A Syndemic in Nonurban Gay and Bisexual Men in British Columbia and within Island Health

by

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BA, University of British Columbia, 2012

A Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF PUBLIC HEALTH

in the School of Public Health and Social Policy

I acknowledge with respect the Lekwungen peoples on whose traditional territory the university stands and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day.

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Abstract

Inequitable HIV acquisition persists among gay and bisexual men (GBM). In 2017, GBM represented 69.8% of new HIV diagnoses in British Columbia (BC) and 80.5% of new HIV diagnoses within Island Health (BCCDC, 2019). I used syndemic theory to examine the relationship between nonurban living environment, syndemic factors, and health outcomes among GBM within Island Health and in BC. I conducted a secondary analysis of the Community Based Research Centre's Sex Now 2015, a national cross-sectional survey of approximately 8000 Canadian GBM. I conducted chi-square tests to compare levels of stigma stratified by urban or nonurban, Cramer's V to examine the association between syndemic factors, and Poisson regression to determine which demographics and health outcomes were associated with more syndemic outcomes. I found prevalent stigma that negatively impacts urban and nonurban GBM. Urban GBM experience more stigma (e.g., called names or slurs) and worse outcomes (e.g., considered suicide) than nonurban GBM in Island Health and BC. Among nonurban GBM within Island Health, Cramer's V may demonstrate a syndemic (e.g., strong associations between several measures of stigma such as verbal violence and discrimination at work and health outcomes such as depression, suicide, partner violence, and alcohol use). Among nonurban GBM within Island Health, Poisson regression revealed that more syndemic factors were associated with negative health outcomes and risk factors, such as attempting suicide, condomless sex, having sexual partners of unknown HIV status, and living with HIV. These findings suggest that a syndemic can occur among nonurban GBM without migration to a large urban centre. Key implications include a need for structural change to destigmatize sexual diversity. Results illustrate a need to normalize conversations about mental health among GBM who would benefit from co-located services that address stigma, mental health, substance use, and sexual health.

Keywords: syndemic, HIV, quantitative, community-based participatory research, nonurban

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Introduction

Background and Significance

In Canada, the national HIV diagnosis rate among gay and bisexual men (GBM) is 71 times higher than other men (Public Health Agency of Canada, 2014). Across British Columbia (BC), new HIV diagnoses among men who have sex with men (MSM) declined slightly from 181 cases in 2008 to 127 cases in 2017 (BC Centre for Disease Control, 2019). Comparatively, there were 43 new diagnoses of HIV among people who inject drugs (PWID) in 2008 and just 12 in 2017 (BC Centre for Disease Control, 2019). In 2017, GBM represented 69.8% of new infections in BC, and 80.5% of new infections within Vancouver Island Health Authority, or Island Health[1] (BC Centre for Disease Control, 2019). Altogether, GBM remain disproportionately affected by HIV in spite of ongoing public health efforts.

Moreover, contemporary GBM in Canada still experience a combination of negative health outcomes and stigma and discrimination, which has been described as a syndemic among GBM (Ferlatte et al., 2014, 2018; Singer, 1994; Stall et al., 2008). For example, stigma and discrimination have a negative impact on GBM health outcomes, such as HIV and mental health (Gilbert & Hottes, 2014; Meyer, 2003; Stall et al., 2003). Additionally, stigma and discrimination decrease the likelihood and timeliness of HIV diagnosis and undermine public health efforts aimed at reducing transmission (Preston et al., 2004; Sengupta et al., 2010; Whitehead, Shaver, & Stephenson, 2016). The national 2015 Sex Now Survey of GBM gathered data on experiences of discrimination across Canada, such as being targeted with antigay violence (e.g., hate talk, beaten up), as well as levels of outness (e.g., telling others about one's sexuality) (Trussler & Ham, 2017). The Sex Now survey found that 48% of respondents residing in Island Health were out to everyone in their family compared with 68% in Vancouver Coastal Health Authority (Trussler & Ham, 2017). Regarding measures of discrimination, the survey found 45% of GBM

[1] In BC, Island Health provides health care services on Vancouver and Gulf Islands and some mainland communities (Island Health, 2018). See Appendix A for a map of the geographic boundaries of the health authorities in BC.

in Island Health have experienced being called homophobic names (Trussler & Ham, 2017). However, the Sex Now survey did not distinguish findings by urban or nonurban living environment; rather, findings were discussed based on health authority geography. Thus, respondents living in urban and nonurban areas of each health authority are combined and any differences between urban and nonurban respondents are not visible. Based on this survey's results, it is unknown if nonurban men differ from urban men regarding syndemic experiences of stigma and negative health outcomes. This thesis intends to compare syndemic factors among urban and nonurban GBM, and learn about the syndemic experiences of GBM in nonurban living environments.

With regard to stigma, there are few formal data about the level and impact of stigma on GBM's health outcomes or access to health services within Island Health. A service review commissioned by Island Health in 2015 found that services are inadequate and that GBM lack visibility and a sense of community. However, there are no data for the region on the contextualized ways that stigma operates and its influence on HIV (Jollimore, 2015). Building on Jollimore's (2015) report, I completed an updated environmental scan of services for GBM in Spring of 2018 as part of my Master of Public Health practicum (Hickman, 2018). The scope of the environmental scan included Central and North Vancouver Island, and reviewed sexual health services, mental health and substance use services, First Nations health service organization services[2], and psychosocial supports. Similar to Jollimore's initial report, my environmental scan revealed a lack of timely, anonymous, and culturally competent services. Stigma appeared to be a barrier for GBM accessing both healthcare services and social connection within Island Health, as evidenced in previous literature (Allen, Glicken, Beach, & Naylor, 1998; Hickman, 2018; Jollimore, 2015; Kitts, 2010; Preston & D'Augelli, 2013; Schwitters & Sondag, 2017).

[2] First Nations health service organizations (FNHSO) are health service organizations administered by the First Nations Health Authority (FNHA) (www.fnha.ca)

There is a paucity of formal research specifically on GBM within nonurban Canadian settings. Literature in urban Canadian and both urban and nonurban American settings has demonstrated that stigma against both HIV and sexual diversity is a barrier to positive health outcomes for GBM (Bauer et al., 2017; Hart & Horton, 2017; Keene, Eldahan, White, & Pachankis, 2017; Preston & D'Augelli, 2013; Schwitters & Sondag, 2017; Shernoff, 1997; Uphold, Rane, Reid, & Tomar, 2005; Williams, Bowen, & Horvath, 2005). However, nonurban American literature should not be directly applied to nonurban Canadian populations since there are important sociopolitical differences between the two countries with respect to GBM. For example, Canada protected sexual orientation under the Human Rights Act in 1998, established same-sex marriage in 2005, and presents less visible opposition to sexual diversity compared with the United States of America (Ferlatte, Hottes, Trussler, & Marchand, 2014). In contrast, the United States of America recognized same-sex marriage a decade later in 2015, and lacks federal law pertaining to discrimination on the basis of sexual orientation (Ferlatte et al., 2014).

My thesis uses syndemic theory to contribute to the sparse literature regarding the prevalence and impact of stigma on health outcomes for a nonurban Canadian GBM population (Kennedy, 2010; Stall et al., 2003; Stall, Friedman, & Catania, 2008). Syndemic theory (Stall et al., 2008) argues that mutually reinforcing epidemics among GBM are socially produced and reduce the overall health of the population more than each discrete epidemic. For example, high levels of substance use, depression, and sexual risk taking interact to reduce GBM health more than each individual factor (Stall et al., 2008). Moreover, Stall (2008) argues that cultural marginalization alone is sufficient to produce a syndemic among (urban) American MSM.

This thesis uses 'stigma' to describe the excess stress GBM are exposed to because this terminology is used by my target population (Salway, Hawkins, Dickie, & Duddy, 2018). Sexual stigma is defined by Herek (2007, pp. 907) as, "the negative regard, inferior status, and relative powerlessness that society collectively accords to any nonheterosexual behavior, identity, relationship, or community".

As well, Stall, Friedman, and Catania's (2008) Theory of Syndemics is informed by Meyer's (2003) concept of minority stress, where negative health outcomes result from a hostile social environment. Meyer's concept of minority stress includes stigma, prejudice, and discrimination, as well as expectations of rejection, concealment, and internalized homophobia. Therefore, 'stigma' is appropriate because Meyer's concept of minority stress explicitly includes stigma, and is the terminology used by my target population (Padgett, 2012).

Terminology best describing my study population itself has been debated (Boellstorff, 2011; Prestage, 2011; Young & Meyer, 2005). 'Men who have sex with men', (MSM) is popular within epidemiology and public health because it is a viral exposure/transmission category intended to reduce AIDS stigma by focusing on behaviour, rather than identity (Prestage, 2011; Young & Meyer, 2005). However, its use beyond a transmission category is criticized specifically for reducing individuals to their sexual behaviour and erasing identities that are the foundation of gay community (Prestage, 2011). Conversely, 'gay and bisexual men' (GBM), takes cultural, political, and social dimensions of sexual identity into consideration (Prestage, 2011). Moreover, Young and Meyer (2005) recommend respecting self-identification in specific contexts to honour participants' self-determination. In this thesis, I specifically address social and contextual factors (e.g., stigma and nonurban living environment) that impact health; therefore, gay and bisexual men (GBM) is the most appropriate term since it includes the social dimensions of sexual identity, rather than just behaviour, and matches the terms offered by participants (e.g. 59.4% identified as gay and 34.6% identified as bisexual). Therefore, while documents cited herein use alternate language, I use GBM in this thesis.

Thesis Objective

Currently, extant quantitative data on syndemics have not been analyzed based on nonurban geography. This study aims to conduct a quantitative analysis of the existence and influence of a syndemic of stigma and negative health outcomes for nonurban GBM within Island Health and in BC. In

order to accomplish this goal, this thesis aims to: 1) develop an understanding of GBM's demographic differences by urban or nonurban living environment, 2) compare syndemic factors among urban and nonurban GBM, 3) examine the associations between syndemic factors, 4) determine which demographics and health outcomes were associated with an increased number of syndemic factors, and 5) test the applicability of syndemic theory among nonurban GBM. This thesis aims to conduct all five steps for Island Health, but only the first two for all of BC.

Literature Review

This literature review is organized into several sections. First is a brief outline of the ecosocial perspective of syndemic theory. This theory was developed from Singer's (1994) perspective on HIV/AIDS and positions HIV as a result of structural conditions. After outlining Singer's (1994) theory and describing findings related to American urban GBM, research on syndemics is presented through three subsections on qualitative syndemics research, syndemics research in Canada, and nonurban syndemics research related to GBM. Each of these subsections describes current findings and identifies gaps in the literature. Following the description of syndemics research is a brief history of research specifically on stigma and an outline of the effects of stigma on GBM health.

Syndemics

This thesis uses the ecosocial perspective of syndemic theory as recommended by the Institute of Medicine Report on LGBT Health (2011). Syndemic theory developed from Singer's (1994) critical medical anthropology perspective on HIV/AIDS. Singer & Clair (2003) described the production of HIV/AIDS with the term syndemic. Syndemic refers to a "set of synergistic or intertwined and mutual enhancing health and social problems" (1994, p. 933). Additionally, syndemic theory describes the tendency of multiple epidemics to co-occur, interact and worsen the effects of one another. Syndemic theory is premised on positioning inequitable rates of HIV among GBM as a socially constructed problem, rather than reduced to a function of individual sexual behavior (Krieger, 2001; Stall et al.,

2008). Rather than conceiving of HIV/AIDS in isolation as a new, exclusively biomedical epidemic, Singer (1994) positioned HIV/AIDS as a result of structural conditions and power relationships. For example, Singer described determinants of HIV along intersections of race, class, and gender. Overall, Singer highlighted the importance of exploring the social origins of HIV/AIDS such as discrimination and homophobia to prevent reductionist, individualistic, 'lifestyle' explanations of disease. As such, syndemic theory offers a valuable model for comprehending how social inequities such as homophobia may maintain GBM's vulnerability to HIV (Singer, Bulled, Ostrach, & Mendenhall, 2017; Stall et al., 2008).

Researchers have used Singer's syndemic theory (1994) to describe the association of co-occurring psychosocial health problems and increased vulnerability to HIV/AIDS (Stall et al., 2003). Stall et al. (2008) developed a theory of a socially produced syndemic among urban American GBM. The authors argued that cultural marginalization was sufficient to produce a syndemic among GBM in the United States of America. Ferlatte and colleagues (2014) explained:

> …their model locates the intertwined epidemics of psychosocial and physical health problems faced by gay men within a life course perspective, while considering the social and structural factors such as homophobia and heterosexism that allow these syndemics to occur (p. 1257).

Taken altogether, syndemic theory offers an explanation for the disproportionate rates of HIV among GBM.

Syndemic theory (Stall et al., 2008) applies primarily to urban middle class American gay men who came of age in the latter 20th century. Syndemic theory asserts that two main dynamics produce a syndemic among this population of urban gay men: socially-produced damages associated with early adolescent male socialization, in combination with the added stresses associated with migration to large cities (Stall et al., 2008). The socially produced damages in adolescence are increased incidences of bullying, harassment, violence, and a lack of freedom of association and expression, which are correlated with long-term consequences of higher rates of depression and lower self-esteem as adults

(Stall et al., 2008). The second main dynamic is the loss of social capital when migrating from community of origin to a large urban center (Stall et al., 2008). The loss of social capital reduces ability to cope with stressors associated with migration to a large city. Taken together, the socially produced damages in early life combined with the stress of migration produce a syndemic among GBM. However, Stall et al. 2008 (p. 254) note that "as socially produced phenomena, the conditions that gave rise to syndemics may change across generations and subpopulations of gay men".

Applying syndemic theory to a contemporary subpopulation of nonurban GBM needs to be modified due to specific temporal and geographic social conditions. Since quantitative data on syndemics have not been analyzed based on nonurban geography, this research contributes to syndemic literature by testing the applicability of the theory among nonurban GBM populations. Accordingly, this thesis aims to conduct a quantitative analysis of a syndemic of stigma and negative health outcomes for nonurban GBM within Island Health and in BC.

Qualitative Syndemics Research

American research empirically substantiated a syndemic in GBM health using predominantly quantitative methods (Bruce & Harper, 2011; Herrick et al., 2013; Klein, 2011; Mustanski, Garfalo, Herrick, & Donenberg, 2007; Parsons, Grov, & Golub, 2012). However, two American studies have explored syndemics using qualitative analyses. First, Lyons, Johnson, & Garofalo (2013) examined the multiple health disparities experienced by young GBM in the United States of America. Analyses of their qualitative interviews identified themes of lack of gay-specific HIV prevention education, absence of role models, and lack of productive future goal related activities as factors influencing their acquisition of HIV (Lyons et al., 2013). The findings support the idea that multiple factors of cultural marginalization cluster together in the lives of young GBM; however, these findings are only drawn from young GBM, and more understanding is needed for how syndemics operate over the lifecourse for GBM in different living environments. The second qualitative study by Frye et al. (2014) focused on young African American and

Latino GBM to understand how their intersections of place, class, and race/ethnicity increase syndemic health outcomes. Their results reflect Stall's original syndemic theory, whereby participants experienced marginalization and isolation due to their sexual identity, failure to conform to gender norms, and same sex sexual behavior (Frye et al., 2014). As well, GBM from low socioeconomic status (SES) neighborhoods experienced multiple pathways heightening their risk of adverse health outcomes, such as their socioeconomic circumstances and the social boundaries of their neighborhood (Frye et al., 2014). In one example, low SES prohibited access to resources necessary to migrate to a more gay-friendly neighbourhood (Frye et al., 2014). In another, social boundaries between neighbourhoods were often racially constructed, and again limited access to gay community. Thus, GBM were confined by lack of access to resources and uncrossable symbolic boundaries between neighbourhoods in New York City. How these issues are experienced among GBM in Canada is less understood and presents an opportunity for further research.

Outside the United States of America, there are select examples of qualitative syndemics research with GBM. For example, a German study completed a qualitative analysis of reasons for drug use among GBM, discovering evidence of multiple syndemic factors (Deimel et al., 2016). The syndemic factors were similar to previous research, such as experiences of violence and discrimination, HIV infection, and family conflict when coming out. In New Zealand, Adams, McCreanor, & Braun (2013) completed a critical qualitative study of gay men's health. Within their interviews, predominant themes were negative impacts on health from heterosexism, social exclusion, minority status and individualized methods of improving health for gay men (Adams et al., 2013). Results supported a social approach to GBM (Adams et al., 2013). The authors were critical of individualistic approaches to health promotion, and instead advocated for a social determinants of health approach that creates structural changes, such as legislative action (Adams et al., 2013).

The above studies demonstrate promising examples of qualitative research on syndemics. The results show that multiple factors, including place, influence HIV acquisition. However, the research is limited to few studies. Additionally, these examples are from an American or international context and are generalizable only to their target populations. As such, more inquiry is needed to understand the impact of syndemic factors on GBM in a nonurban Canadian context. This thesis intends to address this gap in the literature within Island Health and BC regions.

Syndemics Research in Canada

Two Canadian studies of GBM have provided evidence of a syndemic of anti-gay experiences, psychosocial issues, and HIV and sexually transmitted infection (STI) risk (Ferlatte et al., 2014, 2018). Ferlatte and colleagues (2014) measured the degree that anti-gay experiences were associated with psychosocial issues, hypothesizing subsequent additive effects on HIV risk. Their results indicated that 68% of young Canadian gay and bisexual men described one or more forms of anti-gay experience; furthermore, reporting more anti-gay experiences increased the likelihood of psychosocial issues (Ferlatte et al., 2014). Psychosocial issues had an additive effect of increasing the risk of condomless sex in the twelve months prior to survey, lending support to a syndemic hypothesis (2014). As well, syndemic theory has been applied to the syphilis epidemic among GBM (Ferlatte et al., 2018). Syphilis diagnosis was positively associated with anti-gay stigma, and multiple forms of stigma had an additive effect of increasing the prevalence of syphilis diagnosis, lending further support for the syndemic hypothesis (Ferlatte et al., 2018). These two studies show that stigma for GBM is prevalent in Canadian society, and indicate an association between stigma, psychosocial issues, and HIV and syphilis risk among Canadian GBM. While the results lend support to a syndemic hypothesis among GBM, they did not consider the role of living environment or geography. Future research should explore the influence of living environment on the experiences of Canadian GBM.

Nonurban Syndemics

In Commonwealth countries, little research exists regarding a syndemic among GBM living in nonurban contexts (Fisher, Irwin, & Coleman, 2014; Keene et al., 2017; Preston et al., 2004; Schwitters & Sondag, 2017; Sengupta et al., 2010; Uphold et al., 2005; Whitehead et al., 2016; Williams et al., 2005). Galambos (2005) described health disparities among nonurban populations as a neglected frontier; outlining examples of population health inequities such as increased premature mortality and higher suicide rates for men. Preston and D'Augelli (2013) explored how nonurban GBM coped with stigma and found community and family stigma was linked with low self esteem, depression, and high-risk sexual behaviour. However, the authors did not utilize syndemic theory in their work. Additionally, compared with urban populations, nonurban people living with HIV reported increased severity of barriers such as the need to travel long distances for care, medical professional shortages, lack of transportation, and stigma regarding HIV (Heckman, Somlai, Peters, et al., 1998). Taken altogether, there is some evidence of a potential syndemic in nonurban living environments. There is a need to look further at the effect of nonurban living environments on GBM, as well as the possibility that a syndemic is occurring among nonurban GBM.

In a nonurban Canadian context, little research exists regarding the prevalence and influence of stigma on GBM health; moreover, syndemic theory has not been applied in this context. In Ontario, Kennedy (2010) explored the lived experiences of nonurban GBM through qualitative interviews but did not explicitly utilize syndemic theory. Kennedy's (2010) results distinguished between lifelong nonurban men ("natives"), and men who had moved to a nonurban living environment later in life ("transplants"). Longer duration in a nonurban locale was associated with greater degrees of difficulty negotiating sexual identity, beliefs, and community, suggesting nonurban geography might amplify factors contributing to negative health outcomes among nonurban GBM (Kennedy, 2010). For example, "native" men were more likely to be less open about their sexual identity, be single, struggling with past religion,

experience social pressure to conform to heteronormativity, have less socioeconomic resources, and use the internet for sexual expression (Kennedy, 2010). Kennedy's results refer only to a sample of Ontario GBM. More research is needed to replicate and confirm Kennedy's results. As well, research exploring the additive effects of different health factors is needed.

Stigma

In the latter half of the 1900s several scholars theorized about social stigma from sociological and psychological perspectives (Goffman, 1963; Jones, 1984; Link & Phelan, 2001). Stigma and discrimination began to be linked to sexual minority[3] health in the 1980s, with research on minority stress and lesbian women (Brooks, 1981). A public health perspective of sexual minority health was developed in response to study of the effects of heterosexism, homophobia, and stigmatization (Cochran, 2001; Herek, 1998; Meyer, 2001). Around this time, Krieger theorized about the biological expressions of racial discrimination. Krieger (2001) described an ecosocial perspective in social epidemiology where social factors, such as stigma and discrimination, are embodied and lead to disease. Building on these foundational works, Meyer developed an understanding of how prejudice and discrimination affect mental health among sexual minority populations. Meyer published a manuscript demonstrating that lesbian women, gay men, and bisexual people have a higher prevalence of mental disorders than heterosexual people, presenting the conceptual framework of minority stress to explain that "stigma, prejudice, and discrimination create a hostile and stressful social environment that causes mental health problems" (2003, p. 674). Meyer asserted that an ecosocial perspective in social epidemiology disentangles the causal relationships between LGBT identities, experiences of minority stress, and health outcomes (2003).

Research on minority stress has investigated stigma and vice versa (Herek, 2007; Meyer, 2003). Research on stigma describes 'stigma-related stress' rather than minority stress (Frost, 2011). Compared

[3] Refers to a sexual orientation that is nonheterosexual (Hatzenbuehler, 2009)

with the minority stress model, Herek's (2007, pp. 906-907) description of stigma - "the negative regard, inferior status, and relative powerlessness that society collectively accords to any nonheterosexual behavior, identity, relationship, or community" - shifts the source of stigma away from the stigmatized and onto the societal level. Other research framed stigma as a cultural and structural process that manifests as acute and chronic discrimination, expectations of rejection, management and concealment of stigma, and internalized stigma (Frost, 2018; Herek, 2007). Results from several studies indicate that stigma is associated with negative health impacts, such as increased vulnerability to HIV transmission (Fields et al., 2013; Jeffries, 2013; Parker et al., 2016), increased depressive symptoms, and weaker immune systems among GBM living with HIV (Ullrich, Lutgendorf, & Stapleton, 2003). Among GBM living with HIV, HIV-related stigma was associated with transmission risk behaviors as well as psychological distress (Hatzenbuehler, O'Cleirigh, Mayer, Mimiaga, & Safren, 2011). Among LGBT youth, heterosexism predicts psychological distress such as anxiety, depression, and suicidal ideation (Kelleher, 2009). Altogether, stigma results in negative mental health, physical health, performance and relational outcomes (Frost, 2018; Herek, 2007). However, this research largely pertains to the United States of America.

Methodology

This study uses a community-based participatory research (CBPR) approach to develop an understanding of a syndemic of stigma and negative health outcomes for nonurban GBM. CBPR began with advocacy for community empowerment and power sharing in research (Padgett, 2012), and is attributable to the seminal work of Kurt Lewin (1946). CBPR is committed to community empowerment and working toward social betterment (Fishman, 1997; Reason & Bradbury, 2008). CBPR includes egalitarian partnerships between researchers and community members, where community members contribute meaningfully to the research (Israel, 2005; Padgett, 2012).

The Community-Based Research Center (CBRC, www.cbrc.net) promotes the health of gay, bi, trans, Two-Spirit, and queer men (GBT2Q) through research and intervention development. The CBRC was the community lead for the Sex Now 2015 survey that generated the data for my thesis' secondary analyses. The CBRC is committed to a CBPR approach and has been offering Sex Now since 2000, as well as online since 2007, and expanded to included all of Canada in 2010 (Ferlatte et al., 2014; Salway et al., 2018; Trussler & Ham, 2017; Trussler & Marchand, 2005). Since being founded in 1999, the CBRC has employed GBT2Q and built relationships with these communities across Canada, including within Island Health and in BC. These relationships are integral to a CBPR approach (Israel, 2005) because they facilitate data collection in the Sex Now survey from a large sample of participants. The resulting secondary data from the 2015 Sex Now survey will be utilized in this thesis (Padgett, 2012; Trussler & Ham, 2017). Since this thesis uses data collected through a CBPR approach by the CBRC, this thesis also uses a CBPR methodology.

CBRC has developed a checklist for community-research engagement (Salway et al., 2018). Some important aspects of community-research engagement from that list are that researchers should learn about their target population, ongoing communication, and relationship-driven practices (Salway et al., 2018). Regarding relationship driven practices, my supervisor (Dr. Lachowsky) and I have both worked hard to develop relationships with community partners across Vancouver and the Gulf Islands such as AIDS Vancouver Island (AVI), Pride festival organizers, and the Living Out Visibly and Engaged Community Response Network (LOVE CRN). To support ongoing communication, I have actively consulted and engaged with community partners in several communities across Island Health for several years, and regular communication has continued throughout the project. For the past three years, I attended meetings and maintained regular email contact with the LOVE CRN, an advocacy organization for diverse sexual orientations and gender identities within Island Health. Beginning in January 2018, I reached out by email and phone to the organizers of Pride organizations in multiple communities to

better understand their scope. Building on these relationships, I applied for and received a booth at five Pride events for Dr. Lachowsky's local Island Health study, "Improving HIV and STI Prevention Services for Gay and Bisexual Men with Island Health". I attended Pride events in Victoria, Nanaimo, Port Alberni, Comox, and Campbell River. Further, I attended and presented at AVI's Men'scapes, a conference for cis and trans gay, bi, and other men who have sex with men across Vancouver and the Gulf Islands. The CBRC's checklist for community-research engagement also recommends that researchers should learn about the language, culture, and how systems of oppression function for their target population. As a member of the LGBTQ2+ community in central Vancouver Island, I am familiar with the language and culture of my target population. As well, I strive to increase my understanding of how systems of oppression interact in diverse communities across our wide geography. Additionally, the CBRC's checklist suggests study results should be reviewed by community before publication (Salway et al., 2018). Before publishing results, I intend to present the results to the CAB to obtain their feedback and understand what might be needed or missing.

Methods

Methods for this thesis are described below using the internationally established STROBE Recommendations for cross-sectional studies (von Elm et al., 2007). The STROBE Recommendations include the following subheadings for a methods section: study design, setting, participants, quantitative variables (outcomes, explanatory factors, covariates), data sources/measurement, bias, study size, and statistical methods. Prior to describing my specific thesis methods, I have outlined the overall methods of Sex Now 2015, which includes the study design, setting and study size, participants (sampling and recruitment), variables (instrument development), and data sources for Sex Now 2015. Following this, I describe the methods specific to my thesis' secondary data analysis. Additionally, all tables included in this thesis are formatted according to APA 7 (American Psychological Association, 2020).

Sex Now 2015

Study Design. Sex Now is a serial cross-sectional survey of Canadian gay, bisexual, and other men who have sex with men (GBMSM) administered every 12-18 months (Ferlatte et al., 2014; 2018). The survey has been administered anonymously online since 2007. The study is led by the CBRC. The survey was reviewed and approved by an independent Research Ethics Board at the CBRC with Dr. Terry Trussler (CBRC's Research Director at the time) as the Principal Investigator.

Setting and Study Size. Quantitative data from the Sex Now 2015 survey were collected from November 2014 to April 2015 (Ferlatte et al., 2018). The survey collected data from participants across Canada. Nationally, there were over 8,000 completed surveys.

Participants. The study population for the Sex Now 2015 survey was GBM and was messaged as "a survey of sex between men". There was no age restriction and the survey could be completed in French and English. There were no other stated eligibility criteria. Survey participants were recruited through sex-seeking websites and applications, community groups, gay media, social media, and email to participants of previous survey cycles (Ferlatte et al., 2018; Ferlatte et al., 2014).

Variables. The Sex Now 2015 survey was developed by a panel of GBM health researchers and community leaders intending to respond to changing needs of the community. The survey was pilot tested with GBM community members prior to launch. Major sections of the survey asked questions regarding community-identified issues, including: sexual behaviors, sexual health, relationships, health care experiences, working conditions, community participation, social support, mental health, and experiences of sexual stigma and discrimination (Ferlatte et al., 2018).

Data Sources. CBRC owns and controls the Sex Now 2015 data. I was not involved in data collection for Sex Now 2015, but accessed the data as graduate student investigator through a memorandum of understanding with the CBRC (see Appendix C). Ethics approval for this thesis was approved by the University of Victoria's Human Research Ethics Board as per the Tri-Council Policy

Statement on the Ethical Conduct of Research Involving Humans (see Appendix D); the Principal Investigator, Dr. Lachowsky, is my graduate thesis supervisor, and I am named as a Graduate Student Research Assistant on the Human Research Ethics Approved Protocol. All data are stored on Dr. Lachowsky's secure password-protected encrypted university server.

Secondary Analysis: Syndemic Factors and Living Environment

Study Design and Setting. This thesis conducted secondary data analysis using the Sex Now 2015 study to address five objectives (see section above on page 4). For this thesis, I elected to use cross-sectional data at the provincial (BC) and health authority (Island Health) level given my own experience with and connection to locally relevant GBM community partners. In short, I explored the impact of living environment by comparing survey responses from urban and nonurban participants within Island Health and in BC (objectives 1 and 2). I conducted two additional analyses among the nonurban Island Health sub-sample. Potential syndemic factors were tested for associations using Cramer's V (objective 3). Poisson regression was used to identify which demographics and health outcomes were associated with an increased number of syndemic factors (objective 4). The results from objectives 1-4 were considered together to test the applicability of syndemic theory among nonurban GBM (objective 5).

Participants. Participants were selected from the overall Sex Now 2015 dataset based on their living environment. I had two samples of interest for comparing demographic and syndemic outcomes by living environment: 1.) all participants who reported living in BC and 2.) all participants who reported a forward sortation area postal code with the Island Health region (Appendix A). Island Health was my only sample of interest for examining the associations between syndemic factors, and for determining which demographics and health outcomes were associated with an increased number of syndemic factors. If geographic location information was missing, participants were excluded from the analysis. No additional inclusion or exclusion criteria were applied.

Quantitative Variables. This section begins by outlining my chosen definition of nonurban versus urban participant living environment, which is used as a key explanatory factor as well as a sample stratification factor. Following this, I describe the variables used in analyses for each objective.

Nonurban Definition. The variety of definitions and operationalizations of urban and nonurban/rural are a methodological limitation of inquiry into geographic differences. Initially, nonurban was intended to be operationalized by participant survey responses regarding forward sortation area (FSA) postal code. However, self-reported FSA was not a valid measure of urban (first FSA digit being 1-9) versus nonurban (first FSA digit being 0) living environment. FSA was not valid due to increases in population size after postal codes were assigned (e.g. former rural areas now included larger populations). Instead, nonurban was operationalized by participant responses to the question, "Which best describes your living environment?" (participants could select urban, suburban, small city/town, rural, remote, other). Participants who self-reported small city/town, rural, or remote living environments were classified as the 'nonurban' group, and participants who indicated urban or suburban living environments were classified as the 'urban' group. This method of operationalizing and classifying living environment aligns with Statistics Canada definitions of urban. Statistics Canada defines urban as a census metropolitan area (CMA) that has a population centre of 50,000 or more people with adjacent municipalities with a total population of at least 100,000 (Statistics Canada, 2016, 2017). According to the Statistics Canada definition, Greater Victoria is the only CMA within Island Health and therefore was classified as urban for this analysis, and participants from Greater Victoria were excluded for nonurban-specific analyses. Additionally, for the purposes of this study, nonurban refers to areas outside a CMA. As such, the remainder of Island Health (Central and North Vancouver Island, the Gulf Islands, and a section of mainland BC) were classified as nonurban in this study.

Furthermore, when operationalizing nonurban, I chose not to use the Statistics Canada definition of rural to define nonurban. Statistics Canada defines rural areas as those outside of

population centers of at least 1000 (Statistics Canada, 2017). Very few participants would have been included in the nonurban group by using this definition, and many participants' relevant experience living in nonurban centres would be excluded. Accordingly, rural participants were included in the nonurban group.

Despite being a brief survey, the Sex Now 2015 study had over 150 variables that were considered for this thesis. The first review identified variables of potential theoretical relevance. Based on some initial data exploration of those factors, variables were excluded if they demonstrated a low cell count (e.g., less than five responses) in the Island Health region. For example, very few participants used substances such as ketamine, ecstasy, or steroids, and such variables were excluded from the analysis. Alcohol use was used instead because it was prevalent in the sample and had sufficient cell count. To address objectives 1 and 2, a number of demographic and potential syndemic factors were treated as outcomes and compared by participant living environment (urban versus nonurban) as the primary explanatory factor. These variables are outlined in Table 1, and detail the survey question asked of participants as well as how their responses were coded in the analysis. This analysis was conducted for those participants living within Island Health and among those in BC. To address objective 3, a sub-set of variables from Table 1 were selected for the Cramer's V analysis. The selected variables included: rumours about sexuality, experience verbal violence, antigay worry from family, discrimination at work, out to family, ever come out, out to health care provider, ever considering suicide, partner mistreatment, depression, and alcohol use. Variables related to traditional syndemic factors were selected, such as stigma, mental health outcomes, and outness. This selection process was based upon theoretical relevance including which variables had the greatest prevalence within the nonurban Island Health population. For multiple variables asking about closely related issues, the most prevalent variable was selected. For example, 'ever considering suicide' was chosen as a measure of suicidality because it was the most prevalent measure of suicidality; this variable was selected from among the variables that

asked about suicide: 'considering suicide in the past year', 'attempting suicide in the past year', or 'attempting suicide ever'. These other suicide-related variables were excluded from the objective 3 Cramer's V analysis.

Table 1

Demographic and syndemic factor variables for analysis by living environment (Sex Now 2015).

Variable	Survey Question	Coding
	Demographics	
Age	Your age?	0 = <25 1 = 25-34 2 = 35-44 3 = 45-59 4 = 60+
Gender	What is your gender identity? [man]	0 = no 1 = yes
Sexual Orientation	How do you usually describe your sexual identity? [Gay] [Bi]	0 = no 1 = yes 0 = no 1 = yes
HIV Status	What was your most recent HIV test result?	1 = HIV-positive 2 = HIV-negative 3 = I've never had an HIV test
Relocation	Are you still living in the same city/region…? [Where you lived 5 years ago?]	0 = no 1 = yes
Education	What is the highest level of education that you have completed?	0 = high school 1 = some college/university 2 = college 3 = university degree 4 = graduate degree
Ethnicity	What best describes your ethnic/cultural origins? [White/Caucasian (British, European)] [Aboriginal (First Nations, Inuit, Metis)	0 = no 1 = yes
Income	What was your income in the last year?	0 = under 30k 1 = 30k-89,999 2 = over 90k
Employment Status	What is your occupation? [Employed]	0 = no 1 = yes
Retirement Status	What is your occupation? [Retired]	0 = no 1 = yes
	Syndemic Factors	
Rumours about sexuality, ever	Have you experienced any of the following? [Rumours flying about your sexuality]	0 = no 1 = yes

Variable	Survey Question	Coding
Called names, ever	Have you experienced any of the following? [Called out as "homo", "faggot", "queer", etc.]	0 = no 1 = yes
Verbal violence, before 18	Have you ever been targeted with antigay violence? [Verbal violence, hate talk] [Yes, before age 18]	0 = no 1 = yes
Verbal violence, after 17	Have you ever been targeted with antigay violence? [Verbal violence, hate talk] [Yes, after age 17]	0 = no 1 = yes
Discriminated at work, ever	Have you encountered any antigay discrimination in the following settings? [Employment, workplace]	0 = no 1 = yes
Antigay worry with family	What situations worry you about encountering antigay prejudice? [Family events: wedding, funeral…]	0 = minimal worry 1 = more than minimal worry
Out to family	Who knows about your sexuality …? [Family]	0 = not out 1 = out
Out to others	How old were you when you told others about your sexuality with other guys?	0 = never came out 1 = have come out
Out to provider	Have you told a health care provider that you have sex with other men?	0 = no 1 = yes
Considered suicide	Have you ever considered suicide—ending your own life?	0 = no 1 = over a year ago 2 = last year 3 = over a year ago & last year
Mistreatment, partner	Have you ever been mistreated by a sex partner (verbal, emotional or physical abuse)? [Boyfriend, partner, husband]	0 = no 1 = yes
Mistreatment, friend with benefits	Have you ever been mistreated by a sex partner (verbal, emotional or physical abuse)? [Friend with benefits, fuck buddy]	0 = no 1 = yes
Mistreatment, hookup	Have you ever been mistreated by a sex partner (verbal, emotional or physical abuse)? [Hookup, casual, anonymous partner]	0 = no 1 = yes
Depression	In the past year have you discussed depression w/health care provider	0 = no 1 = over a year ago 2 = last year
Alcohol use	Have you used alcohol in the past year?	0 = less than a few times/week 1 = a few times/week or more
HIV serodifferent status partners	In the last year, how many guys whose HIV status was opposite yours did you fuck or fucked you without condoms?	0 = none 1 = one 2 = two or more
STI test, last year	Have you tested within the past year? [STI Test]	0 = no 1 = yes
HIV test, last year	Have you tested within the past year? [HIV Test]	0 = no 1 = yes

Variable	Survey Question	Coding
ART knowledge	Were you aware before taking this survey… [Antiretroviral medications, taken daily, significantly reduce the chance that HIV positive persons can transmit HIV to their sexual partners by suppressing their viral load.]	0 = no 1 = yes
PrEP knowledge	Were you aware before taking this survey… [PrEP - Pre-Exposure Prophylaxis is a daily antiretroviral mediation now available for HIV negative men that can prevent sexual transmission of HIV (not yet approved in Canada).]	0 = no 1 = yes

For the Poisson regression analysis to address objective 4, I created a count outcome variable that summed the number of syndemic factors reported by each participant. The syndemic factors counted were the same variables included in objective 3, the Cramer's V analysis, detailed in the previous paragraph. The explanatory factors for the Poisson regression analysis included demographic variables (same as those in Table 1) and other health and behavioural variables (see Table 2 below).

Table 2

Explanatory factors used for Poisson regression analysis (Sex Now 2015).

Explanatory Factor	Survey Question	Coding
	Stigma & Discrimination	
Lost job due to sexuality	Have you been restricted, rejected or dismissed from career opportunity due to sexuality	0 = no 1 = yes
Called names/slurs, ever	Have you experienced being called out as "homo", "faggot", "queer", etc.	0 = no 1 = yes
Verbal violence, before 18	Have you ever been targeted with antigay violence? [Verbal violence, hate talk]	0 = no 1 = yes
Verbal violence, after 17	Have you ever been targeted with antigay violence? [Verbal violence, hate talk]	0 = no 1 = yes
Physical violence, never	Have you ever been targeted with antigay violence? [Physical violence, beaten up] [No]	0 = no 1 = yes
Physical violence, before 18	Have you ever been targeted with antigay violence? [Physical violence, beaten up] [Yes, before age 18]	0 = no 1 = yes
Discrimination from family, ever	Have you encountered any antigay discrimination: [Family events: wedding, funeral…]	0 = no 1 = yes
Discrimination renting, ever	Have you encountered any antigay discrimination: [Apartment, home rental]	0 = no 1 = yes

Explanatory Factor	Survey Question	Coding
Discrimination in education, ever	Have you encountered any antigay discrimination: [Education, university, college]	0 = no 1 = yes
Discrimination in healthcare, ever	Have you encountered any antigay discrimination: [Health care: clinic, lab, hospital…]	0 = no 1 = yes
	Anticipated Stigma	
Antigay worry while renting	What situations worry you about encountering antigay prejudice? [Apartment, home rental]	0 = minimal worry 1 = > minimal worry
Antigay worry at work	What situations worry you about encountering antigay prejudice? [Employment, workplace]	0 = minimal worry 1 = > minimal worry
Antigay worry in education	What situations worry you about encountering antigay prejudice? [Education, university, college]	0 = minimal worry 1 = > minimal worry
Antigay worry in healthcare	What situations worry you about encountering antigay prejudice? [Health care: clinic, lab, hospital…]	0 = minimal worry 1 = > minimal worry
	Outness	
Out to friends	Who knows about your sexuality …? [Friends]	0 = not out 1 = out
Out at school	Who knows about your sexuality …? [School]	0 = not out 1 = out
Out at work	Who knows about your sexuality …? [Work]	0 = not out 1 = out
Out to community	Who knows about your sexuality …? [Community]	0 = not out 1 = out
Age at first sex w/guy	How old were you when you first had sex with another guy?	0 = <14 1 = 14-17 2 = 18-24 3 = 25+
	Social support	
Time with gay/bi men	How much of your free time do you usually spend hanging out with other gay or bisexual men?	0 = Less than 25% 1 = 25% 2 = 50% 3 = Over 50%
Involved w/LGBT community	Are you currently involved in: [Gay activism, organization, recreation, culture or sport activities]	0 = no 1 = yes
	Sexual Health	
Last sex, condom use	The last time you had sex did you use a condom?	0 = no 1 = yes
Unknown HIV status partners past year	In the last year, how many guys whose HIV status was UNKNOWN did you fuck or fucked you WITHOUT condoms?	0 = none 1 = one 2 = two or more
Condom use w/hookup past year	How often did you use condoms with the following partners over the last year? [Hookup, casual, anonymous partner]	0 = never 1 = intermittent 2 = always

Explanatory Factor	Survey Question	Coding
		3 = no anal sex
HIV test, last year	Have you tested for sexually transmitted infections within the past year? [HIV Test]	0 = have only tested once 1 = every few years 2 = once a year 3 = twice a year 4 = a few times per year 5 = no set pattern
ART knowledge	Were you aware before taking this survey… [Antiretroviral medications, taken daily, significantly reduce the chance that HIV positive persons can transmit HIV to their sexual partners by suppressing their viral load.]	0 = no 1 = yes
PEP knowledge	Were you before taking this survey… [PEP - Post Exposure Prophylaxis: Within three days after a sexual risk event (such as fucking without a condom) there are medications you can take for a month that can prevent an HIV infection from establishing.]	0 = no 1 = yes
PrEP knowledge	Were you before taking this survey… [PrEP - Pre-Exposure Prophylaxis is a daily antiretroviral mediation now available for HIV negative men that can prevent sexual transmission of HIV (not yet approved in Canada).]	0 = no 1 = yes
	Health outcomes	
Delay in health care, stress	In the last year, has anything caused you to delay or skip seeing a health care professional? [I felt stressed out, anxious or depressed]	0 = no 1 = yes
Self-rated health, grouped	In general, how would you describe your overall health (physical, mental, social wellbeing)?	0 = poor/fair 1= good 2 = very good/excellent
Stress	In the past year have you discussed stress w/health care provider	0 = no 1 = over a year ago 2 = last year
Anxiety	In the past year have you discussed anxiety w/health care provider	0 = no 1 = over a year ago 2 = last year
Compulsive/unwanted behaviours	In the past year have you discussed compulsive/unwanted w/health care provider	0 = no 1 = over a year ago 2 = last year
Substance use	In the past year have you discussed substance use w/health care provider	0 = no 1 = over a year ago 2 = last year
Suicidal thoughts	In the past year have you discussed suicidal thoughts w/health care provider	0 = no 1 = over a year ago 2 = last year
Considered suicide	Have you ever considered suicide—ending your own life?	0 = no 1 = over a year ago

Explanatory Factor	Survey Question	Coding
		2 = last year 3 = over a year ago & last year
Considered suicide, last year	Have you ever considered suicide—ending your own life? [in the past 12 mo.]	0 = no 1 = over a year ago 2 = last year
Attempted suicide, ever	Have you ever attempted suicide—ending your own life?	0 = no 1 = yes
Sexual assault	Has anyone ever forced sex on you?	0 = No 1 = Yes, when under 18 2 = Yes, when under 18 & over 18

Data Sources and Measurement. All outcomes of interest came from the Sex Now 2015 survey and were self-reported by participants. I obtained my samples from the main Sex Now dataset by excluding provinces other than BC and health authorities other than Island Health. To obtain my nonurban and urban samples, I recoded the variable for living environment to be binary. Urban and suburban were recoded as 'urban', and small city/town, rural, remote, and other were recoded as 'nonurban'). Several other quantitative variables were recoded due to low cell count and for simplicity of interpretation. For example, among demographic variables, age was recoded from a continuous variable into four different age groups and annual income was recoded into below $30,000, between $30,000 and $89,999, and over $90,000 from several levels in ten-thousand-dollar increments. For syndemic factor variables, 'out to family' was recoded into a binary from the original options ('everyone' and 'some' as 'out', with 'no one' as 'not out'). The question asking participants about their age when they came out was originally a continuous variable; it was recoded as 'yes' if the participant provided an age, or 'no' if the participant responded they had never come out. Outcomes regarding discrimination, as well as partner, friends with benefits, or hookup mistreatment were similarly recoded to be binary. The original options were 'no/not applicable, over a year ago, last twelve months, or over a year ago and the last twelve months'; no/not applicable was left as 'no', and the remaining options were recoded as 'yes'. Questions that asked about antigay worry in different settings, such as with family, when renting,

at work, in education, or in healthcare, were originally coded on a scale from one to five, were one was low worry and five was high worry; these variables were recoded so that participants who responded two through five experienced 'more than low worry', and participants who responded with one experienced 'low worry.' For alcohol use, the original responses were 'never, once a month or less, once a week or less, a few times a week, or daily'; never, once a month or less, and once a week or less were recoded as 'less than a few times per week', and 'a few times per week' or 'daily' were recoded as 'a few times per week or more'. Opposite or unknown HIV status partners was originally six different numerical increments; I recoded anything over two as 'two or more'.

For explanatory factors for the Poisson analysis, I recoded the continuous age at first sex with a guy into age categories; I created the categories under 14, between 14 and 17, 18 and 24, and over 25 years of age. I also recoded time spent with other gay or bi men, which had original responses of 'little, 25%, 50%, 75%, or most' free time; the options 25% and 50% remained the same, and I recoded 'little' as 'less than 25%' and '75% or most' as 'over 50%'. The other explanatory factors included in the Poisson analysis had already been recoded for the comparison between urban and nonurban outcomes. All of the syndemic factors of interest were recoded to be binary. This permitted the count variable to count all of the occurrences of '1', for example.

Bias. As recommended by the STROBE guidelines, here are some comments regarding issues of bias and confounding to provide context. The Sex Now survey is cross-sectional so it cannot determine causation (Aschengrau & Seage, 2014). There is risk of selection and recall biases for the survey. Selection bias may have occurred because of the survey's online format and due to participants agreeing to participate based on exposures (Aschengrau & Seage, 2014). For example, participants with negative experiences might have been more interested in filling out the survey. Recall bias may occur because the survey is based on participant responses, some of which ask about lifetime experiences. The survey was anonymous in order to avoid response bias to uncomfortable questions. Additionally, the secondary

data provided were already cleaned, which did not allow for an analysis of missing data and item non-response bias. In terms of potential confounders and effect modifiers, I acknowledge that these may exist; however, this exploratory analysis did not take these into consideration.

Study Size. There were no a priori power or sample size analyses conducted. The study size for the BC analysis was determined by the number of Sex Now respondents who indicated living in BC (*N* = 1851). For the geographic groupings in BC, respondents who indicated small city/town, nonurban, or remote living environments were classified as the 'nonurban' group (*n* = 794), and participants who indicated urban or suburban living environments were classified as the 'urban' group (*n* = 1057). The study size for the Island Health analysis was determined by the number of participants who indicated residing in the Island Health geographic area (*N* = 283). For geographic groupings, the same process was followed as for the BC population. Participants in the Island Health geography who indicated small city/town, nonurban, or remote living environments were classified as the 'nonurban' group (*n* = 178), and participants who indicated urban or suburban living environments were classified as the 'urban' group (*n* = 105).

Statistical Methods. As stated above, this study sought to conduct a quantitative analysis of the existence and influence of a syndemic of stigma and negative health outcomes for nonurban GBM. In order to accomplish this goal, several steps were required. As an individual could only complete this single cross-sectional Sex Now survey, assumptions of independence are met. A *p*-value of $< .05$ was considered statistically significant. I did not adjust the *p*-value significance level with, for example, a Bonferroni correction as this work was exploratory and would rather risk a Type 1 error. All data were analysed in SPSS statistical software. The detailed analyses for thesis objectives one through four are described below.

Objective 1) To develop an understanding of Island Health and BC GBM's demographic differences by urban or nonurban living environment, demographic variables were stratified by

geography (urban and nonurban) and descriptive statistics (count, percentage) were calculated. Demographic differences between urban and nonurban living environments were examined using chi-square tests, and if necessary Fisher's exact tests. The data met the assumption of independence.

Objective 2) To compare syndemic factors among urban and nonurban GBM within Island Health and in BC, syndemic factors were stratified by geography and differences between urban and nonurban living environments were calculated using chi-square tests, and if necessary Fisher's exact tests. The data met the assumption of independence.

Objective 3) To examine the associations between syndemic factors within a nonurban living environment only, associations between individual syndemic factors for nonurban Island Health GBM were tested for significance using chi-square tests (or Fisher's exact tests), and the strength of the association was tested using Cramer's V (Geert van den Berg, 2020). Since the Stall (2008) syndemics model hypothesizes that psychosocial issues are interrelated and mutually reinforcing, Cramer's V was calculated to assess significant associations between syndemic factors among nonurban Island Health GBM. Cramer's V, also known as Cramer's phi (Geert van den Berg, 2020), is a statistical test for the strength of association between two categorical variables. It is used for variables that produce larger than two-by-two tables and is a number between 0 and 1 that indicates how strongly two categorical variables are associated. A perfect association for Cramer's V would have a value of 1, while a value of 0 would indicate no relationship and that variables are completely independent. The data met the assumption of independence.

Objective 4) To determine which demographics and health outcomes were associated with number of syndemic factors for nonurban Island Health GBM, a count variable of syndemic factors was created. A series of simple Poisson regressions ("Poisson Regression Analysis Using SPSS Statistics", 2018) were used to predict an outcome variable of the number of syndemic factors for nonurban Island Health GBM, with explanatory factors being demographics and other health outcomes. For example, for

those who identified as gay, I was able to determine the average number of syndemic factors (e.g., outness, suicidality) that they experienced, and compare this with those who did not identify as gay. The data met all assumptions required for Poisson regression (Roback & Legler, 2021). First, the outcome variable consisted of numerical 'count data', described by a Poisson distribution, summarizing the number of syndemic factors reported by a participant. Second, the observations were independent of one another, as described earlier. Third, I calculated and examined variance when undertaking the Poisson regression. A fourth assumption pertains to log linearity, but this is difficult to assess without continuous explanatory factors, which are not used in this analysis. Descriptive statistics for the count outcome variable are reported, along with a beta coefficient to indicate the strength and direction of the association. Missing data were excluded from this analysis. No multivariable model was built.

Results

The research objective for this study is to conduct a quantitative analysis of the existence and influence of a syndemic of stigma and negative health outcomes for nonurban GBM within Island Health and in BC. The results from my quantitative analysis may support the existence of a syndemic among nonurban GBM within Island Health. My results also indicate that a syndemic of stigma and negative health outcomes may be having an adverse effect on nonurban GBM within Island Health. In BC, my results suggest both stigma and negative health outcomes may be occurring for both urban and nonurban GBM.

Sample Characteristics

For BC, there were 1851 respondents. Regarding living environment, I found that a large percentage of GBM lived in nonurban environments. For BC, 43% (*n* = 794) GBM resided in a nonurban environment. Of these, 98.6% identified as male. For sexual identity, 73.1% identified as gay, and 23.5% identified as bisexual. For BC, the minimum and maximum ages of participants were 10 and 85

respectively, with a mean age of 42.8 years. For race/ethnicity, 82.7% of participants identified as Caucasian and 6.4% of participants identified as Aboriginal.

Within Island Health, there were 283 respondents, and 62.9% lived in nonurban environments. Of all Island Health participants, 97.9% identified as male. For sexuality, 59.2% identified as gay, and 34.5% identified as bisexual. The Island Health sample had a wide range of ages, with the majority of participants in the 45-59 age category. For Island Health the minimum age of participants was 17, and the maximum age was 85. The mean age was 47.1 years. For race/ethnicity, 88.7% of participants identified as Caucasian and 7.7% identified as Aboriginal.

Demographic Comparisons

British Columbia

For BC, there were significant differences (see Table 3) between urban and nonurban groups with respect to age, gay identity, bisexual identity, HIV status, education, employment status, and retirement status. No significant differences were observed in BC between urban and nonurban groups with respect to gender identity, living in the same home as five years prior, ethnicity, or income.

Differences in age in BC had a significance level of $p < .001$, where a higher percentage of nonurban participants were under 25 or over 60 years of age. Differences in gay identity were significant ($p < .001$), where a higher percentage of urban participants identified as gay. Differences in bisexual identity were significant ($p < .001$), where a higher percentage of nonurban participants identified as bisexual. Differences in HIV status were significant ($p < .001$), where a higher percentage of urban participants were living with HIV, and a higher percentage of nonurban participants had never been tested. Education level was significant ($p < .001$), where a higher percentage of nonurban participants had completed either high school or some high school, college or some college, and a higher percentage of urban participants had completed a university degree, graduate degree, or doctorate. Employment status was significantly different ($p = .016$), where a higher percentage of urban participants were

employed. Retirement status was significant at $p = .018$, where a higher percentage of nonurban participants were retired.

Table 3

Demographic differences by Urban versus Nonurban Geography among BC Participants (Sex Now 2015, N = 1851)

Variable	Urban		Nonurban		
	n	%	n	%	*p*
Age					**< . 001**
<25	103	9.8%	120	15.1%	
25-34	288	27.4%	152	19.1%	
35-44	183	17.4%	111	14.0%	
45-59	353	33.5%	261	32.9%	
60+	126	12.0%	150	18.9%	
Male Identified					.918
No	14	1.3%	11	1.4%	
Yes	1039	98.7%	783	98.6%	
Gay Identified					**< . 001**
No	209	19.8%	287	36.1%	
Yes	844	80.2%	507	63.9%	
Bisexual Identified					**< . 001**
No	874	83.0%	539	67.9%	
Yes	179	17.0%	255	32.1%	
HIV Status					**< . 001**
Positive	166	15.8%	58	7.3%	
Negative	808	76.7%	592	74.6%	
Never tested	79	7.5%	144	18.1%	
Live in same location as 5 years ago					.207
No	346	32.9%	239	30.1%	
Yes	707	67.1%	555	69.9%	
Education - highest level					**< . 001**
Some High School	27	2.6%	29	3.7%	
High School	91	8.6%	125	15.7%	
Some College/University	232	22.0%	249	31.4%	
College	148	14.1%	139	17.5%	
University Degree	351	33.3%	165	20.8%	
Graduate Degree	154	14.6%	69	8.7%	
Doctorate	50	4.7%	18	2.3%	
Ethnicity, Aboriginal					.137
No	994	94.4%	736	92.7%	

Variable	Urban		Nonurban		
	n	%	n	%	*p*
Yes	59	5.6%	58	7.3%	
Ethnicity, Caucasian					.227
No	191	18.1%	127	16.0%	
Yes	862	81.9%	667	84.0%	
Income, grouped					.188
Under $30,000	310	29.4%	255	32.1%	
$30,000-$89,999	575	54.6%	434	54.7%	
Over $90,000	168	16.0%	105	13.2%	
Currently Employed					**.016**
No	367	34.9%	320	40.3%	
Yes	686	65.1%	474	59.7%	
Retired					**.018**
No	945	89.7%	684	86.1%	
Yes	108	10.3%	110	13.9%	

Note. N = 1851 (n = 794 nonurban, n = 1057 urban). Differences by geography were calculated using chi-square tests. **Bolded text** indicates a $p < .05$

Island Health

For Island Health, there were significant differences between the urban and nonurban groups for living in the same location as five years prior (p = .004), where a higher percentage of nonurban participants lived in the same location. Education level completed was significantly different (p = .003), where a higher percentage of nonurban participants completed high school, some college, or a graduate degree, and a higher percentage of urban participants completed college or university. No significant differences were observed between the Island Health urban and nonurban groups in terms of age, gender identity, sexual orientation, HIV status, HIV screening, ethnicity, income, employment status, or retirement status.

Table 4

Demographic differences by Urban versus Nonurban Geography among Island Health participants (Sex Now 2015, N = 283)

Variable	Urban		Nonurban		
	n	%	n	%	*p*
Age					.344
<25	7	6.7%	22	12.4%	
25-34	20	19.0%	27	15.2%	
35-44	12	11.4%	15	8.4%	
45-59	48	45.7%	74	41.6%	
60+	18	17.1%	40	22.5%	
Male Identified					.892
No	2	1.9%	3	1.7%	
Yes	103	98.1%	175	98.3%	
Gay Identified					.242
No	38	36.2%	77	43.3%	
Yes	67	63.8%	101	56.7%	
Bisexual Identified					.166
No	74	70.5%	111	62.4%	
Yes	31	29.5%	67	37.6%	
HIV Status					.121
Positive	16	15.2%	18	10.1%	
Negative	77	73.3%	125	70.2%	
Never tested	12	11.4%	35	19.7%	
Live in same location as 5 years ago					**.004**
No	47	44.8%	50	28.1%	
Yes	58	55.2%	128	71.9%	
Education - highest level					**.003**
High School	8	8.1%	26	15.4%	
Some College/University	25	25.3%	62	36.7%	
College	20	20.2%	25	14.8%	
University Degree	36	36.4%	30	17.8%	
Graduate Degree	10	10.1%	26	15.4%	
Ethnicity, Aboriginal					.192
No	94	89.5%	167	93.8%	
Yes	11	10.5%	11	6.2%	
Ethnicity, Caucasian					.844
No	12	11.4%	19	10.7%	
Yes	93	88.6%	159	89.3%	
Income, grouped					.902
Under $30,000	33	31.4%	52	29.2%	
$30,000-$89,999	62	59.0%	107	60.1%	
Over $90,000	10	9.5%	19	10.7%	
Currently Employed					**.055**

Variable	Urban		Nonurban		
	n	%	n	%	*p*
No	35	33.3%	80	44.9%	
Yes	70	66.7%	98	55.1%	
Retired					.661
No	87	82.9%	151	84.8%	
Yes	18	17.1%	27	15.2%	

Note. $N = 283$ ($n = 178$ nonurban, $n = 105$ urban) Differences by geography were calculated using chi-square tests. **Bolded text** indicates $p < .05$

Syndemic Factors Outcome Data for *British Columbia* Participants

As shown in Table 5, there were significant differences in BC between urban and nonurban populations for the following outcomes: called names or slurs, experienced verbal violence, experienced verbal violence before age 18, considered suicide ever, partner mistreatment, hookup mistreatment, being out to a health care providers, having opposite HIV status partners, having an STI or HIV test in the past year, and awareness that ART and PrEP prevent HIV.

A lower percentage of nonurban (42.9%) than urban participants (57.4%) were called names or slurs ($p < .001$). Additionally, a lower percentage of nonurban (39.8%) than urban participants (55%) had experienced verbal violence ($p < .001$). For verbal violence before age 18, a lower percentage of nonurban (27.6%) than urban participants (35.2%) had experienced verbal violence before age 18 ($p < .001$). Similarly, a lower percentage of nonurban (20.5%) than urban participants (33.5%) experienced verbal violence after age 17 ($p < .001$). For suicide, a lower percentage of nonurban (42.8%) than urban participants (48.5%) had ever considered suicide ($p = .015$). Regarding partner violence, a lower percentage of nonurban (18.6%) than urban participants (23.5%) had experienced mistreatment from a partner ($p = .012$). Also, a lower percentage of nonurban (10.5%) than urban participants (17.1%) experienced mistreatment from a hookup ($p < .001$). For alcohol use, a lower percentage of nonurban (33.9%) than urban participants (45.6%) had used alcohol a few times per week or more in the past year

($p < .001$). Regarding sexual health, a higher percentage of nonurban (90.8%) than urban participants (80.6%) had no opposite HIV status partners in the past year ($p < .001$). A higher percentage of urban (69.9%) than nonurban participants (57.7%) had had an STI test in the past year ($p < .001$) or had had an HIV test in the past year (64.8% and 57.9% respectively, $p = .003$). A higher percentage of urban (84.1%) than nonurban (69%) participants were aware that ART prevents HIV transmission ($p < .001$). A higher percentage of urban (70.6%) than nonurban participants (53.3%) were aware that PrEP prevents HIV transmission ($p < .001$). For outness, a higher percentage of urban (84.4%) than nonurban participants (71.2%) were out to family ($p < .001$), had ever come out (85.3% and 68.1% respectively, $p < .001$), or were out to a health care provider (74.6% and 55.3% respectively, $p < .001$).

Table 5

Syndemic Factors among BC participants by Urban versus Nonurban Geography (Sex Now 2015, N = 1851)

Variable	Urban		Nonurban		
	n	%	n	%	*p*
Rumours about sexuality, ever					.521
No	597	56.7%	462	58.2%	
Yes	456	43.3%	332	41.8%	
Called names or slurs, ever					**< . 001**
No	449	42.6%	453	57.1%	
Yes	604	57.4%	341	42.9%	
Experience verbal violence, ever					**< . 001**
No	474	45%	478	60.2%	
Yes	579	55%	316	39.8%	
Experience verbal violence, before 18					**< . 001**
No	682	64.8%	575	72.4%	
Yes	371	35.2%	219	27.6%	
Experience verbal violence, after 17					**< . 001**
No	700	66.5%	631	79.5%	
Yes	353	33.5%	163	20.5%	
Discrimination at work, ever					.545
No	807	76.6%	618	77.8%	
Yes (ever)	246	23.4%	176	22.2%	
Antigay worry, family					.652

Variable	Urban		Nonurban		
	n	%	n	%	*p*
Minimal worry	699	66.4%	535	67.4%	
More than minimal	354	33.6%	259	32.6%	
Out to family					**< . 001**
Not out	162	15.6%	221	28.8%	
Out	877	84.4%	546	71.2%	
Out, ever					**< . 001**
Never come out	155	14.7%	253	31.9%	
Have come out (ever)	898	85.3%	541	68.1%	
Considered suicide, ever					**.015**
No	542	51.5%	454	57.2%	
Yes	511	48.5%	340	42.8%	
Mistreatment, partner					**.012**
No	806	76.5%	646	81.4%	
Yes	247	23.5%	148	18.6%	
Mistreatment, friend w/benefits					.971
No	957	90.0%	722	90.0%	
Yes	96	9.1%	72	9.1%	
Mistreatment, hookup					**< . 001**
No	873	82.9%	711	89.5%	
Yes	180	17.1%	83	10.5%	
Out to health care provider					**< . 001**
No	229	21.7%	334	42.1%	
Yes	787	74.7%	439	55.3%	
Not sure	37	3.5%	21	2.6%	
In the past year have you discussed depression w/health care provider					.129
No	544	51.7%	444	55.9%	
Over a year ago	214	20.3%	158	19.9%	
Last 12 months	295	28.0%	192	24.2%	
Have you used alcohol in the past year					**< . 001**
Less than a few times/week	573	54.4%	525	66.1%	
A few times/week or more	480	45.6%	269	33.9%	
Opposite HIV status partners past year					**< . 001**
No (none)	794	80.6%	641	90.8%	
1	82	8.3%	34	4.8%	
2 to 5	54	5.5%	22	3.1%	
6 to 9	21	2.1%	4	0.6%	
10 to 19	15	1.5%	1	0.1%	
20+	19	1.9%	4	0.6%	
STI test past year (yes/no)					**< . 001**
No	317	30.1%	336	42.3%	
Yes	736	69.9%	458	57.7%	

Variable	Urban		Nonurban		
	n	%	n	%	*p*
HIV test past year (yes/no)					**.003**
No	371	35.2%	334	42.1%	
Yes	682	64.8%	460	57.9%	
ART, aware prevent HIV					**< . 001**
No	167	15.9%	246	31.0%	
Yes	886	84.1%	548	69.0%	
PrEP, aware prevent HIV					**< . 001**
No	310	29.4%	371	46.7%	
Yes	743	70.6%	423	53.3%	

Note. N = 1851 (*n* = 794 nonurban, *n* = 1057 urban). Differences by geography were calculated using chi-square tests. **Bolded text** indicates $p < .05$. STI = sexually transmitted infection. ART = antiretroviral therapy. PrEP = Pre-Exposure Prophylaxis.

Syndemic Factors Outcome Data for *Island Health* Participants

As shown in Table 6, there were significant differences within Island Health between urban and nonurban populations for the following outcomes: called names or slurs, experienced verbal violence, experienced verbal violence before 18, considered suicide, considered suicide ever, considered suicide last year, attempted suicide ever, partner mistreatment, hookup mistreatment, being out to health care providers, having opposite HIV status partners in the past year, having an STI or HIV test in the past year, and awareness that ART and PrEP prevent HIV transmission.

A lower percentage of nonurban (39.3%) than urban (55.2%) were called names or slurs (p = .009). Similarly, a lower percentage of nonurban (36.5%) than urban (48.6%) had experienced verbal violence (p = .046). For verbal violence before 18, a lower percentage of nonurban (22.5%) than urban (36.2%) had experienced verbal violence before 18 (p = .013). A lower percentage of nonurban (41.6%) than urban (57.1%) had ever considered suicide (p = .011). For partner violence, a lower percentage of nonurban (19.7%) than urban (32.4%) had experienced partner mistreatment (p = .016). A lower percentage of nonurban (6.7%) than urban (16.2%) had experienced mistreatment from a friend with

benefits (p = .011). As well, a lower percentage of nonurban (9.0%) than urban (26.7%) had experienced mistreatment from a hookup (p < .001). Regarding outness, a lower percentage of nonurban (54.1%) than urban (68.6%) were out to a health care provider (p = .017). For sexual health, a higher percentage of nonurban (90%) than urban (78.9%) had no opposite HIV status partners (p = .034). A lower percentage of nonurban (50.6%) than urban (65.7%) had an STI test in the past year (p = .013). Similarly, a lower percentage of nonurban (51.1%) than urban (63.8%) had an HIV test in the past year (p = .038). A lower percentage of nonurban (63.5%) than urban (80%) were aware that ART prevents HIV transmission (p = .004), and a lower percentage of nonurban (49.4%) than urban (65.7%) were aware that PrEP prevents HIV transmission (p = .008).

No significant differences were observed for rumors about sexuality, discrimination at work, antigay worry among family, being out to family, ever having come out, discussing depression with a health care provider in the past year, or frequency of alcohol use in the past year.

Table 6

Syndemic Factors among Island Health participants by Urban versus Nonurban Geography (Sex Now 2015, N = 283)

Variable	Urban		Nonurban		
	n	%	n	%	*p*
Rumours about sexuality, ever					.278
No	52	49.5%	100	56.2%	
Yes	53	50.5%	78	43.8%	
Called Names or Slurs, ever					
No	47	44.8%	108	60.7%	**.009**
Yes	58	55.2%	70	39.3%	
Experience verbal violence, ever					**.046**
No	51	48.6%	65	36.5%	
Yes	54	51.4%	113	63.5%	
Experience verbal violence, before 18					**.013**
No	67	63.8%	138	77.5%	
Yes	38	36.2%	40	22.5%	
Discrimination at work, ever					.567
No	85	81.0%	139	78.1%	

Variable	Urban		Nonurban		
	n	%	n	%	*p*
Yes (ever)	20	19.0%	39	21.9%	
Antigay worry, family					.845
Minimal worry	69	65.7%	119	66.9%	
More than minimal	36	34.3%	59	33.1%	
Out to family					.876
Not out	31	29.5%	52	30.4%	
Out	74	70.5%	119	69.9%	
Out, ever					.268
Never come out	31	29.5%	64	36.0%	
Have come out	74	70.5%	114	64.0%	
Considered suicide, ever					**.011**
No	45	42.9%	104	58.4%	
Yes	60	57.1%	74	41.6%	
Mistreatment, partner					**.016**
No	71	67.6%	143	80.3%	
Yes	34	32.4%	35	19.7%	
Mistreatment, friend w/benefits					**.011**
No	88	83.8%	166	93.3%	
Yes	17	16.2%	12	6.7%	
Mistreatment, hookup					**< .001**
No	77	73.3%	162	91.0%	
Yes	28	26.7%	16	9.0%	
Out to health care provider					**.017**
No	33	31.4%	79	40.4%	
Yes	72	68.6%	93	54.1%	
In the past year have you discussed depression w/health care provider					.842
No	56	53.3%	101	56.7%	
Over a year ago	24	22.9%	39	21.9%	
Last 12 months	25	23.8%	38	21.3%	
Alcohol use in past year					.518
Less than a few times/week	62	59.0%	112	62.9%	
A few times/week or more	43	41.0%	66	37.1%	
Opposite HIV status partners past year					**.034**
No (none)	75	78.9%	144	90.0%	
One	11	11.6%	11	6.9%	
Two or more	9	9.5%	5	3.1%	
STI test past year					**.013**
No	36	34.3%	88	49.4%	
Yes	69	65.7%	90	50.6%	
HIV test past year					**.038**
No	38	36.2%	87	48.9%	

Variable	Urban		Nonurban		
	n	%	n	%	*p*
Yes	67	63.8%	91	51.1%	
ART, aware prevent HIV					**.004**
No	21	20.0%	65	36.5%	
Yes	84	80.0%	113	63.5%	
PrEP, aware prevent HIV					**.008**
No	36	34.3%	90	50.6%	
Yes	69	65.7%	88	49.4%	

Note. $N = 283$ ($n = 178$ nonurban, $n = 105$ urban) Differences by geography were calculated using chi-square tests. **Bolded text** indicates $p < .05$. STI = sexually transmitted infection. ART = antiretroviral therapy. PrEP = Pre-Exposure Prophylaxis.

Cramer's V Analysis of Syndemic Factors

For the nonurban Island Health group only, Cramer's V was calculated to assess the strength of the associations between syndemic factors and chi-square tests were used to assess statistical associations between these syndemic factors. The syndemic factors included in this Cramer's V analysis were rumors about sexuality, experience of verbal violence, discrimination at work, antigay worry from family, being out to family, ever coming out, ever considering suicide, partner mistreatment, being out to a health care provider, discussing depression with a health care provider, and frequency of alcohol use. See Table 7 for complete results.

Most of the measures of stigma and discrimination were positively associated with each other: rumours about sexuality, experiences of verbal violence, discrimination at work, and antigay worry among family were all significantly correlated and associated. Experiences of verbal violence were also significantly correlated with discrimination at work, and discrimination at work was associated with antigay worry among family. Being out to family, ever coming out, or being out to physician was significantly correlated with the all of the above measures of stigma and discrimination, except for antigay worry among family. Ever coming out was also correlated with discussing depression with a

physician, and with considering suicide. Being out, rumours about sexuality, experiences of verbal violence, discrimination at work, discussing depression with a physician, and ever considering suicide were all also significantly correlated with partner violence. Being out in one setting was correlated with being out in other settings. Ever considering suicide and discussing depression with a physician were all correlated with rumours about sexuality, experiences of verbal violence, and discrimination at work. Frequency of alcohol use was also correlated with rumours about sexuality, as well as antigay worry.

Table 7

Associations Between Selected Syndemic Factors Among Nonurban Island Health GBM: Cramer's V (N = 283)

Syndemic Factors	Rumours about sexuality, ever	Experience verbal violence, ever	Discrimination at work	Antigay Worry, family	Out to Family	Out, Ever	Suicide, Ever Considered	Mistreated by Partner	Out to Provider	Depression, Discussed with Doctor	Alcohol Use, Frequency
Rumours about sexuality, ever											
Experience verbal violence, ever	**< .001**/.318										
Discrimination at work	**< .001**/.381	**< .001**/.416									
Antigay Worry, family	**.009**/.196	.141/.110	**.006**/.204								
Out to Family	**< .001**/.368	**< .001**/.327	**< .001**/.268	.742/.025							
Out, Ever	**< .001**/.308	**.003**/.378	**< .001**/.284	.162/.105	**< .001**/.777						
Suicide, Ever Considered	**.009**/.197	**.001**/.260	**.004**/.215	.149/.108	.099/.126	**.006**/.204					
Mistreated by Partner	**.004**/.218	**.001**/.241	**.015**/.182	.575/.042	**< .001**/.272	**.001**/.253	**.001**/.242				
Out to Provider	**< .001**/.212	**.001**/.265	**.003**/.227	.469/.055	**< .001**/.463	**< .001**/.549	.196/.099	**.001**/.263			
Depression, Discussed w Dr.	**< .001**/.303	**.002**/.233	**.003**/.223	.426/.060	**.052**/.149	**.001**/.253	**< .001**/.483	**< .001**/.281	**< .001**/.269		
Alcohol Use, Frequency	**.030**/.162	.318/.75	.356/.069	**.023**/.170	.075/.136	.126/.155	.860/.013	.993/.001	.558/.045	.443/.058	

Note: N = 283. Statistical significance was calculated using Chi-Square tests. The strength of associations was calculated using Cramer's V. The first number before the slash is the *p* value. The second number after the slash is the value for Cramer's V (e.g., *p* value/Cramer's V).

Bolded text indicates $p < .05$.

Poisson Regression of Factors Associated with Count of Syndemic Factors

Finally, simple Poisson regression was conducted for the nonurban Island Health subsample to determine which demographic explanatory factors were associated with a higher number of syndemic factors (see Table 8). The Poisson regression also determined which other syndemic or health outcome explanatory factors (stigma and discrimination, anticipated stigma, outness, suicide, partner violence, aspiration and achievement, social support, sexual health, health care access, health outcomes, mental health, and substance use variables) were associated with a higher number of syndemic factors.

Demographic Factors

There was a significant association ($p = .029$) between age groups and the number of syndemic factors. Those sixty years and over had an average of 4.2 ($SD = 2.24$) syndemic factors, compared with those under 25 who had 5.45 ($SD = 1.94$). The association between gay sexual identity and average number of outcomes was significant at $p < .001$. Respondents who did not identify as gay had an average count of 3.4 ($SD = 2.13$), compared with respondents who did identify as gay who had 5.99 ($SD = 1.65$). The association between HIV status and average number of outcomes was significant at $p < .001$, where respondents living with HIV had an average count of 6.55 syndemic factors ($SD = 2.14$), compared with 4.78 ($SD = 2.28$) among those not living with HIV. The association between a recent move and average number of outcomes was significant at $p = .015$, where respondents who lived in the same location as five years prior had an average count of 4.61 ($SD = 2.14$), compared with those who had moved in the past five years who had 5.52 ($SD = 2.46$). For educational attainment, respondents with a graduate degree had an average count of 5.96 ($SD = 2.32$), while respondents with a high school diploma had an average of 3.57 ($SD = 2.08$, $p < .001$). Differences in income were significant ($p = .006$), where those earning $90,000 and over had 3.89 ($SD = 2.1$), while those earning $30,000 or less had 5.53 ($SD = 2.1$). No significant associations were found with count of syndemic factors and gender identity, ethnicity, employment status, or retirement status.

Stigma and Discrimination

There were significant associations between the count variable and the majority of the other measures of stigma and discrimination, including: losing a job due to sexuality, being called names or slurs, experiencing verbal violence, and experiencing physical violence. Those experiencing the above measures of stigma and discrimination had a higher average number of factors compared with those not experiencing them. The count variable was also significantly associated with discrimination in the following settings: among family, when renting, in education, and in healthcare. Respondents who experienced discrimination among family, when renting, in education, and in healthcare had a higher number of syndemic factors than those who did not.

Anticipated Stigma

There were significant associations between all of the measures of anticipated stigma and the number of syndemic factors at a significance level of $p < .001$, except for antigay worry in education which was significant at $p = .014$ and antigay worry in health care, which was significant at $p = .001$. Those who experienced more than low antigay worry in health care had an average of 5.76 syndemic factors (*SD* = 2.08) compared with those who only experienced low worry at 4.54 (*SD* = 2.25). Those who experienced more than low antigay worry in education had an average of 5.79 (*SD* = 2.59) compared with those who only experienced low worry at 4.69 (*SD* = 2.16). Those who experienced more than low antigay worry when renting had an average of 6.2 (*SD* = 1.94) compared with those who only experience low worry at 4.39 (*SD* = 2.17). Those who experienced more than low antigay worry at work had an average count of 5.83 (*SD* = 2.08) compared with those who only experienced low worry at 4.36 (*SD* = 2.21).

Outness

There were significant associations between outness and age of first sex with another guy and the number of syndemic factors. Those who first had sex with a guy at age 25 or over had an average of

4.29 syndemic factors, compared with those who first had sex with a guy between the ages of 18-24 who had 5.47 (p = .02). As well, those who first had sex with a guy before than age of 14 had an average of 5.74, compared with those who were 25 and over who had 4.29 (p = .009). No significant associations were found between the number of syndemic factors and age at which respondents came out.

Suicide and Partner Violence

There were significant associations between attempting suicide and the number of syndemic factors (p < .001), where those who had attempted suicide had an average of 7.11 factors (SD = 1.11), compared with 4.63 (SD = 2.23) among those who had not attempted suicide. Considering suicide was also significantly associated with the number of syndemic factors. Those who considered suicide over a year ago and within the past 12 months had an average of 6.06 (SD = 2.4), whereas those who had never considered suicide had 3.9 (SD = 1.9). Those who considered suicide in the past twelve months had 6.44 (SD = 2.09), compared with those who did not consider suicide in the past year who had 3.9 (SD = 1.9). For partner violence, only forced sex was significantly associated with the number of syndemic factors. There was a significant association (p = .006) between those who had experienced forced sex when under 18 and when over 18 had an average of 6.22 syndemic factors (SD = 1.69), compared with those who had not experienced forced sex who had 4.68 (SD = 2.3). No significant associations were found between count of syndemic factors and mistreatment from friends with benefits or from hookups.

Social Support

There was also a significant association (p < .001) between time with gay/bi men and the number of syndemic factors, where those who spent over 50% of their time with gay and/or bi men had 6.5 (SD = 1.58) compared with those who spent less than 25% of their time who had 4.36 (SD = 2.27). Involvement with the LGBT community also had significant associations (p = .001), where those who were involved with the LGBT community had an average of 6.28 syndemic factors (SD = 1.79) and those

who were not involved had 4.64 (*SD* = 2.26). No significant associations were found between count of syndemic factors and support network size or civic involvement.

Sexual Health

The number of syndemic factors was significantly associated ($p < .001$) with condom use during most recent sexual encounter, where respondents who used a condom had an average of 4.34 (*SD* = 2.45), and respondents who did not had an average of 5.42 (*SD* = 2.21). There was also a significant association ($p = .041$) between the number of partners of unknown HIV status in the past year and the number of syndemic factors. Those with more than one unknown HIV status partner had an average of 5.88 (*SD* = 2.05) syndemic factors, compared with respondents with none at 4.71 (*SD* = 2.32). There was a significant association ($p = .012$) between frequency of HIV testing and number of syndemic factors, where respondents who tested without a set pattern had an average of 4.85 (*SD* = 2.5) syndemic factors, compared with those who had only tested once who had 3.25 (*SD* = 1.98). Those who knew that ART prevents HIV had a significantly ($p = .01$) higher average number of syndemic factors at 5.19 (*SD* = 2.16) compared with those who did not who had an average of 4.3 (*SD* = 2.35). Those who knew that PEP prevented HIV transmission had a significantly higher ($p = .005$) average number of syndemic factors at 5.32 (*SD* = 2.25) than those who did not know PEP prevented HIV transmission who had 4.39 (*SD* = 2.2). Those who knew PrEP prevented HIV transmission had a significantly ($p < .001$) higher average number of factors at 5.69 (*SD* = 2.13), compared with those who did not know about PrEP at 4.06 (*SD* = 2.11).

Health Care Access

Respondents who delayed health care because of stress had a significantly ($p = .001$) higher average number of syndemic factors at 6.4 (*SD* = 1.69) compared with those who did not delay health care due to stress at 4.67 (*SD* = 2.26). There were no significant associations between the number of syndemic factors and location of routine care, having a physician, competence of physician, sensitivity of reception staff, or a physician having a negative reaction to sexuality. No significant associations were

found between number of syndemic factors and other reasons for delaying health care including lateness, distance to services, inconvenient hours, privacy concerns, wait times, or a lack of sensitivity.

Health Outcomes

Respondents who self-rated their health as fair or poor had a significantly (p = .029) higher average number of syndemic factors at 5.9 (SD = 1.99) compared with those who rated their health as very good or excellent at 4.69 (SD = 2.3). No significant associations between the number of syndemic factors and high blood pressure, cardiovascular disease or cancer were found.

Mental Health & Substance Use

There was a significant (p < .001) association between the average number of syndemic factors and discussing stress with a health care provider. Participants who discussed stress with a health care provider in the past year had an average of 6.48 syndemic factors (SD = 2.07), whereas and participants who did not had 3.48 (SD = 1.97). Further, participants who discussed stress with a health care provider over a year ago had an average of 5.06 syndemic factors (p = .005, SD = 1.91) and participants who did not had 3.48 (SD = 1.97). Participants who discussed anxiety with a health care provider in the past year had an average of 6.78 syndemic factors (p < .001, SD = 1.78) compared with participants who did not at 3.93 (SD = 1.94). Participants who discussed compulsive and unwanted behaviours with a health care provider in the past year had an average of 7.22 syndemic factors (p = .001, SD = 0.971) and participants who did not had 4.65 (SD = 2.29). Participants who discussed alcohol or drugs with a health care provider in the past year had an average number of 6.52 syndemic factors (p = .001, SD = 2.03) compared with participants who did not at 4.57 (SD = 2.23). Participants who discussed suicidal thoughts with a health care provider in the past year had an average of 6.45 syndemic factors (p < .001, SD = 2.25) compared with participants who did not at 4.39 (SD = 2.09). No significant associations were found between the number of syndemic factors and eating disorders or for any measures of substance

use including use of tobacco, marijuana, crystal methamphetamine, poppers, Viagra, steroids, or binge drinking.

Table 8

Poisson Regression of Explanatory Factors associated with Syndemic Factors among Nonurban GBM within Island Health (Sex Now 2015, N = 178)

Explanatory Factors	Number of Syndemic Factors				
	Mean	Standard Deviation	Variance	Beta coefficient	*p*
		Demographic			
Age					
<25	5.45	1.94	3.76	0.261	**.029**
25-34	4.81	2.03	4.12	0.137	.242
35-44	5.20	2.62	6.86	0.214	.119
45-59	5.01	2.35	5.52	0.177	**.057**
60+	4.20	2.24	5.02	referent	
Gay Identified					
No	3.40	2.13	4.54	-2.588	**< .001**
Yes	5.99	1.65	2.72	referent	
Bisexual Identified					
No	5.80	1.92	3.69	2.473	**< .001**
Yes	3.32	1.94	3.76	referent	
HIV Status					
Positive	6.55	2.14	4.58	2.241	**< .001**
Negative	4.78	2.28	5.20	0.470	.261
Never tested	4.31	1.92	3.69	referent	
Live in same location as 5 years ago					
No	5.52	2.46	6.05	0.903	**.015**
Yes	4.61	2.14	4.58	referent	
Education - highest level					
High School	3.57	2.08	4.33	-2.385	**< .001**
Some College/University	4.85	2.17	4.71	-1.107	.300
College	4.80	2.29	5.24	-1.162	**.058**
University Degree	5.00	2.25	5.06	-0.962	.101
Graduate Degree	5.96	2.32	5.38	referent	
Income, grouped					
Under 30k	5.53	2.10	4.41	1.644	**.006**
30k-89,999	4.71	2.30	5.29	0.825	.134
Over 90k	3.89	2.10	4.41	referent	
		Stigma and Discrimination			

Explanatory Factors	Number of Syndemic Factors				
	Mean	Standard Deviation	Variance	Beta coefficient	*p*
Lost job due to sexuality					
No	4.63	2.23	4.97	-0.368	**< .001**
Yes	6.70	1.71	2.92	referent	
Called names/slurs, ever					
No	4.04	2.16	4.67	-0.417	**< .001**
Yes	6.14	1.81	3.28	referent	
Experience verbal violence, before 18					
No	4.61	2.28	5.20	-0.22	**.004**
Yes	5.75	2.00	4.00	referent	
Experience verbal violence, after 17					
No	4.54	2.22	4.93	-0.327	**< .001**
Yes	6.30	1.89	3.57	referent	
Experience physical violence					
No	5.83	1.97	3.88	0.232	**.003**
Yes	4.62	2.28	5.20	referent	
Experience physical violence, before 18					
No	4.69	2.25	5.06	-0.268	**.004**
Yes	6.13	1.98	3.92	referent	
Discrimination from family, ever					
No	4.59	2.16	4.67	-0.394	**< .001**
Yes	6.81	2.12	4.49	referent	
Discrimination renting, ever					
No	4.65	2.16	4.67	-0.532	**< .001**
Yes	7.91	1.44	2.07	referent	
Discrimination in education, ever					
No	4.56	2.11	4.45	-0.447	**< .001**
Yes	7.14	2.12	4.49	referent	
Discrimination in healthcare, ever					
No	4.66	2.19	4.80	-0.356	**< .001**
Yes	6.66	2.22	4.93	referent	
	Anticipated Stigma				
Antigay worry, renting					
Low worry	4.39	2.17	4.71	-0.359	**< .001**
More than low worry	6.20	1.94	3.76	referent	
Antigay worry at work					
Low worry	4.36	2.21	4.88	-0.29	**< .001**
More than low worry	5.83	2.08	4.33	referent	
Antigay worry in education					
Low worry	4.69	2.16	4.67	-0.211	**.014**
More than low worry	5.79	2.59	6.71	referent	

Explanatory Factors	Number of Syndemic Factors				
	Mean	Standard Deviation	Variance	Beta coefficient	*p*
Antigay worry in healthcare					
Low worry	4.54	2.25	5.06	-0.237	**.001**
More than low worry	5.76	2.08	4.33	referent	
		Outness			
Out to friends					
Everyone	6.14	1.54	2.37	0.969	**.002**
Some	4.83	2.25	5.06	0.728	**.008**
No one	2.44	1.25	1.56	0.047	.872
N/A	2.33	1.50	2.25	referent	
Out at school					
Everyone	6.12	1.50	2.25	0.268	**.003**
Some	6.32	1.94	3.76	0.299	**.003**
No one	3.49	2.03	4.12	-0.294	**.002**
N/A	4.68	2.22	4.93	referent	
Out at work					
Everyone	6.15	1.58	2.50	0.372	**< .001**
Some	6.14	1.88	3.53	0.37	**.002**
No one	3.37	2.03	4.12	-0.23	**.043**
N/A	4.24	2.13	4.54	referent	
Out to community					
Everyone	6.20	1.53	2.34	0.351	**.001**
Some	6.19	1.99	3.96	0.349	**.001**
No one	3.45	2.05	4.20	-0.234	**.033**
N/A	3.45	1.86	3.46	referent	
Age at first sex w/guy					
<14	5.74	2.10	4.41	0.292	**.009**
14-17	4.16	2.06	4.24	-0.031	.778
18-24	5.47	2.22	4.93	0.243	**.020**
25+	4.29	2.39	5.71	referent	
		Partner Violence			
Sexual assault					
No	4.68	2.30	5.29	-0.283	**.006**
Yes, under 18	4.80	2.24	5.02	-0.258	**.029**
Yes, under & over 18	6.22	1.69	2.86	referent	
		Social Support			
Time with gay/bi men (%)					
Less than 25%	4.36	2.27	5.15	-0.399	**< .001**
25%	5.74	2.04	4.16	-0.124	.297
50%	5.07	2.06	4.24	-0.247	.108
Over 50%	6.50	1.58	2.50	referent	

Explanatory Factors	Number of Syndemic Factors				
	Mean	Standard Deviation	Variance	Beta coefficient	*p*
Involved w/LGBT community					
No	4.64	2.26	5.11	-0.303	**.001**
Yes	6.28	1.79	3.20	referent	
Sexual Health					
Last sex, condom use (yes/no)					
No	5.42	2.21	4.88	0.224	**< .001**
Yes	4.34	2.45	6.00	referent	
Unknown HIV status partners past year (yes/no)					
None	4.71	2.32	5.38	-0.221	**.041**
One	4.76	1.75	3.06	-0.211	.159
More than one	5.88	2.05	4.20	referent	
Condom use w/hookup past year (yes/no)					
Never	5.86	2.54	6.45	0.132	.228
Intermittent	4.77	1.89	3.57	-0.074	.471
Always	4.27	2.34	5.48	-0.0186	**.045**
No anal sex	5.14	2.10	4.41	referent	
HIV test, frequency					
Have only tested once	3.25	1.98	3.92	-0.401	**.012**
Every few years	4.62	2.44	5.95	-0.048	.695
Once a year	5.33	2.05	4.20	0.094	.441
Twice a year	5.16	1.64	2.69	0.063	.674
A few times per year	5.33	2.14	4.58	0.094	.462
No set pattern	4.85	2.50	6.25	referent	
ART, aware prevent HIV					
No	4.30	2.35	5.52	-0.187	**.010**
Yes	5.19	2.16	4.67	referent	
PEP, aware prevent HIV					
No	4.39	2.20	4.84	-0.194	**.005**
Yes	5.32	2.25	5.06	referent	
PrEP, aware prevent HIV					
No	4.06	2.11	4.45	-0.336	**< .001**
Yes	5.69	2.13	4.54	referent	
Health Care Access					
Delay in health care, stress					
No	4.67	2.26	5.11	-0.314	**.001**
Yes	6.40	1.69	2.86	referent	
Health Outcomes					
Self-rated health, grouped					
Very good/excellent	4.69	2.30	5.29	-0.228	**.029**
Good	4.83	2.23	4.97	-0.199	.078

Explanatory Factors	Number of Syndemic Factors				
	Mean	Standard Deviation	Variance	Beta coefficient	*p*
Fair/poor	5.90	1.99	3.96	referent	
		Mental Health			
In the past year have you discussed w/health care provider…...					
…stress					
No	3.48	1.97	3.88	-0.522	**< .001**
Over a year ago	5.06	1.91	3.65	-0.247	**.005**
Last 12 mo.	6.48	2.07	4.28	referent	
…anxiety					
No	3.93	1.94	3.76	-0.546	**< .001**
Over a year ago	5.69	2.06	4.24	-0.175	.067
Last 12 mo.	6.78	1.78	3.17	referent	
…compulsive/unwanted behaviours					
No	4.65	2.29	5.24	-0.439	**.001**
Over a year ago	5.84	1.34	1.80	-0.211	.211
Last 12 mo.	7.22	0.971	0.94	referent	
…substance use					
No	4.57	2.23	4.97	-0.355	**.001**
Over a year ago	6.16	1.52	2.31	-0.057	.703
Last 12 mo.	6.52	2.03	4.12	referent	
…suicidal thoughts					
No	4.39	2.09	4.37	-0.384	**< .001**
Over a year ago	6.83	1.85	3.42	0.058	.647
Last 12 mo.	6.45	2.25	5.06	referent	
		Suicide			
Considered suicide					
No	3.90	1.90	3.61	-0.44	**<.001**
Over a year ago	6.05	2.01	4.04	-0.002	.986
Last 12 months	6.77	1.76	3.10	0.112	.412
Over a year ago & last 12	6.06	2.40	5.76	referent	
Considered suicide, last year					
No	3.90	1.90	3.61	-0.501	**< .001**
Over a year ago	6.05	2.01	4.04	-0.063	.502
Last 12 months	6.44	2.09	4.37	referent	
Attempted suicide, ever					
No	4.63	2.23	4.97	-0.429	**< .001**
Yes	7.11	1.11	1.23	referent	

Note. N = 283 nonurban GBM. Statistical significance was calculated using chi-square tests. **Bolded text** indicates $p < .05$. ART = antiretroviral therapy. PEP = Post-Exposure Prophylaxis. PrEP = Pre-Exposure Prophylaxis.

Discussion

In the sections below, I discuss the key findings of this thesis in reference to the study objectives and integrate my findings with the existing literature. Key findings of this thesis align with existing syndemic literature (Ferlatte et al., 2014, 2018; Stall et al., 2003, 2008). In reference to the study objectives, my results suggest that a syndemic of stigma and negative health outcomes may be occurring for nonurban GBM within Island Health. Regarding demographic differences, a lower percentage of nonurban (17.8%) than urban (36.4%) GBM within Island Health were college or university educated, and a higher percentage of nonurban (71.9%) lived in the same location as five years prior when compared with urban GBM (55.2%). In BC, a higher percentage of nonurban GBM were aged under 25 or over 60, unemployed, did not complete post-secondary education, identified as bisexual, and had never been tested for HIV. When comparing syndemic factors among nonurban and urban GBM, I found syndemic factors are prevalent among both urban and nonurban GBM across BC, but urban GBM experience a significantly higher percentage of many individual syndemic factors. For example, approximately half of all urban Island Health GBM (48.6%) and urban BC GBM (55%) experienced verbal violence, while percentages for nonurban GBM within Island Health (36.5%) and BC (39.8%) were lower but still notable. When looking exclusively at nonurban Island Health GBM for associations between syndemic factors, I found that 37 out of the 55 tested associations between syndemic factors were statistically significant. As well, my evidence suggests that a higher number of syndemic factors may be associated with negative health outcomes for nonurban GBM in Island Health. For example, nonurban Island Health GBM who had ever attempted suicide had an average of 7.11 syndemic factors, compared with nonurban Island Health GBM who had never attempted suicide at

4.63. Importantly, I found that nonurban GBM were less aware of treatment and prevention options for STIs and HIV. I also determined that nonurban GBM within Island Health who were gay identified, living with HIV, and earned less than $30,000 annually may experience a higher number of syndemic factors. Collectively, these findings suggest that a syndemic may be occurring among contemporary nonurban GBM within Island Health and could occur without the influence of migration to major urban centres (Stall et al., 2008). Below, I will further discuss the most important contributions of this thesis within the context of existing literature. First, I will discuss how my results fit into existing literature, followed by what this thesis adds and how my results differ.

Evidence of a Syndemic

Since the original study by Stall et al. (2003), a syndemic in GBM health has been investigated with consistent findings: GBM experience multiple psychosocial issues that have a cumulative effect on HIV transmission risk (Ferlatte et al., 2014; Hatzenbuehler et al., 2011; Herrick et al., 2013; Parsons et al., 2012). My results reflect this process. My results indicate most measures of stigma and discrimination (rumors, experiences of verbal violence, discrimination, and anti-gay worry among family) are significantly associated with each other, as well as with depression, suicidality, living with HIV, and HIV risk. Moreover, there is a positive relationship between experiencing more syndemic factors and experiencing negative health outcomes (Morrison et al., 2018) such as HIV, depression, suicidality, and poor self-rated health. Importantly, I also found a positive relationship between the number of syndemic factors and condomless sex, having more than one partner of unknown HIV status, and delaying health care due to stress. These results corroborate Ferlatte's (2014) model of syndemic production, where cumulative anti-gay experiences were associated with psychosocial difficulties, which were in turn associated with increased risk of condomless anal sex with partners of unknown HIV status. Taken altogether, I interpret my results as additional evidence of a syndemic in GBM health and the

importance of social conditions as theorized by Stall et al. (2003, 2008) and Ferlatte et al. (2014, 2018) with an emphasis on geography.

A Syndemic Among GBM in Nonurban Living Environments

These results also add to the literature by suggesting that a syndemic can occur in a contemporary nonurban sample of Canadian GBM. Current data on stigma and syndemics among nonurban GBM are limited, use a variety of methods, occur in an American context, and often do not compare living environments (Keene et al. 2017; Preston, D'Augelli, Kassab, & Starks, 2004; Schwitters & Sondag, 2017; Uphold et al., 2005; Whitehead et al., 2016; Williams et al., 2005). Stall et al. (2003) noted their sample excluded men in nonurban areas and that their theory may only apply to urban gay men. They suggested further investigation into the syndemic phenomenon in nonurban areas. By finding results that may affirm the existence of a syndemic for nonurban GBM in Island Health, this thesis fills a gap in the literature regarding living environment.

This thesis also adds to the literature by suggesting a syndemic in GBM health may occur without migration from a nonurban area to a large urban center. Stall et al. (2008) originally theorized that a syndemic is driven in part by migration to large urban centers in pursuit of gay neighbourhoods/communities, and the accompanying loss of social capital. This thesis demonstrates that migration to a large urban centre may not be necessary to drive a syndemic among GBM. However, I was unable to consider the influence of lifetime migration in my analyses due to the structure of the survey questions. Additionally, I found some evidence that moving to a nonurban living environment increases the average number of syndemic factors. Future research could explore the effect of migration to different living environments.

Comparing Urban and Nonurban GBM

Syndemic Factors

While results indicate syndemic factors and their associated negative health outcomes are prevalent regardless of living environment, a primary contribution of this thesis is evidence suggesting that nonurban GBM experience less syndemic factors and better outcomes than their urban counterparts. Results indicate nonurban GMB experience significantly less name-calling or slurs and verbal violence before or after 18 years of age. Nonurban GBM also experience significantly less depression and suicidality when compared with urban GBM. Additionally, within the nonurban Island Health sample, GBM who had lived in the same location for the past five years had less syndemic factors compared with those who had moved in the past five years. These findings suggest that length of nonurban residence may be beneficial. However, I was unable to determine if these GBM were living in their place of birth or not due to the structure of the survey questions. Quantitative research has found prevalent syndemic factors and associated negative outcomes among GBM (Bruce & Harper, 2011; Herrick et al., 2013; Klein, 2011; Mustanski, Garfalo, Herrick, & Donenberg, 2007; Parsons, et al., 2012), but the impact of geography was not considered in these studies. Moreover, with the exclusion of Ferlatte et al. (2014, 2018), most results are derived from an American context. As such, this thesis adds to the literature by generating preliminary evidence that nonurban Canadian GBM experience fewer syndemic factors and better outcomes when compared with urban GBM.

Risk, Treatment, and Prevention

There were significant associations between the number syndemic factors and delaying health care access due to stress, condomless sex, and partners of unknown HIV status. A notable addition is that significantly less nonurban GBM were aware of treatment and prevention options for HIV like antiretroviral therapy and PrEP. As well, similar to existing literature (McKenney et al., 2018), I found that less nonurban GBM had tested for HIV or STIs recently. The combination of risk factors and lack of

awareness of treatment and prevention options among nonurban GBM is problematic because it may increase the likelihood of HIV transmission. In contrast to existing literature (Whitehead, et al., 2016; Sengupta et al., 2010; Hubach et al., 2017), I did not find evidence of barriers to health care for nonurban populations such as travelling long distances, lack of transport, or stigma regarding HIV. Conversely, my thesis only found differences in levels of awareness of treatment and prevention approaches between urban and nonurban GBM (Gilbert, 2015). As such, increasing awareness of treatment and prevention services among nonurban GBM may benefit GBM health. A limitation of this finding is that while there were no significant differences in sexual orientation by living environment for Island Health, this thesis did not take the gender of participants' partners or relationship status into consideration. It is possible that there are differences in these factors by living environment that affect service utilization.

Demographics

This thesis also expands existing Sex Now analyses (Trussler & Ham, 2017) by developing new demographic data for GBM by living environment (urban/nonurban). For Island Health, the only significant demographic differences between urban and nonurban were that more urban GBM had a higher level of education and more nonurban GBM had lived in the same location for five years. Conversely, in BC, there were several significant demographic differences between urban and nonurban GBM. Significant differences were found between urban and nonurban GBM in BC for age, sexuality, HIV status, education, employment, and retirement. Previously, there were only Sex Now data for each health authority (Trussler & Ham, 2017), but no nuanced demographic data within these large regions stratified by living environment. This thesis adds valuable demographic data regarding different living environments that could be considered in analysis of related population health data.

Demographics of Nonurban GBM Most Impacted a Syndemic

In addition to demographic differences by living environment, this thesis sought to determine which individuals within Island Health nonurban living environments were most affected by syndemic factors. Determining who was most affected was important because while levels of stigma and negative health effects are more prevalent among urban populations, levels are still high among nonurban GBM. As such, this thesis adds to the literature by discovering that those under 25, identifying as gay rather than bisexual, living with HIV, who were more out, had moved in the past five years, and earned less than $30,000/year experienced higher levels of syndemic factors. Previous work (Ferlatte et al., 2014) has looked at the synergy of different syndemic factors, but not necessarily at who is most affected. This thesis adds a demographic understanding of who might be most impacted, which could inform priority setting and targeting of policies, programs and resources to those GBM in greatest need. Importantly, GBM who were out to friends, school, work, or community all had a significantly higher average number of syndemic factors compared with those who were not out. These data demonstrate that being out is still problematic for many GBM despite rhetoric of gay acceptance in contemporary Canadian society (Meyer, 2016; Standing Committee on Health, 2019).

Strengths

Strengths of this thesis are the inclusion of new variables, the CBPR methodology, and a combination of well tested and new methods. Regarding methods, the Sex Now (Trussler & Ham, 2017) sample is the only large, anonymous, and local sample of GBM in Island Health and across BC. As well, the survey has been tested and refined through yearly iterations since its inception in 2002 ("Sex Now Survey", n.d.; Trussler & Ham, 2017). The survey's size, anonymity, and ongoing refinement lend strength to my results. Furthermore, while much of the research on syndemics is produced in the United States of America, Sex Now samples Canadian GBM. As such, I was able to create results specific to each

living environment for Island Health and BC. Taken altogether, these methods add strength to my results, which could be used to inform policy and services.

Additionally, the use of Cramer's V and Poisson regression as statistical methods in syndemic research are a strength. Cramer's V was a novel application in the GBM syndemics research that was not used in prior studies that I read. Other work (Ferlatte et al., 2014) looked at the interrelated and mutually reinforcing nature of syndemic factors using crude odds ratios which required defining a specific outcome for the regression analysis. In contrast, Cramer's V allowed me to look at associations between many different syndemic factors. Poisson regression was a strength because it developed an understanding of who was more likely to experience an increased number syndemic factors as well as what other health outcomes were associated with a higher number of syndemic factors. Other work (Ferlatte et al., 2014) has examined the percentage of respondents reporting each psychosocial issue by number of marginalization indicators; in contrast, I looked more at the demographic explanatory factors associated with experiencing a syndemic as well as the associated negative health outcomes of those experiencing more syndemic burden. Therefore, Poisson regression was a strength as it provides more useful information for policy makers, program managers, and service providers to best assess and support GBM.

For methodology, the CBRC is a community-led organization made up of GBM who have built relationships with GBM across Island Health and in BC since 1999. As well, the survey was developed and revised over the years in consultation with their target population. The community-based research methodology driven by those relationships increases the strength of the data collected as well as the potential for mobilization of these findings into action. As such, I argue that CBR methodology may simultaneously increase the validity and reliability of my results.

Another strength of this thesis is the inclusion of measures of outness. Previous work (Ferlatte et al., 2014; 2018; Stall et al., 2003) has primarily investigated urban, white samples of GBM who are

assumed to be living an out gay life. While my sample is also predominantly white, including measures of outness generated evidence that more outness is associated with experiencing a greater number of syndemic factors. As well, outness was significantly associated with several measures of stigma. While my thesis was not focused specifically on outness and understanding its full impact, including outness demonstrates that it plays an important role in syndemic production and provides direction for more nuanced future research. Future work could investigate outcomes for GBM who are out to varying degrees and in different settings. As well, the continued negative impact of outness on GBM health shows considerable need for more than just policies that foster inclusion, but actions that affirm and celebrate the diversity of GBM.

Limitations

This thesis presents several limitations due to the methods, bias, small sample size, difficulty defining 'nonurban', and the study design. I will first discuss the limitations due to methods. Regarding methods, the convenience sample may not accurately represent the target population. Therefore, results of this analysis may not be generalizable beyond the sample of GBM from Island Health and BC in 2014-15. Additionally, the eligibility criteria for Sex Now 2015 had no age restriction and was messaged as a "survey of sex between men". Framing the survey as "a survey of sex between men" may underrepresent those individuals who are not sexually active, but still have relevant syndemic experiences. As well, the lack of a minimum age requirement may skew the results in an unknown direction, and is also a limitation. Lastly, as the sample was predominantly white this analysis could not develop an intersectional understanding syndemics in GBM health, which should be considered in the future.

Another limitation of the methods was the construction of some survey questions. I could not analyze the effect of lifetime migration on GBM health as the survey only asked whether participants had moved in the past five years or not. Accordingly, I could not determine if nonurban GBM had never

left their community of origin, moved from elsewhere, or had returned to their community of origin. Differences in history of migration likely have an influence on syndemics (Kennedy, 2010); however, this thesis was not able to contribute much to the literature in this area. Furthermore, the survey questions regarding mental health asked if participants had, for example, discussed depression with a health care provider. The structure of these questions limited my ability to determine if participants were diagnosed with a mental health condition, and if a diagnosis was significantly associated with other syndemic variables. Therefore, I was only able to determine if discussing mental health was significantly associated with other syndemic variables.

Respondent, selection, and 'healthy worker' biases may be present in this work. Since outcomes are self-reported, respondent bias may be introduced due to underreporting of syndemic factors. GBM may underreport syndemic factors due to stigma regarding mental health, suicidality, substance use, and partner violence. Underreporting syndemic factors would make the magnitude of a syndemic in GBM health appear less than it actually is. However, the anonymous nature of the survey may reduce respondent bias. Selection bias could be introduced by increased participation from GBM who are already connected to the GBM community. Since GBM who were more connected to the GBM community had a greater number of syndemic factors, selection bias may show an increased effect that does not represent the entire GBM population. The healthy worker effect may also bias the results, where nonurban GBM who do not have stigmatizing experiences do not leave their communities of origin. In contrast, GBM who have bad experiences may leave. Therefore, results show a falsely low rate of stigma for nonurban GBM when compared with GBM who now dwell in urban settings. In the future, longitudinal work to investigate the effect of migration over time and efforts to expand the reach of the survey to more diverse GBM may reduce these biases. A more nuanced understanding of how outness and gender of partner (CBRC, 2013) affect differences in syndemic experiences between urban and nonurban GBM is needed. However, small sample size for Island Health limited my ability to stratify by

either factor to determine their affects. For both variables, stratifying by outness would result in low cell count and increase the likelihood of a type two error. As such, a smaller sample size is a limitation of my understanding of the impact of outness on syndemics in GBM health. Using the full national sample, future analyses could take outness and partnership with a woman into consideration to see if significant differences in outcomes by living environment are still present.

Difficulties operationalizing nonurban are a limitation of research on living environment and GBM (Pinault et al., 2020). Inadequate definitions of nonurban are a limitation because they make it difficult to generalize results to other populations. Other areas may define nonurban differently, making it difficult to compare results. However, my results apply primarily to a Canadian context. By using the Statistics Canada (Canada, 2016; 2017) definitions of nonurban, results should be comparable to other Canadian settings. Finally, due to the cross-sectional design, this thesis is limited in its ability to infer a temporality of outcomes or causation, especially for phenomena reported to have recently occurred.

Future Research

Future research could look into the effect of migration, outness, gender of partner, intersectionality, interventions, and utilize a multivariable model. Future research may want to consider the use of multivariable modelling to address issues of confounding. Research on which interventions are most effective for addressing a syndemic in GBM health is needed. Canadian research that corroborates the correlation of favorable policy environment with improved GBM health outcomes is needed, similar to that conducted in the United States of America of America (Hatzenbuehler et al., 2020; Pachankis et al., 2015). Research on interventions could also explore resilience among GBM as a resource (Herrick et al., 2011). As well, future research should look at racial and other minorities to investigate how different social positions affect syndemics for GBM. Future work should also look into the effect of who GBM are partnered with and levels of outness to develop a more nuanced understanding of how syndemics function for GBM. The national Sex Now dataset may be useful for this

purpose. For example, the same analysis of measures of stigma could be repeated but controlling for gender of partner and stratifying by outness to see if effects remain. Finally, a longitudinal study looking at the effect of migration would also be of value.

Public Health Implications

Results from the quantitative analysis suggest a syndemic of stigma and negative health outcomes may be occurring for nonurban GBM within Island Health. Results also show several potential areas for improvements to the lived experience and health outcomes of GBM. Implications of these results for GBM themselves, public health and clinical service providers, and policy are discussed. Policy work is generally a primary public health intervention that could reduce syndemic factors for GBM, thereby improving GBM's social determinants of health. Planning for public health and clinical services, informed by these data, are generally a secondary public health intervention that could improve mental and sexual health for GBM. Additionally, collaborative work with GBM communities, the health sector, and other areas such as education is important for normalizing conversations about mental health. I will begin by discussing implications for policy.

Implications for policy could include a focus on structural change as a primary public health intervention that has downstream benefits for GBM health. These interventions could include an improved Canadian sex education curriculum and policy protecting GBM rights. GBM rights could be protected through reform to Canada's anti-gay policies (Smith, 2020) including the blood donor ban against men who have sex with men (Standing Committee on Health, 2019). These structural changes to policy may help further destigmatize sexuality diversity in Canada and improve health outcomes for GBM (Standing Committee on Health, 2019). Additionally, structural changes to who WorkSafe BC's anti-harassment policy covers (WorkSafeBC, 2020) and the Human Rights Tribunal process (Brodsky & Day, 2014) that allow GBM to more easily advocate for their equal civil rights under Canadian law may set a cultural precedent and decrease stigmatizing experiences.

Next, a federal policy for standardized sex education curriculum for all Canadian students could improve GBM health by reducing stigma (Sex Information and Education Council of Canada (SIECCAN), 2019). Canadian sex education is below international standards and best practices (Mason, 2020). A standard and comprehensive sex education curriculum about GBM and other sexual minorities that follows SIECCAN's (2019) guidelines could shift heteronormativity and decrease the stigma GBM experience from an early age (Ferlatte et al., 2014; Rainbow Health Ontario, 2019). Therefore, a federal policy for a standardized sex education curriculum for all Canadian students is a structural change that could benefit GBM.

Implications for public health planning, and clinical mental and sexual health service provision include the need for a more holistic approach, tailoring service provision to living environment, and increasing awareness of services among nonurban GBM. Awareness of sexual health services and treatment options is lower among nonurban GBM. Significantly less nonurban GBM were aware of HIV treatment and prevention options like PrEP and ART, had tested recently for HIV, or were out to a health care provider. Altogether, these data show a lack of education and awareness for important health interventions for GBM. Low awareness demonstrates the importance of continued efforts by sexual health service providers to educate their clientele (Gilbert, 2015) on new and changing services and treatments, particularly for nonurban GBM.

An additional implication for public health planning is that tailoring service provision to living environment may be appropriate. Since differences in the GBM population by living environment were observed, the services needed may correspondingly differ by area. For BC, differences in demographics by living environment were observed. Conversely, within Island Health the demographic being served is similar throughout. Differences in outcomes by living environment were observed in both living environments for BC and Island Health. As such, tailoring services to the populations living in different areas may be a more appropriate use of limited resources. Moreover, tailored services may more

effectively address health inequities for GBM (McDaid et al., 2020). For example, since nonurban GBM were less aware of treatment and prevention options, public health could collaborate with local organizations in nonurban areas to promote and provide regular testing for HIV and STIs, as well as increased education on ART and PrEP. Conversely, urban GBM were aware of treatment and prevention options, but experienced more stigma and mental health conditions. Therefore, urban GBM may benefit from increased services addressing stigma, mental health, and sexual health simultaneously.

A final implication for program managers within health authorities, and community and non-profit organizations is that a holistic approach may be beneficial. Rather than just addressing the sexual health needs of GBM, a holistic approach also addresses the psychosocial needs of GBM (Salway et al., 2019). Simultaneously addressing both psychosocial and sexual health with "syndemic service integration" (Salway et al., 2019) may reduce the syndemic in GBM health (Ferlatte et al., 2014, 2018). Interventions could focus on ameliorating the effects of stigma to reduce mental and sexual health outcomes (Ferlatte et al., 2018). Two ways to accomplish more holistic care for GBM are discussed below.

First, training health care providers to identify and address syndemic conditions (Morrison et al., 2018) could create a more holistic approach to GBM health care. Evidence suggests that sexual health clinics are a favorable location for patients to address their mental health and substance use (MHSU) concerns, and sexual health clinicians can support their patients regarding these concerns (Black, Salway, Dove, Shoveller, & Gilbert, 2020; Salway et al., 2019). Accordingly, to develop a holistic approach, STI clinicians and other health care providers could be trained to identify and address the syndemic conditions found in this thesis: experiences of verbal violence, discrimination at work, depression, suicidality, outness, and intimate partner violence. Service providers could also be aware of the demographic profile of those most affected by syndemics, and how many measures of stigma are associated with specific health outcomes. This information could be used to more aptly meet patient

needs. Ferlatte et al. (2018) suggests health care providers could discuss these issues with a non-pathologizing, GBM positive approach that acknowledges the effects of stigma and discrimination.

Secondarily, program managers within health authorities, and community and non-profit organizations, could develop a more holistic approach by increasing connections between organizations and service providers. Increased connections and referrals between organizations addressing mental health, violence, and substance use may increase the efficacy of health promotion efforts for GBM (Black et al., 2019; Salway et al., 2020; Stall et al., 2003). Another recommendation is "co-locating" MHSU and sexual health services (Black et al., 2020; Carey & Senn, 2013; Salway et al., 2019; Senn, Carey, & Varnable, 2010; Senn, Walsh, & Carey, 2016) to prevent care that occurs 'in silo'. Specifically, program managers may want to increase the availability of services such as counselling for antigay experiences and victim services for intimate partner violence. Ferlatte et al. (2018) has acknowledged that GBM may not access existing victims' services because those services are typically geared to women. Taken altogether, a holistic approach could better serve as a gateway to treatment for the effects of stigma and discrimination, thereby interrupting the syndemic in GBM health.

This analysis also has implications for GBM living in BC and within Island Health. One implication for GBM is the continued need to normalize conversations within the GBM community and beyond about mental health. Normalizing conversations about the prevalence of mental health challenges could develop awareness and create space for people to support one another. Further, results from this thesis could be used to normalize mental health challenges by framing them as a structural problem rather than as a personal failure. Normalizing conversations about mental health and framing them as a structural issue could be accomplished through cross-sector collaboration between GBM community members, health care professionals, and other areas such as schools or community agencies. A final implication for GBM is that requisite migration to a large urban center may not confer specific benefits

for gay and bisexual men. Rather, a healthy and fulfilling life may be available in contemporary nonurban Western Canada.

Conclusion

Results from this thesis suggest that urban GBM in BC and within Island Health experience more syndemic factors compared to nonurban GBM. However, results suggest that a syndemic can occur among contemporary nonurban GBM without the influence of migration. For nonurban GBM within Island Health, syndemic factors were significantly associated with one another, and a higher number of syndemic factors were associated with increased negative health outcomes. The interrelated and mutually reinforcing nature of a syndemic in GBM health suggests that holistic and co-located health services that recognize syndemic factors could benefit GBM. In addition to syndemic factors, nonurban GBM also had lower awareness of HIV and STI treatment and prevention options compared to urban GBM, suggesting there is a need for further health promotion among nonurban GBM to prevent HIV and STI transmission. Additionally, stigma was prevalent among GBM in BC and within Island Health regardless of living environment, suggesting that policy interventions that generate structural change to destigmatize sexuality diversity may influence health outcomes for GBM.

References

Adams, J., McCreanor, T., & Braun, V. (2013). Gay men's explanations of health and how to improve it. *Qualitative Health Research*, *23*(7), 887–899. https://doi.org/10.1177/1049732313484196

Allen, L. B., Glicken, A. D., Beach, R. K., & Naylor, K. E. (1998). Adolescent health care experience of gay, lesbian, and bisexual young adults. *Journal of Adolescent Health*, *23*(4), 212–220. https://doi.org/10.1016/S1054-139X(98)00022-6

American Psychological Association. (2020). Publication manual of the american psychological association: The official guide to APA style (Seventh ed.). American Psychological Association.

Aschengrau, A., & Seage, G. R. (2014). *Essentials of epidemiology in public health* (3rd ed.). Jones & Bartlett Learning.

Bauer, G. R., Giblon, R., Coleman, T. A., Aykroyd, G., Fraser, M., & Pugh, D. (2017). Community acceptance and HIV sexual risk among gay and bisexual men in a 'typical' Canadian city. *The Canadian Journal of Human Sexuality*, *26*(1), 7–16. http://dx.doi.org/10.3138/cjhs.261-A5

BC Centre for Disease Control. (2019). *HIV in British Columbia: Annual Surveillance Report 2017*. http://www.bccdc.ca/health-professionals/data-reports/hiv-aids-reports

Black, S., Salway, T., Dove, N., Shoveller, J., & Gilbert, M. (2020). From silos to buckets: A qualitative study of how sexual health clinics address their clients' mental health needs. *Canadian Journal of Public Health*, *111*(2), 220–228. https://doi.org/10.17269/s41997-019-00273-6

Boellstorff, T. O. M. (2011). But do not identify as gay: A proleptic genealogy of the MSM category. *Cultural Anthropology*, *26*(2), 287–312. https://doi.org/10.1111/j.1548-1360.2011.01100.x

Brodsky, G., & Day, S. (2014). *Strengthening Human Rights: Why British Columbia Needs a Human Rights Commission*. The Poverty and Human Rights Centre and Canadian Centre for Policy Alternatives - BC Office. https://www-deslibris-ca.ezproxy.library.uvic.ca/ID/245139

Brooks, V. R. (1981). *Minority stress and lesbian women*. Lexington Books.

Bruce, D., & Harper, G. W. (2011). Operating without a safety net: Gay male adolescents and emerging adults' experiences of marginalization and migration, and implications for theory of syndemic production of health disparities. *Health Education & Behavior*, *38*(4), 367–378. https://doi.org/10.1177/1090198110375911

Carey, M. P., & Senn, T. E. (2013). Health and Life Concerns Among Patients Attending a Publicly Funded Sexually Transmitted Infection Clinic. *Journal of Public Health Management and Practice*, *19*(1), E30–E34. https://doi.org/10.1097/PHH.0b013e31822d4bd5

CBRC. (2013, April 4). *The Gradient: Pride, Prejudice and Determinants of Health* [Video]. https://www.cbrc.net/the_gradient_pride_prejudice_and_determinants_of_health

Cochran, S. D. (2001). Emerging issues in research on lesbians' and gay men's mental health: Does sexual orientation really matter? *American Psychologist*, *56*(11), 931–947. https://doi.org/10.1037/0003-066X.56.11.931

Count Occurrences of Values within Cases. (n.d.). Retrieved from https://www.ibm.com/support/knowledgecenter/SSLVMB_24.0.0/spss/base/idh_coun.html

Deimel, D., Stover, H., Hosselbarth, S., Dichtl, A., Graf, N., & Gebhardt, V. (2016). Drug use and health behaviour among German men who have sex with men: Results of a qualitative, multi-centre study. *Harm Reduction Journal*, *13*(1), 36. https://doi.org/10.1186/s12954-016-0125-y

Ferlatte, O., Hottes, T., Trussler, T., & Marchand, R. (2014). Evidence of a syndemic among young Canadian gay and bisexual men: Uncovering the associations between anti-gay experiences, psychosocial issues, and HIV risk. *AIDS & Behavior*, *July 2014*. http://dx.doi.org.ezproxy.library.uvic.ca/10.1007/s10461-013-0639-1

Ferlatte, O., Salway, T., Samji, H., Dove, N., Gesink, D., Gilbert, M., Oliffe, J., Grennan, T., & Wong, J. (2018). An application of syndemic theory to identify drivers of the syphilis epidemic among gay,

bisexual, and other men who have sex with men. *Sexually Transmitted Diseases*, *45*(3), 163–168. https://doi.org/10.1097/OLQ.0000000000000713

Fields, E. L., Bogart, L. M., Galvan, F. H., Wagner, G. J., Klein, D. J., & Schuster, M. A. (2013). *Association of discrimination-related trauma with sexual risk among HIV-positive African American men who have sex with men*. https://doi.org/10.2105/AJPH.2012.300951

Fisher, C. M., Irwin, J. A., & Coleman, J. D. (2014). LGBT health in the midlands: A rural/urban comparison of basic health indicators. *Journal of Homosexuality*, *61*(8), 1062–1090. https://doi.org/10.1080/00918369.2014.872487

Fishman, D. B. (1997). Postmodernism comes to program evaluation III: A critical review of Stringer's Action Research: A Handbook for Practitioners. *Evaluation and Program Planning*, *20*(2), 231–235. https://doi.org/10.1016/S0149-7189(96)00053-5

Frost, D. M. (2011). Social stigma and its consequences for the socially stigmatized. *Social and Personality Psychology Compass*. https://doi.org/10.1111/j.1751-9004.2011.00394.x

Frye, V., Egan, J. E., Tieu, H. V., Cerdá, M., Ompad, D., & Koblin, B. A. (2014). "I didn't think I could get out of the fucking park." Gay men's retrospective accounts of neighborhood space, emerging sexuality and migrations. *Social Science & Medicine*, *104*, 6–14. https://doi.org/10.1016/j.socscimed.2013.12.002

Galambos, C. M. (2005). Health care disparities among rural populations: A neglected frontier. *Health & Social Work*, *30*(3), 179–181. https://doi.org/10.1093/hsw/30.3.179

Geert van den Berg, R. (2020). *Cramer's V—What and Why?* https://www.spss-tutorials.com/cramers-v-what-and-why/comment-page-2/#comments

Gilbert, M. (2015). *Health Literacy, Sexual Health, and Gay Men: Current Perspectives—Report from a Meeting of Researchers, Policy-makers, Service Providers and Community Members (Oct 30—Nov 1, 2014, Vancouver, British Columbia, Canada)*. Ontario HIV Treatment Network.

Goffman, E. (1963). *Stigma: Notes on the management of spoiled identity*. Prentice-Hall.

Hart, L., & Horton, R. (2017). Syndemics: Committing to a healthier future. *Lancet*, *389*(10072), 888–889. https://doi.org/10.1016/S0140-6736(17)30599-8

Hatzenbuehler, M. L., McKetta, S., Goldberg, N., Sheldon, A., Friedman, S. R., Cooper, H. L. F., Beane, S., Williams, L. D., Tempalski, B., Smith, J. C., Ibragimov, U., Mermin, J., & Stall, R. (2020). Trends in State Policy Support for Sexual Minorities and HIV-Related Outcomes Among Men Who Have Sex With Men in the United States, 2008–2014. *Journal of Acquired Immune Deficiency Syndromes (1999)*, *85*(1), 39–45. https://doi.org/10.1097/QAI.0000000000002395

Hatzenbuehler, M. L., O'Cleirigh, C., Mayer, K. H., Mimiaga, M. J., & Safren, S. A. (2011). Prospective associations between HIV-related stigma, transmission risk behaviors, and adverse mental health outcomes in men who have sex with men. *Annals of Behavioral Medicine*, *42*(2), 227–234. https://doi.org/10.1007/s12160-011-9275-z

Herek, G. (1998). *Stigma and sexual orientation: Understanding prejudice against lesbians, gay men, and bisexuals* (Vol. 4). Sage Publications.

Herek, G. (2007). Confronting sexual stigma and prejudice: Theory and practice. *Journal of Social Issues*. https://doi.org/10.1111/j.1540-4560.2007.00544.x

Herrick, A. L., Lim, S. H., Plankey, M. W., Chmiel, J. S., Guadamuz, T. E., Guadamuz, T. T., Kao, U., Shoptaw, S., Carrico, A., Ostrow, D., & Stall, R. (2013). Adversity and syndemic production among men participating in the multicenter AIDS cohort study: A life-course approach. *American Journal of Public Health*, *103*(1), 79–85. https://doi.org/10.2105/AJPH.2012.300810

Hickman, C. (2018). *Community mapping: GbMSM in central & north Vancouver Island* [Unpublished Work].

Israel, B. A. (2005). *Methods in community-based participatory research for health* (1st ed.). Jossey-Bass.

Jeffries, W. (2013). Homophobia is associated with sexual behavior that increases risk of acquiring and transmitting HIV infection among black men who have sex with men. *AIDS and Behavior*. https://doi.org/10.1007/s10461-012-0189-y

Jollimore, J. (2015). *MSM services review prepared for Island Health* [Report]. https://www.viha.ca/NR/.../2015MSMServicesReviewpreparedforIslandHealth.pdf

Jones, E. E. (1984). *Social stigma: The psychology of marked relationships*. W.H. Freeman.

Keene, D. E., Eldahan, A. I., White Hughto, J. M., & Pachankis, J. E. (2017). *'The big ole gay express': Sexual minority stigma, mobility and health in the small city*. https://doi.org/10.1080/13691058.2016.1226386

Kelleher, C. (2009). Minority stress and health: Implications for lesbian, gay, bisexual, transgender, and questioning (LGBTQ) young people. *Counselling Psychology Quarterly*, *22*(4), 373–379. https://doi.org/10.1080/09515070903334995

Kennedy, M. (2010). Rural men, sexual identity and community. *Journal of Homosexuality*, *57*(8), 1051–1091. https://doi.org/10.1080/00918369.2010.507421

Kitts, R. L. (2010). Barriers to optimal care between physicians and lesbian, gay, bisexual, transgender, and questioning adolescent patients. *Journal of Homosexuality*, *57*(6), 730–747. https://doi.org/10.1080/00918369.2010.485872

Klein, H. (2011). Using a syndemics theory approach to study HIV risk taking in a population of men who use the internet to find partners for unprotected sex. *American Journal of Men's Health*, *5*(6), 466–476. https://doi.org/10.1177/1557988311398472

Krieger, N. (2001). Theories for social epidemiology in the 21st century: An ecosocial perspective. *International Journal of Epidemiology*, *30*(4), 668–677. https://doi.org/10.1093/ije/30.4.668

Lewin, K. (1946). Action Research and Minority Problems Journal of Social Issues. *Journal of Social Issues*, *2*(4), 34–46.

Link, B. G., & Phelan, J. C. (2001). Conceptualizing stigma. *Annual Review of Sociology*, *27*(1), 363–385. https://doi.org/10.1146/annurev.soc.27.1.363

Lyons, T., Johnson, A. K., & Garofalo, R. (2013). 'What could have been different': A qualitative study of syndemic theory and HIV prevention among young men who have sex with men. *Journal of HIV/AIDS & Social Services*, *12*(3–4), 368–383. https://doi.org/10.1080/15381501.2013.816211

Mason, N. (2020). *The State of Sex-ed in Canada*. Action Canada for Sexual Health and Rights. https://www-deslibris-ca.ezproxy.library.uvic.ca/ID/10103808

McDaid, L., Flowers, P., Ferlatte, O., Young, I., Patterson, S., & Gilbert, M. (2020). Sexual health literacy among gay, bisexual and other men who have sex with men: A conceptual framework for future research. *Culture, Health & Sexuality*, *ahead-of-print*(ahead-of-print), 1–17. https://doi.org/10.1080/13691058.2019.1700307

McKenney, J., Sullivan, P. S., Bowles, K. E., Oraka, E., Sanchez, T. H., & DiNenno, E. (2018). *HIV Risk Behaviors and Utilization of Prevention Services, Urban and Rural Men Who Have Sex with Men in the United States: Results from a National Online Survey | SpringerLink*. https://doi.org/10.1007/s10461-017-1912-5

Medicine, I. of. (2011). *The health of lesbian, gay, bisexual, and transgender people: Building a foundation for better understanding*. National Academies Press. https://doi.org/10.17226/13128

Meyer, I. (2001). Why lesbian, gay, bisexual, and transgender public health? *American Journal of Public Health*, *91*(6), 856–859. https://doi.org/10.2105/AJPH.91.6.856

Meyer, I. (2003). Prejudice, social stress, and mental health in lesbian,gay, and bisexual populations: Conceptual issues and research evidence. *Psychology of Sexual Orientation and Gender Diversity*, *1*(S), 3–26. https://doi.org/10.1037/2329-0382.1.S.3

Meyer, I. (2016). The Elusive Promise of LGBT Equality. *American Journal of Public Health*, *106*(8), 1356–1358. https://doi.org/10.2105/AJPH.2016.303221

Morrison, S. A., Yoong, D., Hart, T. A., MacPherson, P., Bogoch, I., Sivarajah, V., Gough, K., Naccarato, M., & Tan, D. H. S. (2018). High prevalence of syndemic health problems in patients seeking post-exposure prophylaxis for sexual exposures to HIV. *PloS One*, *13*(5), e0197998–e0197998. https://doi.org/10.1371/journal.pone.0197998

Mustanski, B., Garofalo, R., Herrick, A., & Donenberg, G. (2007). Psychosocial health problems increase risk for HIV among urban young men who have sex with men: Preliminary evidence of a syndemic in need of attention. *Annals of Behavioral Medicine*, *34*(1), 37–45. https://doi.org/10.1007/BF02879919

Pachankis, J. E., Hatzenbuehler, M. L., Hickson, F., Weatherburn, P., Berg, R. C., Marcus, U., & Schmidt, A. J. (2015). Hidden from health: Structural stigma, sexual orientation concealment, and HIV across 38 countries in the European MSM Internet Survey. *AIDS (London)*, *29*(10), 1239–1246. https://doi.org/10.1097/QAD.0000000000000724

Padgett, D. (2012). *Qualitative and mixed methods in public health*. SAGE.

Parker, C. M., Garcia, J., Philbin, M. M., Wilson, P. A., Parker, R. G., & Hirsch, J. S. (2016). *Social risk, stigma and space: Key concepts for understanding HIV vulnerability among black men who have sex with men in New York City*. https://doi.org/10.1080/13691058.2016.1216604

Parsons, J. T., Grov, C., & Golub, S. A. (2012). Sexual compulsivity, co-occurring psychosocial health problems, and HIV risk among gay and bisexual men: Further evidence of a syndemic. *American Journal of Public Health*, *102*(1), 156–162. https://doi.org/10.2105/AJPH.2011.300284

Pinault, L., Khan, S., & Tjepkema, M. (2020). Accuracy of matching residential postal codes to census geography. *Health Reports*, *31*(3), 3–13. https://doi.org/10.25318/82-003-x202000300001-eng

Poisson Regression Analysis using SPSS Statistics. (2018). Retrieved from https://statistics.laerd.com/spss-tutorials/poisson-regression-using-spss-statistics.php

Prestage, G. (2011). *The term 'MSM' demeans us all.* Retrieved from http://crbc.net/sites/crbc.net/files/MSM%20demeans%20us%20all.pdf

Preston, D. B., & D'Augelli, A. R. (2013). *The challenges of being a rural gay man: Coping with stigma* (1st ed.). Routledge. https://doi.org/10.4324/9780203067529

Preston, D. B., D'Augelli, A. R., Kassab, C. D., Cain, R. E., Schulze, F. W., & Starks, M. T. (2004). The influence of stigma on the sexual risk behavior of rural men who have sex with men. *AIDS Education and Prevention*, *Vol. 16*(No. 4), 291–303. https://doi.org/10.1521/aeap.16.4.291.40401

Public Health Agency of Canada. (2014). *National HIV prevalence and incidence estimates for 2011*. *October 2014*. https://www.canada.ca/en/public-health/services/hiv-aids/publications/epi-updates/chapter-1-national-hiv-prevalence-incidence-estimates-2011.html

Rainbow Health Ontario. (2019). *Health Equity Impact Assessment: LGBT2SQ Populations Supplement*. Rainbow Health Ontario.

Reason, P., & Bradbury, H. (2008). *The Sage handbook of action research: Participative inquiry and practice* (2nd ed.). SAGE Publications.

Roback, P., & Legler, J. (2021, January 26). *Chapter four: Poisson regression.* Bookdown. Retrieved March 07, 2021, from https://bookdown.org/roback/bookdown-BeyondMLR/ch-poissonreg.html

Salway, T., Ferlatte, O., Shoveller, J., Purdie, A., Grennan, T., Tan, D. H. S., Consolacion, T., Rich, A. J., Dove, N., Samji, H., Scott, K., Blackwell, E., Mirau, D., Holgerson, N., Wong, J., & Gilbert, M. (2019). The Need and Desire for Mental Health and Substance Use-Related Services Among Clients of Publicly Funded Sexually Transmitted Infection Clinics in Vancouver, Canada. *Journal of Public Health Management and Practice*, *25*(3), E1–E10. https://doi.org/10.1097/PHH.0000000000000904

Salway, T., Hawkins, B., Dickie, C., & Duddy, C. (2018). *G.R.O.W. + L.I.F.T.* [Report]. Community-Based Research Center for Gay Men's Health. http://cbrc.net/growlift

Schwitters, A., & Sondag, K. A. (2017). The lives and sexual risk behaviours of rural, closeted men who have sex with men living in Montana. *Culture, Health & Sexuality*, *19*(1), 121–134. https://doi.org/10.1080/13691058.2016.1211739

Sengupta, S., Strauss, R. P., Miles, M. S., Roman-Isler, M., Banks, B., & Corbie-Smith, G. (2010). A conceptual model exploring the relationship between HIV stigma and implementing HIV clinical trials in rural communities of North Carolina. *N C Med J*, *71*(2), 113–122.

Senn, T. E., Carey, M. P., & Vanable, P. A. (2010). The Intersection of Violence, Substance Use, Depression, and STDs: Testing of a Syndemic Pattern Among Patients Attending an Urban STD Clinic. *Journal of the National Medical Association*, *102*(7), 614–620. https://doi.org/10.1016/S0027-9684(15)30639-8

Senn, T. E., Walsh, J. L., & Carey, M. P. (2016). Mediators of the Relation Between Community Violence and Sexual Risk Behavior Among Adults Attending a Public Sexually Transmitted Infection Clinic. *Archives of Sexual Behavior*, *45*(5), 1069–1082. https://doi.org/10.1007/s10508-016-0714-6

Sex Information and Education Council of Canada (SIECCAN). (2019). *Canadian Guidelines for Sexual Health Education* (p. 100). http://sieccan.org/wp-content/uploads/2019/06/SIECCAN-Canadian-Guidelines-for-Sexual-Health-Education.pdf

Sex Now Survey. (n.d.). Retrieved from https://www.cbrc.net/sex_now

Shernoff, M. (1997). Gay men with AIDS in rural America. *Journal of Gay & Lesbian Social Services*, *Vol. 7*(No. 1), 73–85. https://doi.org/10.1300/J041v07n01_05

Singer, M. (1994). *AIDS and the health crisis of the United States urban poor: The perspective of critical medical anthropology* (Vol. 39). Pergamon-Elsevier Science Ltd.

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

Singer, M., & Clair, S. (2003). *Introduction to syndemics: A critical systems approach to public and community health*. John Wiley & Sons, Inc.

Smith, M. (2020). Homophobia and Homonationalism: LGBTQ Law Reform in Canada. *Social & Legal Studies*, *29*(1), 65–84. https://doi.org/10.1177/0964663918822150

Stall, R., Friedman, M., & Catania, J. (2008). *Interacting epidemics and gay men's health: A theory of syndemic production among urban gay men.: Vol. Unequal opportunity: Health disparities affecting gay and bisexual men in the United States* (R. J. Wolitski, R. Stall, & R. O. Valdiserri, Eds.). Oxford University Press.

Stall, R., Mills, T. C., Williamson, J., Hart, T., Greenwood, G., Paul, J., Pollack, L., Binson, D., Osmond, D., & Catania, J. A. (2003). Association of co-occurring psychosocial health problems and increased vulnerability to HIV/AIDS among urban men who have sex with men. *American Journal of Public Health*, *93*(6), 939–942. https://doi.org/10.2105/AJPH.93.6.939

Standing Committee on Health. (2019). *The health of LGBTQIA2 communities in Canada: Report of the Standing Committee on Health*. Parliament, House of Commons, Standing Committee on Health. Retrieved from https://www.ourcommons.ca/Content/Committee/421/HESA/Reports/RP10574595/hesarp28/hesarp28-e.pdf

Statistics Canada. (2016). *Census Metropolitan Area (CMA) and census agglomeration (CA)*. Retrieved from https://www12.statcan.gc.ca/census-recensement/2016/ref/dict/geo009-eng.cfm

Statistics Canada. (2017). *Population Centre definition*. Retrieved from https://www12.statcan.gc.ca/census-recensement/2016/ref/dict/geo049a-eng.cfm

Trussler, T, & Ham, D. (2017). *Sex now 2015 health authorities* [Report]. http://cbrc.net/resources/2017/sex-now-2015-health-authorities

Trussler, Terry, & Marchand, R. (2005). HIV/AIDS community-based research. *New Directions for Adult and Continuing Education*, *2005*(105), 43–54. https://doi.org/10.1002/ace.168

Ullrich, P. M., Lutgendorf, S. K., & Stapleton, J. T. (2003). Concealment of homosexual identity, social support and CD4 cell count among HIV-seropositive gay men. *Journal of Psychosomatic Research*, *54*(3), 205–212. https://doi.org/10.1016/S0022-3999(02)00481-6

Uphold, C. R., Rane, D., Reid, K., & Tomar, S. L. (2005). Mental health differences between rural and urban men living with HIV infection in various age groups. *Journal of Community Health*, *30*(5), 355–375. https://doi.org/10.1007/s10900-05-5517-y

von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., Vandenbroucke, J. P., for the STROBE Initiative, & STROBE Initiative. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for reporting observational studies. *Bulletin of the World Health Organization*, *85*(11), 867–872. https://doi.org/10.2471/blt.07.045120

Whitehead, Shaver, J., & Stephenson, R. (2016). Outness, stigma, and primary health care utilization among rural LGBT populations. *PLoS ONE*, *11*(1). https://doaj-org.ezproxy.library.uvic.ca/article/ed46e6f6e9404e2b83465fedab48b388

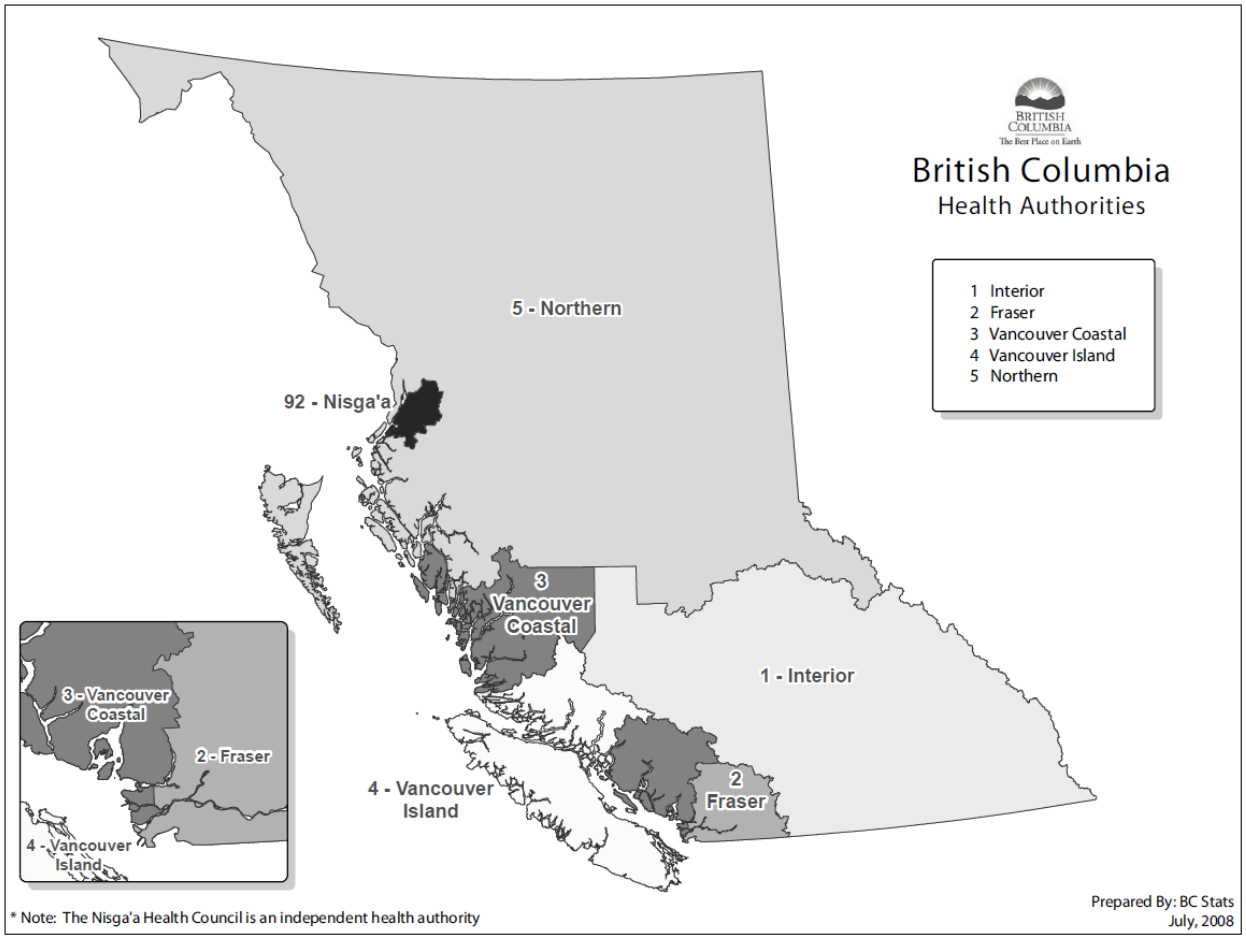
Williams, M. L., Bowen, A. M., & Horvath, K. J. (2005). The social/sexual environment of gay men residing in a rural frontier state: Implications for the development of HIV prevention programs. *The Journal of Rural Health*, *21*(1), 48–55. https://doi.org/10.1111/j.1748-0361.2005.tb00061.x

WorkSafeBC. (2020). *Who does and doesn't need coverage?* https://www.worksafebc.com/en/insurance/need-coverage/who-needs-coverage

Young, R. M., & Meyer, I. H. (2005). The trouble with 'MSM' and 'WSW': Erasure of the sexual-minority person in public health discourse. *American Journal of Public Health*, *95*(7), 1144–1149. https://doi.org/10.2105/AJPH.2004.046714

Appendix A

Map of British Columbia Health Authorities



Appendix B

Quantitative Measures of Syndemics

1. Stigma and Discrimination
   a. For this section participants were asked "have you experienced any of the following?": called homophobic names, rumors about their sexuality, attention to their appearance, pass as straight at an event, excluded socially, missed career opportunity, cyberbullying.
   b. Participants were also asked "have you ever been targeted with antigay violence?" including verbal violence, hate talk, physical violence, beaten up.
   c. Recent discrimination was assessed with the question "have you even encountered antigay discrimination in the following settings?". Situations included: other country customs, justice system, gym/pool/recreation center, employment/workplace, travel/hotel/transportation, family events, Canada customs border entry, health care, apartment/home rental, education/university/college.
2. Anticipated Stigma
   a. Survey participants were asked about anticipated stigma with the question, "what situation worry you about encountering antigay prejudice?". Possible responses were a rating from one (low) to five (high). Situations included: other country customs, justice system, gym/pool/recreation center, employment/workplace, travel/hotel/transportation, family events, Canada customs border entry, health care, apartment/home rental, education/university/college.
3. Discrimination Online
   a. Stigma online was assessed by asking "have you ever experienced discrimination while using online dating or mobile location apps for any of the following reasons? Participants were asked to check all that apply, choosing from: age, body shape/size/look, race/ethnicity, gender

presentation, orientation/sexuality, HIV status, trans history/status, disability, other, none of the above.

4. Outness
   a. Participants respond to the question "who knows about your sexuality?" with possible answers of friends, family, school/college/university, workplace, civic and community activities.
5. Suicide
   a. Participants are asked if they have considered or attempted suicide, at what age, and if they have discussed suicide with a health care professional.
6. Partner Violence
   a. Participants were also asked about partner violence including forced sex, mistreatment by a partner, mistreatment by a friend with benefits or fuck buddy, or mistreatment by a hook up.
7. Substance Use
   a. Participants were asked if they used the following substances before sex the last time they had sex: more than four alcoholic drinks, marijuana, crystal, cocaine, mephedrone, GHB, ketamine, ecstasy, poppers, Viagra, or none of the above.
   b. Participants were asked how often they had used the following recreational substances in the last 12 months: tobacco, marijuana, cocaine, crack, crystal, poppers, Viagra, ecstasy, GHB, ketamine, mephedrone, steroids. Response options were never, once a month of less, once a week or less, a few times a week, or daily.
   c. Participants were also asked about binge drinking. Response options are the same.
8. Aspiration and Achievement.
   a. Questions regarding life expectation were asked such as a self-assessment of overall quality of life, having enough money, owning property, marriage, and becoming a parent.
9. Social Support

a. Participants were asked about time spent with gay or bi men, the support networks, and involvement in personal, gay, or civic activities.

10. Sexual Health
    a. Participants were asked about their last sexual relationship with a guy, how they met, if they lived in the same location, if their partner was or unknown or opposite HIV status, condom use, STI and HIV testing patterns, and knowledge of sexual health practices.
11. Health Care Access
    a. Participants were asked where they access to routine care and if they have a current physician, if their health provider knows about their sexuality, if their current provider is respectful and knowledgeable, is the reception staff are respectful, and about factors that caused delays in accessing services.
12. Health Outcomes
    a. Participants were asked to self-rate their overall health, and if they have been diagnosed with high blood pressure, high cholesterol, diabetes, cardiovascular disease, or cancer.

Appendix C

Graduate Student Memorandum of Understanding

C. Hickman CBRC
GSI MOU.pdf

Appendix D

Certificate of Ethical Approval

University of Victoria

Office of Research Services | Human Research Ethics Board
Administrative Services Building Rm B202 PO Box 1700 STN CSC Victoria BC V8W 2Y2 Canada
T 250-472-4545 | F 250-721-8960 | uvic.ca/research | ethics@uvic.ca

Certificate of Renewed Approval

PRINCIPAL INVESTIGATOR:	Nathan Lachowsky	ETHICS PROTOCOL NUMBER: Minimal Risk - Chair/Vice-chair	17-403
UVic STATUS:	Faculty	ORIGINAL APPROVAL DATE:	09-Nov-17
UVic DEPARTMENT:	PHSP	RENEWED ON:	03-Oct-19
		APPROVAL EXPIRY DATE:	08-Nov-20

PROJECT TITLE: **Life Course and Gay Men's Health: Implications for Health Policy and Programs (Sex Now surveys from 2002 to 2014/15)**

RESEARCH TEAM MEMBER: Co-Investigators: Terry Trussler; Mark Gilbert; Travis Salway; Jody Jollimore; David Ham; Patrick Loftus; Brent Oliver;Brian Hansen; Floyd Visser; David Brennan; Daniel Grace; Joanne Otis; Bertrand Lebouche; Matthew Numer; Peter Saxton. Collaborators: Marc Germain; Sheila O'Brien; Dana Paquette; Pam Krause; Leslie Hill; Logan Chinsky; Michael Taylor; Jonathan Niemczak; Bryan Magwood; Roberto Ortiz Nunez; Frederick Provonost; Chris Aucoin; Kolten MacDonell; Eugene Nam; Rod Knight; Jeffery Morgan. Student: Aidan Ablona; Cait Hickman, Justin Sorge; Staff: Rob Higgins; Ben Klassen; Postdoctoral fellow: Kiffer Card. Research Assistant: Len Tooley

DECLARED PROJECT FUNDING: **Canadian Blood Services; CIHR Planning and Dissemination Grant 2018**

ADDITIONAL COMMENTS: Previous Title: 'Life Course and Gay Men's Health: Implications for Health Policy and Programs (Sex Now survey 2014/15)'

CONDITIONS OF APPROVAL

This Certificate of Approval is valid for the above term provided there is no change in the protocol.

Modifications
To make any changes to the approved research procedures in your study, please submit a "Request for Modification" form. You must receive ethics approval before proceeding with your modified protocol.

Renewals
Your ethics approval must be current for the period during which you are recruiting participants or collecting data. To renew your protocol, please submit a "Request for Renewal" form before the expiry date on your certificate. You will be sent an emailed reminder prompting you to renew your protocol about six weeks before your expiry date.

Project Closures
When you have completed all data collection activities and will have no further contact with participants, please notify the Human Research Ethics Board by submitting a "Notice of Project Completion" form.

Certification

This certifies that the UVic Human Research Ethics Board has examined this research protocol and concluded that, in all respects, the proposed research meets the appropriate standards of ethics as outlined by the University of Victoria Research Regulations Involving Human Participants.

[redacted]

Dr. Rachael Scarth
Associate Vice-President Research Operations

Certificate Issued On: 03-Oct-19

17-403 Lachowsky, Nathan