The Relationship of Sexual Orientation and Depression

by

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Abstract

Depression a disabling chronic illness that crosses borders, cultures, and elements of society. It is well known that there are a number of risk factors for depression including younger age, racial minority status, female sex, presence of substance abuse disorders, chronic illness, and lower socio-economic status. Sexual minorities have been identified as being another group at higher risk for depression, but there have been methodological issues with much of the existing research on sexual orientation and depression. In this work, methodological issues such as grouping different mental illnesses, failing to differentiate by sex, and failing to differentiate by sexual orientation have been overcome to describe the relationship between sexual orientation and depression. Three population representative samples were analyzed using regression techniques to examine the relationship of depression and sexual orientation. The results were combined with existing literature in a meta-analysis. The findings were that overall lesbians, gay men, and bisexuals do not have higher prevalence of depression than heterosexuals. There were three important findings: 1) heterosexual identified men who have same-sex activity have highest risk for depression, 2) gay men may have lower risk for depression than heterosexual men, and 3) gay men in the Canadian Armed Forces differ from civilian counterparts with higher prevalence of depression. This work adds to the existing literature on mental health in sexual minority populations. Further research is needed to examine other mental health disorders and to identify differences in risks based on more complex measures of sexual orientation.

Preface

This thesis is an original work by Roger L. Scott. The University of Alberta Health Research Ethics Board was consulted prior to commencing the research comprising this thesis and it was determined that no further ethics approval was required for the secondary analysis of the datasets.

Chapter 3 of this thesis has been accepted for publication as: Scott, R.L., Lasiuk, G., & Norris, C.M. (2016). The relationship between sexual orientation and depression in a national population sample. *Journal of Clinical Nursing.* Advance online publication. doi:10.1111/jocn.13286. I was responsible for the study design, data analysis and manuscript composition. G. Lasiuk was a supervisory author and was involved in the concept formation and manuscript composition. C.M. Norris was a supervisory author and was involved in the concept formation, review of data analysis, and manuscript composition.

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Dedication

To my mentor and friend, the Late Commodore Christine Newburn-Cook, CD, PhD. You provided me encouragement and support through my first graduate degree and were there for me during the first steps of my doctorate. Without your inspiration and backing, I would not have undertaken to complete a PhD. I miss your leadership, friendship, humour, and occasional “kick in the pants.” Fair winds and following seas.

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And finally, I thank my parents for always telling me I was "the smart one" and who always believed I could do this.

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Glossary

Depression in this thesis refers to the mood disorder major depressive episode (MDE) or major depressive disorder (MDD) as defined in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association [APA], 1994). The two diagnoses share the same diagnostic criteria. The diagnosis of MDE is made for the first episode of depression; subsequent episodes (if they occur) are diagnosed as MDD.

Gender refers to the societal construction of attitudes, feelings and behaviours that a given culture associates with a person's biological sex. [1]

Internalized homophobia refers to sexual minority individuals' internalization of negative societal attitudes towards lesbian, gay, and bisexual people.

Internalized stigma refers to an individual's internalization of stigmatizing assumptions and stereotypes about a potentially stigmatizing characteristic.

Sex refers to a person's biological status and is typically categorized as male, female, or intersex. [1]

Sexual minority refers to individuals with same-sex attractions and/or behaviour.

Sexual orientation refers to the sex of persons that one is sexually and romantically attracted to. Categories of sexual orientation typically refer to attraction to member's one one's own sex (gay, lesbian), attraction to members of the opposite sex (heterosexual or straight), and attraction to members of both sexes (bisexual).[1]

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[1] Adapted from: American Psychological Association. (2012). Guidelines for psychological practice with lesbian, gay, and bisexual clients. *American Psychologist, 67*(1), 10-42. doi:10.1037/a0024659

Chapter 1. Introduction

The World Health Organization (WHO) (2014) describes mental health as state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community. Mental health is further described as a component of general health, which is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity (WHO, 2014).

Mental illness represents a high global burden of disease with unipolar depression ranking as the third most important cause of disability adjusted life years (DALY) in 2004 (WHO, 2008). Unipolar depression is ranked eighth in low-income countries and first in middle- and high-income countries (WHO, 2008). Depression is highly prevalent in both Canada and the United States. The 2012 cycle of the Canadian Community Health Survey – Mental Health (CCHS-MH) reported a 12-month prevalence of 4.7% of major depressive episode amongst the general population aged 15 years and older (Pearson, Janz, & Ali, 2013). Similarly, in the 2005 United States National Comorbidity Study, 6.7% of adults had experienced a major depressive episode in the previous 12 months (Kessler, Chiu, Demler, Merikangas, & Walters, 2005). In light of these high rates worldwide, efforts to identify persons at high risk for developing depression are needed to ameliorate its negative impacts.

Depression

Depression is a term that has been used (a) in the literature descriptively without a standardized definition provided; (b) clinically to describe a cluster of signs and symptoms (typically described as mild, moderate, or severe depression); and/or (c) in the

North American research literature to describe the presence or absence of any of a heterogeneous spectrum of mood disorders according to *Diagnostic and Statistical Manual of Mental Disorders* (DSM) (APA, 2013) or to delineate those that meet a specific cut-off score according to a screening tool or questionnaire. Some of these tools reflect DSM criteria better than do others. For example the *Beck Depression Inventory* and the *Hospital Anxiety and Depression Scale* ask about depression symptoms in the last week, while the DSM criteria specify presence of symptoms for at least two weeks. Thus, the term depression does not have a single definition across all depression studies. In this thesis, the terms used are major depressive episode (MDE) or major depressive disorder (MDD) as in the DSM-IV (APA, 1994), unless the cited authors used cut-off scores cut-off scores from a severity index type tool to measure depression. The names of the specific tool used in the research datasets cited studies are included in the text and the literature review table.

Depression may co-exist with or be secondary to substances abuse, medications, other medical illness (e.g., substance/medication-induced depressive disorder, depressive disorder due to another medical condition, other specified depressive disorder, or unspecified depressive disorder), or result from normal physiologic processes (e.g., premenstrual dysphoric disorder) (American Psychiatric Association [APA], 2013). Depression can also co-occur in the presence of other mental illnesses such as anxiety, bipolar disorder, and schizophrenia; in children it may be diagnosed as disruptive mood dysregulation disorder (APA, 2013).

Major depressive disorder, also referred to as unipolar depression, is characterized by the presence of five or more associated symptoms, one of which must be depressed

mood or loss of interest or pleasure. Symptoms must be present during the same 2-week period and represent a change from previous functioning (APA, 2013). Symptoms associated with major depressive disorder, other than depressed mood or anhedonia, include significant weight change; sleep disturbances; psychomotor agitation or retardation; fatigue or lack of energy; difficulty thinking, concentrating or decision making; feelings of worthlessness or guilt; or recurrent thoughts of death and suicide (APA, 2013; WHO, 2015). The symptom cluster associated with major depressive disorder has led to the creation of scoring systems used in research and clinical practice to identify depressive symptoms and assist clinicians in diagnosing the illness, such as the WHO Composite International Diagnostic Interview (CIDI) (Kessler et al., 2004) or the Centre for Epidemiologic Studies Depression Scale Revised (CESD-R) (Eaton, Muntaner, Smith, Tien & Ybarra, 2004).

Depression is a disabling, and potentially chronic, disorder that affects all aspects of life for individuals, families, and communities through its negative impact on quality of life, stigma associated with mental illness, higher use of health care resources, and lost productivity (Public Health Agency of Canada, 2006). Despite its high prevalence, depression is not distributed equally and certain population sub-groups have higher prevalence rates than do others. Youth, aboriginal other minority groups, people with histories of substance abuse, and those with chronic medical conditions (De Marco, 2000; Evans et al., 2005; Kessler et al., 2003; Kirmayer et al., 1994; Public Health Agency of Canada, 2006) are reported to have higher rates of depression. Women have been reported as having depression rates twice that of men (De Marco, 2000; Kessler, 2003). Other risk factors include low income, unemployment, and being unmarried (De Marco,

2000; Kessler et al., 2003). Lesbian, gay and bisexual people (LGB) are also reported as being at higher risk for depression than are heterosexuals (King et al., 2008).

The effect of depression on health and quality of life is dramatic. People with depression report the lowest quality of health compared to people with chronic diseases including asthma, angina, arthritis and diabetes (Moussavie, Chatterji, Verdes, Tandon, Patel & Ustun, 2007). When it co-occurs with another chronic disease, depression results in even poorer health status. Comorbid chronic diseases cause more negative health outcomes than a single chronic disease, but when depression is comorbid with chronic disease there is an even greater negative effect on health status than comorbidities when depression is not present. The presence of comorbid depression leads to higher health care system utilization, more lost productivity and functional disability (Moussavie et al., 2007; Egede, 2007).

Sexual Orientation

Sexual orientation is a complex and multi-dimensional phenomenon that includes elements of attraction, behaviour, and identity (Rosario & Schrimshaw, 2014; Sell, 1997). Sexual behaviour is sexual activity with others. Sexual identity refers to self-identification as straight (heterosexual), lesbian, gay, bisexual, asexual, or another label that an individual uses to describe sexuality (Rosario & Schrimshaw, 2014). The elements of attraction, behaviour, and identity may be discordant, as discussed in Chapter 3 of this thesis (Diamond, 2014; Rosario & Schrimshaw, 2014). Patterns of attraction, identity, and behaviour can vary in individual's overtime. Women, in particular, have been described as having more fluid or plastic sexuality (Diamond, 2014).

Mental Health and Lesbian, Gay and Bisexual People

Sexual activity between members of the same gender has been present throughout the ages. There are examples of same-sex sexual activity in ancient cultures in Europe, Africa, and the Americas spanning from ancient time onward (Sullivan, 2008; Greenberg, 1988). Societal attitudes towards homosexual activity have been diverse and include being deemed a crime against nature and God; being imbued with special or supernatural powers; to being an illness that warrants treatment (Greenberg, 1988). In the mid-19th century, lawyer Karl Ulrichs advocated for the decriminalization of homosexual behaviour suggesting that it was an inherited condition. He and Karl Kertbeny, a journalist who coined the terms homosexual and heterosexual, argued that homosexuality is a normal variation of human sexuality (Drescher, 2008). Shortly thereafter, a physician named Karl Westphal advanced congenital theory and declared homosexuality to be a psychiatric condition not a legal issue. In the late 19th century, the neurologist Richard von Krafft-Ebing positioned homosexuality as a degenerative neurological disorder (Drescher, 2008). Debate continued through the 20th century on the nature of homosexuality as a pathological psychological condition versus a normal variant of sexual behaviour. Sigmund Freud, the father of psychoanalysis, posited that homosexuality or "inversion" might be an outcome of normal development and that it was not an illness, but an immaturity in the normal progression of human sexuality from an innate bisexual nature through to the mature heterosexual response (Drescher, 2008). Although Freud did not consider homosexuality to be pathological, his successors in the early 20th century did. Sandor Rado, a psychoanalyst, disputed Freud's bisexuality theory

in 1940 and once again homosexuality was described as a pathological condition to be treated and cured (Drescher, 2008, Bayer, 1987).

Research through the 1940s and 1950s challenged the pathological view of homosexuality. Alfred Kinsey's landmark study of human sexuality found that same-sex sexual activity was more common than widely believed and he estimated that up to 10% of males and up to 6% of females were exclusively homosexual. Kinsey also reported that as many as 37% of men and 13% of women engaged in some form of same-sex activity (Kinsey, Pomeroy, & Martin, 1948; Kinsey, Pomeroy, Martin, & Gebhard, 1953). Ford and Beach (1951) reported that homosexuality was common across 49 of the 76 cultures they studied and that homosexual activity was also common among animals. Hooker's (1957) matched pairs comparison of homosexual and heterosexual men found that experienced psychologists could not determine sexual orientation based on results of a battery of psychological tests. The research was unique in that it used a group of men who were not receiving psychiatric or psychological therapy or were not incarcerated as was common practice. She concluded that the behaviours cited as evidence of pathology (anxiety, obsessive and self-hatred behaviours) were responses to social attitudes towards homosexuality and were similar to those of other minority or "outcast" groups (Hooker, 1956). Hooker's findings are consistent with the minority stress theory proposed decades later by Meyer (2007). These studies provided evidence, from non-clinical populations, that homosexuality was not an illness but rather a normal variant of human sexuality.

In 1973 the APA declared homosexuality to be a normal variant of human sexuality and not a psychiatric disorder (APA, 1973). Later however, a new diagnosis was created in the third edition of the Diagnostic and Statistical Manual of Mental

Disorders (DSM-III) labelled ego-dystonic homosexuality (Spitzer, 1981). Ego dystonic homosexuality was indicated by: (1) a persistent lack of heterosexual arousal, which the person experienced as interfering with initiation or maintenance of wanted heterosexual relationships, and (2) persistent distress from a sustained pattern of unwanted homosexual arousal. Spitzer (1981) contended that by this definition heterosexuality remained the norm and that homosexuality was still considered to be abnormal or pathological. Ego-dystonic homosexuality was removed from the DSM in 1986 and the mainstream scientific approach to homosexuality has since been that it is a normal variant of human sexuality as evidenced by the body of literature that has since been developed. Accordingly, throughout the latter part of the 20th century and the first decade of the 21st century, research on gay, lesbian, and bisexual (LGB) people has refocused from homosexuality as pathology to exploring associations between sexual orientation and mental health problems and homosexuality.

Higher risk or prevalence for mental health disorders including depression, substance misuse, and suicide have been reported in representative samples of sexual minorities in the United States (Bolton & Sareen, 2011; Botstick, Boyd, Hughes & Esteban, 2010; Cochran & Mays, 2000a; Cochran & Mays, 2000b; Cochran & Mays, 2009); the United Kingdom (Chakraborty, McManus, Brugha, Bebbington & King, 2011; Warner et al., 2004); Canada (Brennan, Ross, Dobinson, Veldhuizen & Steele, 2010); and the Netherlands (Sandfort, de Graaf, Bijl & Schnabel, 2001). A recent meta-analysis compared individuals who identify as heterosexual with those who identify as LGB and found higher prevalence for depression, anxiety, alcohol or drug dependence and higher

risk for suicide amongst lesbians, gays, and bisexuals compared to heterosexuals (King et al., 2008).

Social Change

The increased research on mental health and sexual orientation occurred alongside other social progress for LGB sexual minority populations. Gay rights activists have won major victories in the decriminalization of homosexuality and gaining civil rights (Bayer, 1987). Popular culture increasingly reflects LGB issues in a positive manner and shapes public opinion (Kelley, 2013; Watercutter, 2013). As social attitudes towards sexual minorities have changed, there have been dramatic changes in public policy worldwide. Twenty-three countries have passed legislation allowing same-sex couples to marry and same-sex marriage is legal in some jursdictions of Mexico, as of 2016 (Pew Research Centre, 2016).

Openly LGB people hold or have held public office including heads of government in Iceland (BBC News, 2009), Belgium (BBC News, 2014, and Luxembourg (Blenkinsop, 2013), and in Ontario, Canada (Office of the Premier, 2014). LGB persons serve openly in the military of up to 25 countries (Palm Center, 2009). In 2016, an openly gay man was appointed the civilian Secretary of the Army in the United States(Washington Blade, 2016) and two general officers have openly acknowledged being gay (Scarborough, 2015; Johnson, 2016). If, as research has suggested, there is a connection between socio-cultural attitudes towards homosexuality and a risk for mental illness, then the improving social attitudes towards LGB people should be reflected in reduced burden of mental illness in the population.

The Role of Stress

Stress and depression are related and there is much literature suggesting that stress can be an antecedent to depression (Tennant, 2002; Hammen, 2005). The effect of stress varies depending on individual factors (e.g., genetics, personality, and past learning); the magnitude and duration of the stressor; and available coping resources, which helps to explain why some people become depressed and others do not. Hammen's (2005) review of stress and depression found that much of the research examining the relationship between the two focussed on negative episodic or acute stressors. The most common stressors associated with depression are "loss" (Hammen, 2005) and interpersonal stressors (Tennant, 2002). Both acute and chronic stressors are associated with depression, but chronic stress is a stronger predictor of depression and relapse (Tennant, 2002). Chronic stressors including poverty, chronic medical conditions, long duration relationship problems, and absence of social support also predict depression (Hammen, 2005).

Social support is shown to have a positive relationship with mental health (Cohen & Wills, 1985), but its role in moderating the effect of stress on depression is an area of continued research. Social support models describe either a main effect of wellbeing and mental health or a moderating effect (Cohen & Wills, 1985). The main effect model of social support describes a generalized effect on wellbeing as a result of the stabilizing positive experiences associated with a social network. Social support provides predictability, stability, and recognition of worth. The buffer model describes social support as an intervening variable in the chain of events between stress and mental illness. Social support can attenuate responses to stress at the time of an event thereby

preventing a stress reaction or it can intervene between the experience of stress and illness (Cohen & Wills, 1985). Resources associated with social support include self-esteem or emotional support, informational support or guidance, social companionship or belonging, and instrumental support such as material resources, services, and finances (Cohen & Wills, 1985).

Chronicity of stress and the role of social support are both important factors in defining risk of depression. In particular both chronic stress and social support are features of the minority stress theory proposed to explain increased rates of mental illness in the LGB population (Meyer, 2007).

Theoretical Base

The higher risks of mental health disorders among LGB people are multi-factorial in nature and include health disparities linked to prejudice, discrimination, and social stigma as chronic stressors (Mays & Cochran, 2001; McLauglin, Hatzenbuehler, & Keys, 2010; Meyer, 2007). Meyer (2007) has proposed the minority stress model as an explanatory framework to conceptualize higher risk for mental illness among LGB individuals. The model suggests that members of a minority group, such as a sexual minority, are at higher risk for mental illness because of the unique chronic stressors they encounter as a result of their disadvantaged position in society (Meyer, 2007).

Minority stress is a group-specific stressor that sexual minorities experience as members of marginalized group. The model describes overlapping sources of stress including general stressors, to which all people may be exposed, as well as additive minority stress processes that together predict mental illness (Meyer, 2007). Minority stress is unique to each marginalized group; is chronic as it reflects sociocultural

structures; and is socially based (Meyer 2007). Minority stress processes exist on a continuum from distal to proximal and include prejudice (e.g. violence, discrimination); stigma (i.e. expectations of rejection and discrimination); concealing or disclosing sexual orientation; and internalized homophobia (Meyer 2007). Distal stress processes, such as discrimination, are external, objective events that are not dependent on individual appraisal or interpretation. Proximal stressors, such as internalized homophobia, are subjective and are related to self-identity (Meyer 2007). These additional and unique stressors may account for increased rates of mental illness in the LGB population.

Stressors interact with characteristics of minority identity, individual coping abilities, and social support leading to negative or positive mental health outcomes (Meyer, 2007). Minority identity is both a potential source of stress and also a stress effect modifier. LGB identity may be a source of strength when it is associated with affiliation with like group members and reinforcement of positive identity (Meyer, 2007). The significance of social support, individual coping and group coping in the minority stress model recalls Hooker's (1956) early observation that there was a "striking parallel" between victimization traits that characterized many members of minority group and the traits that characterized homosexuals.

I will use minority stress as a conceptual framework to rationalize my dissertation research, which explores the relationship between depression and sexual orientation.

Purpose of the Study

My dissertation research involves secondary analysis of existing US and Canadian population-based surveys to examine and compare prevalence of depression between

heterosexual and LGB adult populations.[2] The primary goal was to determine whether there are differences in the prevalence in depression in the LGB population compared to the heterosexual adult population. In order to examine the association of minority stress and depression, sexual behaviour, sexual identity, and social support measures are included.

[2] The research plan did not include transgender people. There were no categories assigned for transgender people in the datasets available.

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Chapter 2. Literature Review

Introduction

As discussed in Chapter 1, many contemporary studies have reported on the mental health of sexual minority individuals. Much of the literature suggests that sexual minorities have higher prevalence of mental disorders than do their heterosexual counterparts. Significant concerns with many studies have been raised concerning methodological issues and the grouping of genders, sexual orientations, and mental health disorders. This chapter reviews current literature that addresses the relationship of sexual orientation and depression. Throughout this chapter the terms lesbian, gay, bisexual, sexual minority, homosexual and heterosexual are used. The use of these terms corresponds with the wording used in the individual studies reported.

Review Method

A search was performed of the following five health sciences databases: CINAHL, MEDLINE, PsychINFO, PubMed and Web of Science. Search terms designed to locate literature related to the sexual orientation and depression were used. Sexual orientation search terms included: gay, lesbian, sexual minority and the truncations homosex* and bisex*. Searches on depression were executed using the truncation depressi* to locate articles related to depression and depressive symptoms. Terms were searched individually and in combination using the Boolean terms AND and OR. The search was limited to articles published in the English language from 2000 to 2015, to include the most contemporary publications.

Results

The initial search yielded 5173 entries. After removing 2989 multiple entries and a further 1913 that were not relevant by title review, 271 articles remained. Titles and abstracts were reviewed to identify any studies of adults (aged 18 and over) that used any measures of depression or depressive symptoms and provided comparisons of LGB and heterosexual groups leaving 25 articles for inclusion in the review (Table A and Figure 1). Studies that involved individuals under the age of 18 were included as long as the total age range included individuals aged 18 and over. Although only studies published since 2000 were included, the dates of population samples ranged from 1990 to 2012.

Fifteen of the studies retained for review used nationally representative population samples, while four others used a geographical population sample other than national (e.g., state or provincial). Six studies used non-randomised convenience samples. The study details are displayed in Table A.

Depression and Sexual Orientation

A recent review of the literature reported that a clear majority of the studies reviewed indicated elevated levels of depressive symptoms or rates of depression across all sexual minority groups (Plöderl & Tremblay, 2015). Similarly, King et al. (2008), reported overall higher risk of 12 month and lifetime prevalence for depression in a meta-analysis on mental health disorders in LGB people. They also noted that the highest quality study in their analysis found that the risk for depression was not higher among men, but was in women. Five studies were included in the depression meta-analysis. Although, many studies report higher risk or rates of depression amongst sexual minority groups, close scrutiny reveals that continued research is needed due to methodological

weaknesses and lack of precise operational definitions. The main themes of the studies will be the focus of this literature review.

Sex

Five of the studies included in this review grouped men and women together for analysis (Blosnich, Gordon & Fine, 2015; Chakraborty, McManus, Brugha & Bebbington, 2011; Jorm, Korten, Rodgers, Jacomb & Christensen, 2002; Shenkman & Shmotkin, 2010; Westefeld, Maples, Buford & Taylor, 2001). Blosnich et al. (2015) compared the mental health of Lesbian, Gay, Bisexual, Transgendered and Queer (LGBTQ) people with U.S. military experience to those without military experience, based on self-reported diagnosis and/or treatment for depression. They found a relative risk (RR) of lifetime depression diagnosis of 1.90 (1.78 – 2.04) and past 12-month depression RR of 2.21 (2.02 – 2.42) amongst non-military experienced LGBTQ compared to non-LGBTQ individuals. Similarly, when they compared military experienced LGBTQ to military experienced non-LGBTQ they found a higher RR for lifetime depression 1.59 (1.59 – 2.50) and past 12-month depression 2.29 (1.24 – 4.20). Military experience, however, did not appear to have a significant effect on depression risk. Chakraborty et al. (2011) also reported higher risk for depression amongst LGB individuals in the U.K. The adjusted odds ratio (AOR) for a depressive episode was 1.80 (1.13 – 2.87) for non-heterosexual orientation and 1.18 (1.15-2.70) for individuals who reported non-heterosexual partners.

Shenkman and Shmotkin (2010) compared depression in a non-randomised case-matched sample between Israeli homosexual (the label the authors used for the gay and lesbian participant group) and heterosexual youth and young adults and found

homosexuals had higher mean scores on the *Centre for Epidemiologic Studies Depression Scale* (CES-D) scores than heterosexuals. Another non-randomised volunteer sample, this time of American college students, reported that LGB students had higher mean depression scores than their heterosexual counterparts (Westfeld, Maples, Buford & Taylor, 2001). In the absence of a prediction model, these results suggested that depression was more strongly correlated to loneliness than to sexual orientation. Finally, an Australian study that grouped men and women together reported a higher risk of depression in homosexuals compared to heterosexuals, but the risk was not significant after adjustment for risk factors (Jorm et al., 2002). When sexual minority groups have been grouped by sex, the findings point toward higher rates of depression in the minority groups compared to heterosexuals.

Studies of men or women only provide a first look at the importance of stratifying depression risk by sex. The *Nurses' Health Study II* showed that lesbians (1.4 [1.2-1.7]), bisexual women (1.6 [1.2-2.0]), and women who identify as "another" sexual minority orientation (1.3 [1.0-1.5]) all had slightly higher prevalence rates for depression than did heterosexual women (Case et al., 2004). Another study comparing health of lesbian, bisexual, and heterosexual college undergraduate students also showed higher risk for depression among sexual minority women. The odds ratios for depression among lesbians were twice that of heterosexuals and for bisexual women was more than three times that of heterosexuals (Kerr et al., 2013).

Boehmer, Glickman and Winter (2012) compared depression rates between sexual minority and heterosexual women survivors of breast cancer. Comparison of mean depression scores revealed no difference between the two groups. Similarly, Hughes et al.

(2014) found no significant difference in the adjusted odds ratio (AOR) for depression amongst heterosexual, mostly heterosexual, bisexual, mostly lesbian, and lesbian women. There was a non-statistically significant trend towards lower depression AOR for both mostly lesbian and lesbian women. Overall, results of studies including measures of depression in samples of women only are inconsistent, with reports of higher levels of depression, slightly higher or no difference in rates, to possibly lower rates for sexual minority women.

In studies that included only men, a different situation emerges. One of the earlier studies that reported higher prevalence of suicide symptoms and affective disorders was Cochran and Mays' (2000) analysis of the *National Health and Nutrition Examination Survey III (1994-1998)*. Using a measure of same-sex partners as the comparator they reported a non-statistically significant AOR of 2.42 (0.75 – 7.78) for lifetime prevalence of major depression in men with any male sex partners. Two small non-randomised studies found no difference in mean *Beck Depression Inventory* (BDI) scores between homosexual and heterosexual men (Bag, Gencdogan, & Kilic, 2005; Bybee, Sullivan, Zielonka & Moes, 2009). Coleman and Hummel (2005) found HIV infected gay men had lower BDI scores than did HIV infected heterosexual men. The role of stigma surrounding HIV infection may be an important factor in that finding, but overall the evidence from these studies suggests there is probably no difference in depression amongst sexual minority versus non-sexual minority men.

Given the differences in depression among men only and women only groups, it becomes important to look at the effect of sex in these studies. The results of 11 studies were reviewed. The earliest nationally representative sample study reviewed was from

the *National Comorbidity Study (1990-1992)* by Gilman et al. (2001). They used the presence of reported same-sex partners in the previous five years to define homosexuals and no reported same-sex partners to define heterosexuals yielding mixed results. Women with any same-sex partners had slightly higher 12 month prevalence of depression than non-same-sex partnered women (34.5% SE 7.8 vs 12.9% SE 0.9, $p<.05$), but there was no significant difference in men. Calculated lifetime AOR for depression produced similar results, with no statistically significant difference for same-sex partner men (1.5 [0.7-3.0]), but higher risk for same-sex partner women (1.9 [1.0-3.3]). Cochran and Mays (2000b) conducted an analysis of the *National Household Survey of Drug Abuse* (1996), once again using the presence or absence of same-sex partners comparison groups. They found highest AOR for 1-year prevalence of major depression among any same-sex partnered men 2.87 (1.30 – 6.33) and women 1.79 (0.74 – 4.32). Another study using the *National Survey of Midlife Development* (1995) had similar findings, revealing an AOR for major depression in gay and bisexual men of 3.57 (1.71 – 7.43) and lesbian and bisexual women of 1.88 (0.71 – 4.98), this time based on self-reported sexual orientation (Cochran, Mays & Sullivan, 2003). An analysis of the *National Latino and Asian American Survey* (2002-2003) again showed differences between men and women (Cochran, Mays, Alegria, Ortega & Takeuchi, 2007). This study found a significant AOR result for lifetime depressive disorder in lesbian and bisexual women (1.63 (1.04 – 2.55) and past-year depressive disorder (1.94 (1.17 – 3.21), but showed a non-significant lower AOR for lifetime depressive disorder in gay and bisexual men (0.84 (0.27 – 2.57) and only a slightly higher AOR for past-year depressive disorder in gay and bisexual men (1.11 (0.31-2.04).

Cochran and Mays (2009) carried out yet another analysis, this time using the *California Quality of Life Survey* (2004-2005) where they reported the RR of 1-year major depressive disorder. Unlike much of their earlier work using single measures of sexual orientation, this study used self-reported sexual orientation and sexual behaviour to compare LGB and heterosexual men and women as well as heterosexual men and women who reported same-sex partners. The new distinction between identification and behaviour was important because it enabled inclusion and analysis of two measures of sexual orientation. Gay men, lesbian, and bisexual women all had higher RR for depression compared to exclusively heterosexual men or women, however, homosexually experienced heterosexual men had the highest risk for depression (3.58 (1.96 – 6.56). Homosexually experienced heterosexual men is the term used by Cochran & Mays to describe the category of men who self-identified as heterosexual, but reported same-sex sexual activity. The final U.S. study (Lindley, Walsemann & Carter, 2012) using the *National Longitudinal Study of Adolescent Health Wave IV* (2007-2008) demonstrated that in young gay men (ages 24 to 32), men who report same-sex attraction and men with same-sex partners had no increase in depressive symptoms compared to heterosexual men. Men who were "mostly straight" did have higher depressive symptoms than did the straight men. Amongst women, being bisexual, mostly straight and mostly gay were all associated with higher depressive symptoms compared with heterosexual women. Men and women with mostly opposite sex partners also had higher levels of depressive symptoms.

Two Canadian studies also showed differences between men and women. Juster et al. (2013) used measures of sexual orientation identity, behaviour, attraction, and fantasy to

identify sexual minority and heterosexual groups in a non-randomised convenience sample from Montreal. Sexual minority men had lower depressive symptoms than did heterosexual men, but once again sexual minority women had higher levels of depressive symptoms than their heterosexual counterparts. In a study of older adults aged 50 and over living with HIV/AIDS, gay men, and bisexual men had lower depression scores than did heterosexual men while women (no sub-grouping on sexual orientation done due to small numbers) had higher overall scores than did men (Brennan, Emlet, Brennenstuhl, & Rueda, 2013).

In the *Netherlands Mental Health Survey and Incidence Study* (Sandfort, de Graaf, Bijl, & Schnabel, 2001) using same-sex partners as the grouping variable, same-sex partnered men had a 1-year AOR for major depression of 1.96 (0.88 – 4.37) and same-sex partnered women had AOR of 1.03 (0.38 – 2.80) compared to non-same-sex partnered people. Lifetime AOR for major depression was 2.35 (1.39 – 3.97) for same-sex partnered men and 2.44 (1.26 – 4.72) for same-sex partnered women. Lhommond, Saurel-Cubizolles and Michaels (2014) measured the effect of sexual orientation on self-report of chronic depression or past 12-month depression. Using measures of self-identification, behaviour, and attraction they found French women were more likely to report depression than men. In descending magnitude, the AOR for chronic depression was highest in lesbian women; bisexual/same-sex-partnered women; heterosexual/same-sex partnered; and heterosexual/same-sex attraction women. The pattern for past-year depression differed in that gay/same-sex partnered men were at highest risk followed by heterosexual/same-sex partnered women; bisexual/same-sex partnered women;

bisexual/same-sex partnered men; heterosexual/same-sex partnered men; and heterosexual/same-sex attraction women.

All of the studies, when reviewed in context of sex and sexual orientation, show the importance of studying men and women separately. Studies that included sex stratification in the analysis fairly consistently found that women had higher rates or risk of depression than did men. Sexual minority women usually had higher rates or risk of depression than did heterosexual women, while gay men often had non-statistically significant differences in depression/depressive symptomatology when compared with heterosexual men. Looking back to the four of five studies that did not stratify by sex and reported higher risk of depression (Blosnich et al., 2015; Chakraborty et al., 2007; Shenkman & Shmotkin, 2010; Westefeld et al., 2001), it is reasonable to question whether the higher risk for depression could be explained by differences between men and women rather than being an effect of sexual orientation.

Sexual Orientation

The previous section provides evidence that studies, which stratify by sex demonstrate different patterns of relationship between sexual orientation and depression/depressive symptoms. Sexual orientation is a complex phenomenon that includes dimensions of identity, attraction, and behaviour (Sell, 1997). Studies included in this review used various measures of sexual orientation including single measures of behaviour or sexual orientation identity; measures that combine identity and behaviour; or measure identity, behaviour and attraction. Rates and risk for depression varied considerably depending on the measure used.

Studies that used single measure of sexual behaviour (i.e., presence or absence of same-sex sexual partners) all reported higher measures of depression in sexual minority groups (Cochran & Mays, 2000a; Cochran & Mays, 2000b; Gilman et al., 2001; Sandfort et al., 2001). A Swiss study (Wang et al., 2014) of young men aged 19-20 used a single measure of attraction as a proxy for sexual orientation and found higher past 2-week mean depression scores for men with any same-sex attraction compared to men attracted exclusively to women. Men who reported attraction to both men and women had the highest scores. The majority of studies using identification (e.g., gay/lesbian, bisexual, heterosexual) as a single measure of sexual orientation reported higher measures of depression in sexual minority groups (Blosnich et al., 2015; Case et al., 2004; Cochran & Mays, 2003; Hughes et al., 2014; Jorm et al., 2002; Kerr et al., 2013, Westefeld et al, 2001). Studies that grouped sexual orientation identities together had varied findings. Blosnich et al., (2015) grouped all LGBTQ identity and reported that risk for lifetime depression and 12-month depression was higher in the LGBTQ groups versus the heterosexual groups. Boehmer et al., (20012) grouped lesbian and bisexual women together and found no difference in mean depression scores compared to heterosexual women. Cochran et al., (2003) grouped gay men and lesbians with bisexual men and women respectively, and reported higher risk of depression for the sexual minority men.

Grouping sexual orientation identity and behaviour into dichotomous (heterosexual/homosexual) categories had mixed results. Bag et al., (2005) found no difference in depression between heterosexual and homosexual groups when identity and behaviour was combined. Cochran et al., (2007) also grouped identity and behaviour and reported higher risk of depression for sexual minority women, but no significant group

difference for sexual minority men. Chakraborty et al. (2007) grouped mostly heterosexual, gay, lesbian, bisexual, and other together to create non-heterosexual and heterosexual groups with a separate behaviour group based on presence or absence of same-sex partners. Collapsing multiple identities or behaviours into dichotomous variables as they did, resulted in higher risk scores for depression in the non-heterosexual orientation and behaviour groups.

When researchers employed a more nuanced conceptualization of sexual orientation, the pattern changed again. Studies that labelled groups as heterosexual, gay or lesbian, and bisexual demonstrated differences between homosexual and bisexual groups. Case et al., (2004) found bisexual women had higher rates of depression than did either lesbian or heterosexual women. Hughes et al., (2014) also used multiple measures of orientation identity in women and demonstrated a non-statistically significant trend towards higher risk of depression for mostly heterosexual and bisexual women and a trend towards lower risk of depression for mostly lesbian and lesbian women. The authors did not explore the effect of combining mostly heterosexual, bisexual, and mostly lesbian categories into a single category. The rationale for creating more than one level of bisexual attraction was not provided. Both Jorm et al. (2002) Kerr et al. (2013) found that bisexuals had the highest risk for depression.

Several studies used multiple measures of sexual orientation including identity, behaviour, and attraction. Not surprisingly, the ways that these elements of sexual orientation were grouped had different results. When identity, attraction, and behaviour were used to create homosexual and heterosexual groups there was no difference in depression scores (Bybee et al., 2009; Shenkman & Smotkin, 2010. On the other hand,

Juster et al. (2013) used identity, behaviour, attraction, and fantasies to create sexual minority and heterosexual groups and found lower depression scores for sexual minority men and higher scores for sexual minority women.

When measures of identity, behaviour, and attraction were stratified in studies of bisexuals, these individuals had the highest risk or rates of depression (Bostwick et al., 2010; Lhommond et al., 2014; Lindley et al., 2012). These studies also suggested that there may be an element of protection or lower risk of depression for some sexual minorities. Bostwick et al. (2010) reported that exclusively lesbian women, attracted only to women, had lower risk for mood disorders than other women. Lhommond et al. (2014) concluded that self-identification as gay or lesbian may be more protective than saying one is bisexual or avoiding a minority identification. Overall, when accounting for sexual orientation, bisexual people tend to have highest risk or rate for depression with gay men and lesbians often showing no difference.

Other Sub-Group Differences

Two studies included measures of depression in people living with HIV/AIDS (Brennan et al., 2003; Coleman & Hummel., 2005). In both studies, gay men living with HIV/AIDS had the lowest depression scores compared to heterosexual men. Brennan et al. also included women and found women with HIV/AIDS had the highest depression scores, but were unable to analyse sexual minority sub-groups due to sample size. Brennan et al. suggests the lower depression scores in the study is explained by the socio-demographic differences between gay and heterosexual men; gay men were more affluent, had higher education and higher measures of social support than the heterosexual men who were also more likely to belong to a racial minority group.

Coleman and Hummel's study only included African American men and still found lower depression scores in the gay group. Perhaps, the findings reflect the stigma associated with HIV/AIDS as a "gay disease" and to some degree reflects findings of no difference in depression risk between gay and heterosexual men found in some of the larger studies already discussed.

Age is known to be associated with depression (Kessler et al., 2003) with low risk until adolescence and young adulthood. Among 18-29 year olds, the odds ratios for 12-month major depressive disorder is reportedly as high as 3.0 (2.0 - 4.4) (Kessler et al., 2003). Age appears to be associated with higher risk and rates of depression in sexual minorities as well. Studies that included predominately adolescents and young adults, defined here as up to age 29, consistently showed higher levels of depression in some or all of the sexual minority groups (Blosnich et al., 2015; Kerr et al., 2013; Lindley et al., 2012; Shenkman & Shmotkin, 2010; Wang et al., 2015; Westfeld et al., 2001). Young men with same-sex partners who reported a major depressive episode in *NHANES III* had younger onset than young men with no same-sex partners (Aged 14.8 vs 20.4) (Cochran & Mays, 2000a). The association between older age, sexual orientation, and depression is not clear from the studies in this review. Pyra et al. (2014) reported that the AOR for depression in lesbians and bisexual women was about 1.5 times greater than for younger heterosexual women. Over time however, the AOR for depression trended down for sexual minority women and trended up for heterosexual women. Older sexual minority women had lower AOR for depression than did heterosexual women. Only one study (Brennan et al., 2003) targeted older adults (50 and over), but the effect of HIV/AIDS stigma precludes any conclusion on the effect of age. It appears age is a consistent risk

factor for depression across sexual minorities and that younger age is associated with higher depressive risk that may be compounded by an effect of sexual orientation in younger adults.

Military personnel are a unique sub-group that are often excluded from population studies. As a result, there is scant literature on the relationship of sexual minority stigma and depression in the military. Although the militaries of many countries allow LGBT people to serve openly, stories of harassment continue to appear in the press.[3] Concealment of sexual minority orientation has been shown to contribute to depression (Cochran, Balsam, Fientje, Malte, & Simpson, 2013). The single related study in this review compared health risk factors between sexual minority members and heterosexuals with military experience and found that military experience did not have a significant effect on risk for depression (Blosnich et al., 2015). The study was limited to young adults whose length of service and exposure to potentially negative impacts was likely low, which may have biased the effect of military service towards the null.

Discussion

Many of the studies in this review reported higher risk or rates of depression among sexual minorities. The way that sexual orientation is measured and reported in these studies is critical to the findings. As shown in this review, single measures of sexual orientation were more likely to result in a finding of higher rates or risk for depression in sexual minorities. Grouping all sexual minorities together to create dichotomous variables was also more likely show sexual minorities worse off than heterosexuals on measures of depression. Even more problematic is the effect of grouping men and women

[3] Canada and Australia lifted bans on LGB members of their militaries in 1992. The United States ban on LGB members of the military was lifted only in 2010.

together. Differences in levels of depressive symptoms appeared when multi-level measures of sexual orientation identity, attraction and behaviour were used rather than dichotomizing all measures into one heterosexual/homosexual variable. Individuals with bisexual identity are attracted to both men and women, or have sexual partners of both sexes emerge as the group with the highest levels of depressive symptoms.

The method for reporting findings is also important. Many studies report on grouped multiple measures of mental health and find poorer mental health overall amongst sexual minorities, which can be assumed to include depression. When such studies are reviewed critically, the relationship between depression and sexual orientation appear overstated. Researchers using nationally representative samples that include very small numbers of sexual minority individuals are tempted to group them together to increase power, but again, such grouping may lead to bias in the findings.

Finally, the measure of depression or depressive symptoms is important. Measures of depression range from self-reported diagnosis, indirect measure based on medications, validated research and clinical scales, to a clinical interview. Self-reported diagnosis may be the least reliable and most prone to bias as there is no measure of validity or reliability. Indirect measures, such as use of anti-depressant medication, are also prone to bias since people may use anti-depressants for conditions other than depression. Depression scales are used most frequently because they are cost effective and shown to be reliable and valid. Scales can measure depressive symptoms in ranges from weeks to lifetime, so comparison of studies using different measures must be done carefully.

Conclusion

This review includes many good quality studies on depression and sexual orientation. Risk of depression varies within sexual minority groups and there is evidence that being gay or lesbian is not, in itself, related to higher levels of depression, but that being bisexual may be. Processes by which minority stressors affect depression for sexual minority individuals is described in the minority stress model (Meyer, 2003). Differences in the experiences of sexual minority groups (e.g. gay, lesbian, bisexual) regarding prejudice and discrimination, rejection, concealment of sexual orientation, and internalized homo-negativity, is a plausible explanation for the differences found in depression among sexual minority groups in this review. Differences in prominence of sexual orientation identity in individuals and sources of social support and group affiliation between sexual minority groups may also partially explain differences found. Younger LGB people appear to have higher rates of depression. This may be related to negative social interactions, fear of rejection, and the stress over coming out to family and friends. The emerging evidence of being gay or lesbian as having some protective effect against depression needs to be confirmed with more research. More research is also needed on unique populations such as military members and veterans, and older adults.

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Figure 1: Literature Search Results

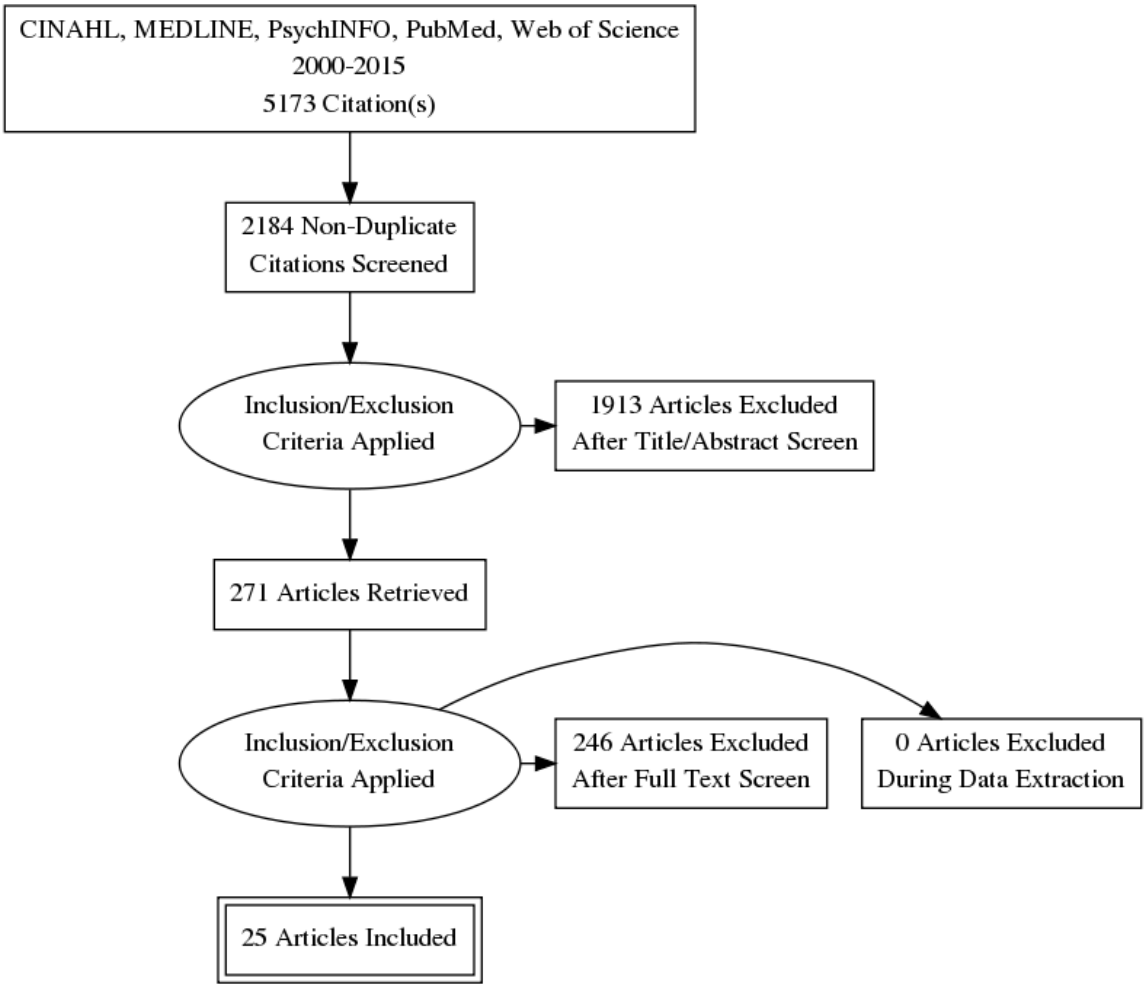

Table 1 (Chapter 2 Table 1)*: List of Included Publications*

Authors (Year of publication)	Title	Sample	Depression Measure	Sexual Orientation Measure	Result
Bag, B., Gencdogan, B., Reis, N., & Kilic, D. (2005)	The comparison of homosexual and heterosexual males as regards their depression, eating attitudes and self-esteem rations sample in Turkey.	Snowball sample (n=77)	Beck Depression Inventory	Orientation and Behaviour (declared homosexual with no same-sex activity in previous 3 years vs declared heterosexual with no opposite sex activity in previous 3 years)	BDI Heterosexual 11.6579 SD 9.0112 Homosexual 10.0769 SD 7.3749 F=0.711 (1,75) p=0.402
Blosnich, J.R., Gordon, A.J., & Fine, M.J. (2015)	Associations of sexual and gender minority status with health indicators, health risk factors, and social stressors in a national sample of young adults with military experience.	National College Health Assessment Fall 2012 survey (n=27,176) Mean ages ranged from 21.8 to 29.6	Self-report of lifetime diagnosis of depression and past 12 months diagnosis or treatment for depression.	Orientation (heterosexual, gay/lesbian, bisexual, unsure or gender response transgender)	Relative Risks (95% CI): Military Experience LGBTQ vs non-LGBTQ Lifetime Depression Diagnosis: 1.59 (1.02-2.50) Past 12 month Depression 2.29 (1.24-4.20) No Military Experience LGBTQ vs non-LGBTQ Lifetime Depression Diagnosis: 1.90 (1.78-2.04) Past 12 month Depression 2.21 (2.02-2.42) No Military experience LGBTQ vs non-LGBTQ 1.90 (1.78-2.04)

Boehmer, U., Glickman, M., & Winter, M. (2012)	Anxiety and depression in breast cancer survivors of different sexual orientations.	State-wide cancer registry with supplemental convenience sample to increase number of sexual minority women (n=438)	Hospital Anxiety and Depression Scale	Not specifically stated. Appears to be by orientation (heterosexual, lesbian, bisexual).	Mean depression score (SD) for: Registry heterosexual: 3.2 (3.0) Registry sexual minority: 2.1 (3.2) Convenience sample sexual minority 3.2 (3.3) *p*=0.74 comparing both minority groups to heterosexual
Bostwick, C.B., Boyd, C.J., Hughes, T.L. & McCabe, S.E. (2010)	Dimensions of sexual orientation and the prevalence of mood and anxiety disorders in the United States.	National Epidemiologic Survey on Alcohol and Related Conditions. Wave 2 (2004-2005) Aged 20 and up	Alcohol Use Disorder and Associated Disabilities Interview Schedule IV	Orientation Heterosexual, gay or lesbian, bisexual, not sure Attraction Only to females, mostly to females, equally to both, mostly to males, only to males Behaviour Only females, both females and males, never had sex, only males	Women: exclusive same-sex attraction had lowest rates of depression. Bisexual had highest lifetime prevalence of depression (behaviour and orientation) Men: Bisexual behaviour and attraction had highest lifetime prevalence for depression with similar rates for gay and bisexual orientation.
Brennan, D.J., Emlet, C.A., Brennenstuhl, S., Rueda, S. (2003)	Socio-demographic profile of older adults with HIV/AIDS: Gender and sexual orientation differences.	Ontario HIV Treatment Network Cohort Study (n=1,103)	Center for Epidemiologic Studies Depression Scale	Orientation (Heterosexual, lesbian/gay, bisexual, other) Gender (male, female, trans, two-spirited, inter-sexed, other	CED-S scores: Heterosexual male: 12.43 Gay male: 10.16 Bisexual male: 9.70 Women: 16.77 *p*=<.001

		Age 50 and over			No sub-grouping of women due to small sample size.
Bybee, J.A., Sullivan, E.L., Zielonka, E., & Moes, E. (2009)	Are gay men in worse mental health than heterosexual men? The role of age, shame and guilt and coming out.	Non-randomised convenience sample (n=167) Age 18-48	Beck Depression Inventory	Orientation Attraction Behaviour (Gay Identity Questionnaire) Dichotomized to Heterosexual and gay.	Mean BDI score (SD) Gay 7.3 (6.8) vs heterosexual 7.4 (7.6). Not statistically different.
Case, P., Austin, B., Hunter, DJ., Manson, J.E., Malspeis, S.M., Willett, W.C., & Spiegelman, D. (2004)	Sexual orientation, health risk factors, and physical functioning in the Nurses Health Study II	Nurses' Health Study II (1995) (n=90,823) Age 32-51	Medical Outcomes Study Short Form 36	Orientation	SF-36 Mental Index ≤52 Prevalence Ratio (95%CI) Heterosexual: Reference 1.0 Lesbian: 1.4 (1.2-1.7) Bisexual: 1.6 (1.2-2.0) Other: 1.3 (1.0-1.5)
Chakraborty, A., McManus, S., Brugha, T.S., Bebbington, P., & King, M. (2007)	Mental health of the non-heterosexual population of England	Adult Psychiatric Morbidity Survey (2007) (n=7403) Age 16 and older	Clinical Interview Schedule Revised	Orientation Heterosexual/Non-heterosexual Partnership Non-same gender/any same-gender	AOR (95%CI) for depressive episode Non-heterosexual orientation 1.80 (1.13-2.87) Non-heterosexual partners 1.77 (1.15-2.70)
Cochran, S.D., & Mays, V.M. (2000a)	Lifetime prevalence of suicide symptoms and affective disorders among men reporting same-sex sexual partners: Results from NHANES III	National Health and Nutrition Examination Survey III (1994-1998) (n=3648) Age 17-39	Depression module of Diagnostic Interview Schedule	Behaviour (any same-sex partners vs no same-sex partners)	AOR (95%CI) for Lifetime prevalence of Major Depression: Any male partners: 2.42 (0.75-7.78)
Cochran, S.D. & Mays, V.M.	Relation between psychiatric syndromes and	National Household Survey of Drug	Modified screening scales from CIDI	Behaviour (no same-sex partners, any	AOR (95%CI) 1-year prevalence for major

(2000b)	behaviourally defined sexual behavior in a sample of the US population.	Abuse (1996). (n=9,908) Age 18 and older		same-sex partners, no partners)	depression: Any same-sex partner Men: 2.87 (1.30-6.33) Women: 1.79 (0.74-4.32)
Cochran, S.D., Mays, V.M. & Sullivan, J.F. (2003)	Prevalence of mental disorders, psychological distress, and mental health use among lesbian, gay, and bisexual adults in the United States.	National Survey of Midlife Development (1995) (n=2,844) Age 25-74	Composite International Diagnostic Interview Short Form	Orientation	AOR (95%CI) for major depression: Men: 3.57 (1.71-7.43) RSE 25.8 Women: 1.88 (0.71-4.98) RSE 29.9
Cochran, S.D., & Mays, V.M. (2009)	Burden of psychiatric morbidity among lesbian, gay, and bisexual individuals in the California Quality of Life Survey	California Quality of Life Survey (2004-2005). (n=2,272) Age 18-72	CIDI-SF	Orientation Behaviour (gay, lesbian, bisexual, homosexually experienced heterosexual, heterosexual)	RR(95%CI) of 1 year MDD Gay: 2.23 (1.56-3.27) Bisexual: 1.51 (0.70-3.24) Homosexually experienced heterosexual: 3.58 (1.96-6.56) Lesbian: 1.64 (1.08-2.43) Bisexual:1.83 (1.26-2.64) Homosexually experienced heterosexual: 0.95 (0.44-2.03)
Cochran, S.D., Mays, V.M., Alegria, M., Ortega, A.N., & Takeuchi, D. (2007)	Mental health and substance use disorders among Latino, Asian America lesbian, gay, and bisexual adults.	National Latino and Asian American Survey (2002-2003) (n=4,498)	WMH-CIDI	Orientation Behaviour Grouped together	AOR (95%CI) for Lifetime depressive disorder Gay/Bisexual: 0.84 (0.27-2.57) Lesbian/Bisexual: 1.63 (1.04-2.55) Past-year depressive disorder

					Gay/Bisexual: 1.11 (0.31-2.04) Lesbian/Bisexual: 1.94 (1.17-3.21)
Coleman, C.L. & Hummel, D.B. (2005)	Sexual orientation a predictor of depressive symptoms among HIV infected African American men: A descriptive correlational study.	Convenience sample (n=98) Age 23-75 Men	Beck Depression Inventory	Orientation (bisexual was not included)	Mean BDI score: Heterosexual 20.17 ± 12.73 Gay 13.12 ± 11.6 $t(96)$=-3.35, p=0.001
Gilman, S.E., Cochran, S.D., Mays, V.M., Hughes, M., Ostrow, D., & Kessler, R.C. (2001)	Risk of psychiatric disorders among individuals reporting same-sex sexual partners in the National Comorbidity Survey	National Comorbidity Survey (1990-1992) (n=5877) Age 15-54	CIDI	Behaviour (same-sex partner in past 5 years)	12 month prevalence of depression %(SE): Male: Hetero: 7.2(0.7) Same-Sex: 10.3 (3.4) RSE 33.0 Female: Hetero 12.9 (0.9) Same-Sex 34.5 (7.8) RSE Lifetime AOR for depression: Hetero reference Same-sex men: 1.5 (0.7-3.0) Same-sex women: 1.9 (1.0-3.3)
Hughes, T.L., Johnson, T.P., Steffen, A.D., Wilsnack, S.C., & Everett, B.	Lifetime victimization, hazardous drinking and depression among heterosexual and sexual minority women.	Pooled data National Study of Health and Life Experiences of	National Institute of Mental Health Diagnostic Interview Schedule	Orientation Heterosexual Mostly heterosexual Bisexual Mostly Lesbian	AOR for depression: Heterosexual 1.0 Mostly H 1.55 (0.90-2.66) Bisexual 2.07 (0.71-6.01) Mostly Lesbian 0.57 (0.20-

(2014)		Women (2001) Chicago Health and Life Experiences of Women (2001). (n=1,415)		Lesbian	1.64) Lesbian 0.85 (0.79-0.92)
Jorm, A.F., Korten, A.E., Rodgers, B., Jacomb, P.A., and Christensen, H. (2002)	Sexual orientation and mental health: results from a community survey of young and middle aged adults.	Personality and Total Health (PATH) Through Life Project (1999-2001) (n=4824) Age 20-44 Australia	Goldberg anxiety and depression scales.	Orientation Heterosexual, homosexual, bisexual, don't know	Estimated marginal means used. Bisexuals had higher levels of depression than heterosexual or homosexual Homosexuals had higher depression scores than hetero but not significant when adjusted for risk factors.
Juster, R.P., Smith, N.G., Ouellet, E., Sindi, S., & Lupien, S.J. (2013)	Sexual orientation and disclosure in relation to psychiatric symptoms, diurnal cortisol, and allostatic load.	Convenience sample from Montreal, QC. (n=87) Age 18-45.	BDI	Klein orientation scale (behaviour, attractions, fantasies, identity) Sexual minority vs heterosexual	ANCOVA gay/bisexual men had lower depressive symptoms than heterosexual men, but lesbian/bisexual women had higher depressive symptoms Non-disclosure of sexual minority status had higher depressive symptoms.
Kerr, D.L., Santurri, L., & Peters, P. (2013).	A comparison of lesbian, bisexual and heterosexual college undergraduate women on selected health issues.	American College Health Association National College Health Assessment II (2008-2009) (n=6,689) Women,	Self-report of depression diagnosis	Orientation	OR (95%CI) Ever diagnosed with depression: Bisexual vs Heterosexual 3.13 (2.75-3.56) Lesbian vs Heterosexual 2.39 (1.99-2.87)

		undergraduate college students.			Bisexual vs Lesbian 1.33 (1.11-1.58)
Lhommond, B., Saurel-Cubizolles, & Michaels, S. (2014)	A multidimensional measure of sexual orientation, use of psychoactive substances, and depression: Results of a national survey on sexual behaviour in France.	Contexte de la Sexualité en France (2006) (n=9872) Age 18-69	Self-report of chronic depression or having been depressed in past 12 months	Orientation Behaviour Attraction	AOR for chronic depression / *12 month depression* Heterosexual / same-sex attraction Men 1.29 (0.3-5.6) / *0.98 – 1.9)* Women 2.07 (1.2-3.5) / *1.94 (1.4-2.6)* Heterosexual / same-sex partners Men 2.25 (0.9-5.9) / *1.95 (1.2 – 3.2)* Women 2.3 (1.2 – 4.3) / *2.96 (2.0-4.3)* Bisexual / same-sex partners Men 2.12 (0.6-8.0) / *2.51 (1.2-5.3)* Women 4.39 (1.6-12.4) / *3.23 (1.5 – 6.9)* Homosexual / same-sex partners Men 2.03 (0.7 – 6.1) / *2.66 (1.4-4.9)* Women 4.93 (1.3 – 18.4) / *2.02 (0.8-4.9* *)*

Lindley, L.L., Walsemann, K.M., & Carter, J.W. (2012)	The association of sexual orientation measures with young adults' health-related outcomes.	National Longitudinal Study of Adolescent Health Wave IV (2007-2008) (n=14,412) Age 24-32	CED	Orientation Attraction Behaviour	Adjusted b(SE) for depressive symptoms (only statistically significant shown) Men Mostly straight: 0.34 (0.07) Women: Mostly straight: 0.26 (0.03) Bisexual 0.42 (0.09) Mostly gay : 0.42 (0.09) Women Attracted to both 0.29 (0.04) Men Mostly opposite sex partners 0.35 (0.10) Women Mostly opposite sex partners 0.20 (0.04)
Pyra, M., Weber, K.M., Wilson, T.E., Cohen, J. Murchison, L., Goparaju L., et al. (2014)	Sexual minority women and depressive symptoms throughout adulthood.	Women's Interagency HIV Study (1994-95, 2001-02, 2011-12) (n=2975) Age 19-72	CES-D	Orientation Behaviour Separate analyses	AOR for depressive symptoms highest between 25-34 yrs for bisexuals (1.66 to 1.45) then trended down to as low as 0.66 (0.43-1.44) age 60 Lesbians ns but went from 1.51 to 1.0between 30-40 then trended down t0 0.44 (0.26-0.76) at 60 Similar patterns for

					behaviour.
Sandfort, T.G.M., de Graaf, R., Bijl, R.V., & Schnabel, P. (2001)	Same-sex sexual behavior and psychiatric disorders: fidnings from the Netherlands Mental Health Survey and Incidence Study	Netherlands Mental Health Survey and Incidence Study (1996) (n=7076) Age 18-64	CIDI	Behaviour Same-gender/any no-same-gender partners	AOR(95%CI) 1-year prevalence for Major depression Men: 1.96 (0.88-4.37) Women: 1.03 (0.38-2.80) Lifetime: Men: 2.35 (1.39-3.97) Women: 2.44 (1.26-4.72)
Shenkman, G., & Shmotkin, D. (2010)	Mental health among Israeli homosexual adolescents and young adults.	Non-randomised, case matched sample recruited at a LGB youth groups. (n=219) Age 15-37	CES-D	Gay Identity Formation Questionnaire (Orientation, attraction, behaviour) into one dichotomous variable.	MANCOVA mean (SD) CES-D Homosexual: 1.85 (0.57) Heterosexual: 1.73 (0.47) P<0.05
Wang et al. (2015)	Psychiatric disorders, suicidality, and personality among young men by sexual orientation.	Cohort Study on Substance use Risk Factors (2010-2011) (n=5875) Age 19-20	Medical Outcomes Study 12-Item-Short-Form Health Survey	Attraction Only to women Mostly to women Both Mostly to men Only to men	Major depression in past 2-weeks mean score (SD) Only women: 6.75 (6.89) Mostly women: 9.00 (7.77) Both: 10.8 (9.39) Mostly men:13.4 (12.9) Men: 12.2 (10.5)
Westefeld, J.S., Maples, M.R., Buford, B., & Taylor, S. (2001)	Gay, lesbian and bisexual college students: The relationship between sexual orientation, loneliness and suicide.	Non-randomised volunteer sample (n=224) Age 18-29	BDI	Orientation	BDI Mean score (SD) LGB 11.51 (8.64) Heterosexual 7.81 (5.99)

Chapter 3. The Relationship Between Sexual Orientation and Depression in a National Population Sample[4]

Abstract

Aims and objectives: The aim of this study was to examine the relationship between sexual orientation and depression in a nationally representative population to determine if sexual minorities report higher levels of depression than the remainder of the population.

Background: Depression is a highly prevalent and disabling chronic disorder worldwide. Prior research utilizing national population samples have reported that members of sexual minorities are at higher risk for depression when compared to heterosexual people. More recent studies have revealed differences in depression risk based on sexual orientation, sexual activity, and sex. There have been significant shifts in societal attitudes towards sexual minorities in recent decades. Continuing research into predictors for reporting depression amongst sexual minorities is needed.

Methods: National Health and Nutrition Examination Survey (NHANES) cycles 2005 – 2012 were used to identify sexual minority status based on declared sexual orientation and presence of same-sex sexual activity. Complex samples logistic and multivariate regression models were used to predict depression adjusted for sexual orientation, sexual activity, age, sex, marital status, education, income, race/ethnicity, employment, and health status.

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[4] This chapter has been published as: Scott, R.L., Lasiuk, G., & Norris, N. (2016). The relationship between sexual orientation and depression in a national population sample. *Journal of Clinical Nursing.* Advance online publication. doi:10.1111/jocn.13286. © John Wiley & Sons Ltd. Reprinted with permission.

Results: Sexual orientation was not a significant independent predictor of depressive symptoms overall. Gay men reported lower levels of depressive symptoms than heterosexual men. In the sex stratified analyses, men who reported having sex with men were 5 times more likely to report depressive symptomatology compared to men who reported opposite sex partners (2005-2008 AOR 5.00, 95% CI 1.44-17.38; 2009-2012 AOR 5.10, 95% CI 1.33-19.54) after controlling for sexual orientation.

Conclusions: Results of our analyses indicate that homosexually experienced heterosexual men appear to be at highest risk for depression. Furthermore, reported physical health status was a significant independent predictor of depression in all models suggesting a strong link between physical and mental health.

Relevance to clinical practice: Primary care providers should inquire about sexual orientation and sexual behaviour as part of a routine health history and be alert for depressive symptoms when orientation and behaviour are not congruent.

Summary Box

What does this paper contribute to the global clinical community?

- The current study shows that sexual orientation and sexual activity are associated with depression and that gay men and lesbians may have lower levels of depressive symptoms than heterosexuals.
- Men who have sex with men were five times more likely to have higher levels of depressive symptoms than men with only opposite sex partners. Heterosexual men reporting same-sex partners in the past 12 months appear to be the group to account for the substantial excess risk.

- Fair or poor physical health status is an independent predictor for higher levels of depression regardless of sex, sexual orientation, or sexual behaviour. People reporting fair or poor health were 2 to 10 times more likely to have higher levels of depressive symptoms.

Introduction

Depression is a highly prevalent disabling, and potentially chronic disorder worldwide that is associated with negative impact on quality of life, negative impact of stigma associated with mental illness, higher use of health care resources and loss of productivity (Public Health Agency of Canada, 2006). Moreover, depression is not equally distributed in the population and certain groups are at higher risk for the disorder including youth, aboriginals, women, people with a history of substance abuse, and those with chronic medical conditions (Kirmayer et al. 1994; De Marco, 2000; Kessler et al. 2003; Evans et al. 2005; Public Health Agency of Canada, 2006;) (De Marco, 2003; Kessler et al. 2003). Other risk factors include low income, unemployment and being unmarried. Gay men, lesbian and bisexual (GLB) men and women are also reported to be at higher risk compared to non-sexual minority people for depression (King et al. 2008). The effect of depression on health and quality of life is dramatic. People with depression report the lowest quality of health compared to people with other chronic diseases (Moussaive et al. 2007) making the identification of people at highest risk of depression an important primary health care consideration.

Background

The understanding of mental health in GLB people has historical underpinnings to pathology. Although the American Psychiatric Association delisted homosexuality as a mental disorder in 1973, only in 1986, with the publication of the DSM-III-R, was it completely delisted. The World Health Organization (WHO) delisted homosexuality as a mental disorder in 1990. Throughout the latter part of the 20th and the first decades of the 21st centuries, social attitudes have been changing and there have been dramatic changes

in public policy worldwide. Popular culture has increasingly reflected GLB issues in a positive manner (Kelly, 2013; Watercutter, 2013). Eighteen countries, including the United States, have approved freedom to marry for same-sex couples and others have recognized some form of recognition other than marriage. Openly GLB people hold public office and GLB people serve openly in the military of up to 25 countries (Palm Centre, 2009). While social stigma surrounding sexual orientation remains in many cultures and countries, research on the mental health of GLB people has refocused from homosexuality as pathology to the association of mental illness with homosexuality.

Higher risk or prevalence for mental health disorders including depression, substance misuse, and suicide have been reported in representative population samples in the United States (Bolton & Sareen, 2011; Botstick et al. 2010; Cochran & Mays, 2000a; Cochran & Mays, 2000b; Cochran & Mays, 2009); the United Kingdom (Chakraborty et al. 2011; Warner et al., 2004); Canada (Brennan et al. 2010); and the Netherlands (Sandford et al. 2001). A recent meta-analysis compared individuals who identify as heterosexual with those who identify as GLB and found higher prevalence for depression, anxiety, alcohol or drug dependence and higher risk for suicide amongst lesbians, gays, and bisexuals compared to heterosexuals (King et al., 2008).

The reasons for higher risks of mental health disorders among GLB people are multi-factorial and include health disparities linked to prejudice, discrimination and social stigma as chronic stressors (Mays & Cochran, 2001; McLauglin et al. 2010, Meyer, 2003, 2007). Meyer's minority stress model suggests that members of a minority group, such as a sexual minority, are at higher risk of mental illness because of the unique chronic stressors they encounter as a result of their disadvantaged position in society

(Meyer, 2003, 2007). If higher risk for depression can be linked to minority stress, then societal change toward acceptance and inclusiveness for sexual minorities could result in reduction of risk.

Methods

Aim

The aim of this study was to examine the relationship between sexual orientation and depression in a nationally representative population to determine if sexual minorities report higher levels of depression than the remainder of the population.

Data Sources

The data for this study were derived from the 2005-2012 National Health and Nutrition Examination Survey (NHANES) (http:// http://www.cdc.gov/nchs/nhanes.htm). The NHANES is a nationally representative annual survey of the civilian non-institutionalized U.S. population and is comprised of a home based questionnaire and a standardized physical examination in a mobile exam center (Johnson et al. 2013). The survey uses a complex, multistage probability sampling design, to achieve a nationally representative sample of the U.S. population excluding all persons in institutional settings, active duty military personnel, family members of active duty military personnel living overseas and citizens residing outside the 50 states and District of Columbia (Johnson *et al.* 2013). Two four-year aggregated cycles were created from the public use data files (2005-2008 and 2009-2012) to identify sufficient sample sizes for statistical examination. The public use sexual behaviour module provided data on adults aged 20 to 59 years old. The unweighted samples sizes were 7,190 for the 2005-2008 cycle and 7,914 for the 2009-2012 cycle. The Human Research Ethics Board at the University of

Alberta was consulted and determined no further ethics approval was required for secondary analysis of publically available datasets.

Variables

Sexual orientation. Sexual orientation was assessed in NHANES with one question asking respondents to describe themselves as heterosexual (straight), homosexual (gay or lesbian), bisexual, something else, not sure, refused, or don't know.

Sexual behaviour. Sexual behaviour was assessed with several questions identifying the type of sexual activity of respondents (vaginal or anal intercourse, oral sex), the gender of sexual partners, and the number of sexual partners in both the last 12 months and lifetime. Many questions were age or sex specific, so the total number of questions asked of respondents varied.

Males who have sex with males (MSM). A dichotomous, categorical variable was created to identify MSM, defined as a male who reported any sexual activity in the last 12 months with a male sexual partner, regardless of self-reported sexual orientation.

Females who have sex with females (FSF). A dichotomous, categorical variable was created to identify FSF, defined as a female who reported any sexual activity in the last 12 months with a female sexual partner, regardless of self-reported sexual orientation.

Depression. NHANES uses questions from the Patient Health Questionnaire 9 (PHQ-9) to screen for depressive symptoms. The PHQ-9 is a self-report assessment of the previous two weeks based on nine symptoms of depression that has been reported as a valid and reliable tool for diagnosis of depressive disorders and depression severity for clinical and research purposes (Kroenke *et al.* 2001). Symptoms are scored from 0 (not at all) to 3 (nearly every day). Presence of a major depressive disorder (MDD) and the

severity of depression is defined by several cut points from the total score ranging from 0 to 27. A continuous depression score variable was computed using the NHANES depression screener module questions and the PHQ-9 scoring criteria. A dichotomous categorical depression variable (depressed / not depressed) was computed using the PHQ-9 scoring criteria for presence of a MDD.

Demographic Characteristics. The sociodemographic variables included were sex, age, marital status, education, income, race, employment, and health status. The association of these characteristics with depression is well reported (Kirmayer et al. 1994; De Marco, 2000; Kessler et al. 2003; Evans et al. 2005; Public Health Agency of Canada, 2006;), as such they were used as covariates in the analyses. To reduce the number of categories with small number of respondents some variables were recoded. Marital status was recoded from six to three categories (Married or partnered; separated, divorced, widowed; never married). Education was recoded from five to three categories (less than high school, high school, more than high school education). Labour status was recoded from four to two categories (working/not working). Health status was recoded from five to two categories (fair or poor health / good, very good, or excellent health). Age in years at time of interview was used for age and family income to poverty index ratio was used for income.

Statistical Methods

We conducted descriptive analyses using self-reported sexual orientation as the grouping for comparison of sociodemographic characteristics. Bivariate analysis was used to examine the strength of association between the sociodemographic characteristics, sexual orientation, and depression. Multicollinearity was assessed with

tolerance and variable inflation factors (VIF) and there were no predictor variables with VIF greater than two. Logistic regression analysis was performed to predict reporting depressive symptomatology (dichotomized yes/no) based on self-reported sexual orientation and sexual behaviour. Multivariate linear regression analysis was then performed to determine differences in predicted depression scores based on self-reported sexual orientation and sexual behaviour. Finally, actual values and unstandardized predicted values for PHQ-9 depression score were compared to assess overall fit of the models.

All data analyses were conducted using SPSS version 23 complex samples module to take into account the complex nature of the sample design and provide statistically valid population inferences (Thomas & Heck, 2001; IBM, 2014). NHANES analytic guidelines were followed for the creation of four year samples, sampling weights, and assessing reliability of estimates (Johnson et al. 2013). Statistical significance was determined as $p < 0.05$. Estimates with a relative standard error (RSE) greater than 30% are marked and should be interpreted with caution. Estimates with a RSE greater than 50% were considered unreliable and not reported.

Results

The estimated proportion of depression in the 2005-2008 sample was 4.0% (95%CI 3.3 – 4.9) with women having higher rates than men (2.4% (2.0 – 3.0) versus 1.6% (1.2 – 2.0%)). In the 2009-2012 sample, the estimated proportion of depression was 5.1% (4.4 – 5.9) with women having higher rates than men (3.0 (2.5 – 3.6) versus 2.1 (1.6 – 2.7)). The estimates are similar to the U.S. population estimate of 6.7% of adults experiencing a major depressive episode in the past 12 months (Kessler et al. 2005). The

sociodemographic characteristics of the samples are presented in Table 1A for 2005-2008 and Table 1B for 2009-2012.

Overall, small proportions of respondents who answered the sexual behaviour survey in both aggregated cycles reported being a sexual minority. In the 2005-2008 sample, 4.9% of men reported being a sexual minority (gay, bisexual, something else, or unsure) and 6.2% of women reported being a sexual minority. Similarly, in the 2009-2012 sample, 4.9% of men and 7.3% of women reported being a sexual minority.

As expected, much larger proportions of gay men (82.0%), lesbians (92.8%), bisexual men (51.9%) and bisexual women (35.1%) reported same-sex sexual activity within the prior 12 months compared to heterosexual men (3.1%) and women (5.4%) in 2005-2008. In the 2009-2012 sample, there were again larger proportions of gay men (82.5%), lesbians (79.4%), bisexual men (60.5%), and bisexual women (42.1%) reporting same-sex sexual activity compared to heterosexual men (10.0%) and women (10.7%). The number of heterosexual men and women reporting same-sex sexual activity in 2009-2012 is twice that of 2005-2008. The result for men must be interpreted with caution due to the relative standard error being greater than 30% in both cycles. The estimates for women are more likely to reflect an increase. Although the 2005-2008 estimate for women has a RSE greater than 30%, the 2009-2012 does not.

Heterosexuals and respondents unsure of their sexual orientation were more likely to be married than GLB respondents. Bisexuals were most likely to be separated, divorced, or widowed while gay men, lesbians, and “other” had the highest proportions of never married. In both samples, gay men and lesbians were more likely to have post-secondary education. “Other” and “unsure” orientations had the lowest education levels.

Heterosexuals accounted for more than 90% of self-reported sexual orientation in all race groups. “Other” and non-Hispanic blacks were more likely to report being bisexual than other race groups. Nearly two-thirds or more of respondents were employed and had a family income to poverty ratio above the poverty cut line. Bisexuals, “other” and “unsure” orientations had higher proportions below the poverty cut line compared to heterosexuals or gays/lesbians. The majority proportion in both cohorts reported their health status as excellent, very good or good. “Other” and “unsure” orientations were more likely to report only fair or poor health.

The adjusted odds ratios (AOR) for depression among heterosexuals, GLB, and people reporting same-sex sexual activity are presented in Table 2A for 2005-2008 and Table 2B for 2009 – 2012. In the 2005-2008 sample gay men were less likely to report depressive symptoms than heterosexual men. The trend toward lower likelihood of depression for gay men compared to heterosexual men was present again in 2009-2012, but was not statistically significant. Lesbians in the 2005-2008 sample had lower risk of depression than heterosexual women, but showed higher risk in 2009-2012, although neither was statistically significant. It appears that the higher risk of depression in the female group accounted for the slightly higher risk of depression in the combined male/female 2009-2012 group.

Bisexual women in 2005-2008 had a non-statistically significant higher risk of depression compared to heterosexuals that became statistically significant and increased to more than double the risk in 2009-2012. Again, women accounted for the overall higher risk of depression in the bisexual group. The 2005-2008 OR for people unsure of

their sexual orientation was more than six times that of heterosexuals, but the AOR was reduced to half that and became statistically non-significant.

In both cycles there was a trend toward higher risk of depression for people reporting same-sex sexual activity. Most importantly in both cohorts, men who reported sleeping with men had up to five times the risk of depression compared to those reporting no same-sex activity. Conversely, the risk for FSF was lower than no FSF women in 2005-2008 and slightly higher in 2009-2012, but these results were not statistically significant.

The analysis was repeated using the continuous variable PHQ-9 score to re-examine the results. Multiple regression analysis was used to predict PHQ-9 depression scores with sexual orientation, sexual behaviour, age, marital status, education, race, employment status, and health status as predictor variables. Preliminary analysis showed a quadratic relationship between depression scores and both age and income, so quadratic variables were included in the model. Individual analyses were completed for males and females in the 2005-2008 (Table 3A) and 2009-2012 (Table 3B) samples. Significant regression formulas were found for each of the models. To further assess fit of the models and better interpret the regression scores, mean PHQ-9 scores were compared to the predicted values for the population. The 2005-2008 males model was similar to the dichotomous model showing a near statistically significant lower risk of depression for gay men compared to heterosexual men ($p = .066$). The model suggested that heterosexual men who had sex with men were more likely to have higher depression scores. The evidence from the dichotomous model that gay men reported less depressive symptoms compared to heterosexual men and that MSM had higher risk for depression

than non-MSM after controlling for sexual orientation suggests that the elevated risk may be attributable to heterosexual men who have sex with men. The 2005-2008 female model provided evidence that bisexual women were more likely to have higher depression scores than heterosexual women. The 2009-2012 linear model also provides evidence that bisexual women have risk for higher depression scores than heterosexual women as was shown in the dichotomous model. The trend towards lower depression risk among gay men also remained, as did the trend for higher depression scores among heterosexual men who have sex with men.

Discussion

The results provide evidence that the majority of heterosexual and GLB people did not report symptoms consistent with depression and that the prevalence of depression differs by sex, sexual orientation, and sexual behaviour. Associations with depression appear to be more closely linked to sexual behaviour and other previously known risk factors for depression rather than sexual orientation. While the independent predictability of sexual orientation was attenuated in our adjusted models, the inclusion of sexual orientation accounted for more variance than models without it.

The finding that gay men had lower past year prevalence of depression in both samples differs from most prior reports on depression symptoms in sexual minority males. There was no significant difference in risk of depression between bisexual men and heterosexual men in either sample. Taken in context of the associated higher risk of depression amongst MSM compared to non-MSM there is evidence to suggest that same-sex experienced heterosexual men may represent the population that is at higher risk for depression. These findings are consistent with other recent reports of depression in gay

men. A recent Canadian study also found that gay men had had lower depressive symptoms than heterosexual men (Juster et al. 2013) in an urban population. Furthermore, Cochran and Mays (2009) reported that same-sex experienced heterosexual men had the higher risk of depression (AOR 3.58 (95%CI 1.96 – 6.56) compared to heterosexual men, but in their study of California residents gay men also had higher risk for depression overall. The difference in findings may be the result of a national versus a single state sample.

Among women, being bisexual may be associated with a higher risk of depression than being heterosexual, and lesbians may be at lower risk for depression or at least have no difference in risk compared to heterosexual women. The risk pattern of past year depression for FSF is unclear. The lower risk suggested in the 2005-2008 sample contrasts with the higher risk suggested in the 2009-2012 sample, but neither are statistically significant, likely indicating no increased risk compared to non-FSF women. Possible lower risk associated with being lesbian is supported by the lower risk of past year depression in women with exclusively same-sex sexual attraction and same-sex behaviour reported by Bostwick et al. (2010).

People uncertain of their sexual orientation also had higher risk than heterosexuals in the 2005-2008 sample and no significant difference in the 2009-2012 sample. Uncertainty of sexual orientation could not be further stratified by sex due to small sample numbers and excessive RSE, but the findings appear similar to the higher risk for mood disorders reported by Bostwick et al. (2010). Reasons for people declaring themselves uncertain about their sexuality are not found in NHANES data. Uncertainty may identify individuals who are sexually inexperienced, questioning their sexuality, or

are unwilling to disclose their sexuality during a survey. Uncertainty may also reflect individuals who do not claim a sexual orientation or define themselves as something other than gay, lesbian or bisexual, although these other categories may also overlap in the "something else" category included in NHANES. The role of uncertain or "something else" sexual orientations on mental health is unclear in these findings.

The patterns of depression that appeared in the cohorts compared to the sociodemographic characteristics known to be risk factors for depression is informative. Gay men and lesbians had patterns of lower risk of depression with higher education, high rates of employment, good family income to poverty index ratios, and high self reported health. The favourable profiles for depression risk factors in these cohorts support the findings of lower levels of depression in this study. Bisexual people had lower levels of education, were more likely to be a racial minority, lower levels of employment and lower family income to poverty index ratios, and slightly lower levels of self-reported health status than both heterosexual and gay men or lesbians, all of which may account for the overall trend to higher rates of depression in the bisexual group. People who are uncertain of the sexual orientation had the least favourable risk profiles based on sociodemographic characteristics.

Social stigma and discrimination have been hypothesized as factors accounting for higher risk of mental illness for sexual minorities (Meyer, 2003; 2007). If that is the case, then as negative societal attitudes change toward positive attitudes, then risk should attenuate. The current findings are opposite to reports of early studies using data collected in the 1980's and 1990's (Cochran & Mays 2000a; 2000b; Sandfort et al. 2001) that suggested higher prevalence of depression for sexual minority men. According to the

General Social Survey (GSS) project of the NORC at the University of Chicago, in 1984, 87% of the U.S. population believed homosexuality was wrong compared to 56% in 2012 (Smith et al. 1972-2014) reflecting a dramatic change perception. The findings of the GSS may be, in part, a reflection of the improvement in societal attitudes towards sexual minorities in the U.S.

One of the most informative findings of this study is the strong association between physical health status and depression. Across both cohorts in the dichotomous and continuous models, fair or poor health was consistently an independent predictor for higher levels of depressive symptoms. Adjusted odds ratios for men reporting fair or poor health in both cohorts had substantial excess risk for depressive symptoms between seven to nine times that of men reporting good, very good, or excellent physical health. Together, sexual orientation based on same-sex sexual activity and physical health status, may explain some of the differences in depression risk in this study compared to others. Cochran & Mays' (2000a; 2000b) studies using U.S. national population samples that reported elevated risk of depression used models that did not adjust for health status and both used reports of any same-sex sexual activity as the indicator for sexual orientation. They analysed data from the 1996 National Household Survey of Drug Abuse (Cochran & Mays, 2000a) and NHANES III 1988-1994 (Cochran & Mays, 2000b). Sandfort et al. (2001) also used a national population sample, the 1996 Netherlands Mental Health Survey, using any same-sex sexual activity to define sexual orientation and also did not adjust for health status. Sexual minority men were likely to report poorer health in those time frames since all three studies were conducted prior to or just as new highly active antiretroviral treatment drugs became available and HIV/AIDS transitioned from a

terminal disease to a chronic one. If homosexually experienced heterosexual men were the sub-set accounting for higher risk of depression then, as they were in the current study, using a single measure of same-sex sexual activity would not have uncovered the pattern.

There are a number of important strengths to this study. First, it measured depression distinct from other mental health disorders unlike other studies that have measured combinations of mood and anxiety disorders (Bostwick et al. 2010; Brennan et al. 2010; Chakraborty et al. 2011; Warner et al. 2004). Combining disorders may lead to inflated estimations of risk overall as can be demonstrated by studies that report combined mental health disorder risk and individual risk. For example, Sandfort et al. (2001) reported that gay men had higher 12-month prevalence of mood disorders, but when reported by individual disorders, both dysthymia and bipolar disorder explained the greatest amount of elevated risk.

The ability to combine adjacent continuous cycles of NHANES data to achieve large sample sizes and the inclusion of more than one measure of sexual orientation are also important strengths for research on the mental health of sexual minorities in this study. Sexual orientation is complex and reflects intertwined and measureable aspects of self-identification, sexual activity, and sexual attraction (Sell, 1997). Previous studies measuring sexual orientation with single categorical self-identification measures (Bolton & Sareen, 2011; Chakraborty et al. 2011), or single measures of sexual activity (Cochran & Mays, 2000a, 2000b; Sandfort et al. 2001) have consistently reported elevated risk for mental health disorders. Studies that have used more than one measure, such as self-identification and sexual activity have shown differences. Bostwick et al. (2010)

measured sexual orientation, sexual attraction, and sexual behaviour and found exclusive lesbians had lower risk of mood disorders. Cochran & Mays (2009) used self-identification and sexual behaviour and identified heterosexual men who have had same-sex behaviour as having the highest risk of depression. Both of those findings are mirrored in this study using two measures of sexual orientation.

The main limitation of this study is the relatively small numbers achieved in the gay/lesbian, bisexual, unsure, and something else sexual orientation categories. To compensate, RSE and confidence intervals are included, and NHANES reporting guidelines for variance were followed. Although the models were adjusted for co-variates, differences in depression amongst specific groups including socioeconomic status, age cohorts or race/ethnicity were not explored due to limitations of sample sizes. Similarly, fuller exploration of sexual orientations other than gay/lesbian or bisexual was not possible. Depression was identified using self-report of depressive symptoms utilizing the PHQ-9 screening tool rather than a clinical diagnosis of depression. Although the PHQ-9 is a validated tool, there may be bias towards over or under reporting of depression cases based on a screening tool versus a clinical diagnosis of depression.

Conclusion

This study provides evidence that being gay/lesbian or bisexual may not contribute to higher risk for depression and that gay men and lesbians may actually have lower rates of depression compared to identified heterosexuals. There was, however, evidence of an association of depression with male same-sex sexual partners regardless of declared sexual orientation. The findings are consistent with other recent studies and

suggest the importance of evaluating mental health risk by discrete disorders rather than by larger groupings such as mood, anxiety, or substance use disorders. Sexual orientation must be studied in context of differences among sex and categories of orientation. Multiple measures of sexual orientation will help identify important patterns such as the one found here amongst men. This study, taken in context of existing research, suggests that prevalence of depression in sexual minorities may have been over estimated, in part, due to the variations in measures of sexual orientation and mental health used in earlier works. This study does not provide evidence that sexual minorities do not continue to suffer from a higher burden of mental health disorders overall, but suggests the need for focussing research on what subgroups and which disorders account for the differences. Changing societal attitudes towards sexual minorities necessitates continued research into their mental health.

Relevance to clinical practice

Current clinical practice guidelines recommend that primary care providers be alert to symptoms of depression in people who may be at higher risk (Joffres et al., 2013; National Institute for Health and Care Excellence, 2009; United States Preventive Services Task Force, 2009). This study suggests sexual orientation may not confer excess risk for depression as previously reported and supports more recent findings that gay men and lesbians may have lower rates of depression compared to heterosexuals. Most important is the finding that homosexually experienced heterosexual men appear to have the highest levels of depressive symptoms. Clinicians should strive to determine sexual orientation and sexual behaviour as part of health history taking in clinical practice and be alert to the presence of depressive symptoms in men whose declared sexual orientation

and sexual history are not congruent. This study, once again, highlights that GLB people are affected by a range of social, structural, and behavioural issues that impact their health and use of the health care system. Health care providers must be familiar with the unique health needs of GLB people to identify barriers to accessing appropriate services and to tailor clinical interventions to provide supportive and sensitive care to this population

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Table 1A
Socieodemographic characteristics of Adults aged 20-59: NHANES cycles 2005-2008.
(n=7190)

	Heterosexual %	Gay or Lesbian %	Bisexual %	Other %	Unsure %	X^2 *p* value
Self-reported Sexual Orientation						51.876 <0.001
Total	94.5	2.5	2.4	0.4	1.0	
Male	95.2	2.5	1.3	0.3	0.8	
Female	93.8	1.1	3.5	0.4*	1.2	
Self –reported Sexual Activity in the previous 12 months						
No SSA	79.9	3.2*	15.2	--	1.1*	305.705 <0.001
SSA	10.3	55.6	39.9	--	--	
No MSM	96.9	18.0	48.1	62 *	68.3	219.337 <0.001
MSM	3.1	82.0	51.9	--	--	
No FSF	94.6	7.2	64.9	--	63.0*	97.601 <0.001
FSF	5.4*	92.8	35.1	73.4*	--	
Marital Status						170.209 <0.001
Married or Partnered	67.5	36.0	43.0	43.2	64.2	
Separated, Divorced, Widowed	13.7	--	22.4	--	11.8	
Never Married	18.8	61.3	34.6	46.2	24.0	
Education						121.364 <0.001
Less than High School	15.7	7.6*	19.6	27.8	58.7	
High School	24.0	6.7*	22.4	21.3*	25.	
More than High School	60.4	85.7	57.9	50.9	15.7*	
Ethnicity						87.958 <0.001
White (Non-Hispanic)	95.0	1.8	2.6	0.2*	0.4*	
Hispanic	93.1	1.4	1.4	0.8	3.4	
Black (Non-Hispanic)	93.4	1.7	3.1	0.8	1.0*	
Other	94.1	2.7*	--	--	2.0*	
Labour Status						26.648 0.009
Working	79.4	78.4	67.0	60.4	63.2	
Not Working	20.6	21.6	33.0	39.6	36.8	
Family Income to Poverty Ratio with 1.00 at or above poverty line						52.063 <0.001
0.00 – 0.99	12.4	6.3*	23.4	22.4*	38.7*	
1.00 and above	87.6	93.7	76.6	77.6	61.3	
Health Status						15.358 0.031
Excellent, Very Good or Good	86.3	86.9	80.3	70.4	74.6	
Fair or Poor	13.7	13.1*	19.7	29.6	25.4	

Note: * Interpret result with caution, result may be unreliable with Relative Standard Error (RSE) > 30%.
-- RSE > 50%, result not reported. Sample size is unweighted. Proportion totals may not equal 100% due to rounding.

Table 1B
Sociodemographic characteristics of Adults aged 20-59: NHANES cycles 2009-2012.
(n=7,914)

	Heterosexual %	Gay or Lesbian %	Bisexual %	Other %	Unsure %	X^2 *p* value
Self-reported Sexual Orientation						55.640 <0.001
Total	93.9	1.8	2.6	0.4	1.3	
Male	95.0	2.3	1.4	0.3*	0.9	
Female	92.7	1.3	3.8	0.5	1.7	
Self –reported Sexual Activity in the previous 12 months						
No SSA	89.5	18.5*	53.0	63.6	53.1*	67.432 <0.001
SSA	10.5	81.5	47.0	36.4 *	46.9*	
No MSM	90.3	--	39.5	78.3	100	86.324 <0.001
MSM	10.0*	82.5	60.5	--	0	
No FSF	89.3	20.6*	57.9	--	46.6*	165.295 <0.001
FSF	10.7	79.4	42.1	53.2*	17.6*	
Marital Status						102.061 <0.001
Married or Partnered	62.9	41.5	41.4	58.2	45.0	
Separated, Divorced, Widowed	14.1	--	15.6	17.8*	16.2	
Never Married	23.0	51.5	43.3	24.0*	38.8	
Education						77.462 <0.001
Less than High School	14.9	8.1*	18.1	34.4	44.0	
High School	21.0	15.6	26.4	15.0*	20.5	
More than High School	64.1	76.3	55.5	50.5	35.6	
Ethnicity						94.145 <0.001
White (Non-Hispanic)	94.5	2.2	2.6	0.2*	0.5	
Hispanic	93.3	1.1	2.0	0.8	2.8	
Black (Non-Hispanic)	92.4	1.6	3.6	--	2.1	
Other	92.0	0.9*	5.8 *	1.4*	3.8*	
Labour Status						14.725 0.059
Working	73.9	71.9	64.2	67.0	61.7	
Not Working	26.1	28.1	35.8	33.0	38.3	
Family Income to Poverty Ratio with 1.00 at or above poverty line						40.473 <0.001
0.00 – 0.99	16.3	21.6	30.9	31.3	31.8	
1.00 and above	83.7	78.4	69.1	68.7	68.2	
Health Status						24.388 0.001
Excellent, Very Good or Good	84.6	87.2	78.9	76.1	67.4	
Fair or Poor	15.4	12.8	21.1	23.9	32.6	

Note: * Interpret result with caution, result may be unreliable with Relative Standard Error (RSE) > 30%.
-- RSE > 50%, result not reported. Sample size is unweighted. Proportion totals may not equal 100% due to rounding.

Table 2A

Adjusted odds ratio for depression (yes/no) in men and women by sexual identity and sexual activity: NHANES cycles 2005 - 2008

		All AOR (95% CI) (n=596)	Men AOR (95% CI) (n=339)	Women AOR (95% CI) (n=236)
By sexual orientation				
	Heterosexual (Reference)	1.00	1.00	1.00
	Gay or Lesbian	0.54 (0.16 – 1.79)	0.12 (0.03 – 0.59)*	0.76 (0.17 – 3.46)
	Bisexual	0.84 (0.31 – 2.29)	0.11 (0.01 – 1.25)	1.20 (0.44 – 3.26)
	Other	0.49 (0.32 – 7.56)	#	#
	Unsure	3.71 (0.72 – 19.18)	#	#
By sexual behaviour				
	SSA	1.01 (0.25 – 4.56)		
	MSM		5.00 (1.44 – 17.38)*	
	FSF			0.56 (0.13 – 2.49)
Gender				
	Female	2.17 (1.28 – 3.67)		
Marital Status				
	Married or partnered (Reference)	1.00	1.00	1.00
	Separated, divorced, widowed	1.12 (0.60 – 2.08)	1.84 (0.90 – 3.75)	0.58 (0.18 – 1.85)
	Never married	0.87 (0.44 – 1.71)	1.94 (0.69 – 5.47)	0.30 (0.08 – 1.08)
Education				
	Less than high school (Reference)	1.00	1.00	1.00
	High school	1.31 (0.47 – 3.69)	0.99 (0.33 – 2.99)	2.17 (0.42 – 11.18)
	More than high school	0.92 (0.53 – 1.60)	0.97 (0.33 – 2.84)	1.03 (0.42 – 2.55)
Race/Ethnicity				
	White (Reference)	1.00	1.00	1.00
	Hispanic	0.42 (0.16 – 1.14)	0.37 (0.13 – 1.09)	1.45 (0.51 – 4.17)
	Black (non-Hispanic)	0.86 (0.46 – 1.60)	0.94 (0.40 – 2.22)	1.08 (0.34 – 3.47)
	Other	0.56 (0.07 – 4.52)	1.26 (0.04 – 40.22)	0.30 (0.04 – 2.00)
Labour Status				
	Not working	0.97 (0.47 – 2.03)	1.27 (0.29 – 5.47)	0.91 (0.37 – 2.22)
Health Status (Reference is Good, very good or excellent)				
	Fair or poor	8.66 (4.93 – 15.23)	9.05 (3.78 – 21.66)	10.43 (4.12 – 25.93)
Age		1.01 (0.98 – 1.04)	1.02 (0.97 – 1.08)	1.03 (0.98 – 1.07)
Family income to poverty index ratio		0.55 (0.52 – 0.84)	0.76 (0.47 -1.23)	0.48 (0.35 – 0.66)

Note: AOR = adjusted odds ratio, CI = confidence interval, SSA = same-sex activity, MSM = males who have sex with males, FSF = Females who have sex with females. Odds ratios are adjusted for age, education, income, marital status, employment status, race/ethnicity, and health status. "All" model also adjusted for gender.

n = sample size unadjusted for complex sample design and weighting.

* $p < 0.05$.

Result not reported due to unreliability in model size.

Table 2B

Odds ratio and adjusted odds ratio for depression (yes/no) in men and women by sexual identity and sexual activity: NHANES cycles 2009 -2012

		All AOR (95% CI) (n=452)	Men AOR (95% CI) (n=142)	Women AOR (95% CI) (n=284)
By sexual orientation				
	Heterosexual (Reference)	1.00	1.00	1.00
	Gay or Lesbian	1.45 (0.53 0 3.99)	0.89 (0.17 – 4.71)	1.72 (0.46 – 6.39)
	Bisexual	2.00 (0.76 – 5.27)	1.09 (0.20 – 5.94)	2.64 (1.04 – 6.70)*
	Other	2.49 (0.71 – 8.79)	#	#
	Unsure	1.02 (0.22 – 4.64)	#	#
By sexual behaviour (Reference is no same-sex sexual activity)				
	SSA	1.80 (0.87 – 3.73)		
	MSM		5.10 (1.33 – 19.54)*	
	FSF			1.44 (0.61 – 3.40)
Gender				
	Female	1.26 (0.63 – 2.52)		
Marital status				
	Married or partnered (Reference)	1.00	1.00	1.00
	Separated, Divorced, Widowed	1.25 (0.45 – 3.49)	0.39 (0.03 – 5.45)	2.26 (0.78 – 6.51)
	Never Married	0.98 (0.45 – 2.14)	0.29 (0.10 – 0.83)	1.56 (0.51 – 4.76)
Education				
	Less than high school (Reference)	1.00	1.00	1.00
	High school	1.54 (0.83 – 2.86)	0.58 (0.07 – 4.96)	2.07 (0.87 – 4.94)
	More than high school	1.03 (.52 – 1.90)	0.68 (0.12 – 3.82)	1.37 (0.49 – 3.83)
Race/Ethnicity				
	White (Reference)	1.00	1.00	1.00
	Hispanic	1.03 (0.47 – 2.27)	0.24 (0.06 – 0.99)	0.88 (0.30 – 2.58)
	Black (non-Hispanic)	0.99 (0.43 – 2.27)	0.30 (0.6 – 1.59)	1.17 (0.39 – 3.51)
	Other	1.23 (0.43 – 3.54)	0.84 (0.14 – 4.92)	1.57 (0.45 – 5.51)
Labour Status				
	Not working	2.98 (1.40 – 6.33)	4.33 (0.68 – 27.58)	3.11 (1.15 – 8.42)
Health Status (Reference is Good, very good or excellent)				
	Fair or Poor	3.09 (1.70 – 5.62)	7.68 (1.76 – 33.54)	2.33 (1.11 – 4.88)
Age		1.01 (0.98 – 1.05)	0.97 (0.91 – 1.03)	1.02 (0.97 – 1.06)
Family Income to poverty ratio		0.74 (0.52 – 1.05)	0.42 (0.26 – 0.66)	0.88 (0.57 – 1.36)

Note: AOR = adjusted odds ratio, CI = confidence interval, SSA = same-sex activity, MSM = males who have sex with males, FSF = Females who have sex with females. Odds ratios are adjusted for age, education, income, marital status, employment status, race/ethnicity, and health status. "All" model also adjusted for gender.

n = sample size unadjusted for complex sample design and weighting.

* $p < 0.05$.

Result not reported due to unreliability in model size.

Table 3A

Summary of multiple regression analysis for variables predicting PHQ-9 depression scores in adult males aged 20-59: NHANES cycles 2005 – 2012

	2005 – 2008 (n=339)					2009 – 2012 (n=142)				
			95% Confidence Interval		*p*			95% Confidence Interval		*p*
Variable	*B*	SE	Lower	Upper	value	*B*	SE	Lower	Upper	value
MSM = none	-1.30	.81	-2.96	.37	.191	-.86	.87	-2.66	.94	.333
Gay	-1.40	.73	-2.90	.10	.066	-.29	1.10	-2.57	2.00	.798
Bisexual	-.91	.82	-2.59	.78	.277	.13	1.01	-1.96	2.22	.897
Less than High School	.34	.66	-1.02	1.70	.610	2.55	1.36	-2.58	3.48	.073
High School	-.09	.63	-1.39	1.22	.83	.90	.75	-.66	2.50	..246
Married or Partnered	-.63	.51	-1.69	.42	.227	.53	.71	-.95	2.01	.467
Separated, Divorced, Widowed	.12	.61	-1.14	1.38	.844	.52	1.43	-2.44	3.48	.720
White	-.69	1.31	-3.39	2.00	.601	1.29	.83	-.43	3.01	.133
Black	-1.40	1.25	-3.97	1.18	.274	-.02	1.17	-2.44	2.40	.987
Hispanic	-2.26	1.30	-4.93	.41	.093	-.76	1.25	-.66	2.46	.549
Employed	-1.21	.77	-2.79	.38	.129	-2.78	1.17	-2.44	2.40	.010
Fair or Poor Health	4.54	1.05	2.37	6.72	.000	3.50	.84	1.76	5.23	.000
Age	.21	.12	-.04	.46	.089	.50	.23	.97	2.18	.039
Income	-.27	.77	-1.85	1.32	.731	-1.29	1.12	-3.62	1.04	.025
Age Quadratic	-.003	.002	-.01	.00	.082	-.01	.003	-.01	-2.40	.262
Income Quadratic	-.03	.11	-.27	.20	.764	.09	.19	-.30	.47	.647

Note: 2005-2008 $R^2 = .24$, $p = .03$. 2009-2012 $R^2 = .41$, $p < .001$.

Reference categories: Same-sex activity in past 12 months (MSM or FSF); Heterosexual; Education more than high school; Never Married; Race other; Labor status unemployed; Health status good, very good or excellent.

n = sample size unadjusted for complex sample design and weighting.

Table 3B

Summary of multiple regression analysis for variables predicting PHQ-9 depression scores in adult females aged 20-59: NHANES cycles 2005 – 2012

	2005 – 2008 (n=236)					2009 – 2012 (n=284)				
			95% Confidence Interval		*p*			95% Confidence Interval		*p*
Variable	*B*	SE	Lower	Upper	value	*B*	SE	Lower	Upper	value
FSF = none	.61	.92	-.13	2.49	.513	-.24	.85	-1.87	1.48	.776
Lesbian	-.71	1.10	-2.95	1.53	.522	.72	1.36	-2.05	3.49	.600
Bisexual	1.47	.70	.05	2.89	.043	1.49	1.10	-.75	3.73	.185
Less than High School	-.88	.67	-2.24	.48	.197	-.15	1.22	-2.63	2.33	.901
High School	1.77	.91	-.08	3.62	.060	.38	.77	-1.18	1.95	.622
Married or Partnered	.68	.53	-.41	1.76	.212	-61	.97	-2.59	1.36	.531
Separated, Divorced, Widowed	1.55	.72	.07	3.03	.040	-.129	1.14	-2.45	2.19	.911
White	2.64	1.08	.43	4.84	.021	-.45	1.15	-2.79	1.90	.702
Black	3.29	1.14	.96	5.63	.007	-.78	1.36	-3.55	2.00	.573
Hispanic	2.97	1.03	.88	5.07	.007	-.67	1.55	-3.82	2.48	.668
Employed	-.76	.68	-2.15	.62	.268	-2.79	.90	-4.62	-.96	.004
Fair or Poor Health	5.24	.85	3.50	6.98	.000	3.26	.95	1.32	5.19	.002
Age	.71	.20	.30	1.12	.001	.34	.27	-.22	.90	.225
Income	-2.69	1.42	-5.59	.21	.067	0.2	.79	-1.56	1.62	.266
Age Quadratic	-.01	.003	-.02	-.004	.001	-.004	.004	-.01	.003	.980
Income Quadratic	.31	.22	-.14	.77	.167	-.08	.15	-.37	.23	.617

Note: 2005-2008 $R^2 = .41$, $p < .001$. 2009-2012 $R^2 = .19$, $p = .016$.

Reference categories: Same-sex activity in past 12 months; Heterosexual; Education more than high school; Never Married; Race other; Labor status unemployed; Health status good, very good or excellent.

n = sample size unadjusted for complex sample design and weighting.

Chapter 4. Sexual Orientation and Depression in Canada[5]

ABSTRACT

Background: Depression is a global concern and it is well known that certain segments of the population are at greater risk. Sexual minorities are recognized as being more likely to suffer from depression due to social stigma and prejudice. The aim of this study was to describe the relationship between sexual orientation and depression in the Canadian population.

Methods: The study used the 2012 Canadian Community Health Survey – Mental Health data. The sample comprised 24,788 Canadians living in the ten provinces. Logistic regression analyses were used to examine the relationship of depression and sexual orientation.

Results: After adjusting for known risk factors for depression, there was no difference in prevalence of past 12-month or lifetime major depressive episode between sexual minorities and heterosexuals. Bisexuals did have a near significant trend towards higher prevalence of both past 12-month and lifetime depression as a combined group, but there were not clear differences when stratified by sex.

Conclusion: This study supports important emerging trends in the relationship between sexual orientation and depression. Research on the mental health of sexual minority people must take into account differences between sexual minority groups and avoid aggregating mental health disorders into broad categories. These findings have implications for public health planning and clinical recommendations.

[5] A revised version of this chapter has been accepted for publication by the *Canadian Journal of Public Health* and is included here in the format of the original submission.

Introduction

Depression is a common mental health problem characterized by depressed mood and loss of interest or pleasure in usual activities; at its worst, it may also include thoughts of death and even suicide (APA, 2013). With 350 million people affected annually, depression is the third leading cause of disability adjusted life years and an important public health concern (World Health Organization, 2014). *The World Mental Health Survey* estimates the 12 month prevalence of mood disorders, including depression, is between 1.1% and 9.7% with the highest rates in western nations (Kessler et al., 2009). In Canada, the 12-month prevalence of a major depressive episode (MDE) is estimated at 4.7% and lifetime MDE is 11.3% in the general population aged 15 and older (Pearson, Janz & Ali, 2013).

The risk for depression differs amongst sub-groups of the population. Youth, aboriginals and other racial minority groups, persons with substance abuse disorders, and those who live with chronic illness have reportedly higher rates of depression (De Marco, 2000; Evans et al, 2005; Government of Canada, 2006; Kessler, 2003; Kirmayer et al., 1994). Sexual minorities (i.e., persons who identify as lesbian, gay or bisexual [LGB]) have also been reported to have higher risk for risk depression than heterosexuals (King et al., 2008). Minority stress theory suggests that members of minority groups suffer higher risk of mental health disorders as an effect of the unique chronic stressors they are exposed to through social stigma and discrimination (Meyer, 2007).

The mental health of sexual minorities in Canada has not been the subject of much study. There is conflicting evidence in the literature with reports of both higher risk for mood disorders among sexual minority women and men as well as lower risk in

sexual minority men (Brennan, Ross, Dobinson, Veldhuizen & Steele, 2010; Steel, Ross, Dobinson, Veldhuizen & Tinmouth, 2009; Juster, Smith, Ouellet, Sindi & Lupien, 2013) . Since depression is such a potentially disabling chronic disease, it is important to identify groups at greatest risk and particular risk factors. The purpose of this study is to describe the relationship between sexual orientation and depression in Canada.

Methods

Design

We conducted a secondary analysis of cross-sectional data from the Canadian Community Health Survey – Mental Health (CCHS-MH).

Ethical Considerations

The University of Alberta Research Human Ethics Board determined that additional ethics approval was not required for this secondary analysis given the ethical oversight of the original Statistics Canada study. Participants in the original study provided informed consent prior to completing the CCHS-MH survey.

Sample

The CCHS-MH survey was carried out between January and December 2012 and collected data on health,social, and economic determinants factors, influences, and processes that contribute to mental health. It sampled Canadians aged 15 years and older living in the ten provinces. Residents of the three territories, persons living on reserves and other Aboriginal settlements, full time members of the Canadian Armed Forces, and institutionalized persons were excluded. The excluded groups represented less than 3% of the target population Statistics Canada 2013a). The CCHS-MH used a three-stage sampling design that sequentially and randomly selected geographical clusters,

households, and then one respondent per household. The detailed design is reported elsewhere (Statistics Canada, 2013a). Data was collected by computer-assisted personal interviewing; 25,113 valid were interviews completed.

Variables

Sexual orientation was assessed with a single question asking respondents if they consider themselves 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), or bisexual (sexual relations with people of both sexes). Responses were categorised as heterosexual (straight), homosexual (gay men and lesbian), bisexual, don't know and refused. Don't know and refused were recoded to a single "other" category for this analysis due to small numbers of respondents.

Depression was defined as an MDE, characterized as a period of at least two weeks of persistent depressed mood, loss of interest or pleasure in usual activities, accompanied by symptoms such a decreased energy, changes in sleep and appetite, impaired concentration, and feelings of guilt, hopelessness or suicidal thoughts. A modified version of the WHO Composite International Diagnostic Interview (CIDI) was used to assess the presence of 12-month or lifetime MDE (Kessler et al., 2004; Statistics Canada, 2013b).

Social Support was measured using an abbreviated Social Provisions Scale (Cutrona & Russell, 1987; Statistics Canada, 2013b), which measured five main social domains - attachment, guidance, social integration, reliable alliance and reassurance of worth. Scores of 10 to 40 are possible, with higher scores reflecting a higher level of perceived social support.

Negative Social Interactions in the preceding month were measured with four questions (Krause, 1995; Statistics Canada, 2013b). These negative social interactions included too many demands from others; feeling that others are critical of the respondent or of things they had done; feeling others were thoughtless or inconsiderate; and that others acted angry or upset towards the respondent. Potential scores ranged from 0-12, with higher scores indicating more negative social interactions.

Socio-demographic variables included age, sex, income, education level, employment status, marital status and race. To reduce the number of categories with small numbers of respondents and comply with Statistics Canada guidelines, some of these variables were recoded. Marital status was reduced from six to three categories: partnered (married and common-law); separated, divorced, or widowed (SDW); and never married. Race was reduced from 13 categories to 2: white and other. Remaining variables were education (less than secondary school, secondary graduate, other post-secondary, post-secondary graduate), employment (employed, unemployed), and sex (male or female).

Health Status was assessed by a screening question for self-perceived physical health on a five-point scale (poor, fair, good, very good, or excellent). Again, to reduce small numbers in the categories they were recoded to binary categorical variables of "good, very good/excellent" and "poor/fair".

Statistical Analysis

Sample weights provided by Statistics Canada were used to ensure the estimates were representative of the study population. Bootstrapping was performed as a variance estimation technique to account for the complex sample design. Statistics Canada

guidelines for data analysis and release were followed (Statistics Canada, 2013a). SAS version 9.4 software was used.

First, we compared demographic characteristics stratified by sexual orientation using chi-square tests for independence. Next we completed a series of three binomial logistic regression models to test for differences in the prevalence of past-year and lifetime MDE by sexual orientation and sex. We calculated unadjusted odds ratios (OR), and adjusted odds ratios (AOR) with three separate models. We adjusted one model for the sociodemographic variables associated with depression (age, education, income, marital status, employment status, race/ethnicity, and perceived physical health). Age was found to have a curvilinear relationship with depression, so a quadratic covariate was included. In the final model we introduced social support and negative social interaction scores as covariates on the premise that these variables might differ between sexual orientation identities as a surrogate measure for minority stress effects. Finally, we completed a multivariable linear regression analyses to examine the relationship between sexual orientation and both social support and negative social interactions.

Results

There were 24,788 Canadians aged 15 and over in the sample with small proportions of gay men (1.5%), lesbians (0.7%), bisexual men (0.6%) and bisexual women (1.1%). Slightly more men (1.8%) were categorized as other (don't know or refused) for sexual orientation compared to women (1.1%). In sexual minority groups, men were more likely to identify as gay than bisexual, while the converse was true for women. Comparison of demographic characteristics is presented at Table 1. The sexual orientation groups differed on most variables. Bisexuals (62.3%), gay men and lesbians

(56.0%), and other (48.8%), were more likely than heterosexuals to have never married. Heterosexuals (13%) and other (13.7%) were more likely to be separated, divorced, or widowed than were sexual minorities. Gay men and lesbians (87.5%) were more likely to be post-secondary graduates than heterosexuals (77.9%), while bisexuals (68.8%) were less likely. White people accounted for the majority of people identifying as gay, lesbian or bisexual. There were small proportions of sexual minorities amongst the racial minorities group. About half of bisexuals were unemployed in the past week and gay men and lesbians had the highest rate of employment. Bisexuals were more likely to report poor physical health (26.6%) and mental health (19.9%). Heterosexuals had the highest proportions of good physical and mental health. In this sample, heterosexuals were older than the sexual minority groups. The gay men and lesbian group had the highest mean household income.

The CCHS-MH prevalence for lifetime and 12-month MDE has been reported elsewhere and our findings did not differ Pearson, Janz & ali, 2013). Sexual minority groups showed significant differences in prevalence of MDE. Bisexuals had the highest prevalence of 12-month MDE (22.4%, 95% CI 13.3 – 31.4%), followed by gay men and lesbians (13.5%, 95% CI 7.3 -19.7%), other (4.6% 95%, CI 1.6 -7.6%) and heterosexuals (4.5%, 95% CI 4.1- 4.9%). A similar pattern existed for lifetime MDE with bisexuals reporting the highest rates (30.8%, 95% CI 21.5 – 40.1) followed by gay men and lesbians (22.0%, 95% CI 15.1 – 28.8), heterosexuals (11.0%, 95%CI 10.4 – 11.7) and other (9.3%, 95% CI 4.4 -14.3%). The prevalence in the heterosexual groups was again very similar to the prevalence reported for the general Canadian population (Pearson, Janz, & Ali, 2013). The proportions reported for gay men and lesbians, bisexuals and

'other' with past-year MDE had high co-efficients of variation (CV) and should be interpreted cautiously. Likewise the proportion reported for other with lifetime MDE had a high CV and should be interpreted cautiously.

Unadjusted and adjusted OR for lifetime and past 12-month MDE based on sexual orientation and stratified by sex are displayed in Tables 2 and 3. The unadjusted odds ratios revealed higher prevalence for past 12-month depression for bisexuals (OR=5.95, 95% CI 3.32 – 10.67), but not for gay men and lesbians. Stratification by sex showed that the prevalence in gay men and lesbians did not differ significantly from heterosexual counterparts, but bisexual women (3.29, 95% CI 1.35 – 8.00) had higher prevalence compared to heterosexual groups. Differences in prevalence between LGB and heterosexuals were not significant in either of the two adjusted models. There was a near significant trend towards higher prevalence for past 12-month depression for bisexuals in model 2 (OR=1.97, 95%CI 0.94-4.12) and model 3 (OR=1.93, 95% CI 0.91 – 4.11).

Unadjusted OR for lifetime prevalence of MDE was also higher in the combined bisexual group (OR=2.27, 95% CI 1.29 – 3.99) and the bisexual men group (OR=3.08, 95%CI 1.12 – 8.49). As was the case for past 12-month MDE the prevalence for lifetime MDE did not significantly differ between the sexual minority groups and the heterosexual groups in the adjusted models, but there was again a near significant trend towards higher prevalence for bisexuals in both model 2 (OR=1.75, 95% CI 1.003 – 3.05) and model 3 (OR=1.73, 95%CI 0.99 – 3.03).

In the adjusted models most covariates were significantly associated with depression. Income and education were inversely associated with depression. Not being married, being unemployed, higher income levels and poor perceived physical health

were all linked with higher odds ratios for depression. Social support scores were generally not significant in the models and negative social interaction scale scores were associated with only a slightly higher prevalence for depression.

Table 4 presents the multivariable linear regression analysis results predicting social support and negative interaction scale scores based on sexual orientation. Sexual orientation was not a significant independent predictor of social support scores in the model grouping men and women together. Female sex, being employed, and being a post-secondary gradate were all significant predictors of higher social support. Younger age, being separated, divorced or widowed or never being marred were significant predictors of lower social support. Sexual minority status was associated with lower negative social interaction scale scores for gay men/lesbians (*B*=.796, p=.000), but higher for bisexuals (*B*=1.202, p=.000). Age and never being married were associated with lower negative interaction scores while female sex; being separated, widowed, or divorced; being a racial minority; and being employed were all associated with higher negative interaction scores. Higher education was also associated with higher negative interaction score.

When the models were changed to include men only, Bisexual men emerged with lower social support scores (*B*=-1.335, *p*=.011) and both gay men (*B*=.796, *p*=.000) and Bisexual men (*B*=1.202, *p*=.000) had higher negative interaction scores. In women only models there was no significant difference in social support scores for lesbians (*B*=.289, *p*=.491) or bisexual women (*B*=-.346, *p*=.319) compared to heterosexual women. Negative social interaction scores were higher for bisexual women (*B*=1.063, *p*=.000), but no difference was found for lesbians (*B*=.272, *p*=.252)

Discussion

This study adds to the existing evidence that the majority of persons who identify as LGB do not suffer from depression. More importantly, this study supports emerging findings that sexual orientation is associated with depression, but that important sub-group differences exist among gay men, lesbians and bisexuals. This study also underscores the importance of examining mental health disorders more discretely than using broad groupings of mood and anxiety and/or other disorders.

There is supporting evidence for the novel finding of reduced prevalence of depression in gay men compared to heterosexual men and no difference in prevalence between heterosexual and bisexual men reported in a US population sample and in another recent Canadian study (Juster et al., 2013; Scott, Lasiuk, & Norris, 2016). Although lower prevalence for gay men was not repeated here, there was no significant difference found in MDE prevalence for sexual minority men compared to heterosexual men. With only self-identity as a measure of sexual orientation, it is not possible to determine the effect of discordance between sexual identity and sexual activity or attraction in this study to compare to findings that heterosexually identified men with same-sex partners account for higher prevalence of depression previously reported in Scott, Lasiuk & Norris (2016) and the California Quality of Life study (CQoL) (Cochran & Mays, 2009).

Lesbian and bisexual women do not appear to be at greatest risk for 12-month or lifetime MDE. This finding differs with the report of higher prevalence for mood and anxiety disorders (3.6 95%CI 2.51-5.16) for bisexual women reported in CCHS Cycle

2.1, but is similar to the CCHS 2.1 finding that reported no significant difference for mood and anxiety disorders for lesbians (Steel et al., 2009). The difference may well be the result of grouping disorders together in the earlier study, however, it is important to note that higher depression prevalence for bisexual women was also found in both the CQoL and National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) Wave 2 (Bostwick, Boyd, Hughes, & McCabe, 2010; Cochran & Mays, 2009). The near significant trend towards higher prevalence of depression in the combined bisexual group in the present study may be reflective of the differences for bisexual women found in the previous reports.

The role of social support and negative social interactions may partly explain the lack of difference in MDE risk for heterosexual and LGB people. As suggested in previous work social attitudes have been changing towards sexual minorities in recent decades resulting is less social stigma or discrimination (Scott, Lasiuk, & Norris, 2016). Increased acceptance of sexual minority status in Canadian society through initiatives such as legalization of same-sex marriage, legal protection from discrimination based on sexual orientation, and mainstream acceptance of openly gay or lesbian celebrities and politicians are possible explanations for the lack of difference in social support found here. LGB people may also protect themselves from internalizing negative stigma of sexual orientation through a sense of belonging to the LGB community or through discovering acceptance among family, friends, and the wider community.

The lower social support scores found for bisexual men and the higher negative interaction scores found for bisexuals overall, suggests there are differences in the effect of being bisexual compared to identifying as gay or lesbian. This is consistent with

evidence that bisexuals face more stigma than gay men and lesbians as a result of negative attitudes from both the sexual minority and heterosexual communities. Gay men and lesbians have been shown to harbour negative attitudes towards bisexuals and heterosexual's attitudes towards bisexual men and women have been shown to be less favourable than their attitudes towards homosexuals (Friedmann, et al, 2014; Herek, 2002). It is possible that lower social support and more negative interactions for bisexuals impacts their risk for depression, although there was only a non-significant trend in the present study.

This study has some limitations. The data are cross-sectional, so no causal link between sexual orientation and depression can be inferred. Nevertheless, there is a body of evidence in the literature describing the mental health of sexual minorities and new trends appear to be emerging. The WHO-CIDI is a self-report tool and is administered by lay-interviewers. Although the WHO-CIDI has been validated and used in several studies, self-report may over or underestimate the true prevalence of MDE compared to the gold standard of a clinical interview and diagnosis. The single domain measure of sexual orientation in the CCHS-MH is a major limitation. Measurement of sexual orientation is complex and straddles domains of identity, attraction, and sexual behaviour. Multiple measures of sexual orientation would have enabled identification of sexual minority people based on those other two domains. True prevalence of sexual minority people may be underestimated by non-disclosure to the identity question or by failing to identify people who do not self-identify as a sexual minority, but have same-sex attraction or sexual activity. Prior research indicates that multiple measures of sexual orientation suggest a higher population prevalence of sexual minorities (Cochran &

Mays, 2009; Scott, Lasiuk, & Norris, 2016). The lack of a category for transgender people in the CCHS-MH sample leaves those people invisible to study. The interaction of race and sexual orientation is unclear and needs more study. The sampling variability in the racial minority category was high. Any interpretation of depression prevalence in dual racial/sexual orientation minority people or the role of the race covariate in the models must be made cautiously. The relationship between race, sexual orientation and mental health requires further study. The large sample size and response rate for the CCHS-MH is an important strength for this study. It enabled analysis of depression distinct from other mental health disorders as well as analysis of gay men, lesbians and bisexual men and women separately.

Previous research on the mental health of sexual minorities may have over-estimated the risk of depression for homosexuals overall by grouping men and women together, and more importantly, by grouping bisexuals with gay men and lesbians. Grouping mental health disorders together may also confound findings of higher risk for poorer mental health in sexual minorities. There is a need for research using multiple measures of the domain of sexual orientation (i.e. sexual identity, behaviour, and attraction) to develop a fuller picture of the mental health of sexual minorities in all large scale population studies that include socio-demographic measures. Similarly, population studies should include categories to identify gender minority people. Over sampling of sexual and gender minority groups may be necessary in study designs to ensure adequate representation for analysis and interpretation. Future research should continue to focus on differences in mental health disparities between sexual minority men and women as well as between different sexual and gender minority groups to identify who is at greatest risk

for mental health disorders and allow public health policy and clinical recommendations to have the greatest possible impact on the mental health of Canadians.

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Table 1
Socio-demographic characteristics of Canadians aged 15 and older: CCHS-MH (n=28,314,716)

	Heterosexual % (n=27,344,093)	Gay or Lesbian % (n=317,337)	Bisexual % (238,292)	Other % (n=414,994)
Sex				
Total	96.6 (96.2 – 97.0)	1.1 (0.9 – 1.3)	0.8 (0.7 – 1.0)	1.5 (1.1 – 1.8)
Male	96.0 (95.3 – 96.7)	1.5 (1.2 – 1.9)	0.6 (0.4 – 0.8)	1.8 (1.3 – 2.4)
Female	97.1 (96.7 – 97.5)	0.7 (0.5 – 0.9)	1.1 (0.8 – 1.3)	1.1 (0.8 – 1.4)
Marital Status				
Married/Partnered	61.0 (60.0 – 61.9)	38.2 (28.9 – 47.6)	28.9 (19.5 – 28.3)†	37.6 (26.7 – 48.3)
Separated, Divorced, Widowed	13.0 (12.4 – 13.7)	5.8 (3.0 – 8.7)†	8.8 (4.6 – 13.0) †	13.7 (8.1 – 19.2)†
Never Married	26.0 (25.3 – 26.8)	56.0 (46.7 – 65.2)	62.3 (52.5 – 72.1)	48.8 (39.0 – 58.7)
Education				
Less than secondary	6.8 (6.3 – 7.2)	2.6 (1.1 – 4.2) †	‡	7.9 (4.4 – 11.5) †
Secondary graduate	9.7 (9.1 – 10.3)	6.4 (3.2 – 9.5) †	10.3 (6.0 – 14.6) †	7.9 (4.3 – 11.4) †
Other post-secondary	4.0 (3.6 – 4.5)	2.4 (0.8 – 4.0) †	‡	‡
Post-secondary graduate	72.3 (71.3 – 73.3)	80.0 (74.0 – 86.0)	60.5 (50.3 – 70.7)	43.5 (32.9 – 54.1)
Not Stated	7.2 (6.5 – 7.8)	8.6 (4.0 – 13.2) †	12.0 (5.0 – 19.0) †	39.0 (27.8 – 50.2)
Race/Ethnicity				
White	97.0 (96.6 – 97.4)	1.3 (1.0 – 1.6)	0.8 (0.6 -0.9)	0.9 (0.7 – 1.2)
Other	94.0 (91.5 – 96.5)	1.0 (0.5 -1.6) †	2.7 (1.4 – 3.9) †	‡
Labour Status (employed in the past week)				
Unemployed	31.3 (30.4 – 32.2)	25.7 (18.1 – 33.3)	46.6 (37.1 – 56.1)	43.2 (32.6 – 53.8)
Employed	68.7 (67.8 – 69.6)	74.3 (66.7 – 82.9)	53.4 (43.9 – 62.9)	56.8 (46.2 – 67.4)
Self Perceived Physical Health				
Good to excellent	85.7 (85.0 – 86.5)	81.7 (75.4 – 87.9)	73.4 (64.7 – 82.1)	85.0 (79.4 – 90.6)
Poor or fair	14.3 (13.5 – 15.0)	18.3 (17.9 – 35.3) †	26.6 (17.9 – 35.3) †	15.0 (9.4 – 20.5) †
Self Perceived Mental Health				
Good to excellent	92.5 (91.9 – 93.0)	85.2 (79.1 – 91.4)	80.1 (72.0 – 88.2)	89.8 (85.8 – 93.8)
Poor or fair	7.5 (7.0 – 8.1)	14.8 (8.6 – 20.9) †	19.9 (11.8 – 28.0) †	10.2 (6.2 – 14.2) †
Age (mean)	45.9 (45.7 – 46.0)	38.0 (35.8 – 40.2)	30.7 (28.5 – 32.9)	45.7 (42.2 – 49.2)
Household income (mean x $1,000)	80.6 (78.3 – 83.0)	90.3 (77.0 – 10.4)	64.2 (52.3 – 76.2)	52.9 (42.1 – 63.7)

Note: Weighted sample sizes are reported. Proportion totals may not equal 100% due to rounding. † interpret result with caution due to high sampling variability (CV 16.5 to 33.3%) associated with the variable. ‡ result not published in accordance with Statistics Canada guidelines for sampling variability (CV >33.3) associated with the variable. Unweighted n=24,788.

Table 2

Unadjusted and Adjusted odds ratio for past 12-month major depressive episode in Canadians Aged 15 and older: CCHS-MH

(N=13,032,627)

		All	Men	Women
		OR (95%CI)	OR (95%CI)	OR (95%CI)
By sexual orientation (reference is Heterosexual)				
Model 1	Gay or Lesbian	2.09 (0.96 -4.55)	1.58 (0.70 – 3.54)	3.24 (0.79 – 13.25)
	Bisexual	**3.73 (1.81 -7.72)**	4.03 (0.64 – 25.48)	**3.29 (1.35 -8.00)**
Model 2	Gay or Lesbian	1.58 (0.62 – 4.00)	1.10 (0.49 – 2.57)	2.46 (0.44 – 13.86)
	Bisexual	*1.97 (0.94 -4.12)*	2.67 (0.31 – 23.3)	1.83 (0.82 – 4.07)
Model 3	Gay or Lesbian	1.57 (0.61 -4.05)	1.04 (0.45 -2.42)	2.46 (0.44 -13.95)
	Bisexual	*1.93 (0.91 – 4.11)*	1.91 (0.14 -25.50)	1.84 (0.82 -4.14)

Note: OR = Odds Ration, AOR = adjusted odds ratio, CI = confidence interval. Model 1 = OR for depression by sexual orientation. Model 2 = AOR for depression by sexual orientation adjusted for age, education, income, marital status, employment status, race/ethnicity, and perceived physical health. Model 3 = AOR for depression by sexual orientation adjusted for model 2 variables, social provisions scale score, and negative social interactions scale score.

Table 3

Unadjusted and Adjusted odds ratio for past lifetime major depressive episode in Canadians Aged 15 and older: CCHS-MH

(N=13,067,000)

		All	Men	Women
		OR (95%CI)	OR (95%CI)	OR (95%CI)
By sexual orientation (reference is Heterosexual)				
Model 1	Gay or Lesbian	1.59 (0.96 – 2.65)	1.39 (0.74 – 2.59)	2.32 (1.04 – 5.19)
	Bisexual	**2.27 (1.29 – 3.99)**	**3.08 (1.12 – 8.49)**	1.79 (0.87 – 3.70)
Model 2	Gay or Lesbian	1.38 (0.81 – 2.36)	1.17 (0.64 – 9.74)	1.98 (0.77 – 5.08)
	Bisexual	*1.75 (1.003 – 3.05)*	2.81 (0.81 -9.74)	1.43 (0.75 – 2.75)
Model 3	Gay or Lesbian	1.38 (0.81 -2.34)	1.16 (0.64 – 2.12)	1.99 (0.77 – 5.11)
	Bisexual	*1.73 (0.99 – 3.03)*	2.74 (0.79 – 9.53)	1.42 (0.74 – 2.75)

Note: OR = Odds Ration, AOR = adjusted odds ratio, CI = confidence interval. Model 1 = OR for depression by sexual orientation. Model 2 = AOR for depression by sexual orientation adjusted for age, education, income, marital status, employment status, race/ethnicity, and perceived physical health. Model 3 = AOR for depression by sexual orientation adjusted for model 2 variables, social provisions scale score, and negative social interactions scale score.

Table 4

Summary of multiple regression analysis for variables predicting Social Provisions Scale and Negative Interaction Scale scores in Canadians aged 15 and older: CCHS-MH

	Social Provisions Scale Overall Score			Negative Interaction Scale Score		
Variable	*B*	SE	*p* value	*B*	SE	*p* value
Gay or Lesbian	.361	.254	.155	.796	.137	.000
Bisexual	-.758	.294	.155	1.202	.159	.000
Age	-0.27	.294	.000	-0.23	.001	.000
Sex	.710	.057	.000	.337	.030	.000
Marital SDW	-1.023	.095	.000	.218	.051	.000
Never Married	-.803	.079	.000	-.040	.042	.345
Aboriginal	-0.61	.153	.690	.602	.081	.000
Other Race	.299	.149	.045	.197	.080	.013
Employment past week	.718	.064	.000	.372	.034	.000
Education Secondary graduate	.003	.120	.982	-.123	.064	.056
Education Other Post-secondary	-.001	.160	.995	.311	.086	.000
Education Post-secondary graduate	.809	.087	.000	.092	.046	.045
Household Income	.000*	.000*	.000	.000*	.000*	.017

Note: Social Provisions Scale R^2=0.51, p=.000; Negative Interaction Scale R^2=0.50, p=.000. * Value is zero due to rounding of small estimate. Reference categories: Male, Married or Common-law, Race White, Unemployed, Education less than secondary school graduate.

Chapter 5. Depression in Lesbian, Gay and Bisexual Members of the Canadian Armed Forces[6]

Purpose: Lesbians, gay men, and bisexuals have been shown to have different risks for mood and anxiety disorders than heterosexuals in population studies, but there is a paucity of research in this area in military populations. The present study examined the relationship between sexual orientation and depression in the Canadian Armed Forces.

Methods: Data were drawn from the Canadian Forces Mental Health Survey 2013 (N=8,165), a representative sample of Regular and Reserve members of the Canadian military. Binomial logistic regression was used to predict 12-month and lifetime odds ratios for major depressive episode stratified by sexual orientation and sex.

Results: Gay male members had higher risk (AOR=3.80, 95% CI 1.60 – 9.05) for lifetime major depressive episode, but not for past 12-month major depressive episode (MDE) compared to heterosexual males. There was no significant difference in risk for lesbians or bisexuals compared to heterosexuals.

Conclusions: The results suggest that gay male members of the CAF are at higher risk for a history of MDE, but not current MDE. This may be a result of ongoing discrimination and stigma faced by gay men in the military or may reflect MDE that occurred prior to military service. The lack of difference in MDE risk for lesbian and bisexual members compared to heterosexual members is an important positive finding.

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Introduction

The Canadian Armed Forces (CAF) represents a small segment of Canadian society that is subject to unique occupational exposures that may influence health and health behaviours because of the stresses of combat missions, humanitarian crises, and lengthy periods away from home. Despite considerable stress associated with deployment, members of the CAF experience their role in day-to-day service in Canada as less satisfying than deployments.[1] In the United States (US) military, occupational stress exposure is associated with poorer mental health, which raises concern for a similar problem in CAF members subsequent to the decade long combat mission in Afghanistan and other locations.[2] That concern for members' mental health led to the 2002 CAF supplement to the Canadian Community Health Survey (CCHS) and the 2013 Canadian Forces Mental Health Survey (CFMHS).[3,4] The CCHS is a representative, cross-sectional survey of information related to health status, health care utilization, and health determinants for the Canadian population. The CFMHS collects similar information within the CAF. These studies were necessary because full-time (regular) members of the CAF are excluded from the CCHS.

CAF members were reported to have higher rates of mental health disorders than the Canadian general population in both the CCHS CAF Supplement and the CFMHS.[3,5,6] In 2002, military members were nearly twice as likely as the general population to have panic disorder or depression in the previous 12 months.[3] In 2013, one in six regular members met diagnostic criteria for major depressive episode (MDE), post-traumatic stress disorder (PTSD), generalized anxiety disorder (GAD), panic disorder, and/or alcohol abuse or dependence. MDE was the most prevalent disorder at 8.0%, nearly double that of the Canadian population.[5,6] Sexual minorities, including lesbians, gay men, and bisexuals (LGB) are also identified as having poorer mental

health compared to the heterosexual population.[7] LGB and transgender (LGBT) persons have served openly in the CAF since 1992 when a ban on their service was lifted with no reported effect on military effectiveness.[8] CAF leadership considers the service of LGBT members as a policy issue and set an expectation that standards of behavior and the accomplishment of the military mission are paramount to sexual orientation or gender identity. This approach by CAF leadership means that studies of the CAF do not ask about sexual orientation or gender identity, resulting in a paucity of research into the potentially unique health experiences of LGBT members. The results of our recent work on depression in sexual minorities suggest that there are important differences in risk among persons who identify as LGB.[9] The CFMHS provided a unique opportunity to explore the relationship between depression and sexual minority status in a military population.

Methods

Design and Ethics

We completed a secondary analysis of data from the CFMHS. The University of Alberta Research Human Ethics Board was consulted and determined that additional ethics approval was not required given the ethical oversight of the original Statistics Canada Study.[4]

Sample

The CFMHS is a cross-sectional survey that collected information about the mental health and need for mental health services of CAF members. Data collection took place between April and August 2013. The survey was sent to 8,393 regular and 1,867 reserve members with 6,696 regular and 1,469 reserve members responding. The overall response rates were 79.8% for

regular members and 78.7% for reservists.[4] A full description including design, methodology, and data accuracy of the CFMHS is available elsewhere.[4]

Variables

Sexual orientation was measured with a single question asking respondents if they consider themselves 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); or 'don't know'. Responses were categorized as heterosexual (straight), homosexual (gay men or lesbian), bisexual, don't know, and refused. The don't know and refused responses were recoded into a single category 'other'. Missing data accounted for approximately 0.3% of the total responses.

Depression was assessed using the *World Health Organization version of the Composite International Diagnostic Interview* (WHO-CIDI).[10] The WHO-CIDI is a standardized instrument used to assess for the presence of mental health disorders according to the definitions and criteria set out in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV).[11] The CFMHS collected data related to MDE characterized as a minimum of two weeks of persistent depressed mood or loss of interest or pleasure in usual activities, accompanied by decreased energy, changes in sleep and appetite, impaired concentration, and feelings of guilt, hopelessness, and/or suicidal thoughts. Presence of both lifetime and past 12-month MDE were measured.

Social Support was measured using an abbreviated Social Provisions Scale,[12] which measured five main social domains - attachment, guidance, social integration, reliable alliance,

and reassurance of worth. Scores of 10 to 40 are possible, with higher scores reflecting a higher level of perceived social support.

Sense of belonging was assessed with a question asking respondents "how would you describe your sense of belonging to your local community" on a four-point scale (very strong, somewhat strong, somewhat weak, very weak).

Sociodemographic variables included age, sex, income, education level, marital status, race, deployment history, CAF component (regular or reserve), and rank group (junior non-commissioned member [NCM], senior NCM, officer). To reduce the number of categories with small numbers of respondents and comply with Statistics Canada guidelines, marital status, race, and education variables were recoded. Marital status was reduced from six to three categories: married and common-law (partnered); separated, divorced, or widowed (SDW); and never married. Race was recoded from thirteen categories to two (white and other). Education was reduced from four to two variables (any secondary school and any post-secondary school education)

Health Status measures included two screening variables to assess self-perceived physical health and mental health on a five-point scale (poor, fair, good, very good, or excellent). Again, to reduce small numbers in the categories they were recoded to binary categorical variables of "poor/fair" and "good/very good/excellent".

Statistical Analysis

Sample weights provided by Statistics Canada were used to ensure the estimates were representative of the study population. Bootstrapping was performed as a variance estimation

technique to account for the complex sample design. Statistics Canada guidelines for data analysis and release were followed.[13] SAS version 9.4 software (SAS Institute Inc., North Carolina, USA) was used for all analyses.

Demographic characteristics were compared after stratification for sexual orientation. Next, we used a series of four binomial logistic regression analyses to predict lifetime and past 12-month odds ratios (OR) for MDE based on sexual orientation. We calculated unadjusted OR in the first model and then adjusted odds ratios (AOR) by introducing a number of known risk factors for depression in model 2 (age, marital status, education, income, race and physical health). In model 3 we introduced military factors (i.e. rank group, service type, and deployment history). Model 4 introduced measures of social support and community belonging. Linear regression analysis was used to predict social support scores stratified by sexual orientation.

Results

There were 68,880 CAF members in the weighted sample (unweighted n=8,165) with small proportions of gay men (0.5%, 95% CI 0.3-0.7; n=280), lesbians (4.9%, 95% CI 3.5-6.4; n=460) and bisexuals (0.6%, 95% CI 0.4-0.9). The proportions of women and men who identify as bisexual were 1.9% (95% CI 0.9-2.9; n=180) and 0.4% (95% CI 0.2-0.6; n=260) respectively. A comparison of demographic characteristics is presented in Table 1. Comparison of marital status was limited due to a high coefficient of variation (CV). The majority of bisexual persons were never married (63.6%, 95% CI 47.9-79.4). Nearly half of those who identified as gay or lesbian (48.6%, 95% CI 36.3-61.0) were married or common-law partnered. More gay men and lesbians (83.8%, 95% CI 74.6-93.0) and bisexuals (81.8%, 95% CI 68.9-94.7) had some post-secondary education compared to heterosexuals (70.4%, 95% CI 69.3-71.6). Nearly half of the

heterosexual group (48.8%, 95% CI 48.4-49.2) and gay men and lesbians (48.6%, 95% CI 37.4-59.9) had been deployed to Afghanistan, but only 18.2% (95% CI 6.8-29.5) of bisexuals had been to Afghanistan. Bisexuals were also the least likely to have deployed on any other international or domestic operation. There was no significant difference in the proportions of gay and lesbian members between the Regular and Reserve force. Comparison between the Regular and Reserve force was not reported for bisexual members due to high sampling variability. Distribution of sexual minorities by rank grouping was consistent with the overall CAF rank group distribution. The majority of all members reported good physical and mental health. Heterosexuals and gay men or lesbians did not differ on mean age (35.5 years vs 35.6 years), but bisexuals were younger (32.6 years). Heterosexuals had the highest mean income, followed by gay men and lesbians and bisexuals. Mean social provisions scale scores did not significantly differ between groups. Most of the data for the 'other' group were either not released or not reported in accordance with Statistics Canada guidelines precluding most comparisons.

The prevalence of MDE differed among sexual orientation groups. Gay men and lesbians had the highest prevalence of 12-month (16.2%, 95% CI 8.1-24.3) and lifetime (29.7%, 85% CI 19.7-39.8) MDE, but these estimates should be interpreted with caution due to the high CV. Heterosexuals had the lowest prevalence for both 12-month (7.9%, 95% CI 7.2-8.5) and lifetime (15.6%, 95% CI 14.7-16.5) MDE. Prevalence of MDE among bisexuals was higher than for heterosexuals and lower than gay men or lesbians, but proportions are not reported due to unacceptable CV associated with the estimates.

Adjusted odds ratios (AOR) for 12-month and lifetime MDE based on sexual orientation and stratified by sex are presented in Table 2. In the final model, gay men had significantly higher odds for lifetime MDE (AOR=3.80, 95% CI 1.60 – 9.05) compared to heterosexual men.

The odds ratio for past 12-month MDE was not statistically significant. Lesbians and bisexuals did not have significantly different risk for MDE than did heterosexuals. Other than sexual orientation, several co-variates were associated with differences in the odds for MDE. Separated, divorced or widowed persons had 1.6 to slightly more than twice the odds for MDE compared to those who were partnered. Being a male officer was associated with lower odds of 12-month (AOR=0.57, 95% CI 0.41 – 0.79) or lifetime (AOR=0.70, 95% CI 0.56 – 0.88) MDE compared to junior NCMs.

Self-perceived physical health was the variable most strongly associated with higher odds of MDE overall. Among men, poor or fair physical health was associated with both higher past 12-month (AOR=3.14, 95% CI 2.44 – 4.05) and lifetime MDE (AOR=2.58, 95% CI 2.13 – 3.13). Women who reported poor physical health showed increased odds for past 12-month MDE only (AOR=3.66, 95% CI 1.83 – 7.30). Higher social provision scores were associated with lower odds of MDE in all groups. A weak reported sense of belonging to community was associated with higher odds for both 12-month MDE (AOR=1.83, 95% CI 1.45 – 2.30) and lifetime MDE (AOR=1.41, 95% CI 1.20 – 1.65) among men, but among women there was no significant difference. Table 3 presents predicted social provisions scale scores for men and women by sexual orientation. Sexual orientation was not associated with differences in social provisions scale scores in this military group.

Discussion

Crude comparison of proportions of sexual minority orientations between the CAF and general population suggests that there are fewer gay men, more lesbians, and fewer bisexuals in the CAF versus the general population. The current study also found that sexual minorities in the

CAF have a mostly similar pattern for risk of MDE compared to recent findings on the association between depression and sexual orientation in US and Canadian (Scott RL, Lasiuk G, & Norris C, Sexual orientation and depression in Canada, *Forthcoming*) general population samples.[9] A study of the US general population found gay men to have lower odds for MDE compared to heterosexual men.[9] A similar study of the Canadian general population (Scott RL, Lasiuk G, & Norris C, Sexual orientation and depression in Canada, *Forthcoming*) found no difference in odds for MDE between the two groups. In the current study, gay men had higher odds for lifetime MDE, but not for past 12-month MDE. Lesbians and bisexual men and women in the CAF showed no differences in MDE compared to heterosexual members. Overall, the lack of difference in risk for MDE in sexual minority members of the CAF is an important positive finding. Although all members of the CAF are exposed to both the usual risk factors and unique occupational risk factors for depression, it appears that, on the whole, sexual orientation does not confer additional risk.

The overall lack of difference in MDE risk may be explained by CAF policies. Since the 1992 prohibition on LGB members serving in the CAF was lifted there has been continued change in attitudes towards sexual minority people in both the military and Canadian society at large. LGB members of the military have access to the same spousal benefits as their heterosexual colleagues, there are anti-discrimination and harassment policies in place, and there are no longer any career limiting policies hindering access to training or advancement in rank. Nevertheless, disclosure of sexual orientation is not influenced by policy alone and some LGB members of the military will choose not to disclose their orientation in the workplace. Discrimination and anti-homosexual sentiment need not be overt to remain part of the culture of a workplace regardless of the institution's discourse on its stance towards sexual minority people

and despite official policy, LGB members who do disclose may still find themselves targets of harassment or forms of violence.[14] Such a possibility is supported by a review of sexual misconduct and harassment in the CAF that found an element of Canadian military culture that remains hostile to LGBT members.[15]

That gay men appear to have higher risk of MDE than do lesbians may also be explained by military culture. The CAF remains a predominantly male institution that values traditional or hegemonic views of masculinity.[16] The CAF does not gather data on the employment, occupations, or experiences of LGB service members because they are not one of the four designated groups under federal employment equity legislation. As a result, it is relatively unknown how policy changes have translated into changes in service conditions for all LGB members and gay male members in particular. There is evidence that anti-gay male derision is common in traditional male cultures, but is not apparent among women's behavior towards lesbians.[17] The military environment may be less favourable for gay males who find themselves in a culture that remains, at least in part, hostile to their presence. They may find their social role identity as a CAF member at odds with their sexual orientation. As a result, gay men may be more likely to conceal their orientation and to fear risk of rejection from other members of the institution. Concealment in this manner may contribute to internalized negative feelings that contribute to excess risk as proposed in minority stress theory.[18] The low proportion of self-identified gay men compared to other population studies may reflect concealment of sexual orientation in CAF men. Although lesbian women are likely to experience some level of stigma or discrimination, as well, research suggests that the prevalence is much less than for gay men.[19] It is possible in the male dominated culture of the CAF that their negative experiences with sexual minority discrimination or stigma are more acute and sporadic than the experiences of gay

men, which are more chronic and pervasive. The psychological mediation framework proposed that exposure to acute stressors contributes to resilience while exposure to chronic stressors contributes to pathology.[20] It is equally important to consider that the lifetime history of MDE may not reflect any aspect of military service, but that the episodes pre-date military service.

In the current analysis, sense of belonging to a community was inversely associated with depression. This suggests that the increased prevalence of MDE for gay men may be due to their small number in the CAF and their lack of connection with other LGB members or the civilian LGB community. Many CAF bases are located distant from urban areas where there is likely to be a smaller concentration of LGB community. Belonging to a community with higher concentrations of LGB people is a protective factor for mood and anxiety disorders that gay men in the military, in particular, may lack.[21]

Factors not related to sexual orientation emerged in this study as strongly predictive of MDE and require attention by the CAF leadership. Relationship loss (i.e. being separated, divorced, or widowed) appears to be an important predictor of MDE. Breakdown of relationships is an important area that family support and operational tempo policies must address. Poor physical health in the CAF population is also associated with greater risk of depression. Lower sense of community was associated with higher MDE risk in men and the trend neared significance in women. Community ties, then, are important and the CAF should attend to healthy military communities for all.

Operational deployment to Afghanistan appears to be associated with higher MDE. Other international or domestic operational experience was not associated with MDE risk. Further study of the association between deployment and mental health should be carried out to monitor

for long-term changes and to identify characteristics of deployment that contribute to poor mental health.

This is the first study to examine the relationship between sexual orientation and depression in the CAF. A main strength of this study is the ability to examine differences by sexual orientation and sex, while a main limitation is the low number of questions in the CFMHS that relate to sexual behavior and precludes more complex analyses of the relationship between sexual orientation and mental health in the CAF. **onclusion**

Two recent Canadian and American studies report that men who identify as heterosexual and have sex with other men have greatest risk for MDE.[9,22] The effect of discordance between sexual identity and sexual behavior may be more pronounced in a military culture and bears closer examination. CAF leadership should reconsider their own "don't ask policy" in order to identify the experiences of service of LGB members. The CAF could endeavor to improve conditions for LGB and transgender members through official recognition of LGBT support groups to foster diversity and acceptance in the military community. Future cycles of the CFMHS should include questions about sexual activity and capture persons who identify as transgender. Replication of this work is needed in future cycles of the CFMHS to evaluate longer term trends and to determine if moves towards increased diversity in the CAF will attenuate the excess risk for depression that gay military men have compared to their civilian counterparts.

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Table 1
Sociodemographic characteristics of Canadian Armed Forces members: CFMHS 2013
(N=68,880, unweighted n=8,165)

	Heterosexual % (95% CI) N=67,500	Gay or Lesbian % (95% CI) N=740	Bisexual % (95% CI) N=440	Other % (95% CI) N=200
Sex				
Total	98.0 (97.7 – 98.4)	1.1 (0.8 – 1.3)	0.6 (0.4 – 0.9) †	0.3 (0.12 – 0.42) †
Male	98.7 (98.5 – 99.1)	0.5 (0.3 – 0.7) †	0.4 (0.2 – 0.6) †	NR
Female	92.9 (91.2 – 94.7)	4.9 (3.5 – 6.4)	1.9 (0.9 – 2.9) †	NR
Marital Status				
Partnered	65.7 (64.6 – 66.8)	48.6 (36.3 – 61.0)	‡	60.0 (34.3 – 85.7) †
Separated, Divorced, Widowed	7.4 (6.8 – 8.0) †	‡	‡	NR
Never Married	‡	43.2 (31.5 – 55.0)	63.6 (47.9 – 79.4)	NR
Education				
Any Secondary School	29.5 (28.4 – 30.1)	18.9 (9.7 – 28.1) †	18.2 (5.3 – 31.1) †	NR
Any Post-secondary	70.4 (69.3 – 71.6)	83.8 (74.6 – 93.0)	81.8 (68.9 – 94.7)	NR
Race				
White	90.1 (89.3 – 90.9)	89.2 (81.4 -97.0)	NR	NR
Other	9.8 (9.0 -10.6)	‡	NR	NR
Has deployed to Afghanistan				
No	51.2 (50.8 – 48.4)	51.4 (40.1 – 62.6)	77.3 (65.9 – 88.6)	‡
Yes	48.8 48.4 – 49.2)	48.6 (37.4 – 59.9)	18.2 (6.8 – 29.5) †	60.0 (36.2 – 83.8) †
Has deployed to international or domestic operation other than Afghanistan				
No	58.6 (57.5 – 59.6)	62.2 (50.7 – 73.7)	77.3 (63.7 – 90.8)	70.0 (49.9 – 90.1)
Yes	41.4 (51.4 – 40.4)	37.8 (26.3 – 49.3)	22.7 (9.2 – 36.3) †	‡
Armed Forces Component				
Regular	98.0 (97.6 – 98.3)	1.1 (0.8 – 1.4)	0.7 (0.4 – 0.9)†	0.3 (0.1 – 0.4) †
Reserve	97.8 (97.0 – 98.5)	1.3 (0.8 – 1.9)†	‡	‡
Rank Group				
Junior NCM	54.5 (54.2 – 54.8)	51.4 (39.1 – 63.6)	63.6 (48.2 – 79.0)	‡
Senior NCM	24.4 (24.1 -24.7)	27.0 (17.6 – 36.5)†	18.2 (7.9 – 28.5)†	‡
Officer	21.0 (20.9 – 21.2)	24.3 (15.5 – 33.2)†	18.2 (1.0 – 29.3)†	‡
Self-Perceived Physical Health				

Good, very good, excellent	89.4 (88.6 -90.1)	89.2 (81.4 -97.0)	81.8 (67.2 – 96.4)	NR
Poor or fair	10.6 (9.9 -11.4)	13.5 (5.7 – 21.4) †	18.2 (3.6 – 32.8) †	NR
Self-Perceived Mental Health				
Good, very good, excellent	86.8 (85.9 – 87.6)	78.4 (68.5 – 88.3)	90.9 (81.9 – 99.9)	50.0 (24.9 – 75.0) †
Poor or fair	13.2 (12.3 -14.0)	21.6 (11.7 -31.5) †	‡	‡
Age mean	35.5 (35.3 – 35.7)	35.6 (33.7 – 38.0)	32.6 (29.7 – 35.4)	34.6 (29.9 – 39.2)
Household Income mean	102,100 (100,969 – 103,230)	91,000 (82,242 – 99,757)	79,100 (65,804 – 92,395)	87,500 (70,825 – 104,174)
Social Provisions Scale mean	36.4 (36.2 – 36.6)	36.1 (34.5 – 37.7)	38.3 (33.6 – 43.0)	32.9 (17.5 – 38.2)

Note: Sample size is weighted. Proportion totals may not equal 100% due to rounding. Statistics Canada guidelines require rounding of cell counts to the nearest 20.

† interpret result with caution due to high sampling variability (CV 16.5 to 33.3%) associated with the variable.

‡ result not published in accordance with Statistics Canada guidelines for sampling variability (CV >33.3) associated with the variable. NR = not approved for release by Statistics Canada.

NCM = non-commissioned member/enlisted.

Table 2

Odds ratios for major depressive episode in Canadian Armed Forces members by sexual orientation: CFMHS 2013

	Past 12-month			Lifetime		
	All	Men	Women	All	Men	Women
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Model 1						
Sexual orientation (reference is heterosexual)						
Gay/Lesbian	**2.33 (1.25 – 4.34)**	2.43 (0.31 – 19.26)	1.70 (0.71 – 4.05)	**2.22 (1.33 – 3.68)**	**3.76 (1.67 – 8.48)**	1.00 (0.50 – 2.02)
Bisexual	1.20 (0.25 – 5.64)	1.16 (0.00 – 315.87)	0.97 (0.00 – 3.17)	0.99 (0.41 – 2.40)	0.74 (0.03 – 17.06)	0.94 (0.02 – 11.55)
Model 2						
Sexual orientation (reference is heterosexual)						
Gay/Lesbian	**2.32 (1.26 – 4.25)**	2.31 (0.33 – 16.22)	1.81 (0.72 – 4.51)	**2.19 (1.31 – 3.68)**	**3.68 (1.66 – 8.14)**	1.01 (0.49 – 2.07)
Bisexual	0.82 (0.16 – 4.17)	0.88 (0.0 – 262.08)	0.52 (0.00 – 181.18)	0.79 (0.31 – 2.01)	0.63 (0.03 – 15.94)	0.74 (0.06 – 8.93)
Model 3						
Sexual orientation (reference is heterosexual)						
Gay/Lesbian	**2.31 (1.28 – 4.18)**	2.50 (0.35 – 17.77)	1.84 (0.75 – 4.51)	**2.18 (1.31 – 3.64)**	**3.85 (1.72 – 8.64)**	0.98 (0.49 – 1.95)
Bisexual	0.88 (0.17 – 4.52)	0.89 (0.00 – 276.8)	0.58 (0.00 – 207.63)	0.83 (0.33 – 2.13)	0.64 (0.03 – 16.30)	0.86 (0.07 – 10.56)
Model 4						
Sexual orientation (reference is heterosexual)						
Gay/Lesbian	**2.13 (1.14 – 3.99)**	2.39 (0.33 – 17.06)	1.59 (0.58 – 4.37)	**2.06 (1.23 – 3.50)**	**3.80 (1.60 – 9.05)**	0.87 (0.52 – 1.78)
Bisexual	0.75 (0.13 -4.41)	0.68 (0.00 – 254.13)	0.50 (0.00 – 202.24)	0.82 (0.30 – 2.19)	0.58 (0.02 – 15.79)	0.95 (0.07 – 12.60)
Marital Status (reference is partnered)						
SDW	**2.18 (1.61 – 2.94)**	**2.03 (1.46 – 2.83)**	**2.58 (1.19 -5.62)**	**1.65 (1.30 – 2.11)**	**1.60 (1.22 – 2.09)**	1.53 (0.84 – 2.77)
Never Married	1.11 (0.85 – 1.45)	1.02 (0.74 – 1.39)	1.79 (0.90 – 3.58)	1.17 (0.97 – 1.42)	1.10 (0.89 – 1.39)	1.31 (0.82 -2.10)
Race (reference is White)						

Other	0.82 (0.57 – 1.18)	0.86 (0.57 – 1.29)	0.68 (0.24 – 1.93)	1.01 (0.80 -1.28)	0.98 (0.74 – 1.28)	1.19 (0.66 – 2.16)
Perceived physical health (reference is Good/Very Good/Excellent)						
Poor or Fair	**3.21 (2.54 – 4.05)**	**3.14 (2.44 – 4.05)**	**3.66 (1.83 – 7.30)**	**2.40 (2.00 – 2.87)**	**2.58 (2.13 – 3.13)**	1.59 (0.92 – 2.78)
Rank (reference is Junior NCM)						
Senior NCM	1.16 (0.90 – 1.48)	1.22 (0.93 – 1.60)	0.75 (0.40 – 1.41)	1.00 (0.84 -1.20)	1.00 (0.82 -1.23)	0.97 (0.63 -1.50)
Officer	**0.74 (0.57 – 0.98)**	**0.57 (0.41 – 0.79)**	1.3 (0.73 – 2.32)	**0.82 (0.67 – 0.99)**	**0.70 (0.56 – 0.88)**	1.21 (0.80 – 1.83)
Military Component (reference is Regular Force)						
Reserve	1.05 (0.82 – 1.35)	1.05 (0.80 – 1.38)	1.2 (0.62 – 2.28)	1.01 (0.84 – 1.22)	1.00 (0.83 – 1.23)	1.21 (0.74 – 1.98)
Has been deployed to Afghanistan						
Yes	**1.41 (1.12 – 1.77)**	**1.44 (1.11 – 1.86)**	1.35 (0.81 – 2.28)	**1.27 (1.08 – 1.48)**	**1.25 (1.05 – 1.49)**	**1.47 (1.02 – 2.12)**
Has been deployed domestically or internationally other than Afghanistan						
Yes	0.94 (0.76 – 1.16)	0.90 (0.71 – 1.15)	1.23 (0.69 – 2.20)	0.98 (0.84 – 1.14)	1.00 (0.84 – 1.19)	1.10 (0.74 – 1.64)
Sense of belonging to local community (reference is Strong)						
Weak	**1.75 (1.42 – 2.15)**	**1.83 (1.45 – 2.30)**	1.44 (0.87 – 2.41)	**1.41 (1.22 – 1.63)**	**1.41 (1.20 – 1.65)**	1.39 (0.97 – 2.00)
Social Provisions Scale Score	**0.91 (0.89 – 0.93)**	**0.91 (0.89 – 0.93)**	**0.88 (0.83 – 0.93)**	**0.95 (0.94 – 0.97)**	**0.95 (0.93 – 0.97)**	**0.94 (0.90 – 0.98)**

Notes: OR = odds ratio. CI = confidence interval. SDW = separated, divorced, or widowed. NCM = non-commissioned member. Model 1 shows unadjusted OR. Model 2 shows OR adjusted for marital status, education, income, race, age, perceived physical health. Model 3 shows OR adjusted for model 2 covariates and rank, military deployment, deployment stats. Model 4 shows OR adjusted for model 2 and 3 covariates with sense of belonging and social provisions score. Age, Income and Education not displayed as they were universally non-significant predictors near 1.00.

Table 3

Summary of multiple regression analysis for variables predicting Social Provisions Scale scores in Canadian Armed Forces members: CFMHS 2013

Variable	Social Support Scale Overall (Men)			Social Support Scale Overall (Women)		
	B	SE	*p* value	*B*	SE	*p* value
Gay or Lesbian	-1.056	2.149	.623	-.516	1.189	.664
Bisexual	-.832	1.456	.568	.456	1.886	.810
Age	-.081	.007	<.001	-.046	.016	.005
Marital Partnered	Reference					
Marital SDW	-1.10	1.854	.553	.383	.620	.537
Never Married	-.747	.483	.123	.100	.599	.868
Race white	Reference					
Race non-white	-.062	.231	.788	-.441	1.001	.660
Income	.824	1.648	.612	1.709	3.547	.621
Education (any high school)	Reference					
Education (any post-secondary)	.219	.461	.634	-.062	.417	.881
Regular Force	Reference					
Reserve Force	.365	.730	.618	.458	1.014	.651
Junior NCM	Reference					
Senior NCM	.766	1.897	.686	.036	.601	.952
Officer	1.123	1.489	.449	.461	945	.625

Note: Social Provisions Scale Men R^2=.043, F=34.11, p<.001; Women R^2=.042, F=33.43 p<.001. NCM=non-commissioned member

Chapter 6. Sexual Orientation and Depression: A meta-analysis

Chapter 2 introduced differences in findings related to rates or risk of depression in persons who identify as belonging to sexual minority groups. There are reports in the literature of sexual minority people having higher risk of depression, no difference in risk, or even lower risk of depression compared to people who identify as heterosexual . Despite evidence implicating sexual orientation as a risk factor for depression in previous studies, the effect size of the differences across studies indicates the need for more detailed examination. Differences exist between men and women and between gays, lesbians, and bisexuals. One possible explanation for the findings of Chapter 2 is differences in methodologies used across studies. Differences in defining and operationalizing variables for sexual orientation and lack of stratification by sex all likely contributed to variation in reported findings. Another explanation may be the strategy used to measure depression or depressive symptoms, that included, self-report, review of prescribed medications, and use of validated scales.

The goal of this chapter is to summarize differences in depression risk between heterosexual and sexual minority people by completing a meta-analysis of the literature.

Method

Meta-analysis of observational studies in epidemiology (MOOSE) guidelines were followed for this review (Stroup et al., 2000). Statistical analysis was completed using Review Manager (RevMan) version 5.3.5 software (The Cochrane Collaboration, 2014).

Data Sources.

The same search strategy used for Chapter 1 was followed in this study and involved a search of the following health sciences databases: CINAHL, MEDLINE, PsychINFO, PubMed and Web of Science. Search terms designed to locate literature related to sexual orientation and depression were used. Sexual orientation search terms included: gay, lesbian, sexual minority, and the truncations homosex* and bisex*. Depression was searched using the truncation depressi* to locate variations on depression and depressive symptomatology. Individual sexual orientation term search results were combined with the Boolean "or" and then the final sexual orientation search was combined with the depression search result using the Boolean "and". The search was limited to English language articles and limited to a 15-year period from 2000 to 2015 to include the most contemporary publications. Abstracts were not included. All eligible studies were reviewed to identify any additional studies not located by the original search.

Study Selection.

Criteria for inclusion were 1) reported effect measure for depressive risk among heterosexual and sexual minority adults aged 18 and over using a validated measurement scale or tool; 2) use of discrete sexual orientation measures for heterosexual, gay men or lesbians, and bisexuals; 3) stratification by sex; and 4) a population based sample. Titles and abstracts were screened to determine eligibility. Data were extracted from the full text versions of each paper including sample, depression measure, sexual orientation measures, and effect size results. Sexual orientation measures of identity, attraction, or behavior were included, but only studies that differentiated between gay or lesbian and

bisexual were included. Reported sexual behavior with both sexes was treated as bisexual.

Analysis.

Separate analyses for sexual orientation identity and same-sex behavior were completed with male and female sub-groups. Due to the differences in sample characteristics and use of differing depression measures, a random-effects model using inverse variance was used to calculate the pooled effect estimates. Heterogeneity was assessed using the I^2 statistic that describes the percentage of variation across studies that is due to heterogeneity rather than chance. (Higgins et al., 2003)

Results

The search strategy yielded 5173 entries with 2989 multiple entries. After scanning titles for relevance 271 studies remained. The three studies completed for Chapters 3 to 5 of this dissertation were added for a total of 274 titles and abstracts for review. Abstracts not meeting eligibility criteria were discarded and 25 full text papers were reviewed. Data was available from seven papers for the analysis (n=5 for male and n=7 for female sub-groups analysis). Table 1 summarizes the included and studies.

Sexual Orientation Identity

Weighted effect size estimates and methodological characteristics for each study included in the analysis are summarized in Figure 1. Each of the studies used a different population based sample, although two of the samples are drawn from different cycles of the *National Health and Nutrition Examination Survey* (Scott, Lasiuk, & Norris, 2016a).

The overall weighted effect size for the relationship between gay or lesbian sexual orientation identity and depression was OR 1.56 (95% CI = 1.08 – 2.13) and statistically

significant (z=2.37, p=0.03). Sub-group analysis of males and females differed in significance and effect. The weighted effect size estimate for males was OR 1.49 (95% CI = 0.72 – 3.08) and not was statistically significant (z=1.08, p=0.28); the OR for females was 1.48 (95% CI = 1.03 – 2.13), which is statistically significant (z=2.12, p<0.001).

A similar pattern was found in the analysis of bisexual sexual orientation and depression. The overall weighted effect size was OR 2.14 (95% CI = 1.69 – 2.71) achieving statistical significance (z=6.35, p<0.001). The effect for bisexual males, OR 1.54 (95% CI = 0.70 – 3.43), did not achieve statistical significance (z=1.07, p=0.29) while the effect for bisexual women did, OR 2.18 (95% CI = 1.75 – 2.71), (z=7.03, p<0.001).

Sexual Orientation Behaviour

Weighted effect size estimates and methodological characteristics for each study included in this analysis are summarized in Figure 2. Three studies contributed to the analysis of the relationship between sexual orientation based on presence of same-sex behaviour and depression. Same-sex sexual behaviour was operationalized differently in the studies. Scott, Lasiuk and Norris (2016a) used any self-report of a same-sex partner, regardless of sexual orientation identity, in the previous year to identify males or females with same-sex behaviour. Cochran and Mays (2009) used self-reported sexual identity and sex of sexual partners to define “homosexually experienced heterosexuals” in males and females. Similarly, Bostwick, Boyd, Hughes & McCabe (2010) used self-report of sexual activity with same-sex partners, opposite-sex partners or both to identify same-sex behaviour. In this group the patterns were reversed compared to the sexual identity

analysis. The overall weighted effect was OR 2.10 (95% CI = 1.57 – 2.82) and statistically significant (z=4.97, p<0.001). The weighted effect for males, OR 3.29 (95% CI = 1.98 – 5.45) was significant (z=4.62, p<0.001), but the weighted effect for females, OR 1.45 (95% CI = 0.95 – 2.23) was not (z=1.71, p=0.05).

Discussion

Total and sub-group analysis in this study demonstrates the effect of grouping together males and females and different sexual orientations when exploring the relationship between sexual orientation and depression. Overall, gay men and lesbians demonstrated approximately 1.5 greater risk for depression than did heterosexuals and bisexuals had more than twice the risk. Sub-group analysis, however, revealed differences in risk between men and women. Gay men did not differ statistically from heterosexual men, but lesbian women had higher risk for depression compared to heterosexual women. Bisexual men, likewise did not statistically differ from heterosexual men for depression risk, but bisexual women did differ from heterosexual women with more than twice the risk. The results of this meta-analysis suggest that sexual minority women identifying as lesbian or bisexual do have higher risk for depression than do heterosexual identified women, but sexual minority men identifying as gay or bisexual may not have higher risk for depression than heterosexual identified men.

Sexual orientation behavior, or same-sex activity, is also associated with difference in depression risk. Overall, same-sex behavior is associated with about twice the risk for depression compared to people reporting no same-sex behavior. Sub-group analysis again reveals important differences. There was no statistical difference in depression risk for females reporting same-sex behavior compared to females who did

not. Conversely, males reporting same-sex behavior had five times the risk of males reporting no same-sex behavior.

The results are consistent with the small number of recent studies showing that sexual orientation and depression have a more complex relationship that one of overall increased risk for all sexual minority groups. In particular, being a heterosexual identified men with a history of same-sex behaviour was a strong predictor of depression in this study.

Strengths and Limitations.

The review comprised only studies with population-based random sample designs. All included studies also used a validated tool for measuring depression and had similar methods of identifying sexual minorities. There were similar proportions of sexual minority people, across the studies, so is likely that the samples were fairly representative of the number of sexual minority people in the general population. Nevertheless, there is likelihood that there is bias towards under reporting of sexual orientation and behavior due to continued stigma associated with being identified as a sexual minority. The studies included also adjusted for similar possible confounding variables such as age, race/ethnicity, income, employment status, education, and sex and all used heterosexuals as the reference group. The width of the overall effect confidence intervals compared to the individual studies suggests improved precision of the estimated effects achieved in this analysis.

Despite the noted strengths, there was moderate to high heterogeneity between the individual studies. Highest heterogeneity was encountered in the sexual orientation identification analysis, but is not unexpected given the differences in findings across the

studies with both statistically significant and non-significant effect sizes and risks both less than or greater than the reference group. The sexual behavior group had the least heterogeneity, but also the least number of studies. A main contributing source for heterogeneity may have been the different tools used to measure depression. Although, sexual orientation measures were fairly consistent, there were differences. Scott, Lasiuk and Norris (2016a) defined same-sex behavior groups based on past year same-sex activity, while Cochran and Mays (2009) used any same-sex activity since age 18. Finally, this review was unable to include any comparisons of stigma or social support to discuss the role of minority stress in depression.

This review provides supporting evidence that the role of sexual minority status as a risk factor for depression is not uniform across measures of sexual orientation nor is it the same for sexual minority men and women. Future population based studies are needed to further explore the role of sexual orientation as a risk factor for depression and other mental health disorders. In particular, differences among sexual minority sub-groups needs further study to confirm where there is higher risk and where there may be less risk.

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Table 1
Characteristics of included studies

Study	Aim	Sample	Method	Results
Bostwick et al. (2010)	Examine associations of sexual orientation, lifetime and past-year mood and anxiety disorders, and sex.	National Epidemiologic Survey on Alcohol and Related Conditions Wave II. N=34,653	Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV)	Mental health outcomes differed by sex, sexual orientation and sexual minority group. Bisexual behavior had highest risk of any mood disorder for males and females.
Case et al. (2004)	Examine associations between sexual orientation and breast cancer risk factors, cardiovascular disease risk factors, mental health status, and health related functioning.	Nurses' Health Study II (NHSII) N=90,823	Medical Outcomes Short Form 36 (SF-36)	Lesbians and bisexual women were more likely to report depression and use of anti-depressants than heterosexual women.
Cochran & Mays (2009)	Examine associations between sexual orientation and mental health/substance use morbidity.	California Quality of Life Survey N=2272	Composite International Diagnostic Interview Short Form (CIDI-SF)	Sexual orientation is a risk indicatory for psychiatric morbidity, but varied by gender and patterns of sexual orientation expression. Gay men, lesbians and bisexuals more likely to meet criteria for depression. Homosexually experienced men more had higher risk for depression than exclusively heterosexual men. Much of the excess risk in gay/bisexual men related to HIV infection.
Hughes et al. (2014)	Understand how differences in sexual identity and victimization experiences influence risk of hazardous drinking and depression a describe variations across sexual	Pooled data from 2001 National Study of Health and Life Experiences of Women and the Chicago Health and Life Experiences of	National Institute of Mental Health Diagnostic Interview Schedule	No difference in risk for depression in sexual minority women compared to heterosexual women in adjusted model. Other factors including age, race, residence, and childhood and adult victimization associated with depression.

	minority groups.	Women. N=1573		
Scott et al. (2016a) (Scott NHANES 5-8 and Scott NHANES 9-12)	Examine the relationship between sexual orientation and depression.	National Health and Nutrition Examination Survey (NHANES) cycles 2005-2012. 2005-2008 N=7190 2009-2012 N=7914	Patient Health Questionnaire 9 (PHQ-9)	Sexual orientation was not a significant independent predictor of depressive symptoms. Gay men had lower levels of depressive symptoms than heterosexual men. Men who had sex with men, including heterosexually identified men, had five times higher risk for depression than men with no same-sex activity.
Scott et al. (2016b) (Scott CCHS)	Describe the relationship between sexual orientation and depression in the Canadian population and to examine the impact of measures of social support.	Canadian Community Health Survey – Mental Health (CCHS-MH) 2012 N=24,788	World Health Organization Composite Diagnostic Interview (WHO-CIDI).	Gay and bisexual men did not differ in depression risk compared to heterosexual men. Lesbians and bisexual women had two to four times higher risk for depression compared to heterosexual women. Bisexuality appears to be associated with higher depressive risk. Sexual orientation was not a strong predictor of social support, but was associated with negative social interactions.
Scott et al. (2016c) (Scott CFMHS)	Examine the relationship between sexual orientation and depression in members of the Canadian Armed Forces.	Canadian Forces Mental Health Study (CFMHS) N=8,165	WHO-CIDI	Gay men had four times risk for lifetime major depressive episode and a near statistically significant trend towards two times higher past 12-month major depressive episode. There as no difference in risk for depression for lesbians and bisexuals compared to the heterosexual reference. Finding may represent ongoing discrimination and stigma faced by gay male military members.

Figure 2 *Forest Plot for Sexual Orientation Gay or Lesbian and Depression*

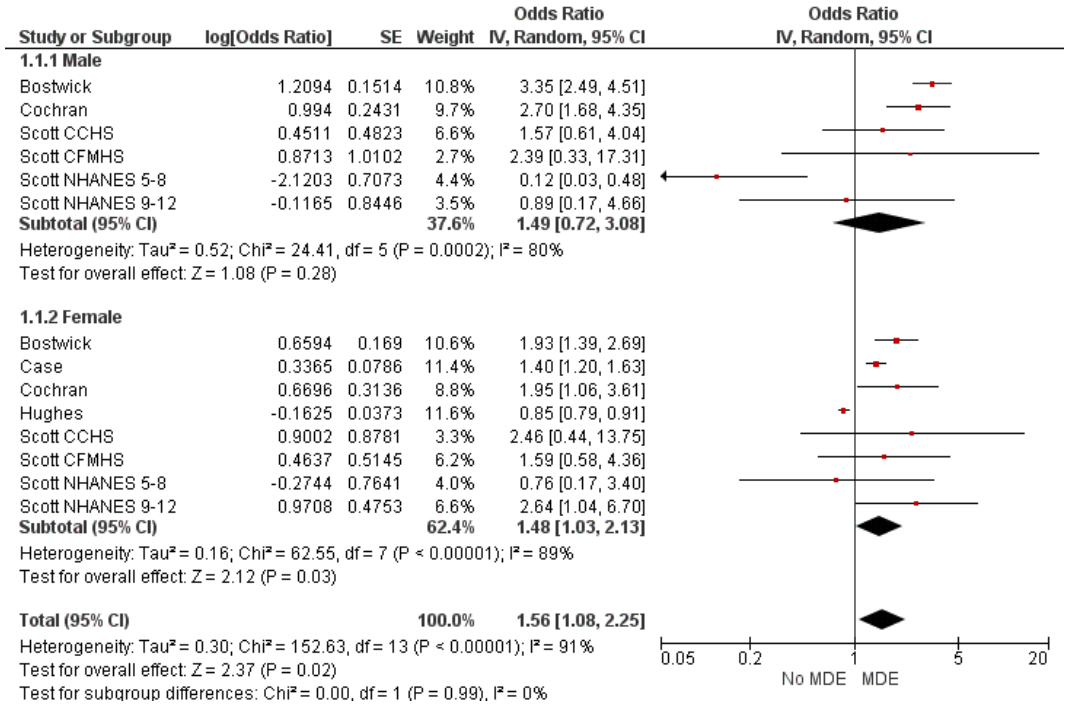


Figure 3 *Forest Plot for Sexual Orientation Bisexual and Depression*

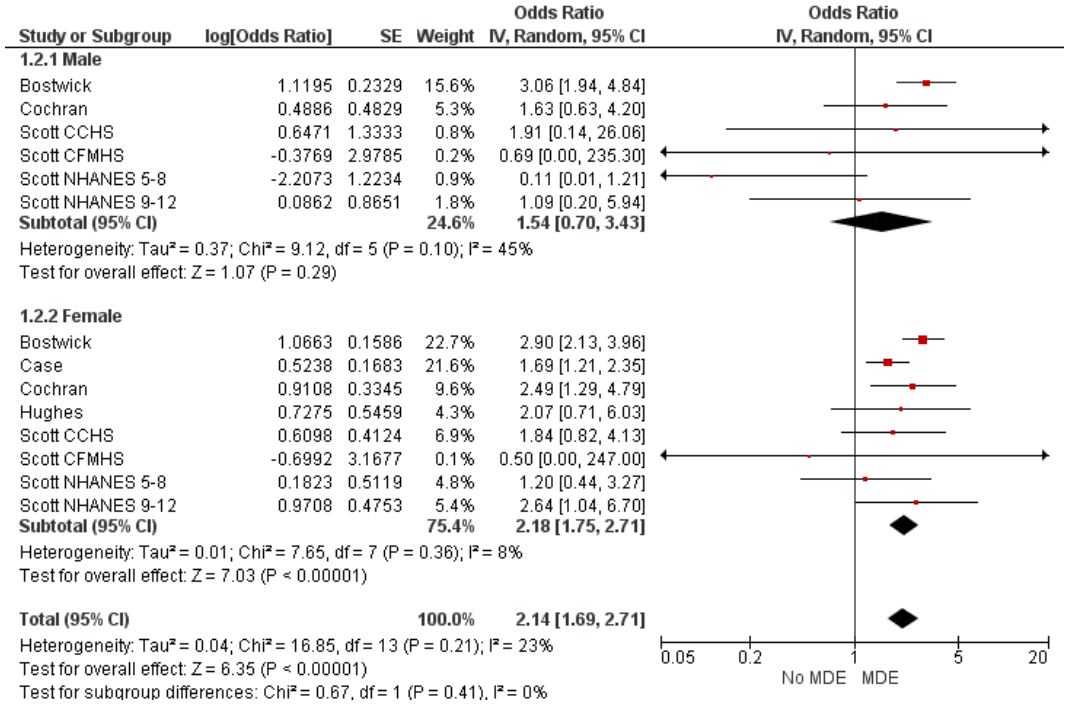
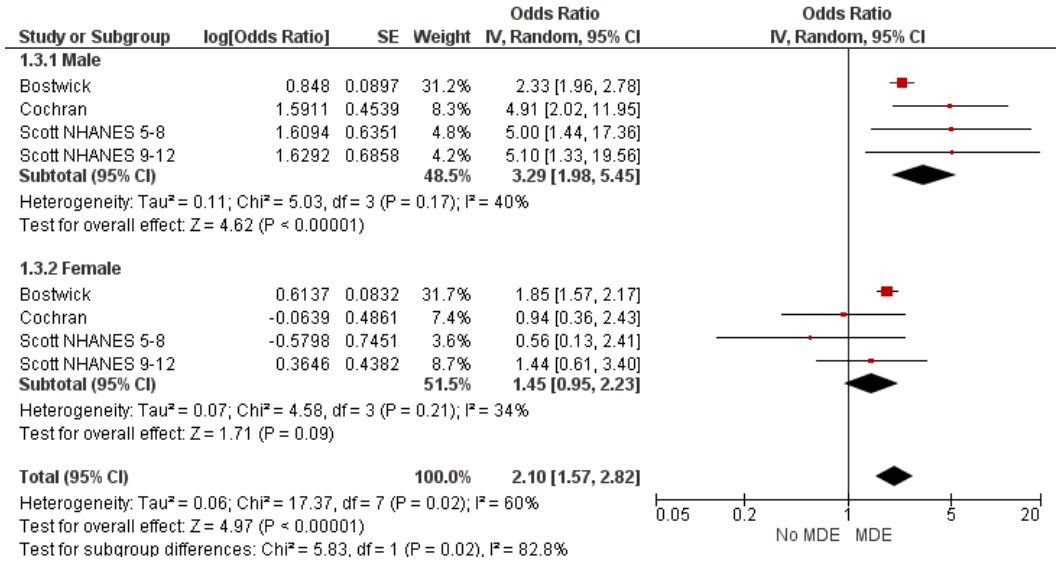


Figure 4 *Forest Plot for Same-sex Behavior and Depression*



Chapter 7. Summary, Conclusions and Recommendations

Through secondary analysis of existing population data sets, new knowledge was generated about the relationship between sexual orientation and depression. This final chapter will summarize the findings of this compilation of studies, highlight conclusions, and discuss the strengths and limitations of this body of research work. Finally, implications for future research and clinical practice will be presented.

Summary of Findings

This dissertation was designed to describe the relationship between sexual orientation and depression using population data sets. While not included in the original research plan, access to the Canadian Forces Mental Health Survey afforded the opportunity to include the little studied military sexual minority population in this work. The literature review identified limitations of previous research in this area. Specifically, that there were inconsistencies in the methods used to investigate the relationship between sexual orientation and depression and a lack of precision when describing the mental health of sexual minorities in general. The finding that sexual minority people suffered from higher rates of mental health disorders was extrapolated to depression without due consideration of the importance of studying disorders separately. These findings emphasize the importance of studying the relationship with respect to differences in sex and sexual orientation sub-groups.

Reporting Sexual Orientation

A major finding of the literature review was the variation in how sexual orientation was defined and reported. Some studies were limited by lack of specific sexual orientation identity questions and relied solely on descriptions of sexual behavior

alone to define a "homosexual" grouping. Others incorporated sexual orientation identity, but often grouped all non-heterosexual orientations together either for convenience or statistical power. Still, another approach to reporting involved grouping sexual orientation identification with same-sex behavior or attraction. The variation in reporting sexual orientation has led to unreliable blanket findings that all sexual minority people suffer higher rates of depression.

In the first paper, it was identified how appropriate sub-grouping of sexual orientation by identification and behavior, stratified by sex revealed important differences in patterns of depression risk. The novel finding that gay men may be at less risk for depression compared to heterosexual men challenges the commonly held perception that sexual minority people are always worse off in regards their mental health. A finding that gay sexual orientation identification may be protective for depression in some fashion offers a new insight into the mental health of gay men and raises questions about the source of protection. Is there resilience in accepting one's sexual orientation and coming out? Perhaps successfully integrating sexual orientation into one's identity and being able to live authentically provides protection. Further research is needed to understand the sources of this possible resilience. The data set for the first paper also enabled exploration of differences between sexual orientation identity and sexual behaviour. The significant difference between depression risk in men who reported same-sex behavior and those who did not, was another important finding. Since the same-sex category included men who identified as heterosexual, gay, and bisexual, the finding suggested that discordance between sexual orientation identification and behaviour contributes to depression risk. Differences in depression risk between sexual minority men and women

showed that earlier research reporting overall higher risk for depression was likely skewed by risk variance by sex. Paper one justified the need for further in-depth study of relationship between sexual orientation and depression.

All three papers illustrated why sexual orientation sub-groupings are necessary. Each of the three papers illustrated patterns in depressive risk. In particular, the meta-analysis demonstrated that bisexuality by identification or by behaviour appeared to have the most relevant association with increased risk for depression/depressive symptomatology. Earlier studies may have erroneously reported an overall higher risk for depression in sexual minority people that was more correctly related to higher risk in particular sub-groups, such as bisexuals. There is some evidence to suggest that sexual orientations other than gay, lesbian or bisexual also have higher risk that could again distort results of earlier studies.

The Effect of Sex

Just as the literature review showed that many studies grouped sexual orientation sub-groups together, many did not stratify results by sex. The reasons for not stratifying by sex were not explained, but likely had to do with statistical power of the study. Known differences in depression risk between men and women justify the approach used in my papers to stratify by sex. The patterns of depression risk were similar to the general population with women displaying higher risk for depression than men. While differences did not exist between sexual minority and heterosexual women overall in the three studies, the meta-analysis did reveal higher risk for sexual minority women.

Minority Stress

The effect of minority stress has been proposed as an explanation for poorer mental health in sexual minority people. According to the theory, sexual minority people are exposed to numerous stressors including discrimination, expectations of rejection, stress surrounding concealment and/or disclosure of sexual orientation, and internalized homophobia (Meyer, 2007). There was no measure of social support, victimization or discrimination in the NHANES data, so the first paper did not evaluate the role of minority stress.

In the second and third papers, it was possible to use social provisions and negative social interactions as surrogate markers for minority stress. It was hypothesized that the social provisions scale (SPS) (Cutrona & Russell, 1987) measures of support in areas of attachment, guidance, social integration, reliable alliance, and reassurance of worth would correspond with experiences of discrimination, expectations of rejection and internalized homophobia. The use of the negative interaction scale (NIS) (Krause, 1995) as a second measure, allowed testing of the hypothesis that higher scores indicated more negative interactions reflecting the negative characteristics of minority stress. The NIS was only available in the CCHS-MH dataset and not the CFMHS dataset.

Social provisions scale scores were not significantly associated with depression in the second paper, but it there was a small inverse association in the third paper. There were no significant differences in social provision score measures between sexual minority people and heterosexuals in the CCHS-MH study (paper two) and primarily no difference in the CFMHS (paper three), although it appears that bisexual women in the military report higher social provisions scores than heterosexual women. On the other

hand, gay men and lesbians had lower NIS scores than heterosexuals, but bisexuals had higher NIS than heterosexuals.

The SPS and NIS score findings were unexpected. The original hypothesis was that sexual minority people would differ from heterosexuals on both scales resulting in lower SPS scores and higher NIS scores in sexual minorities. The overall null hypothesis for SPS may simply reflect that SPS was not an appropriate surrogate for minority stress and did not satisfactorily replace measures for discrimination or victimization. Alternatively, it may be that Canadian societal change in attitude and concentration of sexual minority populations in urban centers has created the conditions where sexual minorities have similar strong relationship and feelings of attachment. Lower NIS scores were also unexpected. Lower scores for gay/lesbians were not expected and perhaps can be explained in the same manner as the SPS results. However, the finding that bisexuals had higher NIS scores counters that finding. Higher NIS for bisexuals may reflect the difficulty they experience in finding a place in either the "straight" or LGBT communities. The SPS and NIS scores do, however, seem to correspond with the depression findings if they do reflect levels of minority stress.

Finally it is important to note the significant finding of higher depression risk for men with same-sex behavior, and how it may reflect the minority stress domain of internalized homophobia. The men who have sex with men (MSM) group in the first paper comprised heterosexual gay and bisexual identified men. Since gay men were found to have lower depression risk than heterosexual men, it is quite plausible that the finding reflects internalized homophobia as a result of discordance between sexual

identity and sexual behavior in men who either 1) deny or suppress their sexual minority identity; and/or 2) are conflicted over their sexual behavior.

Internalized homophobia is a form of internalized stigma. In these studies, MSM and gay male members of the CAF showed higher risk for depression. It is possible that their self-identities (i.e. military and gay; straight and MSM) lead to their accepting negative stereotypes about gay men as applying to themselves or that homophobia discrimination they experience justified. Such internalized stigma could explain the higher odds for depression found in these groups. Overcoming self-stigma of mental illness has been described in the literature in terms very similar to "coming out" for sexual minority people (Corrigan & Rao, 21012).

Important Risk Factors

Although sexual orientation was not a strong independent predictor of depression in these analyses, there were commonalities with previously reported depression risk factors suggesting that the models in this body of research were valid. Demographics including age, sex, marital status, education, income and race corresponded with research in general populations identifying these variables as risk factors for depression. Poor physical health was strongly associated with depression in all three studies, which is consistent with literature that has identified the relationship between chronic disease and poor mental health (Egede, 2007; Moussavie et al., 2007).

Strengths and Limitations

This dissertation overcame the major problem of 'sampling' in prior work in this area. Populations based samples ensured representative samples compared to inferior sampling methods from previous studies such as snow-ball sampling, recruiting from

LGB community centers or online sources. The general consistency of proportions of sexual minorities across the studies supports the notion that the samples are representative. The population datasets enabled sufficient sample size of sexual minorities, to stratify analysis by sub-groups and sex, which was necessary to uncover differences in risk patterns. Furthermore the analyses in the population based analyses allowed than one measure of sexual orientation to explore the relationships in question. Using population based data from both the United States and Canada enhances the generalizability of the findings in Westernized countries. More importantly, the pooling of the findings in this dissertation with prior work through meta-analysis that demonstrated similar patterns of risk provides an important summary of the research in this area to date.

Lack of available measures of minority stress characteristics is the main limitation of this compilation of studies. Although the SPS and NIS measures concepts that may be related to minority stress, they have not been validated as measures of minority stress or discrimination. Neither scale provides measure of important domains such as concealment/disclosure of sexual minority status, nor do they measure negative feelings such as internalized homophobia. Another identified limitation through these studies is the lack of more than one measure of sexual orientation available in the Canadian datasets precluding replication of the same-sex behavior analysis in more than one dataset. Finally, the inability to identify other sexual minorities such as trans-gender people leaves an ongoing gap in the literature in this area.

Implications for Further Research

It is important to note that this dissertation does not suggest that sexual minority people do not have higher risk for mental health disorders compared to non-sexual minority people overall. While these studies have only addressed one disorder – depression –future research is needed to examine the relationships between sexual orientation and other mood, anxiety and substance use disorders. Patterns of risk for depression differ by age, therefore, more research is needed to explore depression risk and age in sexual minority youth and older adults to identify if and how they differ. The body of literature on sexual minority youth is growing and it will be necessary to determine if early onset of depression in that group has long lasting negative health impact or if it in some fashion contributes to resilience.

There is a need for studies of mental health and sexual orientation to continue. Societal change will continue, population demographics will shift, and the effect of minority stress may be affected thus leading to changes in patterns of risk over time.

Population health studies should routinely include multiple measures of sexual orientation including identity, attraction and behavior, so that a more robust understanding of relationships between mental health and sexual orientation can be developed. Gender identity needs to be included in population studies. Researchers who use population data sets should be explicit in requesting the inclusion of multiple measures of sexual orientation and gender identity. Inclusion of measures of discrimination, victimization, and exposure to trauma in population health surveys should also be routine.

Implications for Clinical Practice

First and foremost, this dissertation demonstrates that there is not a global risk for depression in sexual minority people and that majority of sexual minority people do not suffer from depression. Clinicians should not assume that sexual orientation confers higher risk for poor mental health. Rather, clinicians should use open and non-judgmental questions to screen the sexual orientation, behaviors, and sexual health of their clients as part of routine care. All clients should be asked general questions about daily experiences, exposure to trauma past and present, and the health of their relationships as part of an individualized risk for depression and other mental health disorders. Inclusive forms of language that do not project heteronormative assumptions need to be adopted. Sexual and gender minority sensitivity and clinical needs must be included in health care training (Dunn, & Taylor, 2005). Clinical guidelines for LGB primary health care need to be evidence-based and rigorously developed just as non-LGB primary health care guidelines are (McNair & Hegarty, 2010). Creating safe health care spaces for sexual minority people will promote trust in health care providers and ultimately promote good mental health.

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