18-29. PMID: 15068106.

204. Alessi EJ, Martin JI, Gyamerah A, Meyer IH. Prejudice-related events and traumatic stress among heterosexuals and lesbians, gay men and bisexuals. *J Aggress Maltreat Trauma*. 2013;22(5):510-526. PMCID: PMC3860584.

205. Yoshino K. The epistemic contract of bisexual erasure. *Stanford Law Rev*. 2000:1-103. http://www.jstor.org/stable/1229482. Accessed October 31, 2014.

206. Bostwick W, Hequembourg AL. Minding the noise: conducting health research among bisexual populations and beyond. *J Homosex*. 2013;60(4):655-661. doi:10.1080/00918369.2013.760370.

207. Bostwick W, Hequembourg A. "Just a little hint": bisexual-specific microaggressions and their connection to epistemic injustices. *Cult Health Sex*. 2014;16(5):488-503. doi:10.1080/13691058.2014.889754.

208. Ross LE, Dobinson C, Eady A. Perceived determinants of mental health for bisexual people: a qualitative examination. *Am J Public Health*. 2010;100(3):496-502. doi:10.2105/AJPH.2008.156307.

209. Ehlke, S.J., Kelley, M.L., Lewis, R.J., Bostwick, W.B., Braitman, A.L., Heron KE. Sexual Coercion and Alcohol Use Among Self-Identified Bisexual Women: A Moderated Mediation Study. *Alcohol Clin Exp Res*. 2017;41:152A-152A.

210. Allison P. *Missing Data*. Thousand Oaks, CA: Sage; 2002. doi:10.4135/9781412985079.

211. Vittinghoff E, Glidden D V., Shiboski SC, McCulloch CE. *Regression Methods in Biostatistics*. Boston, MA: Springer US; 2012. doi:10.1007/978-1-4614-1353-0.

212. Mathieson CM, Bailey N, Gurevich M. Health care services for lesbian and bisexual women: some Canadian data. *Health Care Women Int*. 2002;23(2):185-196. doi:10.1080/073993302753429059.

213. Travers R, Schneider M. Barriers to Accessibility for Lesbian and Gay Youth Needing Addictions Services. *Youth Soc*. 1996;27(3):356-378. doi:10.1177/0044118X96027003005.

214. Razzano LA, Cook JA, Hamilton MM, Hughes TL, Matthews AK. Predictors of mental health services use among lesbian and heterosexual women. *Psychiatr Rehabil J*. 2006;29(4):289-298. doi:10.2975/29.2006.289.298.

215. Clarke V, Ellis SJ, Peel E, Riggs DW. *Lesbian, Gay, Bisexual, Trans and Queer Psychology: An Introduction*. Cambridge University Press; 2010.

216. American Psychological Association. Guidelines for psychological practice with lesbian, gay, and bisexual clients. *Am Psychol*. 2012;67(1):10-42. doi:10.1037/a0024659.

217. Herrick AL, Egan JE, Coulter RWS, Friedman MR, Stall R. Raising sexual minority youths' health levels by incorporating resiliencies into health promotion efforts. *Am J Public Health*. 2014;104(2):206-210. doi:10.2105/AJPH.2013.301546.

218. Riggle EDB, Whitman JS, Olson A, Rostosky SS, Strong S. The positive aspects of being a lesbian or gay man. *Prof Psychol - Res Pract*. 2008;39(2):210-217. doi:10.1037/0735-7028.39.2.210.

219. Jesdale BM, Mitchell JW. Reported excellent health among men in same-sex and mixed-sex couples: Behavioral Risk Factor Surveillance System, 1993-2010. *J Homosex*. 2012;59(6):788-807. doi:10.1080/00918369.2012.694755.

220. Meyer IH. Minority Stress and Mental Health in Gay Men. *J Health Soc Behav*. 1995;36(1):38. doi:10.2307/2137286.

221. Cox N, Dewaele A, van Houtte M, Vincke J. Stress-related growth, coming out, and internalized homonegativity in lesbian, gay, and bisexual youth. An examination of stress-related growth within the minority stress model. *J Homosex*. 2011;58(1):117-137. doi:10.1080/00918369.2011.533631.

222. Meyer IH. Identity, Stress, and Resilience in Lesbians, Gay Men, and Bisexuals of Color. *Couns Psychol*. 2010;38(3). doi:10.1177/0011000009351601.

223. McLaren S, Jude B, McLachlan AJ. Sense of Belonging to the General and Gay Communities as Predictors of Depression among Australian Gay Men. *Int J Mens Health*. 2008;7(1):90-99. doi:10.3149/jmh.0701.90.

224. McLaren S, Jude B, McLachlan A. Sexual Orientation, Sense of Belonging and Depression in Australian Men. *Int J Mens Health*. 2007;6(3):259-272. doi:10.3149/jmh.0603.259.

225. Williams T, Connolly J, Pepler D, Craig W. Peer victimization, social support, and psychosocial adjustment of sexual minority adolescents. *J Youth Adolesc*. 2005;34(5):471-482. doi:10.1007/s10964-005-7264-x.

226. D'Augelli AR. Clinical Child Psychology and Psychiatry Mental Health Problems among Lesbian, Gay, and Bisexual Youths Ages 14 to 21. *Clin Child Psychol Psychiatry*. 2002;7(3):433–456. doi:10.1177/1359104502007003010.

227. Hsieh N. Explaining the Mental Health Disparity by Sexual Orientation: The Importance of Social Resources. *Soc Ment Health*. March 2014:1-18. doi:10.1177/2156869314524959.

228. Prado G, Pratt IA, Feaster DJ, et al. Differences in Adjustment in HIV+ African American Heterosexual and Homosexual Women. *J Gay Lesbian Med Assoc*. 2002;6(1):19-26. doi:10.1023/A:1020336731655.

229. Frost DM, Meyer IH. Measuring community connectedness among diverse sexual minority populations. *J Sex Res*. 2012;49(1):36-49. doi:10.1080/00224499.2011.565427.

230. McAdams-Mahmoud A, Stephenson R, Rentsch C, et al. Minority stress in the lives of men who have sex with men in Cape Town, South Africa. *J Homosex*. 2014;61(6):847-867. doi:10.1080/00918369.2014.870454.

231. MacKinnon DP, Fairchild AJ, Fritz MS. Mediation analysis. *Annu Rev Psychol*. 2007;58:593-614. doi:10.1146/annurev.psych.58.110405.085542.

232. Diamond LM. New paradigms for research on heterosexual and sexual-minority development. *J Clin Child Adolesc Psychol*. 2003;32(4):490-498. doi:10.1207/S15374424JCCP3204_1.

233. Przedworski JM, VanKim NA, Eisenberg ME, McAlpine DD, Lust KA, Laska MN. Self-Reported Mental Disorders and Distress by Sexual Orientation. *Am J Prev Med*. 2015:1-12. doi:10.1016/j.amepre.2015.01.024.

234. Preacher KJ, Rucker DD, Hayes AF. Addressing Moderated Mediation Hypotheses: Theory, Methods, and Prescriptions. *Multivariate Behav Res*. 2007;42(1):185-227. doi:10.1080/00273170701341316.

235. Monroe SM. Modern approaches to conceptualizing and measuring human life stress. *Annu Rev Clin Psychol*. 2008;4:33-52. doi:10.1146/annurev.clinpsy.4.022007.141207.

236. Cohen S, Kessler RC, Gordon LU. Strategies for measuring stress in studies of psychiatric and physical disorders. In: *Measuring Stress: A Guide for Health and Social Scientists*. ; 1995:3-26. http://www.psy.cmu.edu/~scohen/Cohen%2C S et al (1995).pdf. Accessed July 24, 2015.

237. Lazarus RS, Folkman S. *Stress, Appraisal, and Coping*. New York: Springer-Verlag; 1984.

238. Lyon BL. Stress, Coping, and Health. In: Hill Rice V, ed. *Handbook of Stress, Coping, and Health: Implications for Nursing Research, Theory, and Practice*. 2nd ed. ; 2012:1-20.

239. MacKinnon DP. Mediation in Categorical Data Analysis. In: *Introduction to Statistical Mediation Analysis*. New York: Erlbaum; 2008:297-324.

240. MacKinnon D. Mediation and Moderation. In: *Introduction to Statistical Mediation Analysis*. New York: Erlbaum; 2008:275-296.

241. MacKinnon DP, Cox MG. Commentary on "Mediation analysis and categorical variables: The final frontier" by Dawn Iacobucci. *J Consum Psychol*. 2012;22(4):600-602. doi:10.1016/j.jcps.2012.03.009.

242. Meyer IH. Prejudice and discrimination as social stressors. In: Meyer IH, Northridge ME, eds. *The Health of Sexual Minorities*. Springer; 2007:242-267. doi:10.1007/978-0-387-31334-4_10.

243. Grossman AH, Daugelli AR, Hershberger SL. Social support networks of lesbian, gay, and bisexual adults 60 years of age and older. *J Gerontol B Psychol Sci Soc Sci*. 2000;55(3):P171-P179. doi:10.1093/geronb/55.3.P171.

244. Doty ND, Willoughby BLB, Lindahl KM, Malik NM. Sexuality Related Social Support Among Lesbian, Gay, and Bisexual Youth. *J Youth Adolesc*. 2010;39(10):1134-1147. doi:10.1007/s10964-010-9566-x.

245. Turner RJ, Brown RL. Social Support and Mental Health. In: Horwitz A V, Scheid TL, eds. *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems*. New York: Cambridge University Press; 2010:200-212.

246. Herek GM, Norton AT, Allen TJ, Sims CL. Demographic, Psychological, and Social Characteristics of Self-Identified Lesbian, Gay, and Bisexual Adults in a US Probability Sample. *Sex Res Social Policy*. 2010;7(3):176-200. doi:10.1007/s13178-010-0017-y.

247. Carpiano RM, Kelly BC, Easterbrook A, Parsons JT. Community and Drug Use among Gay Men: The Role of Neighborhoods and Networks. *J Health Soc Behav*. 2011;52(1):74-90. doi:10.1177/0022146510395026.

248. Egan JE, Frye V, Kurtz SP, et al. Migration, neighborhoods, and networks: approaches to understanding how urban environmental conditions affect syndemic adverse health outcomes among gay, bisexual and other men who have sex with men. *AIDS Behav*. 2011;15 Suppl 1:S35-50. doi:10.1007/s10461-011-9902-5.

249. Frye V, Koblin B, Chin J, et al. Neighborhood-level correlates of consistent condom use among men who have sex with men: a multi-level analysis. *AIDS Behav*. 2010;14(4):974-985. doi:10.1007/s10461-008-9438-5.

250. Williams DR, Neighbors HW, Jackson JS. Racial/ethnic discrimination and health: findings from community studies. *Am J Public Health*. 2008;98(9 Suppl):S29-37. PMID: 12554570.

251. Davidson K, McLaren S, Jenkins M, Corboy D, Gibbs PM, Molloy M. Internalized Homonegativity, Sense of Belonging, and Depressive Symptoms Among Australian Gay Men. *J Homosex*. 2017;64(4):450-465. doi:10.1080/00918369.2016.1190215.

252. Link BG, Phelan JC. Conceptualizing Stigma. *Annu Rev Sociol*. 2001;27(1):363-385. doi:10.1146/annurev.soc.27.1.363.

253. Meyer IH. Prejudice as Stress: Conceptual and Measurement Problems. *Am J Public Health*. 2003;93(2):262-265. doi:10.2105/AJPH.93.2.262.

254. Hatzenbuehler ML, Nolen-Hoeksema S, Dovidio J. How does stigma "get under the skin"?: the mediating role of emotion regulation. *Psychol Sci*. 2009;20(10):1282-1289. doi:10.1111/j.1467-9280.2009.02441.x.

255. Zinn MB, Dill BT. Theorizing difference from multiracial feminism. *Fem Stud*. 1996;22(2):321-332. doi:10.2307/3178416.

256. Agénor M, Krieger N, Austin SB, Haneuse S, Gottlieb BR. At the intersection of sexual orientation, race/ethnicity, and cervical cancer screening: assessing Pap test use disparities by sex of sexual partners among black, Latina, and white U.S. women. *Soc Sci Med*. 2014;116:110-118. doi:10.1016/j.socscimed.2014.06.039.

257. Garnett BR, Masyn KE, Austin SB, Miller M, Williams DR, Viswanath K. The intersectionality of discrimination attributes and bullying among youth: an applied latent class analysis. *J Youth Adolesc*. 2014;43(8):1225-1239. doi:10.1007/s10964-013-0073-8.

258. VanderWeele TJ. On the distinction between interaction and effect modification. *Epidemiology*. 2009;20(6):863-871. doi:10.1097/EDE.0b013e3181ba333c.

259. Birkett M, Newcomb ME, Mustanski B. Does It Get Better? A Longitudinal Analysis of Psychological Distress and Victimization in Lesbian, Gay, Bisexual, Transgender, and Questioning Youth. *J Adolesc Health*. 2015;56(3):280-285. doi:10.1016/j.jadohealth.2014.10.275.

260. Ryan C, Huebner D, Diaz RM, Sanchez J. Family Rejection as a Predictor of Negative Health Outcomes in White and Latino Lesbian, Gay, and Bisexual Young Adults. *Pediatrics*. 2009;123(1):346-352. doi:10.1542/peds.2007-3524.

261. Hatzenbuehler ML, Corbin WR, Fromme K. Trajectories and determinants of alcohol use among LGB young adults and their heterosexual peers: results from a prospective study. *Dev Psychol*. 2008;44(1):81-90. doi:10.1037/0012-1649.44.1.81.

262. Russell ST, Fish JN. Mental Health in Lesbian, Gay, Bisexual, and Transgender (LGBT) Youth. *Annu Rev Clin Psychol*. 2016;12:465-487. doi:10.1146/annurev-clinpsy-021815-093153.

263. Fredriksen-Goldsen KI, Cook-Daniels L, Kim H-J, et al. Physical and mental health of transgender older adults: an at-risk and underserved population. *Gerontologist*. 2014;54(3):488-500. doi:10.1093/geront/gnt021.

264. Kuyper L, Fokkema T. Loneliness Among Older Lesbian, Gay, and Bisexual Adults: The Role of Minority Stress. *Arch Sex Behav*. 2010;39(5):1171-1180. doi:10.1007/s10508-009-9513-7.

265. Marshall BDL, Shoveller J, Kahler CW, et al. Heavy Drinking Trajectories Among Men Who Have Sex with Men: A Longitudinal, Group-Based Analysis. *Alcohol Clin Exp Res*. 2015;39(2):380-389. doi:10.1111/acer.12631.

266. Balsam KF, Rothblum ED, Beauchaine TP. Victimization over the life span: a comparison of lesbian, gay, bisexual, and heterosexual siblings. *J Consult Clin Psychol*. 2005;73(3):477-487. doi:10.1037/0022-006X.73.3.477.

267. Anderson E, McCormack M. Intersectionality, critical race theory, and American sporting oppression: examining black and gay male athletes. *J Homosex*. 2010;57(8):949-967. doi:10.1080/00918369.2010.503502.

268. American Psychological Association. Lesbian, Gay, Bisexual & Transgender Persons & Socioeconomic Status. Fact Sheet. http://www.apa.org/pi/ses/resources/publications/factsheet-lgbt.aspx. Accessed November 10, 2014.

269. Waite S, Denier N. Gay Pay for Straight Work: Mechanisms Generating Disadvantage. *Gend Soc*. 2015;XX(X):1-28. doi:10.1177/0891243215584761.

270. Frank JW, Cohen R, Yen I, Balfour J, Smith M. Socioeconomic gradients in health status over 29 years of follow-up after midlife: the Alameda county study. *Soc Sci Med*. 2003;57(12):2305-2323. doi:10.1016/j.socscimed.2003.08.003.

271. McGarrity L, Huebner DM. Is being out about sexual orientation uniformly healthy? The moderating role of socioeconomic status in a prospective study of gay and bisexual men. *Ann Behav Med*. 2014;47(1):28-38. doi:10.1007/s12160-013-9575-6.

272. Barrett DC, Pollack LM. Whose Gay Community? Social Class, Sexual Self-Expression, and Gay Community Involvement. *Sociol Q*. 2005;46(3):437-456. doi:10.1111/j.1533-8525.2005.00021.x.

273. Krieger N. Theories for social epidemiology in the 21st century: an ecosocial perspective. *Int J Epidemiol*. 2001;30(4):668-677. doi: 10.1093/ije/30.4.668.

274. Williams DR, Mohammed S. Discrimination and racial disparities in health: evidence and needed research. *J Behav Med*. 2009;32(1):20-47. doi:10.1007/s10865-008-9185-0.

275. Stata. Margins-Marginal means, predictive pargins and marginal effects. 2013:1-55. http://www.stata.com/manuals13/rmargins.pdf. Accessed June 17, 2017.

276. UCLA: Statistical Consulting Group. Deciphering Interactions in Logistic Regression. *Inst Digit Res Educ*. https://stats.idre.ucla.edu/stata/seminars/deciphering-interactions-in-logistic-regression/. Accessed May 31, 2017.

277. Hosmer DW, Lemeshow S. *Applied Logistic Regression*. Hoboken, NJ, USA: John Wiley & Sons, Inc.; 2000. doi:10.1002/0471722146.

278. Meyer IH, Dietrich J, Schwartz S. Lifetime prevalence of mental disorders and suicide attempts in diverse lesbian, gay, and bisexual populations. *Am J Public Health*. 2008;98(6):1004-1006. doi:10.2105/AJPH.2006.096826.

279. Becker AB. Determinants of Public Support for Same-Sex Marriage: Generational Cohorts, Social Contact, and Shifting Attitudes. *Int J Public Opin Res*. 2012;24(4):524-533. doi:10.1093/ijpor/eds002.

280. Chief Public Health Officer. *Report on the State of Public Health in Canada 2011: Youth and Young Adults - Life in Transition*. Ottawa; 2011. Accessed October 22, 2013.

281. Gamarel KE, Reisner SL, Parsons JT, Golub S. Association between socioeconomic position discrimination and psychological distress: Findings from a community-based sample of gay and bisexual men in New York City. *Am J Public Health*. 2012;102(11):2094-2101. doi:10.2105/AJPH.2012.300668.

282. Balsam KF, Molina Y, Beadnell B, Simoni J, Walters K. Measuring multiple minority stress: the LGBT People of Color Microaggressions Scale. *Cultur Divers Ethnic Minor Psychol*. 2011;17(2):163-174. doi:10.1037/a0023244.

283. Bostwick WB, Meyer I, Aranda F, et al. Mental health and suicidality among racially/ethnically diverse sexual minority youths. *Am J Public Health*. 2014;104(6):1129-1136. doi:10.2105/AJPH.2013.301749.

284. Warner LR. A best practices guide to intersectional approaches in psychological research. *Sex Roles*. 2008;59(5-6):454-463. doi:10.1007/s11199-008-9504-5.

285. Long S. J. Scott Long - Indiana University. http://www.indiana.edu/~jslsoc/. Accessed June 13, 2017.

286. Fredriksen-Goldsen KI, Simoni JM, Kim H, et al. The health equity promotion model: Reconceptualization of lesbian, gay, bisexual, and transgender (LGBT) health disparities. *Am J Orthopsychiatry*. 2014;84(6):653-663. doi:10.1037/ort0000030.

287. Clement D. *Human Rights in Canada: A History*. Waterloo, ON: Wilfrid Laurier University Press; 2016.

288. FitzGerald M, Rayter S. *Queerly Canadian: An Introductory Reader in Sexuality Studies*. Toronto, ON: Canadian Scholars' Press; 2012. http://www.torontopubliclibrary.ca/detail.jsp?R=2915170. Accessed June 16, 2017.

289. Marshal MP, Dietz LJ, Friedman MS, et al. Suicidality and Depression Disparities Between Sexual Minority and Heterosexual Youth: A Meta-Analytic Review. *J Adolesc Health*. 2011;49(2):115-123. doi:10.1016/j.jadohealth.2011.02.005.

290. Cochran BN, Stewart AJ, Ginzler J a, Cauce AM. Challenges faced by homeless sexual minorities: comparison of gay, lesbian, bisexual, and transgender homeless adolescents with their heterosexual counterparts. *Am J Public Health*. 2002;92(5):773-777. PMCID: PMC1447160.

291. Mays VM, Cochran SD. Mental health correlates of perceived discrimination among lesbian, gay, and bisexual adults in the United States. *Am J Public Health*. 2001;91(11):1869-1876. PMCID: PMC1446893.

292. Blanchflower DG, Oswald AJ. Is well-being U-shaped over the life cycle? *Soc Sci Med*. 2008;66(8):1733-1749. doi:10.1016/j.socscimed.2008.01.030.

293. Rosario M, Schrimshaw EW, Hunter J. Disclosure of sexual orientation and subsequent substance use and abuse among lesbian, gay, and bisexual youths: critical role of disclosure reactions. *Psychol Addict Behav*. 2009;23(1):175-184. doi:10.1037/a0014284.

294. Corrigan P, Matthews A. Stigma and disclosure: Implications for coming out of the closet. *J Ment Health*. 2003;12(3):235-248. doi:10.1080/0963823031000118221.

295. Dharma C, Bauer GR. Understanding sexual orientation and health in Canada: Who are we capturing and who are we missing using the Statistics Canada sexual orientation question? *Can J Public Health*. 2017;108(1):21. doi:10.17269/cjph.108.5848.

296. Thiede H, Valleroy LA, MacKellar DA, et al. Regional Patterns and Correlates of Substance Use among Young Men Who Have Sex with Men in 7 US Urban Areas. *Am J Public Health*. 2003;93(11):1915-1921. doi:10.2105/AJPH.93.11.1915.

297. Roberts AL, Rosario M, Corliss HL, Koenen KC, Austin SB. Childhood gender nonconformity: a risk indicator for childhood abuse and posttraumatic stress in youth. *Pediatrics*. 2012;129(3):410-417. doi:10.1542/peds.2011-1804.

298. Petterson LJ, VanderLaan DP, Vasey PL. Sex, Sexual Orientation, Gender Atypicality, and Indicators of Depression and Anxiety in Childhood and Adulthood. *Arch Sex Behav*. 2016. doi:10.1007/s10508-016-0690-x.

299. Matthews AK, Cho YI, Hughes TL, Johnson TP, Alvy L. The influence of childhood physical abuse on adult health status in sexual minority women: the mediating role of smoking. *Womens Health Issues*. 2013;23(2):e95-102. doi:10.1016/j.whi.2012.11.007.

300. Rieger G, Savin-Williams RC. Gender nonconformity, sexual orientation, and psychological well-being. *Arch Sex Behav*. 2012;41(3):611-621. doi:10.1007/s10508-011-9738-0.

301. Jacobson R, Cohen H, Diamond GM. Gender Atypicality and Anxiety Response to Social Interaction Stress in Homosexual and Heterosexual Men. *Arch Sex Behav*. 2016;45(3):713-723. doi:10.1007/s10508-015-0528-y.

302. Factor RJ, Rothblum ED. A Study of Transgender Adults and Their Non-Transgender Siblings on Demographic Characteristics, Social Support, and Experiences of Violence. *J LGBT Health Res*. 2008;3(3):11-30. doi:10.1080/15574090802092879.

303. Grant JM, Mottet L a, Tanis J, Herman JL, Harrison J, Keisling M. National Transgender Discrimination Survey Report on Health and Health Care. *Natl Cent Transgender Equal*. 2010;5(November):23. doi:10.1016/S0016-7878(90)80026-2.

304. Macintyre S. Understanding the social patterning of health: the role of the social sciences. *J Public Health Med*. 1994;16(1):53-59. PMID: 8037954.

305. Rose G. Sick Individuals and Sick Populations. *Int J Epidemiol*. 1985;14(1):32-38. doi:10.1093/ije/14.1.32.

306. The Williams Institute. *Best Practices for Asking Questions about Sexual Orientation on Surveys*.; 2009. https://williamsinstitute.law.ucla.edu/wp-content/.../SMART-FINAL-Nov-2009.pdf. Accessed October 31, 2013.

307. Tate CC, Ledbetter JN, Youssef CP. A two-question method for assessing gender categories in the social and medical sciences. *J Sex Res*. 2013;50(8):767-776. doi:10.1080/00224499.2012.690110.

308. Krieger N. Embodiment: a conceptual glossary for epidemiology. *J Epidemiol Community Health*. 2005;59(5):350-355. doi:10.1136/jech.2004.024562.

309. Hatzenbuehler ML, Phelan JC, Link BG. Stigma as a fundamental cause of population health inequalities. *Am J Public Health*. 2013;103(5):813-821. doi:10.2105/AJPH.2012.301069.

310. Peter T. Mind the gap: predicting the positive mental health of adult sexual minority Canadians. *Health Promot Int*. 2017;19:545-559. doi:10.1093/heapro/dax016.

311. Carman M, Corboz J, Dowsett GW. Falling through the cracks: The gap between evidence and policy in responding to depression in gay, lesbian and other homosexually active people in Australia. *Aust N Z J Public Health*. 2012;36(1):76-83. doi:10.1111/j.1753-6405.2012.00828.x.

312. Butler M, McCreedy E, Schwer N, et al. *Improving Cultural Competence to Reduce Health Disparities*. Agency for Healthcare Research and Quality (US); 2016. http://www.ncbi.nlm.nih.gov/pubmed/27148614. Accessed February 8, 2017.

313. Hatzenbuehler ML, O'Cleirigh C, Grasso C, Mayer K, Safren S, Bradford J. Effect of same-sex marriage laws on health care use and expenditures in sexual minority men: a quasi-natural experiment. *Am J Public Health*. 2012;102(2):285-291. doi:10.2105/AJPH.2011.300382.

314. Livingston JD, Milne T, Fang ML, Amari E. The effectiveness of interventions for reducing stigma related to substance use disorders: A systematic review. *Addiction*. 2012;107(1):39-50. doi:10.1111/j.1360-0443.2011.03601.x.

315. Mayer KH, Bekker L-G, Stall R, Grulich AE, Colfax G, Lama JR. Comprehensive clinical care for men who have sex with men: an integrated approach. *Lancet*. 2012;380(9839):378-387. doi:10.1016/S0140-6736(12)60835-6.

316. Hodel D, Levi J, De Biasi A. *Addressing the Social Determinants of Health Inequities Among Gay Men and Other Men Who Have Sex With Men in the United States*.; 2014. http://healthyamericans.org/report/116/. Accessed May 31, 2017.

317. Jones JR. *(Un)normalizing Education: Addressing Homophobia in Higher Education and K-12 Schools.* Information Age Publishing; 2014. http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2015-05073-000&site=ehost-live. Accessed May 31, 2017.

318. Reisner SL, Hughto JMW, Dunham EE, et al. Legal Protections in Public Accommodations Settings: A Critical Public Health Issue for Transgender and Gender-Nonconforming People. *Milbank Q*. 2015;93(3):484-515. doi:10.1111/1468-0009.12127.

319. Substance Abuse and Mental Health Services Administration. *A Provider's Introduction to Substance Abuse Treatment for Lesbian, Gay, Bisexual, and Transgender Individuals*.; 2012. http://store.samhsa.gov/shin/content//SMA12-4104/SMA12-4104.pdf. Accessed April 20, 2017.

320. Rogers TL, Emanuel K, Bradford J. Sexual Minorities Seeking Services. *J Lesbian Stud*. 2002;7(1):127-146. doi:10.1300/J155v07n01_09.

321. Eubanks-Carter C, Burckell LA, Goldfried MR. Enhancing Therapeutic Effectiveness With Lesbian, Gay, and Bisexual Clients - Eubanks-Carter - 2006 - Clinical Psychology: Science and Practice - Wiley Online Library. *Clin Psychol Sci Pract*. 2006;12(1):1-18. doi:10.1093/clipsy.bpi001.

322. Talley AE. Recommendations for improving substance abuse treatment interventions for sexual minority substance abusers. *Drug Alcohol Rev*. 2013;32(5):539-540. doi:10.1111/dar.12052.

323. Committee On Adolescence. Office-based care for lesbian, gay, bisexual, transgender, and questioning youth. *Pediatrics*. 2013;132(1):198-203. doi:10.1542/peds.2013-1282.

324. Adelson SL, American Academy of Child and Adolescent Psychiatry (AACAP) Committee on Quality Issues (CQI). Practice Parameter on Gay, Lesbian, or Bisexual Sexual Orientation, Gender Nonconformity, and Gender Discordance in Children and Adolescents. *J Am Acad Child Adolesc Psychiatry*. 2012;51(9):957-974. doi:10.1016/j.jaac.2012.07.004.

325. Olson J, Forbes C, Belzer M. Management of the transgender adolescent. *Arch Pediatr Adolesc Med*. 2011;165(2):171-176. doi:10.1001/archpediatrics.2010.275.

326. Fisher SK, Poirier JM, Blau GM. Improving emotional and behavioral outcomes for LGBT youth: A guide for professionals. In: *Improving Emotional and Behavioral Outcomes for LGBT Youth: A Guide for Professionals*. Baltimore, Md. : Paul H. Brookes Pub. Co; 2012:xxvi, 318. https://searchworks.stanford.edu/view/9635666. Accessed May 31, 2017.

327. McNair RP, Hegarty K. Guidelines for the Primary Care of Lesbian, Gay, and Bisexual People: A Systematic Review. *Ann Fam Med*. 2010;8(6):533-541. doi:10.1370/afm.1173.

328. Makadon HJ, Mayer KH, Potter J, Goldhammer H. *The Fenway Guide to Lesbian, Gay, Bisexual, and Transgender Health*. American College of Physicians; 2010.

329. Alderson K. *Counseling LGBTI Clients*. SAGE Publications; 2013. https://us.sagepub.com/en-us/nam/counseling-lgbti-clients/book234754. Accessed May 31, 2017.

330. das Nair R, Butler C. *Intersectionality, Sexuality and Psychological Therapies: Working with Lesbian, Gay and Bisexual Diversity*. Wiley; 2012. doi:10.1002/9781119967613.

331. Matteson DR. Psychotherapy with bisexual individuals. In: Cabaj, R.P., Stein T., ed. *Textbook of Homosexuality and Mental Health*. Washington, D.C.: American Psychiatric Press; 1996:433-450.

332. US Department of Health and Human Services. Improving Cultural Competence to Reduce Health Disparities for Priority Populations - Research Protocol. Effective Health Care Program. https://effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productid=1934. Published 2014. Accessed May 31, 2017.

333. Substance Abuse and Mental Health Services Administration. LGBT Training Curricula. https://www.samhsa.gov/behavioral-health-equity/lgbt/curricula. Accessed May 31, 2017.

334. Hollenbach AD, Eckstrand KL, Dreger AD. *Implementing Curricular and Institutional Climate Changes to Improve Health Care for Individuals Who Are LGBT, Gender Nonconforming, or Born with DSD: A Resource for Medical Educators*.; 2014. https://members.aamc.org/eweb/upload/LGBTDSD Publication.pdf. Accessed April 20, 2017.

335. Obedin-Maliver J, Goldsmith ES, Stewart L, et al. Lesbian, Gay, Bisexual, and Transgender–Related Content in Undergraduate Medical Education. *JAMA*. 2011;306(9):221-234. doi:10.1001/jama.2011.1255.

336. Hadland SE, Yehia BR, Makadon HJ. Caring for Lesbian, Gay, Bisexual, Transgender, and Questioning Youth in Inclusive and Affirmative Environments. *Pediatr Clin North Am*. 2016;63(6):955-969. doi:10.1016/j.pcl.2016.07.001.

337. Rutherford K, McIntyre J, Daley A, Ross LE. Development of expertise in mental health service provision for lesbian, gay, bisexual and transgender communities. *Med Educ*. 2012;46(9):903-913. doi:10.1111/j.1365-2923.2012.04272.x.

338. ALGBTIC LGBQQIA Competencies Taskforce. Association for Lesbian, Gay, Bisexual, and Transgender Issues in Counseling Competencies for Counseling with Lesbian, Gay, Bisexual, Queer, Questioning, Intersex, and Ally Individuals. *J LGBT Issues Couns*. 2013;7(1):2-43.

339. Mulé NJ, Ross LE, Deeprose B, et al. Promoting LGBT health and wellbeing through inclusive policy development. *Int J Equity Health*. 2009;8:18. doi:10.1186/1475-9276-8-18.

340. Lim FA, Brown D V, Justin Kim SM. Addressing health care disparities in the lesbian, gay, bisexual, and transgender population: a review of best practices. *Am J Nurs*. 2014;114(6):24-34, 45. doi:10.1097/01.NAJ.0000450423.89759.36.

341. McNamara MC, Ng H. Best practices in LGBT care: A guide for primary care physicians. *Cleve Clin J Med*. 2016;83(7):531-541. doi:10.3949/ccjm.83a.15148.

342. Pachankis JE. Uncovering Clinical Principles and Techniques to Address Minority Stress, Mental Health, and Related Health Risks Among Gay and Bisexual Men. *Clin Psychol (New York)*. 2014;21(4):313-330. doi:10.1111/cpsp.12078.

343. Higa D, Hoppe MJ, Lindhorst T, et al. Negative and Positive Factors Associated With the Well-Being of Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning (LGBTQ) Youth. *Youth Soc*. 2012;46(5):663-687. doi:10.1177/0044118X12449630.

344.   Bauer GR, Scheim AI, Pyne J, Travers R, Hammond R. Intervenable factors associated with suicide risk in transgender persons: a respondent driven sampling study in Ontario, Canada. *BMC Public Health*. 2015;15(1). doi:10.1186/s12889-015-1867-2.

345.   Meyer IH, Northridge M. *The Health of Sexual Minorities: Public Health Perspectives on Lesbian, Gay, Bisexual and Transgender Populations*. New York: Springer; 2007.

346.   Herek GM, Garnets LD. Sexual orientation and mental health. *Annu Rev Clin Psychol*. 2007;3:353-375. doi:10.1146/annurev.clinpsy.3.022806.091510.

Appendices

Appendix A Search Terms and Strategy for Question 2 in the Literature Review

Databases
- Pubmed
- Medline
- PsycINFO
- Sociological Abstracts
- CINAHL
- ProQuest Dissertations

Search terms
Note: / = MESH term; .mp = title/abstract/keyword

1. Sexual orientation/GLB populations
Homosexuality/ sexual minorities/ Bisexuality/
homosexual*.mp. GLBT*.mp.   LGBT*.mp. sexual minorit*.mp.
"Men who have sex with men" or msm or "women who have sex with women" or wsw.mp.
WSMW or WSWM or MSWM or MSMW).mp.
gender identit*
gender expression
gender minorit*.mp.
sexual orient* or sexual identit*).mp.
gay or lesbian* or bisexual*.mp.
same sex attract*.mp

2. Heavy drinking
Alcohol related disorders/ Alcohol induced disorders/ Alcoholic intoxication/ Alcoholism/ Binge drinking/
Alcohol consum*.mp Alcohol use.mp Alcohol misuse.mp Alcohol abuse.mp Alcohol drink*.mp
Alcohol dependence.mp Alcohol problem*.mp Alcohol addict*.mp Drunkenness.mp Problem drinking.mp heavy drinking.mp risky drinking.mp hazardous drinking.mp.

3. Mental health disparities
Anxiety disorders/ Agoraphobia/ Anxiety, Separation/ Neurocirculatory Asthenia/ Neurotic Disorders/ Obsessive-Compulsive Disorder/ Panic Disorder/ Phobic Disorders/ Phobia, Social/ mood disorders/ Bipolar Disorder/ Cyclothymic Disorder/ or Depressive Disorder, Major/ or Depressive Disorder, Treatment-Resistant/ Dysthymic Disorder/ Post-traumatic Stress Disorder/ mental disorder.mp. mental illness.mp. depressi* disorder*.mp. depressi* syndrome*.mp
affective disorder*.mp. anxiety disorder*.mp. mood disorder*.mp. agoraphobia.mp. separation Anxiety.mp. neurocirculatory Asthenia.mp. Neurotic Disorder*.mp. Neurotic depression Obsessive Compulsive Disorder.mp. panic disorder.mp. phobi*disorder.mp. dysthymi* disorder*.mp. cyclothymic* disorder*.mp. psychiatric disorder*.mp. bipolar.mp. mania.mp. manic depressi*.mp. manic state.mp concurrent disorders.mp.

4. Explanations for mental health disparities
Discrimination (Psychology)/ prejudice/ Homophobia/ social stigma/ models, psychological/ psychological theory/ psychopathology/ minority groups/px stress, psychological/ Risk Factors/ protective factors/ health status disparities/ Adaptation, Psychological/ Psychosocial Support Systems/ social isolation/ or Loneliness/ Social Alienation/ Social Marginalization/ social distance/ Peer Group/ or Peer Influence/ or social networking/ or Community Networks/ or social identification/ or Social Capital/ Social Norms/ or Social Values/
Anti Gay Bias.mp. victim*.mp. prejudice.mp. discriminat*.mp. stigma*.mp. structural stigma.mp. internalizing disorder*.mp. externalizing behavior* mp. Psychological Model*.mp. psychopatholog*.mp. minority stress.mp. minority groups.mp. psychological distress.mp. life stress.mp. risk factor*.mp. Population* at Risk.mp. protective factor*.mp. ameliorat* factor*.mp. buffer.mp. health care disparit*.mp. health status disparit*.mp. psychologic adaptation.mp. coping.mp. resilien*.mp. psychosocial support.mp. social isolation.mp. loneliness.mp. social Alienation.mp. Social Marginalization.mp. social distance.mp. social rejection.mp. social acceptance.mp. peer connect*.mp. social network*.mp. neighbor?rhood network*.mp. Community Network*.mp. community belong*.mp. community connect*.mp. Social Identit*.mp. sense of belong*.mp. Social capital.mp. Social Conform*.mp. societal norm*.mp. social norm*.mp. community norm*.mp. correlate*.mp. mediat*.mp. moderat*.mp.

Search strategy
LGB populations: 1
Alcohol and mental health disparities: 2 OR 3
Alcohol and mental health disparities in LGB populations: 1 AND (2 OR 3)
Explanations for mental health disparities: 1 AND (2 OR 3) AND 4

Appendix B Summary of Study Variables

Variable	CCHS Name	Concept	Question	Universe	Availability	Original Coding	Re-name	Re-code
Sexual identity	SDC_7AA	Considers self heterosexual, homosexual or bisexual	Do you consider yourself to be: (heterosexual, homosexual, that is lesbian or gay, or bisexual)?	Respondents aged 18 to 59 (Note: not stated includes interviews by proxy)	- All cycles - Core content	Heterosexual=1 Homosexual=2 Bisexual=3 Not applicable=6 Don't know=7 Refusal=8 Not stated=9	SO Format so	Heterosexual=0 Gay/ lesbian=1 Bisexual=2 (7,8,9 = set to .) (6 were dropped)
Mood disorder	CCC_280	Has a mood disorder	Remember, we are interested in conditions diagnosed by a health professional. Do you have a mood disorder such as depression, bipolar disorder, mania or dysthymia?	All respondents (Note: includes manic depression)	- All cycles - Core content	Yes=1 No=2 Don't know=7 Refusal=8 Not stated=9	MOOD Format mood	Yes=1 No=0 (7,8,9 = set to .)
Anxiety disorder	CCC_290	Has an anxiety disorder	Do you have an anxiety disorder such as a phobia, obsessive-compulsive disorder or a panic disorder?	All respondents	- All cycles - Core content	Yes=1 No=2 Don't know=7 Refusal=8 Not stated=9	ANX Format anx	Yes=1 No=0 (7,8,9 = set to .)
Anxiety-Mood	N/A	Has both a mood and an anxiety disorder	n/a	All respondents	n/a	n/a	CONCUR RENT Format concurrent	Yes = 1 (MOOD=1 and ANX=1) No = 0 (MOOD=0 & ANX=0, MOOD = 1 & ANX=0, MOOD=0 & ANX=1)

Variable	CCHS Name	Concept	Question	Universe	Availability	Original Coding	Re-name	Re-code
Heavy drinking	ALC_3	Frequency of having 5 or more drinks	How often in the past 12 months have you had 5 or more drinks on one occasion?	Respondents who answered ALC_1=1, 7 or 8. That is, those who answered "yes, don't know, refused" to drank alcohol in past 12 months	- All cycles - Core content	Never=1 Less than once a month=2 Once a month=3 2 to 3 times a month=4 Once a week=5 More than once a week=6 Not applicable=96 Don't know=97 Refusal=98 Not stated=99	DRINK Format drink	Yes=1 (once a month or more, 3,4 5, 6) No=0 (1,2) as well as alc_1=2 (those who did not drink in the last 12 months)
Co-occurring anxiety or mood disorder and heavy drinking	N/A	Has either a mood or anxiety disorder and reports heavy drinking	n/a	All respondents	n/a	n/a	MAD	Yes = 1 [(MOOD=1 or ANX=1) and DRINK=1] No = 0 [(MOOD=0 or ANX=0) and (DRINK=0 or 1)]
Perceived Life Stress	GEN_07	Perceived life stress	Thinking about the amount of stress in your life, would you say that most days are: (not at all stressful, not very stressful, a bit stressful, quite a bit stressful, or extremely stressful)?	Respondents aged 15 and over	- All cycles - Core content	Not at all stressful=1 Not very stressful=2 A bit stressful=3 Quite a bit stressful=4 Extremely stressful=5 Not applicable=6 Don't know=7 Refusal=8 Not stated=9	STRESS Format stress	Stressful=1 (4,5) Not stressful=0 (1,2,3)

Variable	CCHS Name	Concept	Question	Universe	Availability	Original Coding	Re-name	Re-code
Community Belonging	GEN_10	Sense of belonging to local community	How would you describe your sense of belonging to your local community? Would you say it is: very strong, some-what strong, some-what weak, or very weak)?	All respondents (Note: proxy interviews were coded 'not stated')	- All cycles - Core content	Very strong=1 Somewhat strong=2 Somewhat weak=3 Very weak=4 Don't know=7 Refusal=8 Not stated=9	BELONG Format belong	Weak=1 (3, 4) Strong=0 (1, 2)
Age	DHH_AGE	Age	What is your age?	All respondents	- All cycles - Core content	Continuous	AGE Format age	18-29=3 30-39=2 40-49=1 50-59=0
Sex	DHH_SEX	Sex	Interviewer: Enter the respondent's sex. If necessary, ask: Is respondent male or female?	All respondents	- All cycles - Core content	Male=1 Female=2	SEX Format sex	Male=0 Female=1
Education	EDUDR04	Highest level of education - respondent, 4 levels	CCHS derived variable.	All respondents	- All cycles - Core content	Less than secondary school graduation=1 Secondary school graduation=2 Some post-secondary=3 Post-secondary graduation=4 Not stated=9	EDU Format edu	Less than secondary school graduation=1 Secondary school graduation=2 Some post-secondary=3 Post-secondary graduation=0
Household income	incdhh	Total household income from all sources	2007-2008 categories listed 2009-2010 has 60k+ income go up by 10k (i.e., 60-70-80), so coding was adjusted for this cycle, such	All respondents Note: imputed data	- All cycles - Core content	No income=1 < $5,000=2 $5,000-9,999=3 $10,000-14,999=4 $15,000-19,999=5 $20,000-29,999=6 $30,000-39,999=7 $40,000-49,999=8	INCOME Format income	>$100000=0 (12) $0-39,999=1 (1,2,3,4,5,6,7) $40-59999=2 (8,9) $60-99999=3 (10,11)

Variable	CCHS Name	Concept	Question	Universe	Availability	Original Coding	Re-name	Re-code
			that $60-99999=3 (10,11,12,13,14) 2011-2012 imputed data already part of CCHS file			$50,000-59,999=9 $60,000-79,999= 10 $80,000-99,999= 11 > $100,000=12		
Racialized minority status	SDC_43a	Cultural/ racial origin - White	People living in Canada come from many different cultural and racial backgrounds. Are you White?	All respondents who answered SDC_41 = (2,7,8)	- All cycles - Core content	Yes=1 No=2 Not applicable=6 Don't know=7 Refusal=8 Not stated=9	RACE Format race	White=0 (1) Racialized minority=1 (2,6)
Marital status	DHH_MS	Marital status	What is your marital status? Are you married, living common-law, widowed, separated, divorced, or single, never married?	All respondents	- All cycles - Core content	Married=1 Common-law=2 Widowed=3 Separated=4 Divorced=5 Single, never married=6 Don't know=97 Refusal=98 Not stated=99	MARITA L Format marital	Married/common law = 0 (1,2) Single = 1 (3,4,5,6)
Region of Canada	GEO_PRV	Province of residence of respondent	N/A	All respondents	- All cycles - Core content	NL=10 PEI=11 NS=12 NB=13 QC=24 ON=35 MB=46 SK=47 AB=48 BC=59 YK=60 NWT=61 NU=62	PROVIN CE Format province	Ontario=0 (35) Atlantic=1 (10,11, 12,13) Quebec=2 (24) Prairies=3 (46, 47, 48) British Columbia=4 (59) Northern Territories=5 (61, 62)
Rural/ Urban	Geodur2	Urban and rural areas – 2 levels	N/A	All respondents	- All cycles - Core content	Urban=1 Rural=2	RURAL Format rural	Urban=0 (1) Rural=1 (2)

Appendix C Diagnostic Tests – Select Results

Multi-collinearity

Variable	VIF
Sexual Identity	1.01
Anxiety Disorder	1.37
Mood Disorder	1.33
Anxiety-Mood Disorder	1.50
Heavy Drinking	1.23
Concurrent Disorder	1.88
Life Stress	1.03
Community Belonging	1.02
Sex	1.07
Age group	1.20
Educational Attainment	1.03
Household Income	1.01
Marital Status	1.10
Racial Minority Status	1.04
Province	1.01
Rural/Urban Area	1.03
CCHS cycle	1.00
Mean	1.16

Misspecification of the link function

	Anxiety Disorders	Mood Disorders	Anxiety-Mood Disorders	Heavy Drinking	Co-occurring Disorders
_hat	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
_hatsq	$= 0.67$	$= 0.64$	$= 0.24$	< 0.001	$= 0.56$

Notes. P-values from linktests for final main effects models in research objective 1.

	Anxiety Disorders	Anxiety-Mood Disorders	Heavy Drinking
_hat	< 0.001	< 0.001	< 0.001
_hatsq	0.426	0.359	< 0.001

Notes. P-values from linktests for final models with interaction terms in research objective 1.

	Anxiety Disorders	Mood Disorders	Co-occurring Disorders
_hat	< 0.001	< 0.001	< 0.001
_hatsq	$= 0.40$	$= 0.12$	$= 0.44$

Notes. P-values from linktests for final models in research objective 3.

Goodness of fit statistics

	Anxiety Disorders	Mood Disorders	Anxiety-Mood Disorders	Heavy Drinking	Co-occurring Disorders
F-test	= 0.86	= 0.78	= 1.17	= 8.59	= 0.16
P-value	= 0.56	= 0.64	= 0.31	< 0.001	= 0.99

Notes. Results from estat tests for final main effects models in research objective 1.

	Anxiety Disorders	Anxiety-Mood Disorders	Heavy Drinking
F-test	= 0.92	= 1.24	= 8.04
P-value	= 0.50	= 0.27	< 0.001

Notes. Results from estat tests for final models with interaction terms in research objective 1.

	Anxiety Disorders	Mood Disorders	Co-occurring Disorders
F-test (df)	= 0.94	= 1.43	= 0.81
P-value	= 0.49	= 0.17	= 0.60

Notes. Results from estat tests for final main effects models in research objective 3.

Influential Observations

Anxiety Disorders
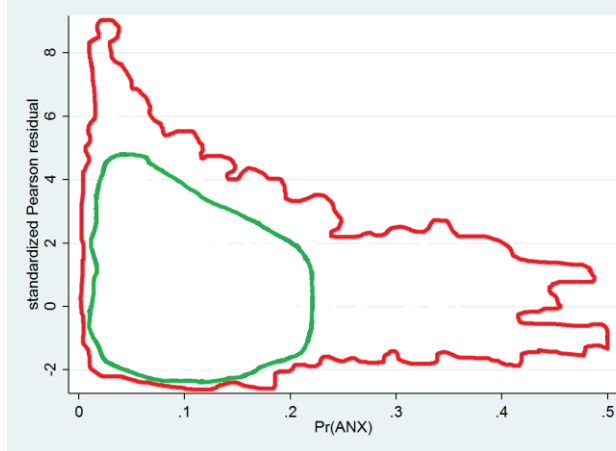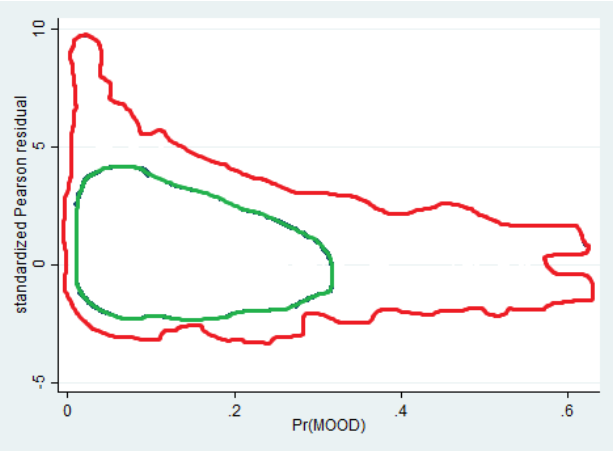
Mood Disorders

Anxiety-Mood Disorders

Heavy Drinking

Co-occurring Disorders

Notes. Pearson residuals from final main effects models in research objective 1.

Appendix D Prevalence Rates of Anxiety, Mood, and Anxiety-Mood Disorders, Heavy Drinking, and Co-Occurring Anxiety or Mood Disorder and Heavy Drinking by Sexual Identity: CCHS, 2007-08, 2009-10, 2011-12, and 2007-12

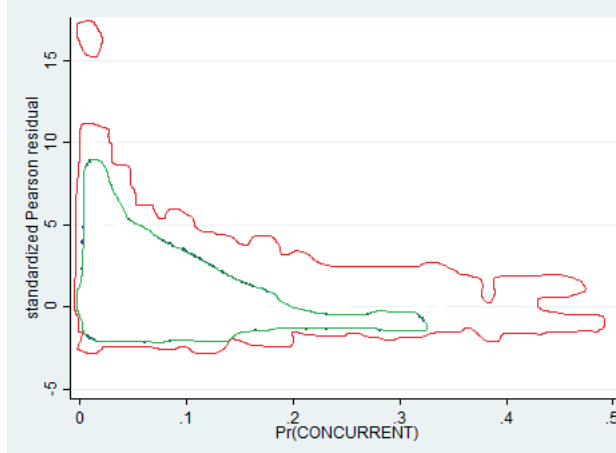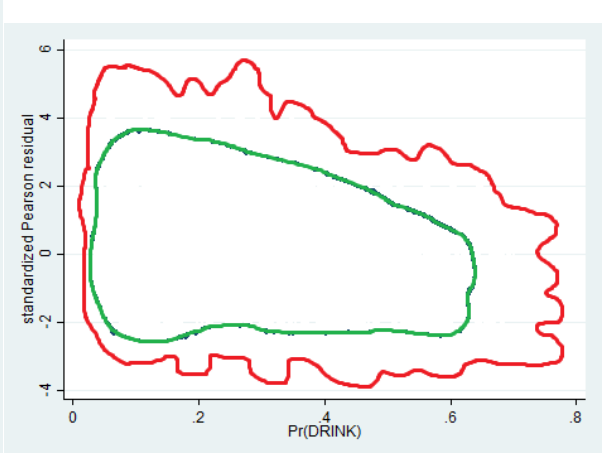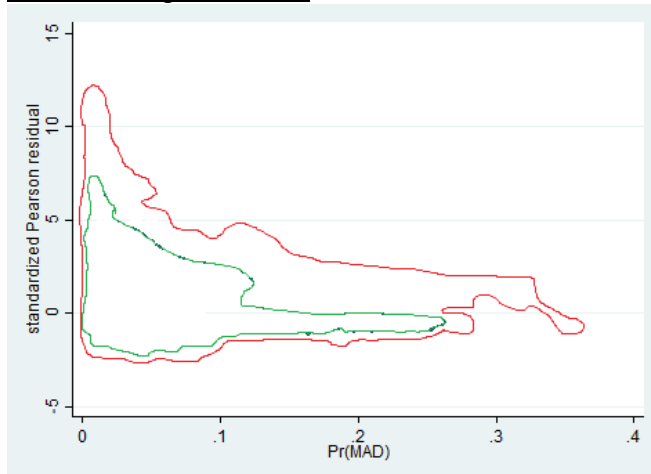|	All				Heterosexual				Gay/Lesbian				Bisexual			
Cycle	2007-2008	2009-2010	2011-2012	2007-2012	2007-2008	2009-2010	2011-2012	2007-2012	2007-2008	2009-2010	2011-2012	2007-2012	2007-2008	2009-2010	2011-2012	2007-2012
Anxiety Disorder																
% [Yes]	**6.0**	**5.4**	**7.0**	**6.1**	5.8	5.3	6.7	5.9	11.7	10.2	12.4	11.4	17.5	16.5	26.6	20.7
(95% CI)	(5.7-6.2)	(5.2-5.7)	(6.7-7.4)	(6.0-6.3)	(5.5-6.1)	(5.0-5.5)	(6.4-7.1)	(5.8-6.1)	(9.3-14.6)	(7.9-13.1)	(9.6-16.0)	(9.9-13.2)	(14.0-21.7)	(12.6-21.3)	(22.0-31.7)	(18.3-23.4)
Mood Disorder																
% [Yes]	**7.1**	**7.0**	**7.7**	**7.3**	6.9	6.8	7.4	7.0	14.1	13.8	15.4	14.5	21.3	22.6	29.1	24.8
(95% CI)	(6.9-7.4)	(6.7-7.3)	(7.4-8.0)	(7.1-7.5)	(6.7-7.2)	(6.5-7.1)	(7.0-7.7)	(6.8-7.2)	(11.2-17.5)	(10.6-17.9)	(11.9-19.8)	(12.5-16.7)	(17.3-26.1)	(17.7-28.3)	(24.5-34.1)	(22.0-27.7)
Anxiety-Mood Disorder																
% [Yes]	**2.8**	**2.5**	**3.3**	**2.8**	2.6	2.4	3.1	2.7	7.6	4.8	7.3	6.6	12.0	9.1	18.2	13.5
(95% CI)	(2.6-2.9)	(2.3-2.7)	(3.1-3.5)	(2.7-3.0)	(2.5-2.8)	(2.2-2.6)	(2.8-3.3)	(2.6-2.8)	(5.7-10.1)	(3.4-6.8)	(5.0-10.6)	(5.5-7.8)	(8.9-16.0)	(6.0-13.6)	(14.6-22.5)	(11.4-15.8)
Heavy Drinking																
% [Yes]	**21.8**	**22.4**	**23.9**	**22.7**	21.7	22.2	23.8	22.6	23.8	30.3	29.4	27.9	28.0	32.6	30.4	30.4
(95% CI)	(21.4-22.3)	(21.9-22.9)	(23.4-24.5)	(22.4-23.0)	(21.3-22.2)	(21.7-22.7)	(23.2-24.3)	(22.3-22.9)	(20.0-28.1)	(25.7-35.3)	(24.9-34.4)	(25.2-30.8)	(22.9-33.7)	(27.3-38.3)	(25.7-35.6)	(27.2-33.8)
Co-Occurring Anxiety or Mood Disorder and Heavy Drinking																
% [Yes]	**2.3**	**2.1**	**2.6**	**2.3**	2.2	2.0	2.5	2.3	4.2	6.1	5.1	5.2	9.6	9.2	10.9	10.0
(95% CI)	(2.1-2.4)	(2.0-2.3)	(2.4-2.8)	(2.2-2.4)	(2.0-2.4)	(1.9-2.2)	(2.3-2.7)	(2.2-2.4)	(2.7-6.4)	(4.3-8.6)	(3.1-8.1)	(4.1-6.5)	(6.6-13.8)	(6.1-13.6)	(7.5-15.7)	(7.9-12.4)

Notes. Weighted data. CCHS, 2007-08 (n = 79,957), 2009-10 (n = 72,554), 2011-12 (n = 70,037), and 2007-12 (N = 222,548).

Appendix E Distribution of the Study Outcomes among the Heterosexual, Gay/Lesbian and Bisexual Respondents:

CCHS, 2007-12

	All (100%)	**Heterosexual** (97.8%)	**Gay/Lesbian** (1.3%)	**Bisexual** (1.0%)
	n (%)	n (%)	n (%)	n (%)
Anxiety Disorder				
Yes	14,751 (6.1)	13,963 (5.9)	353 (11.4)	435 (20.7)
No	198,250 (93.9)	194,109 (94.1)	2,425 (88.6)	1,716 (79.3)
Mood Disorder				
Yes	18,640 (7.3)	17,618 (7.0)	461 (14.5)	561 (24.8)
No	194,386 (92.7)	190,479 (93.0)	2,318 (85.5)	1,589 (75.2)
Mood and Anxiety Disorder				
Yes	7,357 (2.8)	6,853 (2.7)	213 (6.6)	291 (13.5)
No	205,533 (97.2)	201,112 (97.3)	2,565 (93.4)	1,856 (86.5)
Heavy Drinking				
Yes	49,033 (22.7)	47,687 (22.6)	704 (27.9)	642 (30.4)
No	163,104 (77.3)	159,541 (77.4)	2,063 (72.1)	1,500 (69.6)
Mood or Anxiety and Heavy Drinking				
Yes	5,439 (2.3)	5,068 (2.2)	154 (5.2)	217 (10.0)
No	200,777 (97.7)	196,602 (97.8)	2,455 (95.8)	1,720 (90.4)

Notes. Weighted data.

214

Appendix F Adjusted Odds Ratios for Anxiety, Mood, and Anxiety-Mood Disorders, Heavy Drinking, and Co-Occurring

Anxiety or Mood Disorder and Heavy Drinking for Study Participants with and without Missing Sexual Identity Data: CCHS,

2007-2012

	Anxiety Disorder	Mood Disorder	Anxiety-Mood Disorder	Heavy drinking	Co-Occurring Anxiety or Mood Disorder and Heavy Drinking
	(n = 215,216)	(n = 215,257)	(n = 215,099)	(n = 213,313)	(n = 208,196)
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Sexual Identity					
Heterosexual	1.0	1.0	1.0	1.0	1.0
Gay/ Lesbian	**2.0*** (1.7-2.4)	**2.2*** (1.8-2.6)	**2.5*** (2.0-3.0)	1.0 (0.9-1.2)	**2.0*** (1.6-2.6)
Bisexual	**3.0*** (2.5-3.5)	**3.4*** (2.8-4.0)	**3.8*** (3.0-4.7)	**1.5*** (1.2-1.7)	**3.3*** (2.6-4.3)
Missing	**1.7*** (1.5-2.0)	**1.9*** (1.6-2.2)	**2.1*** (1.7-2.6)	**0.3*** (0.3-0.4)	0.8 (0.6-1.1)

*Notes. Weighted data. All models adjusted for sex, age, educational attainment, household income, racialized minority status, marital status, region of Canada, rural/urban area, and survey cycle. * p < .001.*

Appendix G Sub-group Specific Adjusted Odds Ratios for Interactions of Sexual Identity and Social Positions from the

Final Regression Models, CCHS, 2007-2012

	MOOD DISORDERS #	ANXIETY DISORDERS #	CO-OCCURRING DISORDERS
	AOR	AOR	AOR
Sexual Identity - Income - Racial Minority			
Heterosexual - >$100,000 - White	REF	REF	…………………..
Heterosexual - >$100,000 - Racialized Minority	0.5	0.6	…………………..
Heterosexual - $60-99,999 - White	1.3	1.2	…………………..
Heterosexual - $60-99,999 - Racialized Minority	0.7	0.6	…………………..
Heterosexual - $40-59,999 - White	1.6	1.5	…………………..
Heterosexual - $40-59,999 - Racialized Minority	0.9	0.7	…………………..
Heterosexual - $0-39,999 - White	2.8	2.3	…………………..
Heterosexual - $0-39,999 - Racialized Minority	1.3	0.9	…………………..
Gay/Lesbian - >$100,000 - White	2.7	1.7	…………………..
Gay/Lesbian - >$100,000 - Racialized Minority	0.1	0.1	…………………..
Gay/Lesbian - $60-99,999 - White	3.3	2.0	…………………..
Gay/Lesbian - $60-99,999 - Racialized Minority	4.0	4.4	…………………..
Gay/Lesbian - $40-59,999 - White	2.9	1.5	…………………..
Gay/Lesbian - $40-59,999 - Racialized Minority	0.6	3.3	…………………..
Gay/Lesbian - $0-39,999 - White	5.3	5.1	…………………..
Gay/Lesbian - $0-39,999 - Racialized Minority	2.3	1.6	…………………..
Bisexual - >$100,000 - White	4.3	2.3	…………………..
Bisexual - >$100,000 - Racialized Minority	2.2	2.1	…………………..
Bisexual - $60-99,999 - White	4.5	3.6	…………………..
Bisexual - $60-99,999 - Racialized Minority	1.1	0.9	…………………..
Bisexual - $40-59,999 - White	3.1	2.8	…………………..
Bisexual - $40-59,999 - Racialized Minority	1.0	0.6	…………………..
Bisexual - $0-39,999 - White	6.9	5.7	…………………..
Bisexual - $0-39,999 - Racialized Minority	6.1	6.3	…………………..

Notes. Weighted data. All models adjusted for marital status, respondents' residence in terms of region of Canada and urban/rural area, as well as survey cycle. #Model ran with bootstrap 317 replications. Empty cells indicate the interaction was not included in the model; "n.s." indicates a not statistically significant result.

Appendix G (Continued) Sub-group Specific Adjusted Odds Ratios for Interactions of Sexual Identity and Social Positions from the Final Regression Models, CCHS, 2007-2012

	MOOD DISORDERS #	ANXIETY DISORDERS #	CO-OCCURRING DISORDERS
	AOR	AOR	AOR
Sexual Identity-Racial Minority			
Heterosexual - White	REF	REF	…………………..
Heterosexual - Racialized Minority	0.5	0.5	…………………..
Gay/Lesbian – White	2.2	1.8	…………………..
Gay/Lesbian - Racialized Minority	1.1	1.5	…………………..
Bisexual – White	3.0	2.5	…………………..
Bisexual - Racialized Minority	1.6	1.7	…………………..
Sexual Identity - Income	*n.s*	*n.s.*	
Heterosexual - >$100,000			REF
Heterosexual - $60-99,999			1.1
Heterosexual - $40-59,999			1.3
Heterosexual - $0-39,999			1.7
Gay/Lesbian - >$100,000			1.4
Gay/Lesbian - $60-99,999			2.2
Gay/Lesbian - $40-59,999			2.4
Gay/Lesbian - $0-39,999			4.4
Bisexual - >$100,000			5.2
Bisexual - $60-99,999			4.3
Bisexual - $40-59,999			1.8
Bisexual - $0-39,999			5.3

Notes. Weighted data. All models adjusted for marital status, respondents' residence in terms of region of Canada and urban/rural area, as well as survey cycle. #Model ran with bootstrap 317 replications. Empty cells indicate the interaction was not included in the model; "n.s." indicates a not statistically significant result.

Appendix G (Continued) Sub-group Specific Adjusted Odds Ratios for Interactions of Sexual Identity and Social

Positions from the Final Regression Models, CCHS, 2007-2012

	MOOD DISORDERS #	ANXIETY DISORDERS #	CO-OCCURRING DISORDERS
	AOR	AOR	AOR
Sexual Identity-Age			
Heterosexual - 50–59	REF	REF	…………………..
Heterosexual - 40–49	1.0	1.2	…………………..
Heterosexual - 30–39	0.9	1.1	…………………..
Heterosexual - 18–29	0.5	0.9	…………………..
Gay/Lesbian - 50–59	2.8	2.3	…………………..
Gay/Lesbian - 40–49	2.2	2.2	…………………..
Gay/Lesbian - 30–39	1.4	1.7	…………………..
Gay/Lesbian - 18–29	1.0	1.8	…………………..
Bisexual - 50–59	1.8	1.5	…………………..
Bisexual - 40–49	3.1	2.1	…………………..
Bisexual - 30–39	2.7	3.8	…………………..
Bisexual - 18–29	2.3	3.4	…………………..
Sexual Identity - Sex			
Heterosexual - Male	…………………..	REF	…………………..
Heterosexual - Female	…………………..	1.9	…………………..
Gay/Lesbian- Male	…………………..	2.7	…………………..
Gay/Lesbian - Female	…………………..	2.9	…………………..
Bisexual - Male	…………………..	3.0	…………………..
Bisexual - Female	…………………..	4.6	…………………..

Notes. Weighted data. All models adjusted for marital status, respondents' residence in terms of region of Canada and urban/rural area, as well as survey cycle. #Model ran with bootstrap 317 replications. Empty cells indicate the interaction was not included in the model; "n.s." indicates a not statistically significant result.

Appendix H Search Strategy for Supplemental Literature Review on Interventions

A supplemental targeted search of the peer-reviewed and "grey" literature (either unpublished or published in non-commercial form, including government reports, policy statements, and issue papers) was undertaken in April 2017. The research question was "What interventions have been applied (or proposed) to address the mental health and substance use disparities among sexual minorities?" The literature was limited to articles and reports published between 2010 and 2017, and written in English.

In PubMed, the search terms were selected according to three primary domains: sexual orientation, alcohol misuse interventions, and mental health interventions. For sexual orientation, the terms included gay, lesbian, bisexual, homosexual, sexual orientation, and sexual minority. For alcohol misuse, terms included alcohol related disorders, binge drinking, heavy drinking, problem drinking, and hazardous drinking. For mental health, terms included general terms such as mental illness and mental disorders and specific terms for psychological disorders (depression, anxiety, mood disorder and concurrent disorder). For interventions, terms included guidelines, best practices, treatments, programs, public health, service, initiative, approaches, and policies.

Grey literature was identified from a series of targeted websites, including: Centre for Addiction and Mental Health, Substance Abuse and Mental Health Services Administration (US); National Alliance on Mental Illness (US); AIDS Council of New South Wales (ACON) (Australia): Fenway Institute (US); LGBTI Health Alliance (Australia); Mental Health America (US): The Association of Gay and Lesbian Psychiatrists (US); and National LGBT Health Education Center (US). In addition to searching the National Guideline Clearinghouse, a Google custom search on addiction and mental developed by the Centre for Addiction and Mental Health

was also utilized. Finally, further references were identified through hand searches of relevant

bibliographies and reference lists.