

Sexual Orientation Differences in Health and Wellbeing Among Women Living with HIV in Canada: Findings from a National Cohort Study

Carmen H. Logie^{1,2}  · Ashley Lacombe-Duncan¹ · Ying Wang¹ · Angela Kaida³ · Alexandra de Pokomandy^{4,5} · Kath Webster³ · Tracey Conway² · Mona Loutfy^{2,6,7}

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Abstract Sexual orientation differences in health and wellbeing among women living with HIV (WLH) are underexplored. Limited research available, however, suggests that sexual minority WLH may experience barriers to HIV care. Cross-sectional baseline data was analyzed from a Canadian cohort study with WLH (sexual minority women [SMW]: n = 180; heterosexual women: n = 1240). SMW (median age 38 years, IQR 13) included bisexual (58.9%), lesbian (17.8%) and other sexualities (23.3%). In multivariable analyses adjusting for age, poverty, education, and ethnicity, SMW identity was associated with increased odds of: *clinical* (80% vs. 100% antiretroviral adherence), *intrapersonal* (previous/current injection drug use [IDU] vs. no IDU history, depression, lower resilience), *interpersonal* (childhood abuse, sex work, adulthood abuse), and *structural* (HIV support services barriers, unstable housing, racial discrimination,

gender discrimination) factors in comparison with heterosexual identity. Sexual minority WLH experience social and health disparities relative to heterosexual WLH, highlighting the need for interventions to promote health equity.

Keywords HIV · Women · Lesbian · Bisexual · Health status disparities

Introduction

Women account for over one-fifth of the 75,500 people living with HIV in Canada [1]. Studies suggest that women with HIV may experience barriers to accessing HIV care across the care cascade—the series of steps from HIV diagnosis through to viral suppression [2, 3]. Steps include HIV diagnosis, linkage to care, retention in care, and prescription of antiretroviral treatment, with the final desired outcome of viral suppression [2, 3]. These barriers may be situated at multiple levels, including individual level barriers such as sociodemographic factors (e.g. younger age [4]), clinical factors (e.g. immunosuppression [5]), and intrapersonal factors (e.g. injection drug use [6]). Social environmental level barriers include interpersonal factors, such as a lack of social support [7]. Structural level barriers comprise intersecting stigma and discrimination (e.g. HIV-related stigma, racism) [8] and housing instability [9]. Conversely, women's resilience facilitates access to, and uptake of, HIV care [10].

Sexual minority women, including lesbian, gay, bisexual, queer, two-spirit women and other women who have sex with women, are underrepresented in research with women with HIV [11–13]. The pervasive belief that sexual minority women are at low risk for acquiring HIV has

✉ Carmen H. Logie
carmen.logie@utoronto.ca

¹ Factor-Inwentash Faculty of Social Work, University of Toronto, 246 Bloor Street West, Toronto, ON, USA

² Women's College Research Institute, Women's College Hospital, Toronto, ON, USA

³ Faculty of Health Sciences, Simon Fraser University, Vancouver, BC, USA

⁴ Department of Family Medicine, McGill University, Montreal, QC, USA

⁵ Chronic Viral Illness Service, McGill University Health Centre, Montreal, QC, USA

⁶ Dalla Lana School of Public Health, University of Toronto, Toronto, ON, USA

⁷ Department of Medicine, University of Toronto, Toronto, ON, USA

resulted in their needs being largely unaddressed in HIV research, prevention, treatment, and care [11, 13–16]. Gaps in knowledge exist regarding sexual minority women with HIV, including limited understanding of their experiences accessing HIV care across the HIV care cascade, and social and structural factors known to be associated with access to HIV care.

Sexual minority women are living with HIV worldwide [8, 10, 17]. Qualitative studies report that sexual minority women with HIV experience ongoing marginalization across HIV prevention (e.g., lack of prevention materials that address safer sex between women) [14, 17, 18], treatment and care (e.g., lack of tailored services and/or heteronormative approaches to service provision) [8, 12, 14, 18], and research (e.g., limited knowledge of health outcomes among sexual minority women with HIV) [12, 14]. These studies also highlight how marginalization based on intersecting social identities, for example HIV positive serostatus, sexual orientation, ethno-racial identity, and socio-economic status, shape the everyday experiences of sexual minority women with HIV as well as limit healthcare access [12, 17]. For example, participants in a qualitative study with sexual minority women with HIV from the United States (US) ($n = 16$) described the need for secondary HIV prevention programs to address safer sex with male and female partners [17]. In a qualitative study [14] with sexual minority women with HIV from Canada ($n = 7$), participants described how intersecting stigma contributed to: social exclusion from family and friends, as well as the wider lesbian, bisexual and gay communities; increased exposure to violence; and barriers to accessing HIV care and support. Arend [12] similarly found that among 16 low-income HIV-positive sexual minority women of color, social support groups for sexual minority women were perceived to be stigmatizing towards people living with HIV, and groups for women with HIV were perceived as heteronormative.

Scant research has compared sexual orientation differences in health and wellbeing among women with HIV. From the broader literature on sexual orientation health disparities, it is widely established that sexual minority women experience poorer mental health (e.g., depression [19–22], substance use [19–21]) and sexual health (e.g., sexually transmitted infections [STIs] [23]) factors in comparison with heterosexual women. Depression [24] and substance use [6] are known barriers to accessing HIV care among women with HIV broadly, and the presence of other STIs increase vulnerability to HIV acquisition [25]. Understanding these disparities among sexual minority women with HIV is therefore necessary to enhance their engagement in care, health and wellbeing. Sexual stigma is a social determinant of sexual minority women's health inequities, producing minority stress, limiting access to

affirmative health care [26, 27], reducing social support networks [28], and constraining employment and education opportunities, in turn contributing to lower socioeconomic status [29]. Poverty is a known barrier to HIV care among women with HIV [6]. A quantitative study that compared HIV-positive sexual minority women of color ($n = 95$) to HIV-positive heterosexual women of color ($n = 274$) reported higher lifetime rates of sexual and physical abuse among lesbian and bisexual women in comparison with heterosexual women, and reported no differences in depression [16]. Studies have shown that both current adulthood abuse [30] and a history of childhood abuse [31] can reduce access to care for women with HIV through contributing to increased depression and substance use.

Studies with sexual minority women who experience increased marginalization (e.g., sex workers, women who use drugs) report disparities between sexual minority women and heterosexual women [15, 32]. For example, a study with sex workers in Vancouver, Canada, reported that lesbian and bisexual women were overrepresented in sex work and experienced higher rates of injection drug use, incarceration, homelessness, and violence than heterosexual women [15]. Sex work influences access to HIV care for HIV-positive sex workers, who experience internalized sex work stigma as well as overt discrimination across health and social service settings [33, 34]. Studies in the US [35, 36] and Canada [32] have found that relative to heterosexual women who use drugs, sexual minority women who use drugs are more likely to be homeless [32, 35, 36], ever incarcerated [35, 36], involved in sex work [35, 36], and to have experienced sexual violence [32].

Differences in outcomes are also seen by sexual orientation identity category [37, 38]. For example, in the Canadian Community Health Survey, lesbian women reported lower access to primary healthcare compared to heterosexual women, as well as a lower likelihood of having had a Papanicolaou test compared to both bisexual or heterosexual women [37]. The odds of reporting poor or fair versus good mental health among bisexual women in the Canadian Community Health Survey sample was three times higher in comparison with heterosexual women [37]. A US population-based study found that while sexual minority people were more likely to report a number of adverse experiences (activity limitation, smoking, substance use, asthma, lifetime sexual victimization) compared to heterosexual people, some issues were more prevalent among bisexual women, such as binge drinking and physical intimate partner violence [38]. Differences among sexual minority women with HIV are underexplored, and are needed to develop targeted and precise interventions.

Social ecological factors (e.g., mental health, substance use, stigma and discrimination, and housing insecurity) present barriers to care among women with HIV generally.

As sexual minority women experience social and health disparities, there is a need to examine health and wellbeing among sexual minority women with HIV. The primary study objective was to explore differences in *clinical* (e.g., CD4 count, medication adherence), *intrapersonal* (e.g., depression, injection drug use), *interpersonal* (e.g., sex work, experiences of abuse), and *structural* (e.g., HIV-related stigma, unstable housing) factors between sexual minority women with HIV and heterosexual women with HIV participating in a large, national community-based study. Our secondary objective was to examine differences in these clinical, intrapersonal, interpersonal, and structural factors among sexual minority women (lesbian, bisexual, and women with other sexual minority identities). Specific research questions included: Are there statistically significant differences between sexual minority and heterosexual women with HIV across clinical, intrapersonal, interpersonal, and structural factors? Are there statistically significant differences between lesbian, bisexual, and women with other sexual minority identities across clinical, intrapersonal, and structural factors? We hypothesized that relative to heterosexual women with HIV, sexual minority women with HIV would experience poorer health and wellbeing (e.g., lower CD4 count, poorer medication adherence, higher HIV stigma). Furthermore, we hypothesized that relative to lesbian women with HIV, bisexual women with HIV would experience poorer health and wellbeing (e.g., lower medication adherence, higher depression).

Methods

Data Source and Analyses Inclusion Criteria

Data were derived from a cross-sectional survey with 1420 women with HIV ($n = 180$ sexual minority; $n = 1240$ heterosexual) who completed a baseline visit between August 2013 and May 2015 for the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS), a large, national, community-based research (CBR) study in British Columbia, Ontario, and Quebec, Canada. CHIWOS focuses on healthcare utilization, healthcare access, and health outcomes among women with HIV in Canada. A description of the cohort and CBR approach of CHIWOS have been detailed elsewhere [39, 40].

Peer research associates—women with HIV trained and supported as researchers—helped to recruit self-identified women with HIV aged 16 years or older using non-random sampling methods such as word-of-mouth through peer research associate networks and online through Listservs for women with HIV and the study website, Facebook

page, and Twitter. Peer research associates also engaged in venue-based sampling, recruiting participants from AIDS service organizations, HIV health clinics, and community-based organizations serving women with HIV, particularly serving those populations who are over represented in the Canadian HIV epidemic (e.g., women who use drugs) [39, 40].

Peer research associates administered a structured questionnaire using a tablet or computer (median completion time: 89 min [IQR 71, 115]) to participants in a setting of the participant's choice. Some participants in rural or remote areas chose to complete the survey administered by the peer research associate via phone or Skype [39, 40]. Participants received a \$50 honorarium for their participation. Ethics approval was obtained from research ethics boards at Women's College Hospital, University of Toronto (Ontario), Simon Fraser University and the University of British Columbia/Providence Health (British Columbia), and McGill University Health Centre (Quebec). Study sites with independent Research Ethics Boards obtained their own approval prior to commencing enrolment.

Measures

Self-identified sexual orientation was assessed by the question: "With respect to your sexual orientation, how do you currently identify?" Available response options included: (a) Heterosexual/Straight; (b) Lesbian; (c) Gay; (d) Queer; (e) Bisexual; (f) Two-spirited; (g) Questioning and (h) Other (please specify). With an affirmative response to (a) Heterosexual/Straight, participants were coded as heterosexual and the remaining as sexual minority.

Several socio-demographic covariates were considered in this study, including *age*, *gender identity* (cisgender, transgender, other gender), *legal relationship status* (married/common law, single, separated/divorced/widowed, other), *immigration status* (Canadian citizen, landed immigrant/permanent resident, refugee, other), *ethnicity* (Indigenous, Black, Caucasian and other), *education* (less than high school vs. high school or higher), *number of financial dependents*, *poverty* (<\$20,000 CAD annual household income which reflects an income lower than Canada's 2015 low income cut-off for a single person of \$23,861 [41] vs. >\$20,000 annual household income), *province of residence* (British Columbia, Ontario, Quebec) and *years since HIV diagnosis* (<6, 6–14, >14 years).

Clinical factors included CD4 count, viral load, and antiretroviral adherence. *CD4 count* was assessed categorically: "What was your lowest CD4 count? (a) less than 200 cells/mm³; (b) 200–500 cells/mm³; (c) more than 500 cells/mm³; and (d) don't know or prefer not to

answer.” *Viral load* was based on self-reported most recent viral load (undetectable [<50 copies/mL] or detectable [≥ 50 copies/mL]) [42]. *Antiretroviral adherence* was categorized by asking participants to provide their best estimate about how much medication they took in the past month: (a) 100% adherence; (b) 80% or greater-99% adherence; (c) $<80\%$ adherence [43].

Intrapersonal factors included depression, injection drug use, and resilience. *Depression* was assessed using the Center for Epidemiologic Studies Depression 10-item Scale [44, 45] (e.g., ‘In the past week, I was bothered by things that usually don’t bother me’, score range 0–30; Cronbach $\alpha = 0.87$). *History of injection drug use* was derived with two questions: “In your lifetime, have you ever used injection drugs?” Persons who responded “Yes” were asked the question: “Over the last three months, have you used injection drugs?” Participants who responded “No” to the first question were coded as never injection drug use, those who responded “Yes” to the first question but “No” to the second question were coded as previous injection drug use, participants who responded “Yes” to both questions were coded as current injection drug use. *Resilience*, including personal competence and self-acceptance, was assessed using the Resiliency Scale (e.g., ‘I usually manage one way or another’, score range 10–17; Cronbach $\alpha = 0.91$) [46].

Interpersonal factors included sex work, childhood abuse history, and history of adult abuse. *Sex work involvement* was assessed by asking if participants had ever been provided with any of the following in exchange for sex: money; drugs; shelter; food; gifts; clothes; services; others. An affirmative response to any was coded as sex work involvement. *History of childhood abuse* was measured dichotomously by asking: “During your childhood, did an adult ever: physically hurt you, insult, threaten or verbally degrade you, and/or sexually force themselves on you or force you to have sex?” *History of adult abuse* was also measured dichotomously by asking: “As an adult, has someone ever: physically hurt you, insult, threaten or verbally degrade you, and/or sexually force themselves on you or force you to have sex?” *Current adult abuse* was assessed by: “Has this violence (physically hurt you, insult, threaten or verbally degrade you, and/or sexually force themselves on you or force you to have sex) happened in the last 3 months?”

Structural factors included HIV-related stigma, racial discrimination, gender discrimination, unstable housing, food insecurity, barriers to HIV medical care, and barriers to HIV support services. *HIV-related stigma* was measured with Wright’s shortened 10 item version of Berger’s HIV Stigma Scale (e.g., ‘I have lost friends by telling them I have HIV’, score range 0–100; Cronbach $\alpha = 0.85$) [47]. *Racial discrimination* was assessed with the Everyday

Discrimination Scale-Racism (e.g., ‘In your day-to-day life, how often have any of the following things happened to you because of your race: e.g. You are treated with less courtesy’, score range 8–48; Cronbach $\alpha = 0.96$) [48]. *Gender discrimination* was measured by Everyday Discrimination Scale-Sexism (e.g., ‘In your day-to-day life, how often have any of the following things happened to you because you are a woman [for cisgender women] or because of your gender [for trans-identified persons]: e.g. You receive poorer service’, score range 8–48; Cronbach $\alpha = 0.94$) [48]. *Housing status* was assessed with the item: “Which of the following best describes the residence in which you currently live?” *Unstable housing* was coded to include participants who lived in: a self-contained room, transition house, halfway house, safe house, couch surfing, outdoors on street, parks, or in a car. Stable housing was coded as including participants who lived in apartment (own/rent) or a house (own/rent). *Food insecurity* was derived from three statements focused on experiences in the past 12 months: fears of running out of food; experiences with running out of food; and inability to eat balanced meals (score range 0–6), adapted from established measures of food insecurity used in population-based Canadian surveys [49]. Scores of 0–1 were coded as secure and 2–6 were coded as insecure. *HIV medical care barriers* were identified by asking if participants had received HIV medical care in the past year (if no, participants were coded as experiencing barriers). *Barriers to HIV support services* were identified with the item: “Have you ever tried to access HIV support services and been unable to?”

Analyses

We first conducted descriptive analyses of all variables, followed by bivariate analyses (*T* test and χ^2) to determine differences between heterosexual and sexual minority women with HIV ($n = 1240$). Modeling approaches used by recent studies with sexual minority women [15, 32], we then conducted univariate and multivariable logistic regression analyses to determine the appropriate estimates of the adjusted odds ratios for sexual minority identity status, controlling for covariates that were significant from bivariate analysis (age, poverty level, education level, and ethnicity). Although significant in bivariate analyses, sociodemographic variables that did not have an adequate sample size per cell (gender identity) or that posed an issue of multicollinearity (number of financial dependents and poverty) were not controlled for.

The dependent variable was sexual minority identity status (sexual minority = 1, heterosexual = 0). Independent variables included clinical factors, intrapersonal factors, interpersonal factors, and structural factors identified in the previous section. Each factor was tested in a separate

individual model, controlling for the covariates identified in the bivariate analyses. We conducted descriptive analyses of all variables, followed by variable analyses (ANOVA, and χ^2) to determine differences within sexual minority women by sexual orientation category ($n = 180$). Unadjusted and adjusted multinomial logistic regression analyses were used to determine the relative odds for sexual minority identity category, controlling for socio-demographic factors (age, poverty level, education level, and ethnicity). Dependent variables were sexual orientation identity category (Lesbian = 0, Bisexual = 1, and Other sexual orientation [gay, queer, two-spirit, questioning or other] = 2) with lesbian as the reference group. Independent variables included clinical factors, intrapersonal factors, interpersonal factors, and structural factors identified in the previous section.

For both sets of analysis, statistical significance was set at the $p < 0.05$ level. Missing responses were excluded from the analyses. Robustness analysis (results not shown) were conducted to confirm the statistical rationale for final models [50]. All statistical analyses were performed using STATA (version 12.0).

Results

Participant Characteristics

Table 1 reports sociodemographic characteristics for heterosexual women ($n = 1240$) and sexual minority women ($n = 180$). Of the total sample, ($n = 1425$), five participants responded don't know or prefer not to answer in response to the question regarding sexual orientation and were excluded from analysis. Among all participants, most participants identified as cisgender women, were Canadian citizens, and had been living with HIV for 6 or more years. Among sexual minority women, the majority identified as bisexual (58.9%), followed by gay, queer, two-spirit, questioning, or other sexual orientations (23.3%), and lesbian (17.8%). Sexual minority women were younger (median age 38 compared to 43 for heterosexual women; $p < 0.001$). While the highest proportion of ethnicity category was Caucasian for both heterosexual and sexual minority women with HIV (40.4% and 46.1%, respectively), among heterosexual women, Black was reported second most frequently (31.9%), and among sexual minority women, Indigenous was the second most frequently reported ethnicity (35.6%). A significantly smaller proportion of sexual minority women (21.2%) completed less than high school compared to heterosexual women (15.2%, $p < 0.05$) and a higher proportion of sexual minority women (73.5%) compared to heterosexual women

(64.3%, $p < 0.05$) reported an annual household income of less than \$20,000.

Differences Between Sexual Minority Women and Heterosexual Women

As displayed in Table 1, in addition to sociodemographic differences, bivariate analyses also indicate that *clinical* (detectable viral load, medication adherence), *intrapersonal* (depression, history of injection drug use, resilience), *interpersonal* (sex work, childhood abuse) and *structural* (HIV-related stigma, racial discrimination, gender discrimination, unstable housing, food insecurity, HIV medical care barriers, HIV support services barriers) factors were significantly different between sexual minority and heterosexual women with HIV in Canada.

In univariate logistic regression analyses (Table 2), sexual minority women were more likely to report *socio-demographic* characteristics including younger age, household annual income less than \$20,000 CAD, less than high school education, Aboriginal or Black ethnicity compared to Caucasian ethnicity, than heterosexual women. Sexual minority women with HIV were more likely to report *clinical* (detectable viral load vs. undetectable, 80–99% adherence and <80% adherence compared to 100% adherence), *intrapersonal* (depression, current and previous injection drug use compared to never injection drug use, lower resilience), *interpersonal* (sex work, childhood abuse, current adult abuse) and *structural* (HIV-related stigma, racial discrimination, gender discrimination, unstable housing, food insecurity, barriers to HIV medical care, HIV support services barriers) factors in comparison with heterosexual women with HIV.

Multivariate logistic regression analyses controlling for age, poverty, education, and ethnicity (Table 2) revealed that compared to heterosexual women with HIV, sexual minority women with HIV were significantly more likely to report *clinical* (80% medication adherence vs. 100% medication adherence [AOR 2.57, 95% CI 1.45–4.56]), *intrapersonal* (depression [AOR 1.06, 95% CI 1.03–1.08]), previous injection drug use [AOR 2.35, 95% CI 1.51–43.65] and current injection drug use [AOR 4.54, 95% CI 2.70–7.61] compared to never injection drug use, lower resilience [AOR 0.96, 95% CI 0.95–0.98]), *interpersonal* (sex work [AOR 2.87, 95% CI 1.71–4.81], childhood abuse [AOR 2.93, 95% CI 1.83–4.70], current adult abuse [AOR 1.88, 95% CI 1.30–2.70]), and *structural* (racial discrimination [AOR 1.03, 95% CI 1.02–1.05], gender discrimination [AOR 1.04, 95% CI 1.02–1.06], unstable housing [AOR 1.72, 95% CI 1.11–2.69], barriers to HIV support services [AOR 1.76, 95% CI 1.15–2.69]) factors.

Table 1 Participant characteristics of heterosexual (n = 1240) and sexual minority (n = 180) women with HIV in Canada, August 2013–May 2015

Characteristic	Sexual minority women Median (IQR) or No. (%)	Total (n = 180)	Heterosexual women Median (IQR) or No. (%)	Total (n = 1240)	<i>p</i>
Socio-demographic factors					
Age	38.0 (33.0–46.0)	180	43.0 (51.0–36.0)	1240	<0.001
Gender identity		180		1240	<0.001
Cisgender women	147 (81.7)		1211 (97.7)		
Transgender women	24 (13.3)		29 (2.3)		
Other gender identified woman	9 (5.0)		0 (0.0)		
Legal relationship status		180		1338	<0.001
Married/common law	53 (29.44)		403 (32.6)		
Single	110 (61.11)		574 (46.6)		
Separated/divorced/widowed	17 (9.44)		255 (20.6)		
Other	0		6 (0.48)		
Immigration status		178		1237	<0.001
Canadian Citizen	165 (92.7)		986 (79.7)		
Landed immigrant/permanent resident	6 (3.4)		162 (13.1)		
Refugee	4 (2.3)		59 (4.8)		
Other	3 (1.7)		30 (2.4)		
Ethnicity		180		1240	<0.001
Indigenous	64 (35.6)		252 (20.3)		
ACB Black	21 (11.7)		395 (31.9)		
White	83 (46.1)		501 (40.4)		
Other ethnicity	12 (6.7)		92 (7.4)		
Education-lower than high school	38 (21.23)	179	188 (15.2)	1234	0.04
Financial dependents	0.0 (1.0)	179	0.0 (2.0)	1236	<0.001
Poverty <20 k household income	130 (73.5)	177	772 (64.3)	1201	0.02
Province		180		1240	0.001
BC	61 (33.9)		294 (23.7)		
Ontario	92 (51.1)		617 (49.8)		
Quebec	27 (15.0)		329 (26.5)		
Year of HIV diagnosis		176		1196	0.62
<6 years	48 (27.3)		297 (24.8)		
6–14 years	65 (36.9)		486 (40.6)		
>14 years	63 (35.8)		413 (34.5)		
Sexual orientation		180		1240	
Heterosexual/straight			1240 (100)		
Lesbian	32 (17.8)				
Bisexual	106 (58.9)				
Gay, queer, two spirit, questioning, or other sexual orientation	42 (23.3)				
Clinical factors					
CD4 count		140		1020	0.68
<200 cells/mm ³	11 (7.9)		65 (6.4)		
200–500 cells/mm ³	49 (35.0)		338 (33.1)		
>500 cells/mm ³	80 (57.1)		617 (60.5)		
Detectable viral load	39 (24.4)	160	164 (14.4)	1140	0.001
Medication adherence		132		1041	0.001

Table 1 continued

Characteristic	Sexual minority women Median (IQR) or No. (%)	Total (n = 180)	Heterosexual women Median (IQR) or No. (%)	Total (n = 1240)	<i>p</i>
100% adherence	48 (36.4)		505 (48.5)		
80–99% adherence	60 (45.5)		444 (42.7)		
<80% adherence	24 (18.2)		92 (8.8)		
Intrapersonal factors					
Depression score	12.5 (SD = 8.1)	177	9.7 (7.4)	1188	<0.001
History of injection drug use (IDU)		175		1219	<0.001
Never IDU	77 (44.0)		879 (72.1)		
Not currently, but previously IDU	57 (32.6)		258 (21.2)		
Currently IDU	41 (23.4)		82 (6.7)		
Resiliency	60 (10)	179	65 (10)	1232	<0.001
Interpersonal factors					
Transactional sex	53 (59.6)	89	167 (30.5)	548	<0.001
History of childhood abuse	144 (85.2)	169	751 (66.2)	1135	<0.001
History of adult abuse	143 (84.1)	170	912 (79.8)	1143	0.19
Current adult abuse	59 (34.7)	170	224 (19.6)	1143	<0.001
Structural factors					
HIV stigma	60 (75–47.5)	178	57.5 (70–42.5)	1221	0.03
Racial discrimination	22 (32–8)	179	16 (27–8)	1276	<0.001
Gender discrimination	24 (31–16)	179	16 (27–9)	1216	<0.001
Unstable housing	35 (19.4)	180	116 (9.4)	1240	<0.001
Food insecurity	129 (72.1)	179	777 (63.0)	1234	0.02
Barriers to HIV medical care	19 (10.6)	180	74 (6.0)	1220	0.02
Barriers to HIV support services	36 (20.5)	176	160 (13.1)	1226	0.01

IQR interquartile range, *BC* British Columbia, *IDU* injection drug use

Differences in Factors by Sexual Orientation Category

In bivariate analyses (Table 3), factors that differed significantly between sexual orientation groups included: gender identity, legal relationship status, immigration status, ethnicity, sex work, and barriers to HIV medical care. Unadjusted and adjusted multinomial logistic regression analyses were conducted to assess clinical, intrapersonal, interpersonal, and structural differences in factors between bisexual and other sexual orientations (including gay, queer, two-spirit, questioning, or other) relative to lesbian women (Table 4). In univariate logistic regression analysis, women who were bisexual and other sexual orientations were more likely to report sex work than lesbian women, and bisexual women were less likely to report HIV medical care barriers in comparison with lesbian women.

In multinomial logistic regression analyses controlling for age, poverty, education, and ethnicity (Table 4), bisexual women had over 8 times the odds (OR 8.36, 95%

CI 1.88–37.21), and women of other sexual orientations over 6 times the odds (OR: 6.37, 95% CI 1.17–34.76), of sex work involvement relative to lesbian women. Bisexual women were 8 times more likely (OR 8.23, 95% CI 2.49–27.18), and women of other sexual orientations 7 times more likely (OR 7.43, 95% CI 1.58–34.97), to report a history of adult abuse compared to lesbian women. Bisexual women were also significantly less likely to report barriers to HIV medical care relative to lesbian women (OR 0.20, 95% CI 0.05–0.79).

Discussion

Our study is among the first quantitative studies to highlight important health outcome differences between women with HIV of different sexual orientations. We found that almost 14% of our sample identified as sexual minorities. In contrast, only 3% of the population aged 18–59 reported themselves to be gay or lesbian (1.7%), or bisexual (1.3%),

Table 2 Unadjusted and adjusted multivariate logistic regression analyses of clinical, intrapersonal, interpersonal and structural factors associated with sexual minority identity (n = 180) compared to heterosexual identity (n = 1240) among women with HIV in Canada, August 2013–May 2015

Variables	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Sociodemographic		
Age	0.96 (0.95–0.98)***	
Poverty (<20 k)	1.54 (1.08–2.19)*	
Less than high school	1.50 (1.01–2.22)*	
Ethnicity		
Caucasian (ref)	1	
Aboriginal	1.53 (1.07–2.20)*	
Black	0.32 (0.20–0.53)***	
Other	0.79 (0.41–1.50)	
Clinical		
CD4 count		
<200 cells/mm ³ (ref)	1	1
200–500 cells/mm ³	0.86 (0.42–1.74)	0.99 (0.48–2.06)
>500 cells/mm ³	0.77 (0.39–1.51)	0.92 (0.45–1.86)
Detectable viral load	1.92 (1.29–2.85)***	1.10 (0.72–1.69)
Medication adherence		
100% adherence (ref)	1	1
80–99% adherence	1.42 (0.95–2.12)	1.30 (0.85–1.97)
<80% adherence	2.74 (1.60–4.70)***	2.57 (1.45–4.56)**
Intrapersonal		
Depression	1.05 (1.03–1.07)***	1.06 (1.03–1.08) ***
Injection drug use		
Never IDU (ref)	1	1
Not currently, but previously IDU	2.52 (1.74–3.65)***	2.35 (1.51–3.65)***
Currently IDU	5.71 (3.67–8.87)***	4.54 (2.70–7.61)***
Resilience	0.96 (0.94–0.97)***	0.96 (0.95–0.98)***
Interpersonal		
Transactional sex	3.36 (2.12–5.32)***	2.87 (1.71–4.81)***
History of childhood abuse	2.95 (1.89–4.58)***	2.93 (1.83–4.70)***
Current adult abuse	2.18 (1.54–3.09)***	1.88 (1.30–2.70)**
Structural		
HIV stigma	1.01 (1.00–1.02)*	1.01 (0.99–1.01)
Racial discrimination	1.03 (1.01–1.04)***	1.03 (1.02–1.05)***
Gender discrimination	1.04 (1.03–1.06)***	1.04 (1.02–1.06)***
Unstable housing	2.34 (1.54–3.54)***	1.72 (1.11–2.69)*
Food insecurity	1.52 (1.07–2.15)*	1.45 (0.97–2.15)
Barriers to HIV medical care	1.85 (1.09–3.15)*	1.43 (0.81–2.52)
Barriers to HIV support services	1.71 (1.15–2.56)*	1.76 (1.15–2.69)*

Adjusted for age, poverty, education, and ethnicity

CI Confidence interval, IDU injection drug use

* p < 0.05, ** p < 0.01, *** p < 0.001

in the Canadian Community Health Survey [51], a nationally-representative sample of Canadians. This suggests that sexual minority women may be overrepresented in the HIV epidemic among Canadian women; it also underscores the importance of allowing women to define other sexual orientations beyond lesbian and bisexual. Our

findings corroborate the larger body of literature that demonstrates disparities among sexual minority women relative to heterosexual women with regards to mental health outcomes [19–22], including substance use [19–21], sex work involvement [15, 35, 36], economic insecurity [29], and poor access to care [52]. We extend this literature

Table 3 Sexual orientation differences in socio-demographic, clinical, intrapersonal, interpersonal, and structural factors among women with HIV (n = 180) in Canada, August 2013–May 2015

Characteristic	Lesbian (n = 32) Median (IQR) or No. (%)	Bisexual (n = 106) Median (IQR) or No. (%)	Other sexual orientation (n = 42) Median (IQR) or No. (%)	<i>p</i> *
Socio-demographic factors				
Age	37.5 (33.5–46.5)	37.5 (45–33)	39 (48–34)	0.42
Gender identity				
Cisgender women	27 (84.4)	96 (90.6)	24 (57.1)	<0.001
Transgender women	4 (12.5)	5 (4.7)	15 (35.7)	
Other gender identified woman	1 (3.1)	5 (4.7)	3 (7.1)	
Legal relationship status				
Married/common law	13 (40.6)	35 (33.0)	5 (11.9)	0.05
Single	17 (53.1)	60 (56.6)	33 (78.5)	
Separated/divorced/widowed	2 (6.2)	11 (10.4)	4 (9.5)	
Immigration status (other sexual orientation, n = 40)				
Canadian citizen	27 (84.4)	102 (96.2)	36 (90.0)	0.01
Landed immigrant/permanent resident	3 (9.4)	3 (2.8)	0 (0.0)	
Refugee	2 (6.3)	1 (0.9)	1 (2.5)	
Other	0 (0.0)	0 (0.0)	3 (7.5)	
Ethnicity				
Aboriginal	16 (50.0)	54 (50.9)	13 (31.0)	0.08
Black	7 (21.9)	39 (36.8)	18 (42.9)	
Caucasian	6 (18.8)	7 (6.6)	8 (19.1)	
Other	3 (9.4)	6 (5.7)	3 (7.1)	
Education-lower than high school	5 (15.6)	26 (24.8)	7 (16.7)	0.39
Financial dependents	0 (0–0)	0 (0–1)	0 (0–0)	0.82
Poverty < 20 k household income	20 (62.5)	75 (72.8)	35 (83.3)	0.13
Province				
BC	7 (21.9)	40 (37.7)	14 (33.3)	0.17
Ontario	22 (68.8)	47 (44.3)	23 (54.8)	
Quebec	3 (9.4)	19 (17.9)	5 (11.9)	
Year of HIV diagnosis (bisexual, n = 102)				
<6 years	7 (21.9)	30 (29.4)	11 (26.2)	0.69
6–14 years	11 (34.4)	40 (39.2)	14 (33.3)	
>14 years	14 (43.8)	32 (31.4)	17 (40.5)	
Clinical factors				
CD4 count (lesbian, n = 25; bisexual, n = 84, other sexual orientation n = 31)				
<200 cells/mm ³	2 (8.0)	8 (9.5)	1 (3.2)	0.50
200–500 cells/mm ³	10 (40.0)	25 (29.8)	14 (45.2)	
>500 cells/mm ³	13 (52.0)	51 (60.7)	16 (51.6)	
Detectable viral load	3 (10.3)	27 (28.4)	9 (25.0)	0.14
Medication adherence (lesbian, n = 22; bisexual, n = 85)				
100% adherence	6 (27.3)	35 (41.2)	7 (28.0)	0.36
80–99% adherence	13 (59.1)	33 (38.8)	14 (56.0)	
<80% adherence	3 (13.6)	17 (20.0)	4 (16.0)	
Intrapersonal factors				
Depression score	9 (4–16)	12 (6–19)	12.5 (8–17)	0.41
History of injection drug use (IDU) (bisexual, n = 104)				
Never IDU	17 (53.1)	40 (38.5)	20 (51.3)	0.28

Table 3 continued

Characteristic	Lesbian (n = 32) Median (IQR) or No. (%)	Bisexual (n = 106) Median (IQR) or No. (%)	Other sexual orientation (n = 42) Median (IQR) or No. (%)	<i>p</i> *
Not currently, but previously IDU	10 (31.3)	34 (32.7)	13 (33.3)	
Currently IDU	5 (15.6)	30 (28.9)	6 (15.4)	
Resiliency (other sexual orientation, n = 41)	61 (64.5–58)	60 (65–53)	63 (66–58)	0.34
Interpersonal factors				
Transactional sex (lesbian, n = 14, bisexual, n = 57, other sexual orientation, n = 18)	3 (21.4)	39 (68.4)	11 (61.1)	0.01
History of childhood abuse (lesbian, n = 30; bisexual, n = 100; other sexual orientation, n = 39)	25 (83.3)	84 (84.0)	35 (89.7)	0.66
History of adult abuse	18 (60.0), n = 30	89 (88.1), n = 101	36 (92.31), n = 39	<0.001
Current adult abuse	11 (36.67), n = 30	39 (38.61), n = 101	9 (23.08), n = 39	0.22
Structural factors				
HIV stigma (lesbian, n = 31; bisexual, n = 105)	62.5 (52.5–72.5)	60 (45–75)	60 (50–80)	0.44
Racial discrimination (lesbian, n = 31)	23 (8–32)	20.5 (8–32)	24 (16–32)	0.51
Gender discrimination (bisexual, n = 105)	23.5 (11.5–32)	24 (15–29)	26 (18–32)	0.25
Unstable housing	8 (25.0)	17 (16.0)	10 (23.8)	0.38
Food insecurity (lesbian, n = 31)	19 (61.3)	76 (71.7)	34 (81.0)	0.18
Barriers to HIV medical care	6 (18.8)	5 (4.7)	8 (19.1)	0.01
Barriers to HIV support services (lesbian, n = 31; bisexual, n = 104; other sexual orientation, n = 41)	3 (9.7)	28 (26.9)	5 (12.2)	0.04

p value based on ANOVA for continuous variables or χ^2 for categorical variables

The sample size for each variable is lesbian (n = 32), bisexual (n = 106) and other sexual orientation (n = 42) unless otherwise specified

to document that these disparities also exist among sexual minority women with HIV.

We found that sexual minority women with HIV reported lower antiretroviral adherence. Lower adherence may be associated with the multiple challenges reported by sexual minority women with HIV in this study, including injection drug use, and food and housing insecurity. Interventions that address upstream determinants of health for sexual minority persons, such as human rights protections that ensure equal opportunity to employment and income and combat stigma, can address healthcare access disparities. Future studies may aim to further explore barriers and facilitators to antiretroviral adherence specifically among sexual minority women living with HIV.

Sexual minority women with HIV in our study reported poorer intrapersonal factors than their heterosexual counterparts. Corroborating other research with women with HIV, we found higher rates of depression among sexual minority women compared to heterosexual women [22]. Minority stress theory suggests that stigma and discrimination related to one's sexual orientation contributes to poorer physical health and mental wellbeing among sexual minority people [53, 54]. Future studies may explore how

sexual stigma may intersect with HIV stigma, gender discrimination, and racial discrimination to impact the health and wellbeing of sexual minority women with HIV. Both current and previous injection drug use was higher among sexual minority women. Prior research, including a large Australian study of 5378 women who inject drugs, reported that in comparison with heterosexual women, bisexual women had significantly greater odds of multiple injection drug risk practices including receptive sharing of drug preparation equipment [55]. Qualitative research [12] with low-income HIV-positive sexual minority women of color described sexual and HIV-related stigma in drug rehabilitation settings. Further research is necessary to understand HIV prevention and care needs of sexual minority women with HIV who inject drugs. Our finding of higher odds of childhood abuse histories among sexual minority women corroborates prior research with HIV-positive sexual minority women [16].

Sexual minority women had higher odds of sex work in comparison with heterosexual women with HIV in our study. Among sexual minority women, bisexual women and women of other sexual minority orientations were more likely than lesbian women to report involvement in

Table 4 Unadjusted and adjusted multinomial logistic regression analyses of clinical, intrapersonal, interpersonal, and structural factors by sexual minority identity (n = 180) among women with HIV in Canada, August 2013–May 2015

Variables	Unadjusted odds ratio (95% CI)		Adjusted odds ratio (95% CI)	
	Bisexual	Other sexual orientation	Bisexual	Other sexual orientation
Sociodemographic				
Age	0.99 (0.96–1.04)	1.02 (0.97–1.07)		
Poverty (<20 k)	1.61 (0.70–3.71)	2.99 (1.02–8.85)*		
Less than high school	1.78 (0.62–5.09)	1.08 (0.31–3.78)		
Ethnicity				
Caucasian (ref)	1	1		
Aboriginal	1.65 (0.62–4.39)	3.16 (1.01–9.89)*		
Black	0.35 (0.10–1.18)	1.64 (0.45–5.94)		
Other	0.59 (0.13–2.64)	1.23 (0.21–7.15)		
Clinical				
CD4 count				
<200 cells/mm ³ (ref)	1	1	1	
200–500 cells/mm ³	0.63 (0.11–3.47)	2.80 (0.22–35.29)	0.78 (0.13–4.81)	3.47 (0.25–47.24)
>500 cells/mm ³	0.98 (0.19–5.18)	2.46 (0.20–30.28)	1.36 (0.23–7.94)	3.93 (0.30–52.22)
Detectable viral load	3.44 (0.96–12.32)	2.89 (0.70–11.87)	3.18 (0.85–11.85)	3.94 (0.90–17.20)
Medication adherence				
100% adherence (ref)	1	1	1	1
80–99% adherence	0.44 (0.15–1.28)	0.92 (0.25–3.48)	0.49 (0.16–1.54)	1.13 (0.27–4.70)
<80% adherence	0.97 (0.22–4.36)	1.14 (0.18–7.28)	1.33 (0.27–6.49)	1.56 (0.22–11.20)
Intrapersonal				
Depression	1.04 (0.98–1.09)	1.03 (0.98–1.10)	1.03 (0.98–1.09)	1.02 (0.96–1.09)
Injection drug use				
Never IDU (ref)	1	1	1	1
Not currently, but previously IDU	1.45 (0.58–3.57)	1.11 (0.39–3.15)	1.00 (0.36–2.80)	0.90 (0.27–3.03)
Currently IDU	2.55 (0.85–7.69)	1.02 (0.26–3.94)	1.71 (0.48–6.05)	0.56 (0.12–2.56)
Resilience	0.98 (0.94–1.02)	1.01 (0.95–1.06)	0.98 (0.94–1.03)	1.02 (0.96–1.08)
Interpersonal				
Transactional sex	7.94 (1.97–32.01)**	5.76 (1.18–28.25)*	8.36 (1.88–37.21)**	6.37 (1.17–34.76)*
History of childhood abuse	1.05 (0.35–3.15)	1.75 (0.43–7.18)	1.17 (0.36–3.78)	1.58 (0.36–6.86)
History of adult abuse	4.94 (1.92–12.75)**	8.00 (2.00–31.99)**	8.23 (2.49–27.18)**	7.43 (1.58–34.97)*
Structural				
HIV stigma	1.00 (0.98–1.02)	1.01 (0.99–1.04)	0.99 (0.98–1.02)	1.01 (0.98–1.03)
Racial discrimination	1.00 (0.97–1.04)	1.02 (0.98–1.06)	1.00 (0.96–1.04)	0.99 (0.95–1.05)
Gender discrimination	1.01 (0.97–1.05)	1.03 (0.99–1.08)	0.99 (0.95–1.04)	1.02 (0.97–1.07)
Unstable housing	0.57 (0.22–1.49)	0.94 (0.32–2.73)	0.57 (0.21–1.56)	0.80 (0.26–2.46)
Food insecurity	1.60 (0.69–3.69)	2.68 (0.93–7.72)	1.59 (0.61–4.10)	1.96 (0.62–6.19)
Barriers to HIV medical care	0.21 (0.06–0.76)*	1.02 (0.31–3.30)	0.20 (0.05–0.79)*	1.22 (0.35–4.23)
Barriers to HIV support services	3.44 (0.97–12.21)	1.30 (0.29–5.89)	2.89 (0.78–10.68)	0.96 (0.20–4.58)

Adjusted for age, poverty, education, and ethnicity

Lesbian is the reference category. Other sexual orientation category includes women self-identified as gay, queer, two-spirit, questioning, or other sexual orientation

* p < 0.05, ** p < 0.01, *** p < 0.001

sex work. These findings are similar to an Australian study [55] that reported significantly greater odds of sex work among bisexual and lesbian women in comparison with

heterosexual women, as well as a study by Lyons and colleagues [15] who found that lesbian and bisexual women were overrepresented among sex workers in

Vancouver, Canada. Sex work involvement may be partially associated with the economic insecurity experienced by sexual minority women in our sample, which may be shaped by the convergence of multiple forms of stigma and discrimination.

We found sexual minority women had higher odds of experiencing racial and gender discrimination than heterosexual women with HIV, highlighting the importance of intersectional approaches to understanding stigma [12, 17]. Additionally, among sexual minority women, bisexual women had lower odds of reporting barriers to HIV medical care relative to lesbian women. These findings are congruent with qualitative studies documenting the marginalization of lesbians from HIV prevention, care, and support [14]. It could be that bisexual women with HIV may be positioned better to access services tailored for heterosexual women with HIV. Sexual orientation differences in outcomes have also been reported among sexual minority women in Canada; for example, in the Canadian Community Health Survey, lesbian women reported lower access to primary healthcare compared to heterosexual women, as well as a lower likelihood of having had a Papanicolaou test compared to bisexual or heterosexual women [52].

We did not find statistically significant differences between sexual minority and heterosexual women with HIV in CD4 count, detectable viral load, food insecurity, or barriers to HIV medical care in multivariate analyses. In some cases, the lack of significance may be due to uniformly low or high proportions between participants from either group, such as barriers to HIV medical care that were experienced by a minority of the sample (10.6 and 6.0% for sexual minority and heterosexual women with HIV, respectively), and high food insecurity across the sample (72.1 and 63.0% for sexual minority and heterosexual women with HIV, respectively). Alternately, these factors may no longer be significant when controlling for poverty. For example, a study of 878 people living with HIV followed between 1995 and 2005 indicated that socioeconomic status was associated with HIV-related health, including CD4 count [56]. While we found statistically significant differences between sexual minority and heterosexual women with HIV across most factors, we did not find statistically significant differences within sexual minority identity categories for most variables. It could be that given the small sample sizes of lesbian ($n = 32$) and other sexual minority identified women ($n = 42$) we were underpowered to detect differences, particularly across categorical variables with non-binary responses (e.g., CD4 count, medication adherence). Alternately, it is possible that sexual minority women with HIV, regardless of sexual orientation identity category, are uniformly disadvantaged as a group. However, the few associations we did find

suggest that bisexual women may have increased vulnerability to social and health disparities due to sex work involvement and elevated exposure to violence, and that lesbian women may have increased barriers to access to HIV medical care. Future quantitative studies with larger sample sizes or targeted, in-depth, qualitative studies could further explore sexual orientation differences among sexual minority women with HIV.

Our study has limitations. As we draw on baseline, cross-sectional data, causality cannot be inferred. The broader CHIWOS study used purposive, non-random sampling predominantly from AIDS service organizations and HIV clinics. This may have introduced recruitment bias whereby women recruited may experience higher access to care and less marginalization than other women with HIV, or may be particularly marginalized and seeking support. This non-random sampling limits generalizability of findings. All data collected were self-reported and subject to social desirability and recall bias. However, the involvement and leadership of peer research associates, who shared common experiences and identities to the participants, and the option to complete certain parts of the survey without the interviewer (i.e., violence) may have mitigated these issues [39]. There may have been greater potential for social desirability bias among the few participants who completed the survey by phone or Skype, who would not have had the option to complete sections of sensitive materials without the interviewer. While recall bias is a concern and the study lacked biological factors (e.g., chart data), preliminary validation of viral load self-report data for a portion of CHIWOS study participants revealed a high degree of validity of self-report [42]. The inclusion of a large number of variables and the use of multiple comparisons may have increased the susceptibility of our analysis to Type I error. However, this was mitigated by selection of variables for analyses based on theoretical rationale. We also conducted a robustness sensitivity analysis for factors associated sexual minority identity compared to heterosexual identity. Finally, the independent analysis of each factor (e.g., adherence) with covariates limits the conclusions that can be drawn from this study. Despite these limitations, our study is unique in identifying sexual orientation differences in a range of factors among women with HIV. The large sample size and multiple constructs permitted a thorough investigation of health and wellbeing among sexual minority women with HIV.

Conclusions

Sexual minority women with HIV experience social and health inequalities in comparison with heterosexual women with HIV. Given the higher odds of social and health

disparities among sexual minority women with HIV, future research and interventions tailored for this population are warranted. Work to improve the health and wellbeing of sexual minority women with HIV can be multi-level, addressing intrapersonal (e.g. depression, antiretroviral adherence), interpersonal (e.g. social support), and structural (e.g. racism, housing insecurity, HIV support services barriers) levels. This work should be trauma-informed to address histories of childhood abuse, operate with a harm reduction approach to support persons who currently and previously inject drugs, and challenge heteronormativity in HIV prevention and care. Intersectionality, which acknowledges the impact of multiple, co-occurring forms of marginalization—such as racism and sexual stigma—may provide a salient theoretical framework for work with sexual minority women with HIV. Research and interventions are urgently needed to ensure sexual minority women with HIV can achieve health, social and economic equity.

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Compliance with Ethical Standards

Conflict of interest All authors declare no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All participants provided written, voluntary informed consent (or oral consent with a study team member present as a witness for surveys conducted by phone or Skype) at enrolment in the survey phase of the CHIWOS study. Ethical approval for all study procedures was provided by the Research Ethics Boards of Simon Fraser University, University of British Columbia/Providence Health, Women's College Hospital and McGill University Health Centre.

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